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May 10, 2023

L-MT-23-019
Tech Spec 5.6.1

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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Monticello Nuclear Generating Plant
Docket No. 50-263
Renewed Facility Operating License No. DPR-22

2022 Annual Radiological Environmental Operating Report

Pursuant to the requirements of Monticello Nuclear Generating Plant (MNGP) Technical Specifications 5.6.1, the Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy, is submitting the following enclosures:

Enclosure 1 - 2022 Annual Radiological Environmental Operating Report

Enclosure 2 - 2021 Annual Radiological Environmental Operating Report, Supplemental Information

Summary of Commitments

This letter makes no new commitments and no revisions to existing commitments.

Shawn C. Hafen
Plant Manager, Monticello Nuclear Generating Plant
Northern States Power Company – Minnesota

Enclosures (2)

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
Resident Inspector, Monticello, USNRC
Minnesota Department of Commerce

ENCLOSURE 1

2022 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM JANUARY 1 – DECEMBER 31, 2022

151 Pages Follow

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2022 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (AREOR)

Monticello Nuclear Generating Plant

Last Updated: 4/28/2023

2022 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Monticello Nuclear Generating Plant

Prepared for:
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ACRYONYMS AND ABBREVIATIONS

AREOR	Annual Radiological Environmental Operating Report
BTP	Radiological Assessment Branch Technical Position, Rev. 1, on Radiological Monitoring
CFR	Code of Federal Regulations
D/Q	Deposition Coefficient
E	East
EDC	Environmental Dosimetry Company
ENE	East-Northeast
ESE	East-Southeast
ft	feet
ft^2	square feet
GEL	General Engineering Laboratories LLC
GPS	Global Positioning System
ISFSI	Independent Spent Fuel Storage Installation
LLD	lower limit of detection
LOD	limit of detection
MDA	minimum detectable activity
MDC	minimum detectable concentration
MDL	minimum detection limit
mi	mile
MNGP	Monticello Nuclear Generating Plant
mrem	millirem
MWe	megawatt electric
N	North
NE	Northeast
NIST	National Institute of Standards and Technology
NNE	North-Northeast
NNW	North-Northwest
NRC	Nuclear Regulatory Commission
NW	Northwest
OCA	owner-controlled area
ODCM	Offsite Dose Calculation Manual

pCi/g	picocurie per gram
pCi/L	picocurie per liter
pCi/kg	picocurie per kilogram
pCi/m^3	picocurie per cubic meter
REMP	Radiological Environmental Monitoring Program
S	South
SE	Southeast
SSE	South-Southeast
std quarter	Standard quarter, 91 days
SSW	South-Southwest
SW	Southwest
TLD	Thermoluminescent Dosimeter
USB	Universal Serial Bus
W	West
WNW	West-Northwest
WSW	West-Southwest

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Arnold, J.R., and H.A. Al-Salih. 1955. Beryllium-7 Produced by Cosmic Rays. *Science*. April 121(3144): 451-453.

Barnett, F., P. Carson, T. Linscome-Hatfield, and H. Brittingham. ProUCL 5.2. U.S. Environmental Protection Agency, Washington, DC, 2022.

Code of Federal Regulations (CFR), 10 CFR Appendix I to Part 50 – Numerical Guides for Design Objectives and Limiting Conditions for Operation To Meet the Criterion "As Low as is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents, January 2002.

Code of Federal Regulations (CFR), 40 CFR Part 141- National Primary Drinking Water Regulations, December 1975.

MNGP Chemistry Manual, Procedure I.05.41, “Annual Land Use Census and Critical Receptor Identification”.

Nuclear Regulatory Commission (NRC) Generic Letter 79-65 Radiological Environmental Monitoring Program Requirements Enclosing Branch Technical Position (BTP), Revision 1, November 1979.

NUREG 1302 Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors, April 1991.

Offsite Dose Calculation Manual (ODCM) 07.01 Monticello Nuclear Generating Plant, Revision 26.

Regulatory Guide 4.15 Quality Assurance for Radiological Monitoring Programs, Revision 1, 1979.

EXECUTIVE SUMMARY

This 2022 Annual Radiological Environmental Operating Report (AREOR) describes the Monticello Nuclear Generating Plant (MNGP) Radiological Environmental Monitoring Program (REMP) and program results for the 2022 calendar year.[1] MNGP is operated by Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (Xcel) under a license granted by the U.S. Nuclear Regulatory Commission (NRC).

Provisions of NRC's NUREG-1302, NRC Generic Letter 79-65 Branch Technical Position, MNGP Technical Specifications, and MNGP's Offsite Dose Calculation Manual (ODCM) establish the requirements of the REMP. This AREOR describes the purpose and scope of MNGP's REMP, along with the monitoring and sampling results for the reporting period.

AREOR Contents

This AREOR includes the following:

- Identification of sampling locations
- Descriptions of environmental sampling and analysis procedures
- Comparisons of present environmental radioactivity levels and historical environmental data
- Analyses of trends in environmental radiological data as potentially affected by MNGP operations
- A summary of environmental radiological sampling results
- Quality assurance practices, sampling deviations, unavailable samples, and program changes, as applicable

Plant Stack, used for dispersing treated gaseous effluents, Monticello Nuclear Generating Plant in Winter

Summary of Activities and Results

Sampling activities were conducted as prescribed by MNGP's ODCM. Required analyses were performed and detection capabilities were met for the collected samples required by the ODCM. To compile data for this AREOR, 825 samples were analyzed, yielding 1,791 test results. Based on the annual MNGP Land Use Census, the current number of sampling sites for MNGP is sufficient. Concentrations observed in the environment in 2022 for MNGP-related radionuclides were within the ranges of concentrations observed in the past. The continued operation of MNGP has not contributed measurable radiation to the environment.

[1] Some of the composite samples which correspond to Quarter 4 and December 2022 extended to January 3rd 2023.

1 INTRODUCTION

Welcome to Monticello Nuclear Generating Plant

The Radiological Environmental Monitoring Program (REMP) for the Monticello Nuclear Generating Plant (MNGP),[2] located in Monticello, Minnesota, provides data on measurable levels of radiation and radioactive materials in the area surrounding the Site[3] and evaluates the relationship between quantities of radioactive materials released from MNGP and the resultant doses to individuals from principal pathways of exposure. At any given nuclear utility in the United States, REMPs are designed to provide a check on a nuclear utility's Effluent Release Program[4] and dispersion modeling to ensure that radioactive effluent concentrations in the air, terrestrial, and aquatic environments conform to the "As Low As Reasonably Achievable" (ALARA) design objectives of Appendix I of Chapter 10 of the Code of Federal Regulations (CFR) Part 50 (CFR, 2002).

This 2022 Annual Radiological Environmental Operating Report (AREOR) has been prepared by Arcadis U.S., Inc. and presents a summary of the environmental data from exposure pathways, interpretations of that data, along with analyses and trends of the results covering the 2022 calendar year.[5]

[2] In this document, a distinction is made between "MNGP," "Site," and "Plant." "MNGP" is the name of the facility. "Site" refers to the entire areal extent of MNGP's property, including the uncontrolled and controlled areas. "Plant" refers to the controlled area. The REMP involves monitoring and sampling at various locations across the Site and offsite locations.

[3] Referred to as the Site "environs."

[4] The Effluent Release Program is separate but related to the REMP. Both are required by federal regulations.

[5] Some of the composite samples which correspond to Quarter 4 and December 2022 extended to January 3rd 2023.

Figure 1.0-1[6] below illustrates various exposure pathways[7] for receptors.[8] Routinely monitored pathways include ingestion, inhalation, and direct radiation. Exposure pathways are based on Site-specific information, such as the locations and habitats of receptors, the ages of those receptors, and the distance and relationship of those receptors with respect to release points and water usage around MNGP. A Site-specific REMP has been developed and maintained in accordance with MNGP's ODCM, NUREG-1302, and the Branch Technical Position on Radiological Environmental Monitoring.

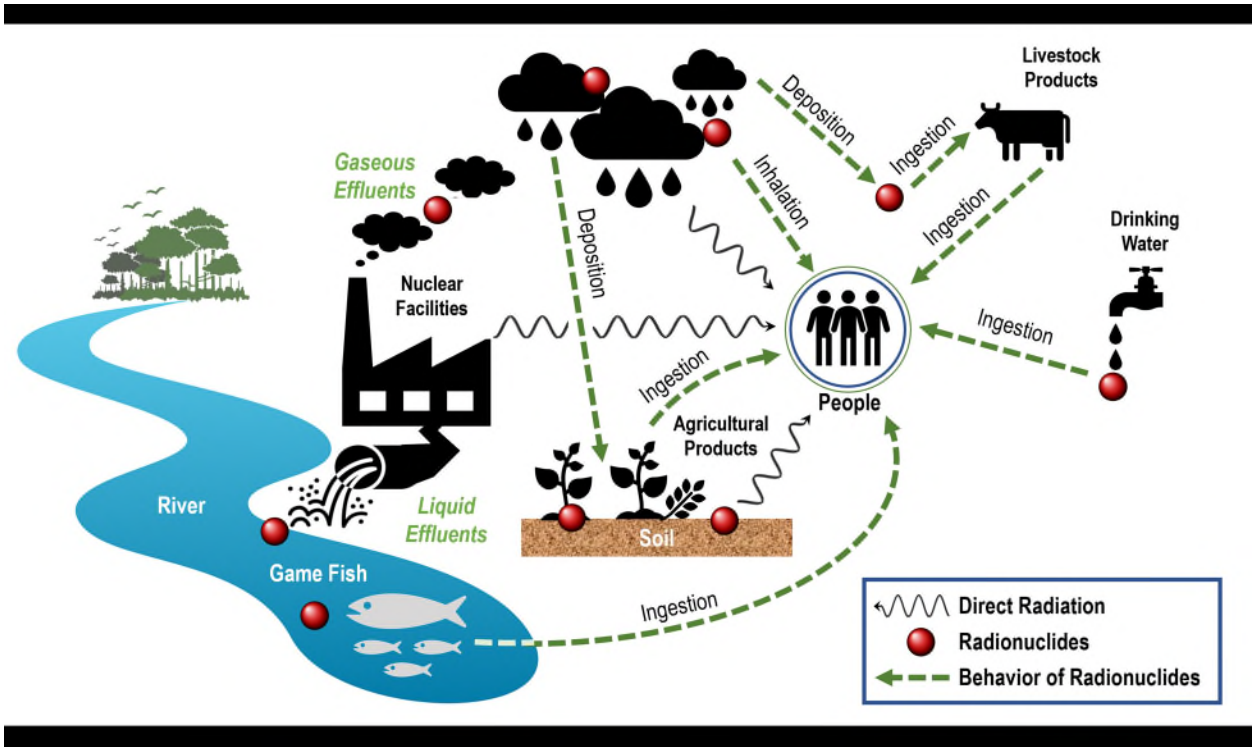

Figure 1.0-1: Monitored Potential Exposure Pathways

1.1 Site Description and Sample Locations

1.1.1 Site Description

Located in Wright County, Minnesota, MNGP is located along the Mississippi River and is approximately 40 miles northwest of the Twin Cities of Minneapolis and St. Paul. MNGP generates commercial electrical

[6] Image Credit: Jesse R. Toepfer, © 2020.

[7] An exposure pathway describes the route of the radiological exposure from a source. The primary radiological emissions from the Site are airborne discharges. The following pathways are monitored as part of MNGP's REMP: external dose, ingestion of radioactive material, and inhalation of radioactive material.

[8] Living things that can be affected by radioactive effluent releases are referred to as environmental "receptors."

power via a boiling water reactor with a nominal generating capacity of 681 megawatts electric (MWe). Commercial production was initiated on June 30, 1971.

1.1.2 Rationale for Sample Locations

The REMP was established to assess the exposure pathways to humans. Specific methods and different environmental media are required to assess each pathway. Sampling locations for the Site are chosen based upon meteorological factors, preoperational monitoring, and results of the land use surveys. A number of sample points are selected as control locations because they are distant enough to preclude any MNGP effect, and thus, unaffected by Site operations. MNGP's REMP sampling locations and the Thermoluminescent Dosimeter (TLD) monitoring locations are discussed in Section 2 of this AREOR.

1.2 Scope and Requirements of the REMP

MNGP's REMP is based on U.S. Nuclear Regulatory Commission (NRC) guidance, is conducted in accordance with MNGP's ODCM, and is furthermore guided by applicable procedures for sample media, sampling locations, sampling frequency, and analytical sensitivity requirements. Indicator and control locations were established for comparison purposes to distinguish radioactivity originating from the Plant versus that from natural or other anthropogenic[9] sources. This program provides for surveillance of appropriate critical exposure pathways to man, protects vital interests of members of the public, and is intended to satisfy compliance with state and federal environmental agencies. Section 3 lists the reporting levels and sample collection frequency for detection of radioactivity in the environment.

[9] An "anthropogenic" source refers to radioactivity from a manmade substance, as well as radioactivity from natural sources that would not otherwise normally be present in the environment either in an amount, concentration, and/or at a specified rate, without human intervention.

Blooming Trees at Monticello Nuclear Generating Plant

The Annual Land Use Census, required by MNGP's ODCM, is performed to ensure changes in the use of areas at or beyond the Site boundary are identified and that appropriate modifications to the REMP are made if necessary. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50 (CFR, 2002). Results are described in Section 5 of this document.

In addition, participation in an interlaboratory comparison program is performed in fulfillment of MNGP's ODCM operational requirements. The comparison program provides for independent checks on the precision and accuracy of measurements of radioactive material in REMP sample matrices. These checks are performed as part of the quality assurance (QA) program for environmental monitoring to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50 (CFR, 2002) and Regulatory Guide 4.15 "Quality Assurance for Radiological Environmental Monitoring Programs" (Regulatory, 1979). Appendix A of this 2022 AREOR summarizes the results obtained as part of this comparison program.

2 RADIOLOGICAL ENVIRONMENTAL SAMPLING PROGRAM REQUIREMENTS

Figures 2.2-1 through 2.2-5 depict MNGP's REMP sampling locations and the TLD monitoring locations. The location numbers shown on these maps correspond to locations listed in Tables 2.1-1 through 2.1-5. Guidance for the format and layout of these tables and figures is derived from MNGP's ODCM.

2.1 Exposure Pathway and Sample Locations

Table 2.1-1 below presents the sample frequency and collection based on Deposition Coefficients (D/Qs), analysis type, and number of samples versus their locations for airborne radioiodine and particulates.

Table 2.1-1: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis: Airborne (ODCM 07.01 Table 1)

Exposure Pathway and/or Sample	Number of Samples and Sample Locations**	Sampling and Collection Frequency	Type and Frequency of Analysis
1. Airborne Radioiodine & Particulates	Samples from five locations: three samples from offsite locations (in different sectors) of the highest calculated annual average ground level D/Q, one sample from the vicinity of a community having the highest calculated annual average ground-level D/Q, and one sample from a control location specified in Table 2.1-5.	Continuous sampler operation with sample collection weekly.	Radioiodine analysis Weekly for I-131 Particulate: Gross beta activity on each filter weekly* Analysis **SHALL** be performed more than 24 hours following filter change. Perform gamma isotopic analysis on composite (by location) sample quarterly.

Notes:

* If gross beta activity in any indication sample exceeds 10 times the yearly average of the control sample, a gamma isotopic analysis is required.

** Sample locations are further described in Table 2.1-5.

Table 2.1-2 below presents the sample frequency and collection, analysis type, and number of samples versus their locations for direct radiation.

Table 2.1-2: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis: Direct Radiation (ODCM 07.01 Table 1)

Exposure Pathway and/or Sample	Number of Samples and Sample Locations**	Sampling and Collection Frequency	Type and Frequency of Analysis
2. Direct Radiation	40 TLD stations established with duplicate dosimeters placed at the following locations:**** 1. Using the 16 meteorological sectors as guidelines, an inner ring of stations in the general area of the site boundary is established and an outer ring of stations at a distance of 4 to 5 miles distance from the plant site is established. Because of inaccessibility, two sectors in the inner ring are not covered. 2. Ten dosimeters are established at special interest areas and four control stations. 3. Three neutron and gamma dosimeter sets are located along the OCA fence. Additionally, three neutron dosimeters are stationed with special interest and inner ring TLDs and four neutron control dosimeters are stationed with the REMP control TLDs.	Quarterly	Gamma/Neutron Dose quarterly

Notes:
** Sample locations are further described in Table 2.1-5.
**** Three control TLD locations have only one dosimeter.

Table 2.1-3 below presents the sample frequency and collection, analysis type, and number of samples versus their locations for waterborne pathways.

Table 2.1-3: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis: Waterborne (ODCM 07.01 Table 1)

Exposure Pathway and/or Sample	Number of Samples and Sample Locations**	Sampling and Collection Frequency	Type and Frequency of Analysis
3. Waterborne			
a. Surface Water	Upstream and downstream locations	Monthly composite of weekly samples (water and ice conditions permitting)	Gamma Isotopic analysis of each monthly composite Tritium analysis of quarterly composites of monthly composites
b. Groundwater	Three samples from wells within 5 miles of the MNGP and one sample from a well greater than 10 miles from the MNGP	Quarterly	Gamma Isotopic and tritium analyses of each sample
c. Drinking Water	One sample from the City of Minneapolis water supply	Composite of 2 weekly samples when I-131 analysis is performed; monthly composite of weekly samples otherwise	I-131 analysis on each bi-weekly composite when the dose calculated for the consumption of the water is greater than 1 millirem (mrem) per year[#] Composite for gross beta and gamma isotopic analyses monthly Composite for tritium analysis quarterly
d. Sediment from Shoreline	One sample upstream of the MNGP, one sample downstream of the MNGP, and one sample from the shoreline of the recreational area	Semiannually	Gamma isotopic analysis of each sample

Notes:

** Sample locations are further described in Table 2.1-5.

[#] The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM.

Table 2.1-4 below presents the sample frequency and collection, analysis type, and number of samples versus their locations for ingestion pathways.

Table 2.1-4: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis: Ingestion (ODCM 07.01 Table 1)

Exposure Pathway and/or Sample	Number of Samples and Sample Locations**	Sampling and Collection Frequency	Type and Frequency of Analysis
4. Ingestion			
a. Milk	Samples from milking animals in three locations within 3 miles from the MNGP having the highest dose potential; if there are none, then one sample from milking animals in each of three areas between 3 to 5 miles from the MNGP where doses are calculated to be greater than 1 mrem per year[#] One sample from milking animals at a control location, 10 to 20 miles from the MNGP and in the least prevalent wind direction	Biweekly when animals are on pasture; monthly at other times	Gamma Isotopic and Iodine-131 analysis of each sample
b. Vegetation	Samples of vegetation grown closest to each of the two offsite locations of highest predicted annual average D/Q if milk sampling is not performed, and one sample from 10 to 20 miles in the least prevalent wind direction	Monthly during growing season	Gamma Isotopic and Iodine-131 analysis of each sample
c. Fish	One sample of one game species of fish located upstream and downstream of the MNGP	Samples collected semi-annually	Gamma isotopic analysis on each sample (edible portion only on fish)
d. Food Products	One sample of corn and potatoes from any area that is irrigated by water in which liquid radioactive effluent has been discharged***	At time of harvest	Gamma isotopic analysis of edible portion of each sample

Notes:

** Sample locations are further described in Table 2.1-5.

*** As determined by methods outlined in Section 2.3 of the ODCM 07.01.

[#] The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM.

Table 2.1-5 below presents the location, code designation, and referenced collection site for a given sample type.

Table 2.1-5: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis (ODCM 07.01 Table 4)

Type of Sample	Code	Collection Site	Location		
			Distance Miles	Compass Heading	Sector
River water	M-8c	Upstream of Plant	within 1,000 ft upstream of Plant intake		
River water	M-9	Downstream of Plant	within 1,000 ft downstream of Plant discharge		
Drinking water	M-14	City of Minneapolis	37.0	132	SE
Groundwater	M-43c	Imholte Farm	12.3	313	NW
Groundwater	M-11	City of Monticello	3.3	127	SE
Groundwater	M-12	Plant Well No. 11	0.26	252	WSW
Groundwater	M-55	Hasbrouck Residence	1.60	255	WSW
Sediment-River	M-8c	Upstream of Plant	within 1,000 ft upstream of Plant intake		
Sediment-River	M-9	Downstream of Plant	within 1,000 ft downstream of Plant discharge		
Sediment-Shoreline	M-15	Montissippi Park	1.27	114	ESE
Fish	M-8c	Upstream of Plant	within 1,000 ft upstream of Plant intake		
Fish	M-9	Downstream of Plant	within 1,000 ft downstream of Plant discharge		
Vegetation*	M-41	Training Center	Near 0.8	151	SSE
Vegetation*	M-42**	Biology Station Road	Near 0.7	136	SE
	M-42A**		Near 0.7	108	ESE
Vegetation*	M-43c	Imholte Farm	Near 12.3	313	NW
Cultivated Crops					
(corn)***	-	-			
(potatoes)***	-	-			

Notes:

* Actual location for vegetation sampling may vary depending on availability of broad leaf plant species. The nearest available broad leaf specimens to the location should be used.

** M-42 is the preferred sampling location; however, M-42A may be used in place of M-42, if samples are not available at the preferred location.

*** Collected only if Plant discharges radioactive effluent into the river, then only from river irrigated fields, as determined by Section 2.1 of the ODCM 07.01.

Code letters are defined below:

c = Locations of control samples (used for control air sampler and water control sample)

Table 2.1-5: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis (ODCM 07.01 Table 4) (Continued)

Type of Sample	Code	Collection Site	Location		
			Distance Miles	Compass Heading	Sector
Particulates and Radioiodine					
(air)	M-1c	Air Station M-1	11.0	307	NW
(air)	M-2	Air Station M-2	0.8	140	SE
(air)	M-3	Air Station M-3	0.6	104	ESE
(air)	M-4	Air Station M-4	0.8	147	SSE
(air)	M-5	Air Station M-5	2.6	134	SE
Direct Radiation Inner Ring - (general area of the site boundary)					
(TLD)	M01A	Sherburne Ave. So.	0.75	353	N
(TLD)	M02A	Sherburne Ave. So.	0.79	23	NNE
(TLD)	M03A	Sherburne Ave. So.	1.29	56	NE
(TLD)	M04A	Biology Station Rd.	0.5	92	E
(TLD)	M05A	Biology Station Rd.	0.48	122	ESE
(TLD)	M06A	Biology Station Rd.	0.54	138	SE
(TLD)	M07A	Parking Lot H	0.43	157	SSE
(TLD)	M08A	Parking Lot F	0.45	175	S
(TLD)	M09A	County Road 75	0.38	206	SSW
(TLD)	M10A & ISFSI-15 (neutron)	County Road 75	0.38	224	SW
(TLD)	M11A	County Road 75	0.4	237	WSW
(TLD)	M12A & ISFSI-14 (neutron)	County Road 75	0.5	262	W
(TLD)	M13A	North Boundary Rd.	0.89	322	NW
(TLD)	M14A	North Boundary Rd.	0.78	335	NNW

Notes:

Code letters are defined below:

A = Locations in the general area of the site boundary

C = Locations of control samples (used for control air sampler and water control sample)

Table 2.1-5: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis (ODCM 07.01 Table 4) (Continued)

Type of Sample	Code	Collection Site	Location		
			Distance Miles	Compass Heading	Sector
Direct Radiation Outer Ring - (about 4 to 5 miles distant from the Plant)					
(TLD)	M01B	117th Street	4.65	1	N
(TLD)	M02B	County Road 11	4.4	18	NNE
(TLD)	M03B	County Rd. 73 & 81	4.3	51	NE
(TLD)	M04B	County Rd. 73 (196th Street)	4.2	67	ENE
(TLD)	M05B	City of Big Lake	4.3	89	E
(TLD)	M06B	County Rd 14 & 196th Street	4.3	117	ESE
(TLD)	M07B	Monticello Industrial Dr.	4.3	136	SE
(TLD)	M08B	Residence Hwy 25 & Davidson Ave	4.6	162	SSE
(TLD)	M09B	Weinand Farm	4.7	178	S
(TLD)	M10B	Reisewitz Farm - Acacia Ave	4.2	204	SSW
(TLD)	M11B	Vanlith Farm - 97th Ave	4.0	228	SW
(TLD)	M12B	Lake Maria St. Park	4.2	254	WSW
(TLD)	M13B	Bridgewater Sta.	4.1	270	W
(TLD)	M14B	Anderson Res. - Cty Rd 111	4.3	289	WNW
(TLD)	M15B	Red Oak Wild Bird Farm	4.3	309	NW
(TLD)	M16B	University Ave and Hancock St, Becker	4.4	341	NNW

Notes:

Code letters are defined below:

B = Locations about 4 to 5 miles distant from MNGP

Table 2.1-5: Monticello Nuclear Generating Plant Radiological Environmental Monitoring Program Sample Collection and Analysis (ODCM 07.01 Table 4) (Continued)

Type of Sample	Code	Collection Site	Location		
			Distance Miles	Compass Heading	Sector
Direct Radiation - (special interest locations)					
(TLD)	M01S	127th Street NE	0.66	241	WSW
(TLD)	M02S & ISFSI-16 (neutron)	Krone Residence	0.5	220	SW
(TLD)	M03S	Big Oaks Park	1.53	103	ESE
(TLD)	M04S	Pinewood School	2.3	131	SE
(TLD)	M05S	20500 Co. Rd 11, Big Lake	3.0	118	ESE
(TLD)	M06S	Monticello Public Works	2.6	134	SE
(TLD)	I-11 & ISFSI-11 (neutron)	OCA Fence South, on exit road	0.31	222	SW
(TLD)	I-12 & ISFSI-12 (neutron)	OCA Fence Middle, on exit road	0.32	230	SW
(TLD)	I-13 & ISFSI-13 (neutron)	OCA Fence North, on exit road	0.34	240	WSW
Direct Radiation Controls - (10 to 12 miles distant from Plant)					
(TLD)	M01C & Neutron Control D	Kirchenbauer Farm	11.5	323	NW
(TLD)	M02C & Neutron Control C	Cty Rd 4 & 15	11.2	47	NE
(TLD)	M03C & Neutron Control A	Cty Rd 19 & Jason Ave	11.6	130	SE
(TLD)	M04C & Neutron Control B	Maple Lake Water Tower	10.3	226	SW

Notes:

Code letters are defined below:

C = Locations of control samples (used for control air sampler and water control sample)

S = Special interest locations

2.2 Maps of Sample Locations

Figure 2.2-1 below illustrates the sampling locations associated with surface water, well water, air, and vegetation.

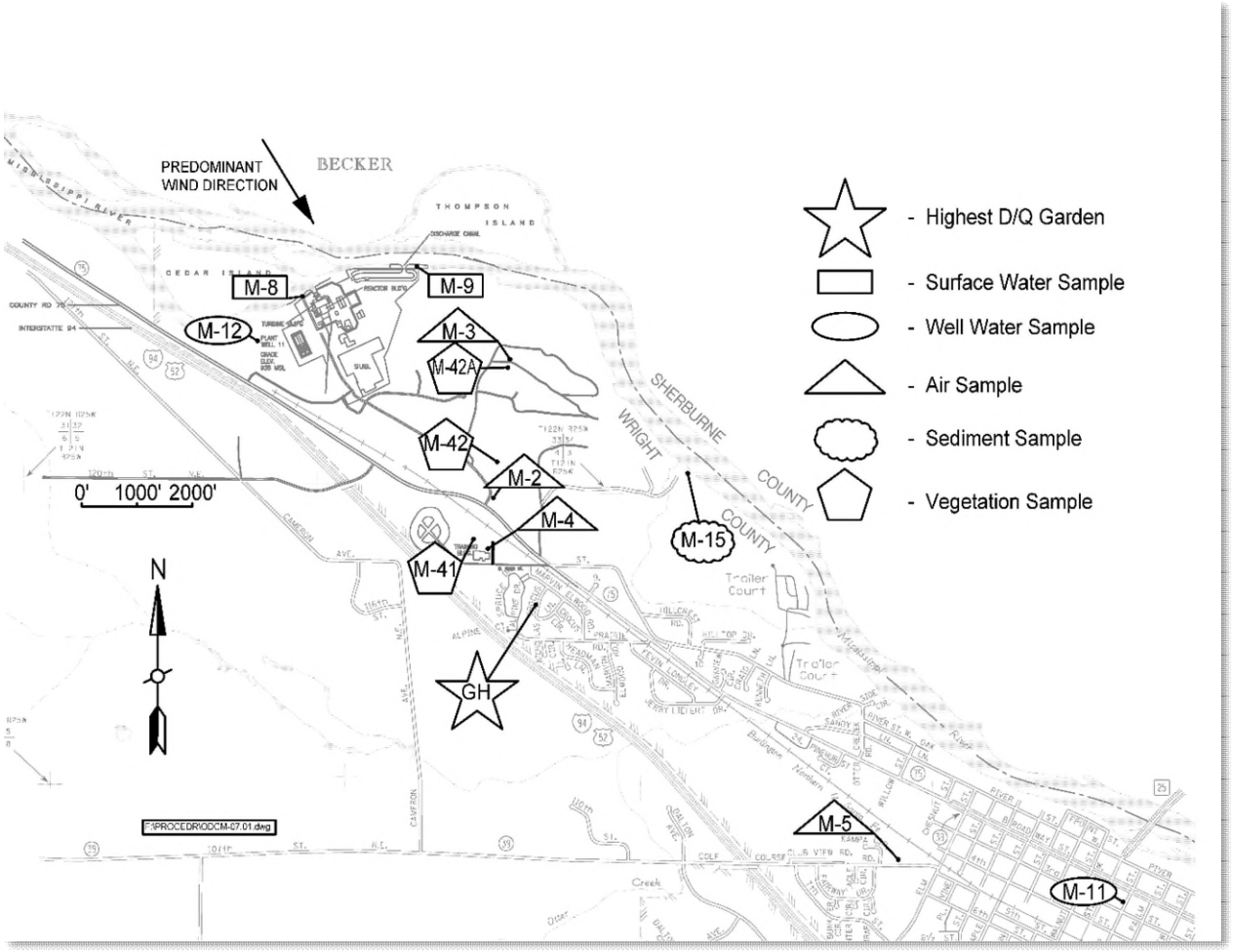

Figure 2.2-1: Radiation Environmental Monitoring Program (ODCM 07.01 Figure 1)

Figure 2.2-2 below illustrates the locations of the 4- to 5-mile ring and special interest TLD monitoring stations.

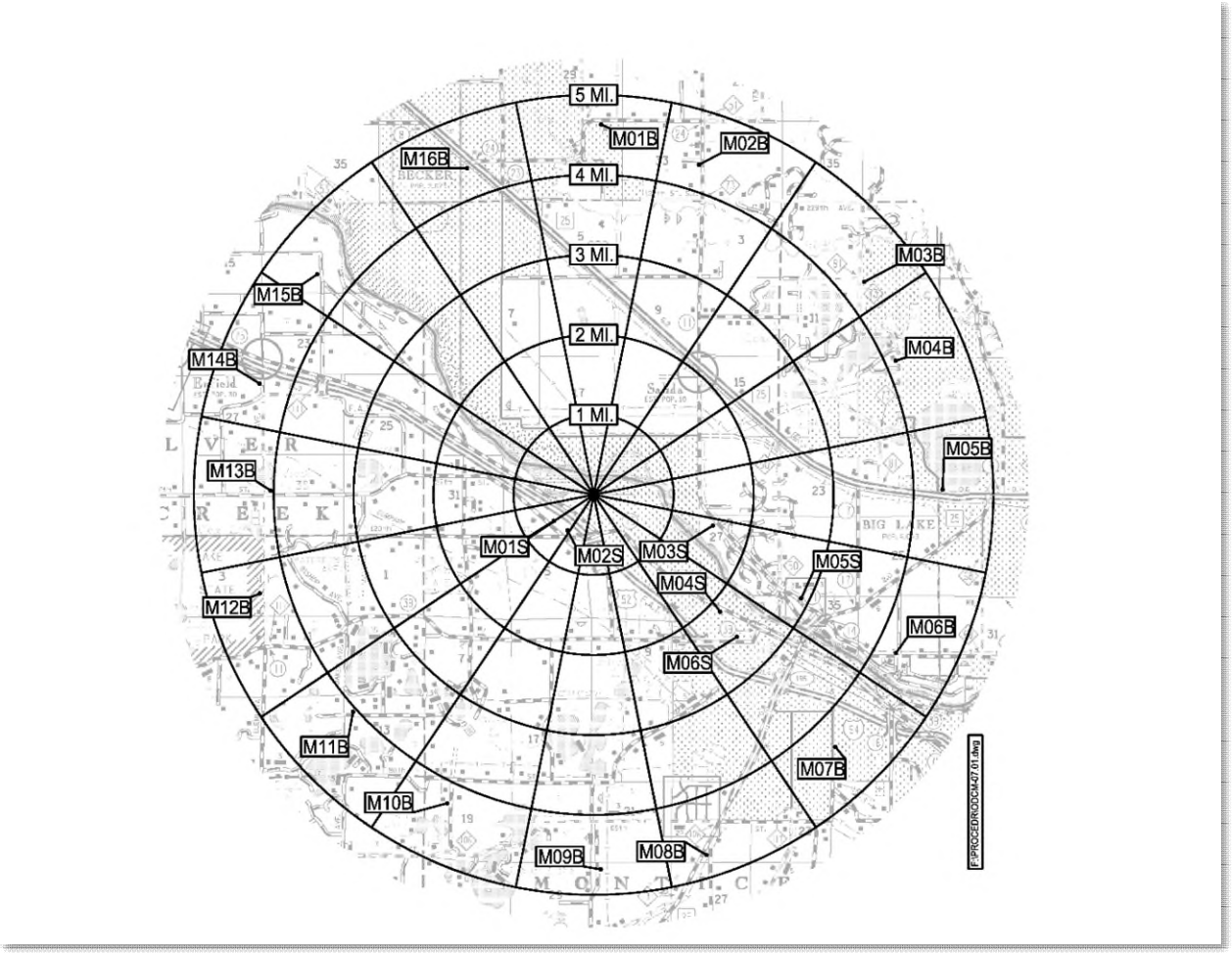

Figure 2.2-2: 4 - 5 Mile Ring and Special Interest TLD Locations (ODCM 07.01 Figure 2)

Figure 2.2-3 below illustrates the locations of site boundary TLD monitoring stations.

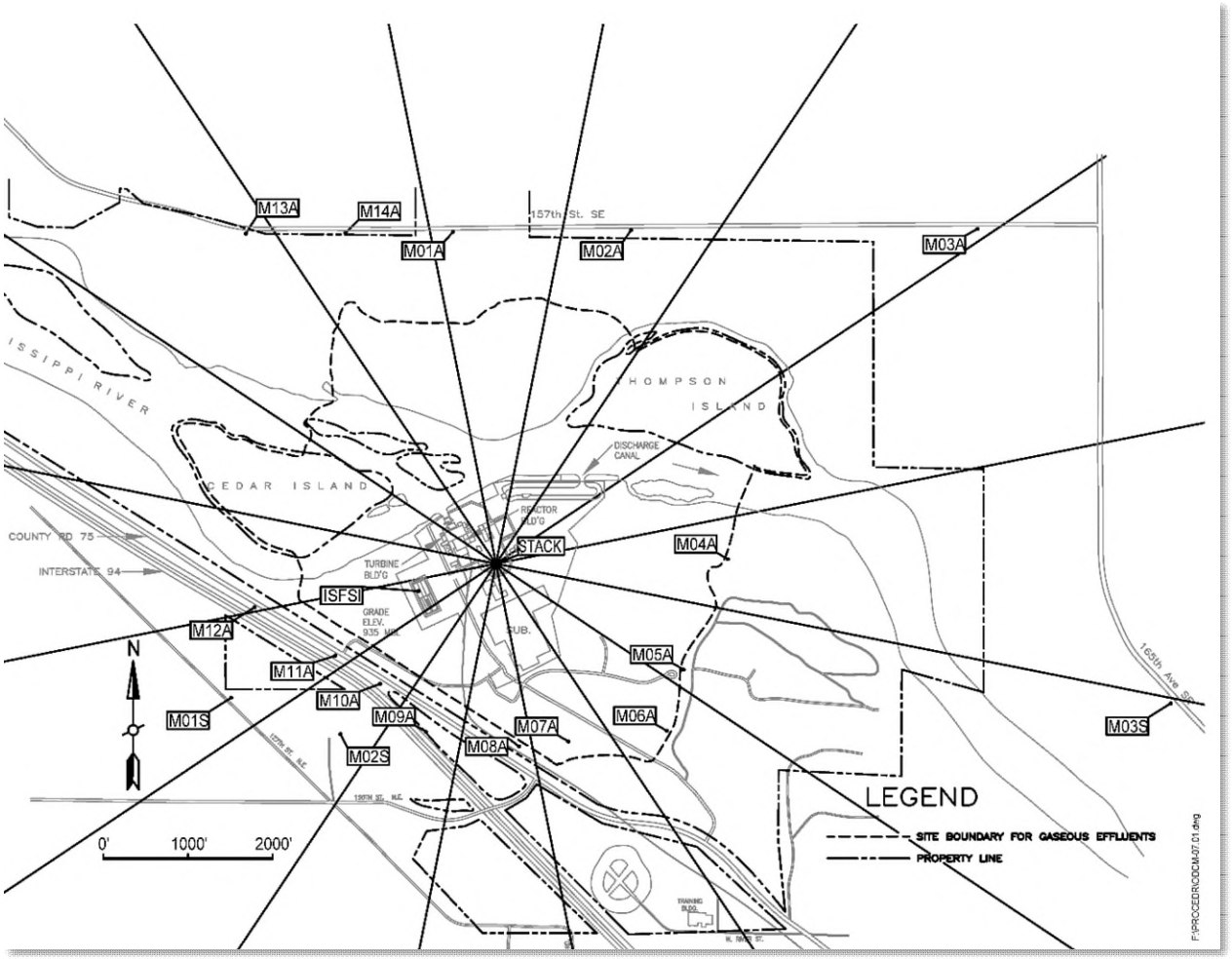

Figure 2.2-3: Site Boundary TLD Locations (ODCM 07.01 Figure 3)

Figure 2.2-4 below illustrates the control sample locations.

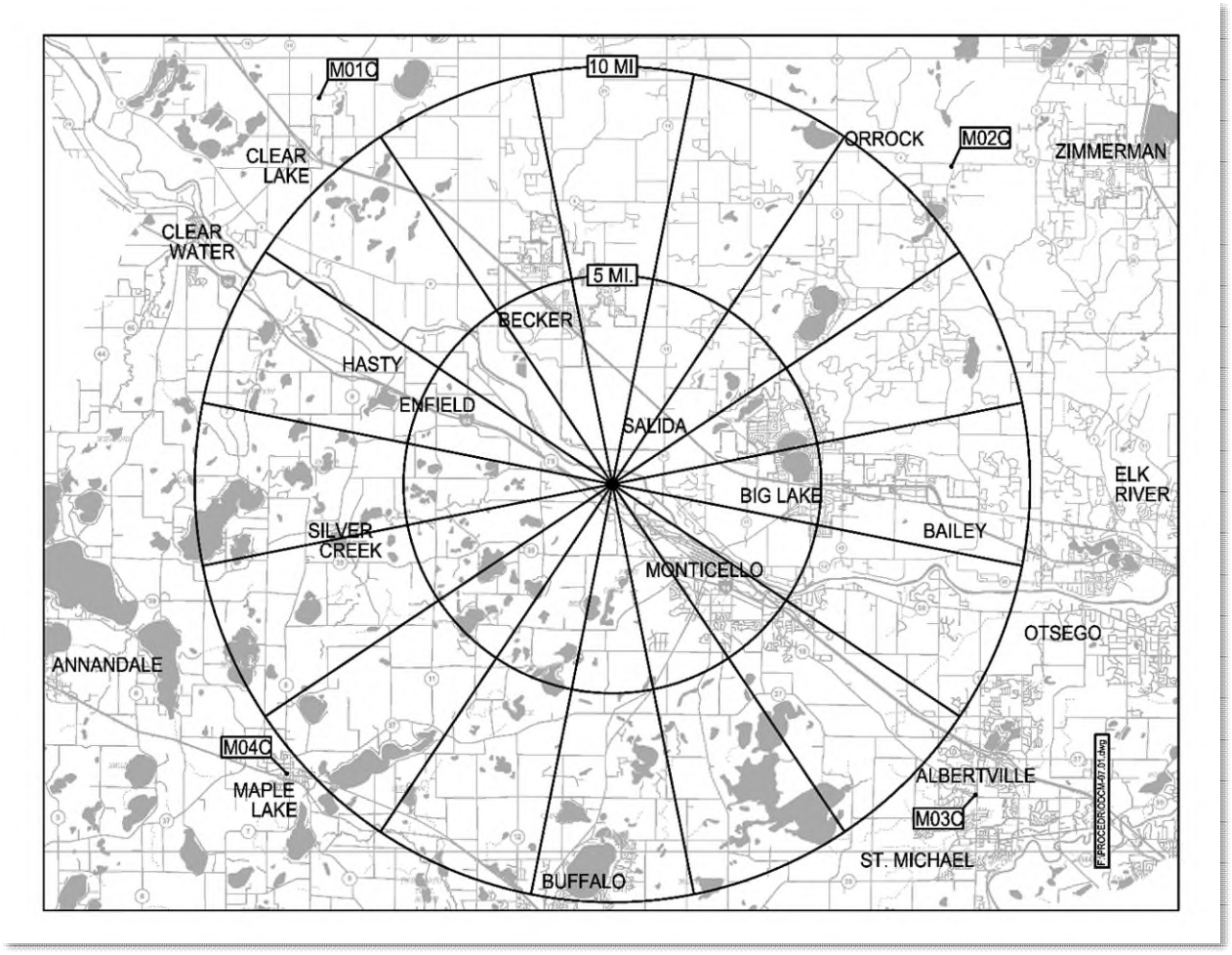

Figure 2.2-4: Control Locations (ODCM 07.01 Figure 4)

Figure 2.2-5 illustrates the ISFSI TLD locations.

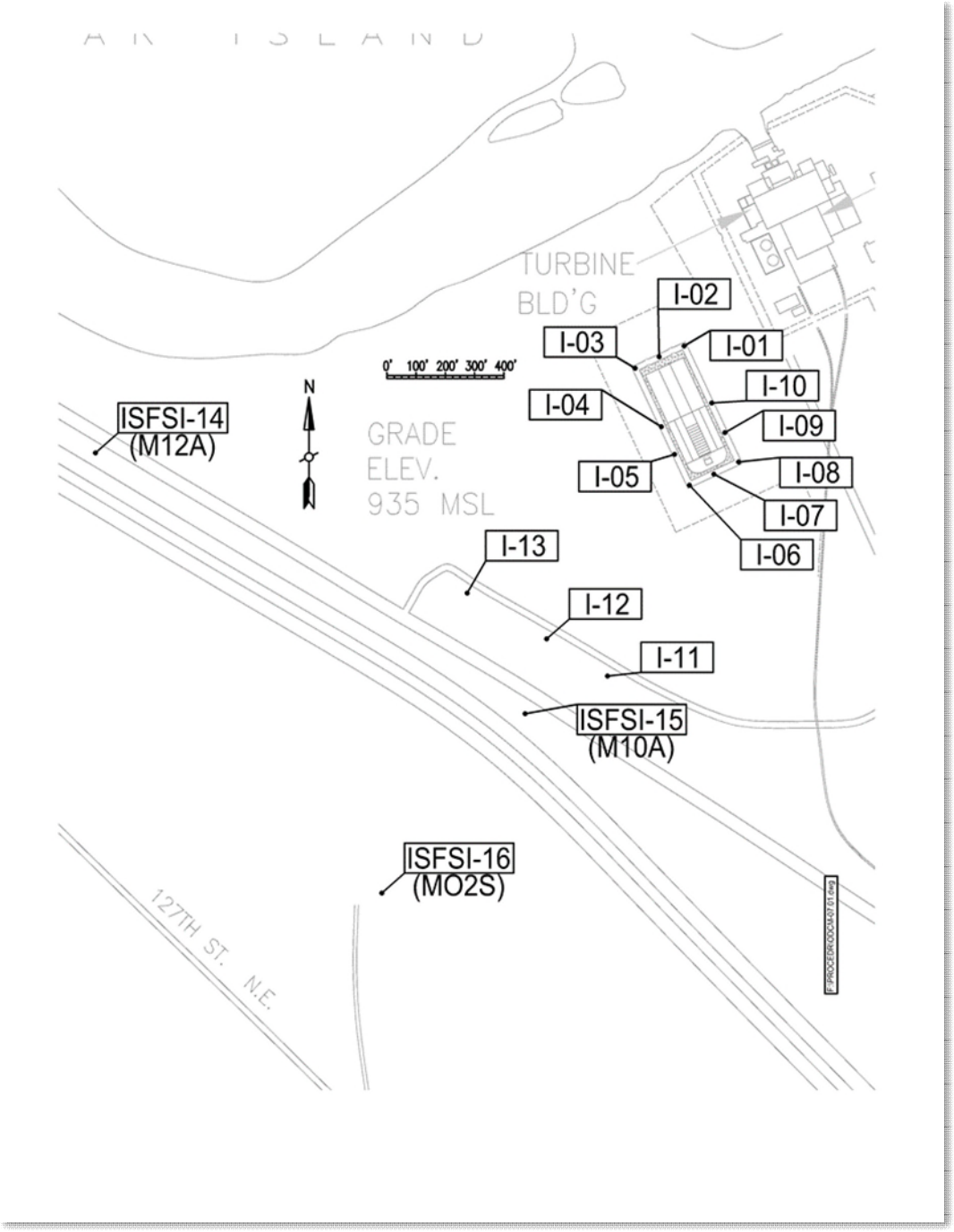

Figure 2.2-5: ISFSI TLD Locations (ODCM 07.01 Figure 5)

3 STATISTICAL AND CALCULATIONAL METHODOLOGY

3.1 Trend Identification

The REMP is not only intended to determine levels of radionuclides in the environment associated with MNGP's operations, but to evaluate trends in those levels over a period of time. If the data indicate a trend in the concentration of a radionuclide in an environmental medium, it could indicate that reactor operations are causing that particular radionuclide to fluctuate in the environment. Understanding effluent releases from MNGP is necessary to identify and interpret trends (or lack of trends) based on environmental data. Factors that may affect environmental levels of radionuclides include prevailing weather conditions (*e.g.*, periods of drought, solar cycles, and extreme precipitation events) and construction activities in close proximity to MNGP of a given sampling location.[10] Some of these factors may be obvious, such as, the increase of airborne particulate beryllium-7 concentration due to atmospheric mixing or increase of surface water tritium due to atmospheric deposition from heavy precipitation events, while others are sometimes unknown.

In some cases, a Mann-Kendall trend test was used to determine whether a statistically significant trend is apparent in a dataset. Mann-Kendall tests were conducted at a 95 percent confidence level using ProUCL Version 5.2 (Barnett et al., 2022).

3.2 Estimation of the Mean Value

A widely used statistical calculation was performed on the raw data collected under the sample analysis program. The calculation involved determining the mean value for the indicator and control samples for each sample medium. The mean value was used in the reduction of the data generated by the sampling and analysis of the various media in the REMP. "Net activity (or concentration)" is the activity (or concentration) determined to be present in the sample. No "minimum detectable activity (or concentration)," "lower limit of detection," "less than level," or negative activities or concentrations are included in the calculation of the mean. Equation 1 below was used to calculate the estimated mean. The estimated mean is equal to the sum of all the individual sample values, beginning with the first sample, divided by the total number of samples.

$$\overline{x} = \frac{\sum_{i=1}^{N} x_i}{N}$$

(Equation 1)

Where:

$\overline{x}$ = estimate of the mean
i = individual sample
N = total number of samples with a net activity (or concentration)
x_i = net activity (or concentration) for sample i

[10] Additionally, from time to time, the trends may be affected by statistical additions or exclusions of known sources of radioactive material. For instance, there is a measurable amount of radioactivity attributable to the 1986 Chernobyl accident and the 2011 Japan earthquake and tsunami, which triggered the Fukushima Dai-ichi Nuclear Power Plant incident. It is important to note whether these factors are being accounted for, as they affect radiological environmental measurements, even though they are not attributable to MNGP.

When mean values are proceeded by a "±" value in the text, the ± value represents the standard deviation of the individual values used to estimate the mean.

3.3 Lower Limit of Detection and Minimum Detectable Concentration

The lower limit of detection (LLD) and minimum detectable concentration (MDC) are used throughout the REMP and are defined as follows.

- LLD is defined in the ODCM as the smallest concentration of radioactive material in a sample that will yield a net count above the system background that will be detected with 95 percent probability; *i.e.*, only a 5 percent probability of falsely concluding that a blank observation represents a “real” signal. The LLD is an *a priori* (*i.e.,* before the fact) measurement. The actual LLD is dependent upon the standard deviation of the background-counting rate, the counting efficiency, the sample size (mass or volume), the radiochemical yield, and the radioactive decay of the sample between sample collection and counting. The required LLDs for each sample medium and selected radionuclides are provided in the ODCM and listed in Table 3.4-2.
- MDC is the net counting rate (sample after subtraction of background) that must be surpassed before a sample is considered to contain a scientifically measurable amount of a radioactive material exceeding background amounts. The MDC is calculated using a sample background and may be thought of as an "actual" LLD for a particular sample measurement.

Certain gross counting measurements display a calculated negative value, indicating background is greater than sample activity. In these instances, it does not mean that radioactivity is removed from the environment. Instead, the measurement errors associated with the radiochemical analysis have fluctuated causing the background count rate to be greater than the sample count rate.

3.4 Reporting Levels and Lower Limits of Detection for Radioactivity

Reporting levels and LLDs for activity found in environmental samples are listed in Table 3.4-1 and Table 3.4-2. Required REMP sample analyses and their frequencies are listed in Table 3.4-3.

Table 3.4-1: Reporting Levels for Radioactivity Concentrations in Environmental Samples (ODCM 07.01 Table 2)

Analysis	Water (pCi/L)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/L)	Vegetables (pCi/kg, wet)
Tritium (H-3)	20,000[a]				
Manganese-54 (Mn-54)	1,000		30,000		
Iron-59 (Fe-59)	400		10,000		
Cobalt-58 (Co-58)	1,000		30,000		
Cobalt-60 (Co-60)	300		10,000		
Zinc-65 (Zn-65)	300		20,000		
Zirconium-95 and Niobium-95 (Zr-Nb-95)	400[b]				
Iodine-131 (I-131)	2[c]	0.9		3	100
Cesium-134 (Cs-134)	30	10	1,000	60	1,000
Cesium-137 (Cs-137)	50	20	2,000	70	2,000
Barium-140 and Lanthanum-140 (Ba-La-140)	200[b]			300[b]	

Notes:

[a] For drinking water samples. This is a 40 CFR Part 141 (CFR, 1975) value. If no drinking water pathway exists, a value of 30,000 pCi/L may be used.

[b] Total for parent and daughter product.

[c] If no drinking water pathways exist, a value of 20 pCi/L may be used.

Table 3.4-2: Maximum Values for the Lower Limits of Detection (LLD) (ODCM 07.01 Table 3)

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/L)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
Gross beta	4	0.01				
Tritium (H-3)	2000[a]					
Manganese-54 (Mn-54)	15		130			
Iron-59 (Fe-59)	30		260			
Cobalt-58 and Cobalt-60 (Co-58, 60)	15		130			
Zinc-65 (Zn-65)	30		260			
Zirconium-95 and Niobium-95 (Zr-Nb-95)	15[b]					
Iodine-131 (I-131)	1[c]	0.07		1	60	
Cesium-134 (Cs-134)	15	0.05	130	15	60	150
Cesium-137 (Cs-137)	18	0.06	150	18	80	180
Barium-140 and Lanthanum-140 (Ba-La-140)	15[b]			15[b]		

Notes:

[a] If no drinking water pathway exists, a value of 3000 pCi/L may be used.

[b] The specified LLD applies to the daughter nuclide of an equilibrium mixture of the parent and daughter nuclides. Per the Radiological Assessment Branch Technical Position (BTP), the following values may be used for individual nuclide LLDs when equilibrium conditions are not met: 30 pCi/L for zirconium-95, 15 pCi/L for niobium-95, 60 pCi/L for barium-140, and 15 pCi/L for lanthanum-140.

[c] If no drinking water pathway exists, a value of 15 pCi/L may be used.

Table 3.4-3: Analysis and Frequency of Samples

Pathway	Sample Location	Type	I-131	Gross Beta	Gamma Isotopic	Tritium	Gamma Dose
Airborne Particulate and Radioiodine	M-1 Air Station M-1	Control	W	W	Q[1]		
	M-2 Air Station M-2		W	W	Q[1]		
	M-3 Air Station M-3		W	W	Q[1]		
	M-4 Air Station M-4		W	W	Q[1]		
	M-5 Air Station M-5		W	W	Q[1]		
Direct Radiation	M01C to M04C	Control					Q
	M01A to M14A						Q
	M01B to M16B						Q
	M01S to M06S						Q
	I-11 to 1-13						Q
Waterborne: River Water	M-8c Upstream of MNGP	Control			M[1]	Q[1]	
	M-9 Downstream of MNGP				M[1]	Q[1]	
Waterborne: Groundwater	M-43c Imholte Farm	Control			Q	Q	
	M-11 City of Monticello				Q	Q	
	M-12 Plant Well No. 11				Q	Q	
	M-55 Hasbrouck Residence				Q	Q	
Waterborne: Drinking Water	M-14 City of Minneapolis		BW[1,2]	M[1]	M[1]	Q[1]	
Waterborne: Sediment	M-8c Upstream of Plant	Control			SA		
	M-9 Downstream of Plant				SA		
	M-15 Montissippi Park				SA		
Ingestion: Milk	-		M/BW[3,4]		M/BW[3,4]		
Ingestion: Vegetation	M-43c Imholte Farm	Control	M[5]		M[5]		
	M-41 Training Center		M[5]		M[5]		
	M-42 Biology Station Road		M[5]		M[5]		
Ingestion: Fish	M-8c Upstream of Plant	Control			SA		
	M-9 Downstream of Plant				SA		
Ingestion: Food Products	-				A[3]		

Notes:

[1] Composite of weekly samples.

[2] Iodine-131 analysis included on each bi-weekly composite when the dose from the consumption of the water is greater than 1 mrem/year. (ODCM Revision 26)

[3] This pathway is currently unavailable at MNGP.

[4] Every two weeks when animals are on pasture; monthly at other times.

[5] During growing season when milk samples are unavailable.

W = weekly BW = every two weeks M = monthly Q = quarterly SA = semi-annually A = annually

4 INTERPRETATION OF RESULTS

4.1 Airborne Radioiodine and Particulates

The average annual gross beta[11] concentrations in airborne particulates were similar at the indicator (0.044 ± 0.018 picocuries per cubic meter (pCi/m^3) for 2022) and control locations (0.043 ± 0.018 pCi/m^3 for 2022). Mann-Kendall tests were conducted on the air particulate data for control and indicator locations. The data from 2009 to 2022 show a statistically significant increasing trend at a 95 percent confidence level; however, because this trend is observed with the control and indicator samples, the trend is not due to plant impact. The results are graphed below in Figure 4.1-1.

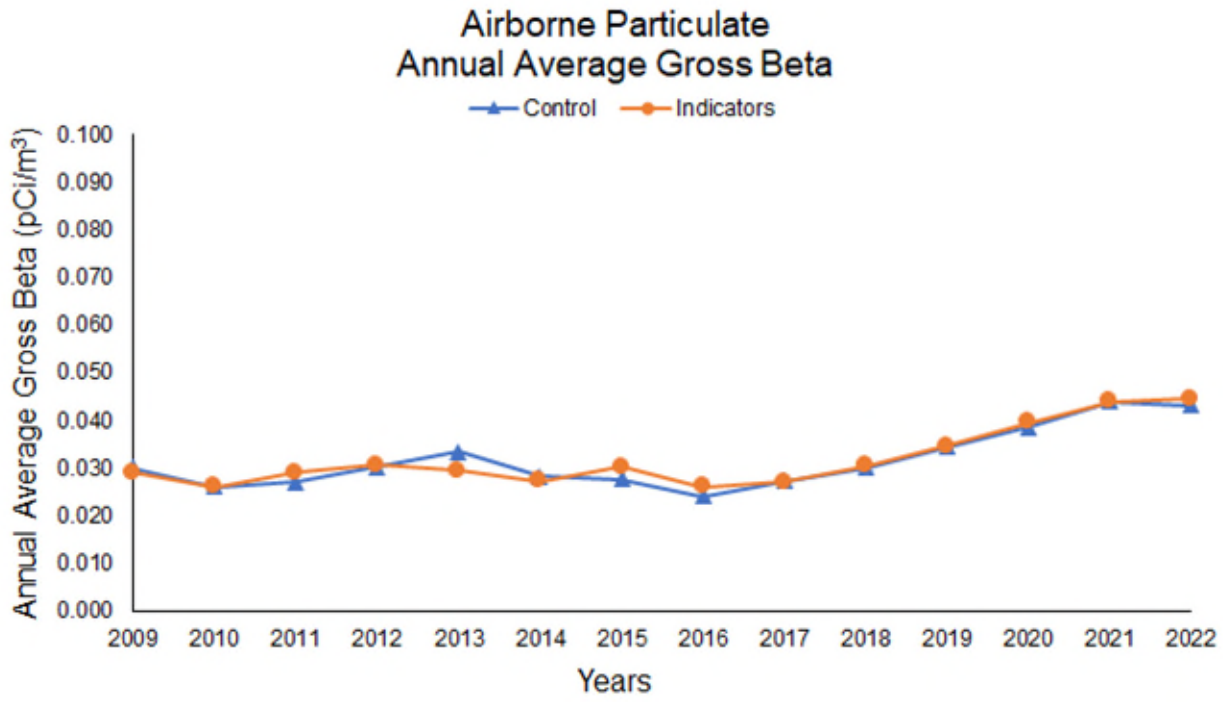

Figure 4.1-1: Graph of Historical Airborne Particulate Gross Beta

[11] Gross beta is a measurement of all beta activity present, regardless of specific radionuclide source. Beta particles are physically identical to electrons, but are differentiated by their source (beta particles are created in the nucleus during certain types of nuclear transformations, whereas electrons come from the electron cloud surrounding the nucleus). Beta particles can have various states of energy.

Figure 4.1-2 shows the average indicator gross beta from the four indicator locations (Air Station locations M-2, M-3, M-4, M-5) versus the control location (Air Station M-1) in 2022. The error bar represents the statistical uncertainty, as 1.96 sigma (σ) (95% confidence), associated with each measurement for a given sample collection date. Despite the variability of gross beta activity in airborne particulates, the average results from the indicator locations were similar to the results from the control location.

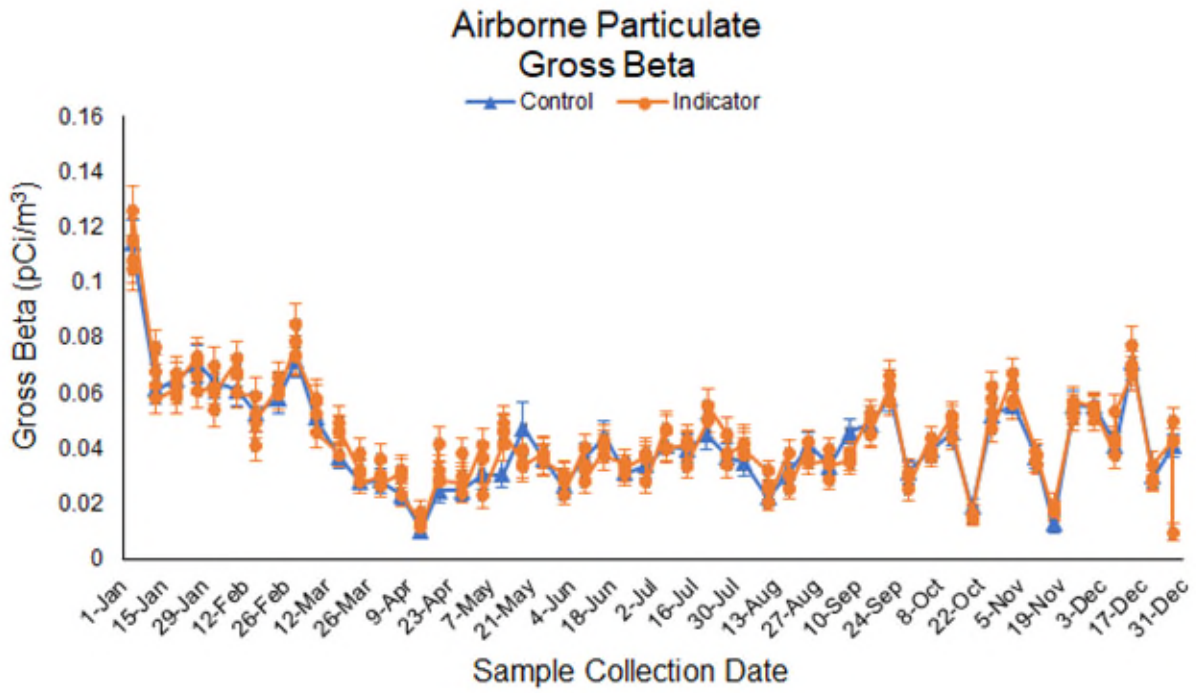

Figure 4.1-2: Graph of 2022 Average Airborne Particulate Gross Beta for Indicator and Control Locations

Mixing of the upper and lower atmospheres can transport suspended particles and beryllium-7[12] from the upper atmosphere to the lower atmosphere, which can increase the airborne particulate gross beta in the lower atmosphere. Gamma spectroscopic analysis of quarterly composites of air particulate filters yielded similar results for indicator and control locations. Beryllium-7 was detected in all samples, with an average activity of 0.081 ± 0.025 pCi/m^3 for the control locations, and 0.082 ± 0.026 pCi/m^3 for the indicator locations. All other gamma-emitting isotopes were below their respective LLD limits.

The weekly levels of airborne radioiodine-131 were below the LLD for the airborne radioiodine cartridge samples analyzed. There was no indication of an emission of radioiodine from MNGP.

[12] Beryllium-7 can be created in the upper atmosphere by cosmic radiation and solar flares (Arnold & Al-Salih, 1955).

4.2 Drinking Water

Tritium activity, gamma isotopic, and gross beta results were measured below the detection limit for all samples. Gross beta averages are shown on Figure 4.2-1. There was no indication of an effect from MNGP. Because each measurement was below its respective LLD value, the annual dose for drinking water was assumed to be less than 1 mrem/year, and therefore iodine-131 analyses were not conducted in 2022 per ODCM Revision 26 (ODCM 07.01).

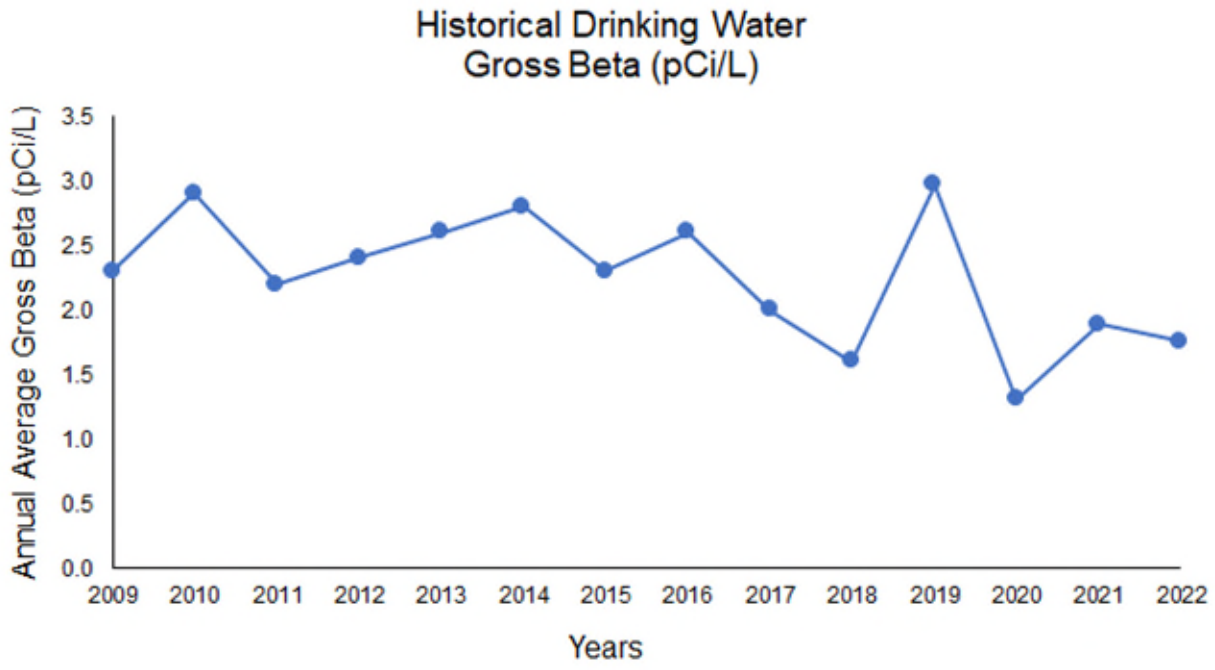

Figure 4.2-1: Graph of Historical Gross Beta for Drinking Water Sample

4.3 River Water

River water was analyzed from samples both upstream and downstream of MNGP. Tritium activity was measured below the detection limit for all samples. The gamma isotopic results were all below detection limits.

4.4 Groundwater

Tritium and gamma isotopic results were below the detection limit for all samples taken. The data for 2022 were consistent with the previous years' results and no MNGP operational effects were indicated.

4.5 Broadleaf Vegetation

Vegetation samples were collected during the growing season of June, July, August, and September 2022. Gamma isotopic and iodine-131 concentrations were measured below the detection limit in all samples. These samples are required when milk samples are not available.

4.6 Food Products

Corn and potato samples were not required for 2022. There were no crops within five miles (mi) of MNGP irrigated using water from the Mississippi River, and MNGP did not discharge radioactive liquid effluents.

4.7 Fish

Fish were analyzed in 2022, including two fish species collected from upstream locations and two collected from downstream locations in June and September. Two species of fish, shorthead redhorse and smallmouth bass, were collected from each location. Gamma spectroscopy was performed on the edible portion of the fish. Only potassium-40, which is a common radioisotope found in nature and would not be associated with MNGP activities, was found with an average of 3.10 ± 0.42 picocuries per gram (pCi/g) wet weight for the four upstream samples and 3.43 ± 0.13 pCi/g wet weight for the four downstream samples. These results are consistent with historical results. Other gamma-emitting isotopes remained below detection limits. There were no gamma emitting radionuclides attributable to MNGP operations identified in any of the 2022 fish samples.

Canada Goose and Goslings Crossing Near an MNGP Radiological Environmental Sampling Point

4.8 Shoreline Sediment

Shoreline sediments were collected from three locations: upstream, downstream, and downstream-recreational. Similar levels of activity have been observed since 1996 (see Figure 4.8-1) and are indicative of the influence of fallout deposition from above ground nuclear weapons testing. Levels of cesium-137 in sediments are observed to fluctuate as silt distributions shift due to natural erosion and transport processes. Naturally occurring beryllium-7 and potassium-40 were also detected. There was no indication of a MNGP effect.

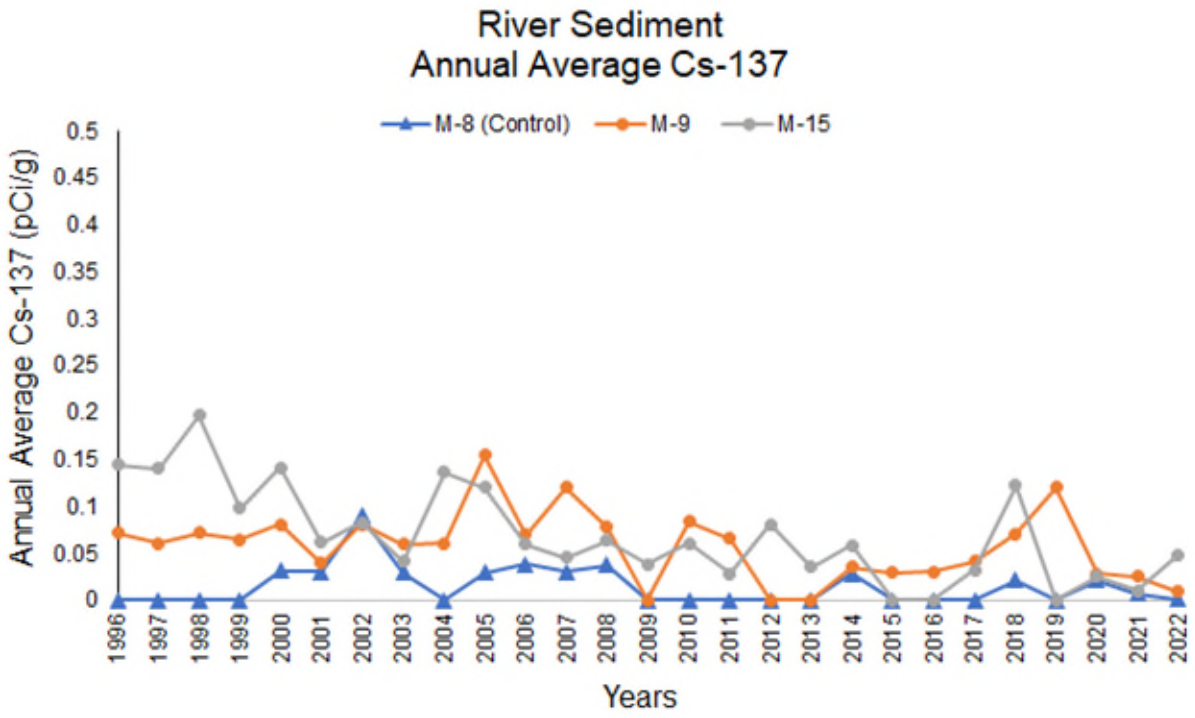

Figure 4.8-1: Graph of Historical Cesium-137 in River Sediment

4.9 Direct Gamma Radiation

4.9.1 Environmental TLD

Direct gamma radiation was measured in the general area of the Site boundary, at the inner ring, at an outer ring 4 to 5 miles from the Plant, at special interest areas, and at four control locations using TLDs. On average, the quarterly TLD measurements (where one standard [std] quarter is a 91-day period) were similar for both inner and outer rings, at 14.5 and 14.1 millirem (mrem)/standard quarter (std quarter), respectively. The mean for special interest locations was 14.4 mrem/std quarter and the mean for the control locations was 13.6 mrem/std quarter. Figure 4.9.1-1 shows the average measured dose from each std quarter. The error bars represent the statistical uncertainty associated with each average measurement.

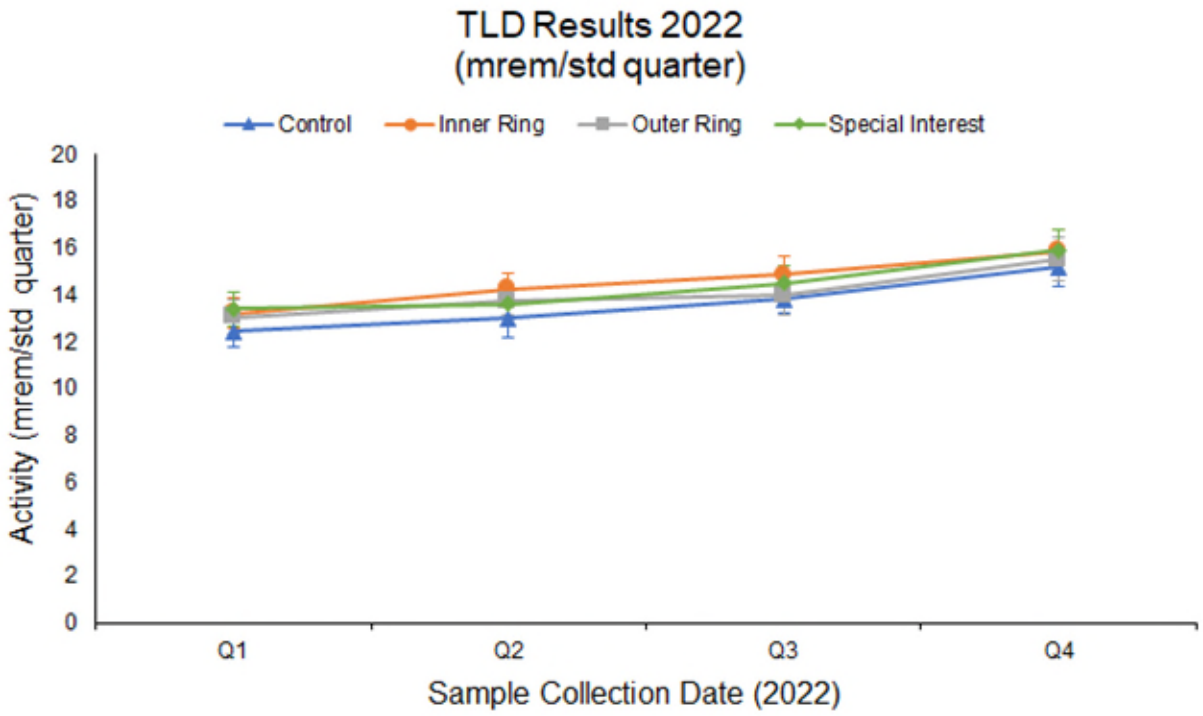

Figure 4.9.1-1: Graph of Direct Gamma Radiation Measurements

Dose rates measured at the inner and outer ring locations in 2022 were similar to those observed from 1999 through 2021 and are shown in Figure 4.9.1-2. No MNGP effect on ambient gamma radiation is indicated.

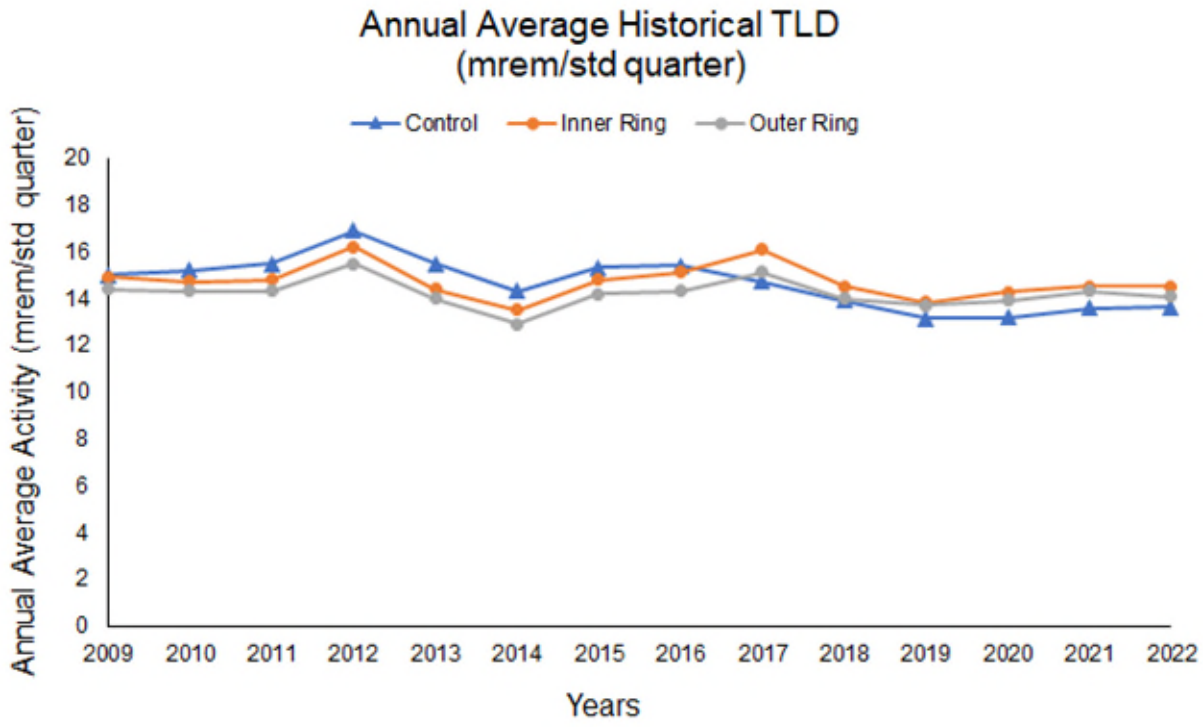

Figure 4.9.1-2: Graph of Historical Direct Gamma Measurements

4.9.2 ISFSI TLD

Gamma and Neutron TLDs are located around the Independent Spent Fuel Storage Installation (ISFSI) to monitor direct radiation from stored fuel for trending purposes. The ISFSI TLDs are not considered true REMP TLDs and are not representative of the dose to members of the public. Results for monitoring are included in Section 10.

No additional spent fuel casks were moved to the ISFSI in 2022. Annual data trends at and in the vicinity of the ISFSI are consistent with expectations. There were no detectable dose rate increases observed at the Site boundary TLDs in 2022.

5 LAND USE CENSUS

5.1 Purpose

The Land Use Census identifies the pathways (or routes) by which radioactive material may reach the general populations near commercial nuclear generating stations. This is accomplished by completing studies each year that identify how the surrounding lands are used by the population. A comprehensive census of the use of the land within a five-mile distance of the Plant is completed during the growing season each year. This information is used for dose assessment and to identify changes to the stations sampled and the type of samples. Therefore, the purpose of the Land Use Census is to ensure the REMP is current based on human activity near MNGP, as well as to provide data for the calculation of estimated radiation exposure.

Woodchuck Near an MNGP Radiological Environmental Sampling Point

The pathways evaluated are:

- Ingestion Pathway - Results from eating food crops that may have radioactive materials deposited on them or may have taken up radioactive materials from the soil or atmosphere. Another potential pathway is through drinking milk or eating cheese from local cows or goats. The vegetation used to feed these animals may include radioactive material due to deposition or uptake from soil and the radioactivity transferred to the milk. If milk animals are not present, vegetation is collected *in lieu* of milk.
- Direct Radiation Exposure Pathway - Results from deposition of radioactive materials on the ground or from passage of these radioactive materials in the air.
- Inhalation Pathway - Results from breathing radioactive materials transported in the air.

5.2 Methodology

The following must be identified within a five-mile radius of the Plant for each of the sixteen meteorological sectors (*i.e.*, compass heading) for potential wind direction; for example, North-Northeast (NNE):

- The nearest resident
- The nearest garden of greater than 500 square feet (ft^2) producing broadleaf vegetables ("Garden")
- The nearest animal used for meat consumption ("Meat")
- The nearest milk-producing animal ("Milk")

The 2022 survey was performed using door-to-door surveys and visual observations while driving; additionally, inputs from the 2021 field data forms were used to evaluate changes to the land use. Google Earth Pro satellite imagery and the Homeland Security Emergency Management Monticello Basemap were used in determining changes in land use. Data were collected using a combination of the Spyglass App and Google Earth Pro, using a universal serial bus (USB) global positioning system (GPS) receiver. Google Earth Pro was used to determine receptor location distances and sectors; these results were used in determining dispersion parameters for dose calculations. Distance, direction, and dose pathway information is used to determine if any sampling locations need to be changed in the REMP sampling program and for determining Critical Receptor data.

5.3 2022 Land Use Census

The 2022 Land Use Census was conducted between September 1st, 2022 and September 22nd, 2022, by the REMP Program Owner in accordance with MNGP's Chemistry Manual, Procedure I.05.41, "Annual Land Use Census and Critical Receptor Identification" (MNGP, n.d.).

There were no sectors that had an increase in the nearest garden D/Q of greater than 20 percent compared to 2021.[13] The highest D/Q garden for 2022 remains in sector SSE at 1.21 miles from MNGP.

[13] According to the 2021 Land Use Census, there was a new garden identified in the SSE sector that would've increased the D/Q for that sector above 20%; however, the garden was below the required threshold of 500 sq ft required. The garden has since shifted to a decorative garden. The majority of new receptors identified this year were new gardens; however, zero of the new gardens were the highest D/Q of their respective sector.

Pigs identified 3.43 miles away from the plant

In 2022, there was one sector where the highest Meat Animal D/Q values increased by 20 percent. Pigs were identified at 3.43 mi away from the plant in the NW (Q) sector, where animals had not previously been identified.

There were no sectors in which the highest D/Q values for the nearest resident increased by more than 20 percent in 2022. The highest D/Q resident remains at 0.99 miles from the Plant in the SSE sector.

In 2019 a new Milk location was located 3.25 miles in the NNE sector. The animal is infrequently milked and only provides enough for the family usage. The owner indicated that the cow had birthed a calf that will eventually be milked as well. There is also a beef cow at the location. Due to the relativity low deposition, the calculated dose at this location is lower than the vegetation sample locations. Milk samples are required for three locations within 3 miles or three locations where doses are calculated to be greater than 1 mrem/year (ODCM 07.01). The identified Milk animal is greater than 3 miles from the site, and the dose from all pathways at that location is 0.0146 mrem/year to the infant thyroid. Thus, vegetation sampling was performed in lieu of milk sampling.

There are no crops being irrigated from the Mississippi River within five miles downstream of the Plant, based upon the most recent Water Use Resources Permit Index Report from the Minnesota Department of Natural Resources. The nearest downstream drinking water supplies drawn from the Mississippi River remain St. Paul and Minneapolis water supplies as currently documented in the ODCM and Updated Final Safety Analysis Report.

The highest D/Q location for each pathway is described in Table 5.3-1.

Table 5.3-1: Summary of Highest Location for Each Pathway in 2022

Pathway	Sector	Distance (mi)	D/Q
Resident	SSE	0.99	1.40E-08
Meat	WSW	1.78	9.60E-10
Meat + Garden	W	1.82	6.90E-10
Garden	SSE	1.21	6.70E-09
Milk[1]	NNE	3.24	3.90E-10
Crops	-	-	-

Notes:

[1] Vegetation performed *in lieu* of Milk sampling.

Doses due to ground plane, inhalation, and ingestion of vegetables and meat, were calculated for the highest D/Q Resident, Meat, Garden, and combined Meat and Garden locations identified in the 2022 Land Use Census. In accordance with the ODCM, the long- and short-duration gaseous releases from the Reactor Building Vent and the Off-gas Stack for the previous calendar year were used as the source terms.

Doses were calculated using the RADEAS computer program with the 2021 Annual Effluent Data report source term as input. This resulted in identifying the same sector, distance, and pathway as compared to last year's critical receptor. The organ with the highest dose was bone, consistent with 2021. The location, comprising a residence with a garden, is 1.20 miles away from the Plant located in the SSE sector (designated GH). The pathway identified is the combination of ground plane, inhalation, and vegetable ingestion. For the purposes of compliance with 10 CFR 50 Appendix I, the critical receptor is defined as a child at this location with dose calculated to the bone. The dose for this receptor is estimated at 0.0245 mrem/year.

6 QUALITY ASSURANCE

6.1 Sample Collection

MNGP personnel performed the environmental sample collections as specified by approved sample collection procedures.

6.2 Sample Analysis

General Engineering Laboratories, LLC (GEL) performed the environmental sample analyses as specified by approved analysis procedures. GEL is located in Charleston, South Carolina.

6.3 Dosimetry Analysis

Environmental Dosimetry Company (EDC) works in conjunction with Stanford Dosimetry to perform the environmental dosimetry measurements as specified by approved dosimetry analysis procedures. The Environmental TLD program at EDC provides Panasonic TLD badges containing calcium sulfate ($CaSO_4$) phosphor elements for posting in the field. The raw TLD results are corrected for individual element sensitivity and reader sensitivity as determined by the quality control results. Control dosimeters are used to determine the background radiation exposure during the shipment and serve to evaluate transit exposures. The transit exposures are subtracted from the field dosimeters. Since the measured signal fades from the time of exposure to analysis, the fade of the thermoluminescent response is corrected.

6.4 Laboratory Equipment Quality Assurance

6.4.1 Daily Quality Control

GEL has an internal QA program which monitors each type of instrumentation for reliability and accuracy. Daily quality control checks ensure that instruments are in proper working order, and these checks are used to monitor instrument performance.

6.4.2 Calibration Verification

National Institute of Standards and Technology (NIST) standards that represent counting geometries are analyzed as unknowns at various frequencies, ranging from weekly to annually, to verify that efficiency calibrations are valid. The frequency is dependent upon instrument use and performance. Investigations are performed and documented should calibration verification data fall outside of the acceptable limits.

6.5 General Engineering Laboratory, LLC

GEL participated in various QA programs for inter-laboratory, intra-laboratory, third-party cross check programs, and a number of proficiency testing programs during 2022. A summary of the GEL QA program results for the sample media types sent to GEL during 2022 is documented in Appendix A.

The standard operating procedures used by GEL are approved methods. Copies of GEL's accreditations and certifications are available on their website, www.gel.com.

6.6 Environmental Dosimetry Company

EDC participates in an internal performance acceptance criteria and a quarterly independent testing TLD intercomparison program. In 2022, 100 percent of the individual dosimeters passed the performance criteria. A summary of the 2022 EDC Annual Quality Assurance Status Report is documented in Appendix B.

7 ENVIRONMENTAL SAMPLING MODIFICATIONS

7.1 Program Modifications

There were no programmatic changes to environmental sampling in 2022.

7.2 Change of Sampling Procedures

There were no changes to sampling procedures in 2022.

7.3 Change of Analysis Procedures

There were no changes to the analysis procedures in 2022.

7.4 Sample Deviations and Unavailable Analyses

Table 7.4-1 lists the deviations from the required REMP sample collection in 2022. Despite these sample deviations, 99.4 percent of the required samples were successfully obtained and analyzed.

Table 7.4-1: Sample Deviations and Unavailable Analyses

Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Corrective Action	Condition Report
Surface Water	Gamma Isotopic	M-8C	Composite - Gamma: Jan, Feb, Dec 2022[1]	Unsafe condition for sampling due to frozen river surface	Sample obtained when water thawed	501000059732
Airborne Particulate	Gamma Isotopic, Iodine-131, Gross Beta	M-1	May 2022	Air sampler was found to not be running. Partial sample was collected but is considered a missed sample.	Replaced pump and verified functioning. Results are still reported in Section 10.	501000063192
Direct Radiation	Gamma Dose	M09B	Q3	Sampler likely struck by farming equipment and dislodged from post.	Updated DAR 603000007001 with this CAP number for tracking	501000067454
Airborne Particulate	Gamma Isotopic, Iodine-131, Gross Beta	M-2	December 2022	Air sampler was found to not be running. Partial sample was collected but is considered a missed sample.	Replaced pump and verified functioning. Results are still reported in Section 10.	501000069541
TLD	Gamma	M12A	Q4	TLDs were in the same holder, which went missing. Likely cause was snow removal activities.	A second search will be performed when snow melts and the holder will be reaffixed to prevent reoccurrence.	501000069800

Notes:

[1] January and February samples could not be collected, but samples were collected in March. The quarterly composite for tritium therefore only includes March. For the quarter 4 composite sample, data was only collected for October and November.

7.5 Analytical Deviations

The ODCM 07.01 (ODCM 07.01) Table 3 LLD values for the parent-daughter isotopic pair barium-140/lanthanum-140 are 60 pCi/L and 15 pCi/L, respectively (*see* Table 3.4-2). Of the 49 groundwater, surface water, and drinking water samples collected in 2022, the LLD was not satisfied in six of the barium-140/lanthanum-140 samples (12%). In each sample, the MDC was higher than the LLD. The cause of the deviation was largely due to the time period between sample analysis and sample collection. A delay in the analysis of the sample by the laboratory, coupled with short radiochemical half-life, caused the deviations. Table 7.5-1 below details the analytical deviations.

Table 7.5-1: Analytical Deviations

Location	Collect Date/Time	Analysis Date/Time	Isotope	Result (pCi/L)	ODCM 07.01 Table 3 Required LLD (pCi/L)	Minimum Detectible Concentration (MDC) (pCi/L)
M-8 Upstream of Plant	7/27/2022 12:00	9/20/2022 9:18	La-140	13.2 U	15	60.9
			Ba-140	-62.1 U	60	167
	11/23/2022 11:30	1/10/2023 12:21	La-140	-2.1 U	15	17.3
M-9 Downstream of Plant	1/26/2022 13:11	3/11/2022 16:03	La-140	-2.65 U	15	21.2
	2/23/2022 11:39	4/5/2022 13:01	La-140	-6.59 U	15	22.6
			Ba-140	33.7 U	60	67
	4/27/2022 14:45	6/8/2022 10:18	La-140	-1.21 U	15	18.1
	7/27/2022 12:00	9/19/2022 13:24	La-140	-2.72 U	15	46.8
			Ba-140	-8.21 U	60	135

Notes:

U qualifier indicates that the analyte was analyzed for, but not detected above the MDC.

8 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM – SUMMARY OF RESULTS

This section presents a summary of MNGP's REMP sampling and monitoring results for the 2022 period for airborne particulates, airborne radioiodine, direct radiation, and measurable radioactivity in milk, broadleaf vegetation, river water, aquatic invertebrates, shoreline sediments, groundwater, drinking water, and fish. In all, there were no reported non-routine measurements.

8.1 Radiological Environmental Monitoring Program Data Summary

Table 8.1-1 below presents the summary of MNGP's REMP sampling and monitoring results for the 2022 period.

Table 8.1-1: Radiological Environmental Monitoring Program Summary

Name of Facility:	Monticello Nuclear Generating Plant	Docket No:	50-263
Location of Facility:	Wright, Minnesota	Reporting Period	January – December 2022

Medium or Pathway Sampled (Units)	Type, Total Number of Analyses performed (e.g. I-131, 400)	ODCM Table 3 Lower Limit of Detection (LLD)	Indicator Mean[1] (f)[2] Range[1]	Location with Highest Annual Mean Name Distance and Direction	Mean[1] (f)[2] Range[1]	Control Mean[1] (f)[2] Range[1]	Number of Nonroutine Reported Measurements
Airborne Particulates (pCi/m^3)	Gross Beta (260)	0.01	0.044 (208/208) 0.009 - 0.126	M-5, Air Station 2.6 m @ 134/SE	0.046 (52/52) 0.016 - 0.126	0.043 (52/52) 0.013 - 0.114	0
	Gamma (20)						0
	Be-7[3]	-	0.082 (16/16) 0.048 - 0.127	M-5, Air Station 2.6 m @ 134/SE	0.085 (4/4) 0.051 - 0.121	0.081 (4/4) 0.055 - 0.109	
	Mn-54	-	<LLD	-	-	<LLD	
	Co-58	-	<LLD	-	-	<LLD	
	Co-60	-	<LLD	-	-	<LLD	
	Zn-65	-	<LLD	-	-	<LLD	
	Zr-Nb-95	-	<LLD	-	-	<LLD	
	Ru-103	-	<LLD	-	-	<LLD	
	Ru-106	-	<LLD	-	-	<LLD	
	Cs-134	0.05	<LLD	-	-	<LLD	
	Cs-137	0.06	<LLD	-	-	<LLD	
	Ba-La-140	-	<LLD	-	-	<LLD	
	Ce-141	-	<LLD	-	-	<LLD	
	Ce-144	-	<LLD	-	-	<LLD	
Airborne Radioiodine (pCi/m^3)	I-131 (260)	0.07	<LLD	-	-	<LLD	0
Broadleaf Vegetation (pCi/kg-wet)	Gamma (12)						0
	Mn-54	-	<LLD	-	-	<LLD	
	Fe-59	-	<LLD	-	-	<LLD	
	Co-58	-	<LLD	-	-	<LLD	
	Co-60	-	<LLD	-	-	<LLD	
	Zn-65	-	<LLD	-	-	<LLD	
	Zr-Nb-95	-	<LLD	-	-	<LLD	
	I-131	60	<LLD	-	-	<LLD	
	Cs-134	60	<LLD	-	-	<LLD	
	Cs-137	80	<LLD	-	-	<LLD	
Milk (pCi/L)	I-131 (0)	1	N/A	N/A	N/A	N/A	0
	Gamma (0)	N/A	N/A	N/A	N/A	N/A	0

Table 8.1-1: Radiological Environmental Monitoring Program Summary (Continued)

Medium or Pathway Sampled (Units)	Type, Total Number of Analyses performed (e.g. I-131, 400)	ODCM Table 3 Lower Limit of Detection (LLD)	Indicator Mean[1] (f)[2] Range[1]	Location with Highest Annual Mean Name / Distance and Direction	Mean[1] (f)[2] Range[1]	Control Mean[1] (f)[2] Range[1]	Number of Nonroutine Reported Measurements
Fish (pCi/kg-wet)	Gamma (8)						0
	K-40[3]	-	3427 (4/4) 3240 - 3520	M-9 Downstream of Plant	3527 (4/4) 3240 - 3520	3097 (4/4) 2740 - 3590	
	Mn-54	130	<LLD	-	-	<LLD	
	Fe-59	260	<LLD	-	-	<LLD	
	Co-58	130	<LLD	-	-	<LLD	
	Co-60	130	<LLD	-	-	<LLD	
	Zn-65	260	<LLD	-	-	<LLD	
	Zr-Nb-95	-	<LLD	-	-	<LLD	
	Cs-134	130	<LLD	-	-	<LLD	
	Cs-137	150	<LLD	-	-	<LLD	
	Ba-La-140	-	<LLD	-	-	<LLD	
	Ce-144	-	<LLD	-	-	<LLD	
Shoreline Sediments (pCi/kg-dry)	Gamma (6)						0
	Be-7[3]	-	1290 (2/4) 351 - 2230	M-9 Downstream of Plant	2230 (1/2) 2230 - 2230	477 (1/2) 477 - 477	
	K-40[3]	-	11160 (4/4) 9740 - 13100	M-15 Montissippi Park	11420 (2/2) 9740 - 13100	10150 (2/2) 10100 - 10200	
	Mn-54	-	<LLD		-	<LLD	
	Fe-59	-	<LLD	-	-	<LLD	
	Co-58	-	<LLD	-	-	<LLD	
	Co-60	-	<LLD	-	-	<LLD	
	Zn-65	-	<LLD	-	-	<LLD	
	Zr-Nb-95	-	<LLD	-	-	<LLD	
	Cs-134	150	<LLD	-	-	<LLD	
	Cs-137	180	<LLD	-	-	<LLD	
	Ba-La-140	-	<LLD		-	<LLD	
	Ce-144	-	<LLD	-	-		
Drinking Water (pCi/L)	Gross Beta (12)	4	<LLD	-	-	None	0

Table 8.1-1: Radiological Environmental Monitoring Program Summary (Continued)

Medium or Pathway Sampled (Units)	Type, Total Number of Analyses performed (e.g. I-131, 400)	ODCM Table 3 Lower Limit of Detection (LLD)	Indicator Mean[1] (f)[2] Range[1]	Location with Highest Annual Mean Name / Distance and Direction	Location with Highest Annual Mean Mean[1] (f)[2] Range[1]	Control Mean[1] (f)[2] Range[1]	Number of Nonroutine Reported Measurements
Drinking Water (pCi/L)	Gamma (12)						0
	Mn-54	15	<LLD	-	-	None	
				-			
			<LLD	-	-		
	Fe-59	30	<LLD	-	-	None	
	Co-58	15	<LLD	-	-	None	
	Co-60	15	<LLD	-	-	None	
	Zn-65	30	<LLD	-	-	None	
	Zr-Nb-95	15[4]	<LLD	-	-	None	
	Cs-134	15	<LLD	-	-	None	
	Cs-137	18	<LLD[6]	-	-	None	
	Ba-La-140	15[4]	<LLD		-	None	
	Ce-144	-				None	
	I-131 (0)	1	-	-	-	None	0
	Tritium (4)	2000	<LLD	-	-	None	0
Groundwater (pCi/L)	Gamma (16)						0
	Mn-54	15	<LLD	-	-	<LLD	
	Fe-59	30	<LLD	-	-	<LLD	
	Co-58	15	<LLD	-	-	<LLD	
	Co-60	15	<LLD	-	-	<LLD	
	Zn-65	30	<LLD	-	-	<LLD	
	Zr-Nb-95	15[4]	<LLD	-	-	<LLD	
	Cs-134	15	<LLD	-	-	<LLD	
	Cs-137	18	<LLD	-	-	<LLD	
	Ba-La-140	15[4]	<LLD	-	-	<LLD	
	Ce-144	-	<LLD	-	-	<LLD	
	I-131[6] (0)	1[5]	<LLD	-	-	<LLD	0
	Tritium (4)	2000	<LLD	-	-	<LLD	0
River Water (pCi/L)	Gamma (21)						0
	Mn-54	15	<LLD	-	-	<LLD	
	Fe-59	30	<LLD	-	-	<LLD	
	Co-58	15	<LLD	-	-	<LLD	
	Co-60	15	<LLD	-	-	<LLD	
	Zn-65	30	<LLD	-	-	<LLD	
	Zr-Nb-95	15[4]	<LLD	-	-	<LLD	
	Cs-134	15	<LLD	-	-	<LLD	
	Cs-137	18	<LLD	-	-	<LLD	
	Ba-La-140	15[4]	<LLD	-	-	<LLD	
	Ce-144	-	<LLD	-	-	<LLD	
	Tritium (8)	2000	<LLD	-	-	<LLD	0

Table 8.1-1: Radiological Environmental Monitoring Program Summary (Continued)

Medium or Pathway Sampled (Units)	Type, Total Number of Analyses performed (e.g. I-131, 400)	ODCM Table 3 Lower Limit of Detection (LLD)	Indicator Mean[1] (f)[2] Range[1]	Location with Highest Annual Mean Name / Distance and Direction	Location with Highest Annual Mean Mean[1] (f)[2] Range[1]	Control Mean[1] (f)[2] Range[1]	Number of Nonroutine Reported Measurements
Direct Radiation: Control (10 to 12 miles distant) (mrem/91 days)	Gamma (16)	-	N/A	M03C 11.6 mi @ 130/SE	14.8 (4/4) (13.1 - 16.3)	13.6 (16/16) (11.9 - 16.3)	0
Direct Radiation: Inner Ring (General Area at Site Boundary) (mrem/91 days)	Gamma (55)	-	14.5 (55/55) (12.5 - 16.6)	M11A, 0.4 mi @ 237/WSW	15.13 (4/4) (13.9 -16.3)		0
Direct Radiation: Outer Ring (4-5 mi. distant) (mrem/91 days)	Gamma (63)	-	14.1 (63/63) (11.2 – 16.5)	M09B, 4.7 mi @ 178/S & M11A, 0.4 mi @ 237/WSW	15.0 (4/4) (13.3 – 16.5) 15.0 (4/4) (13.6 – 15.9)		0
Direct Radiation: Special Interest Areas (mrem/91 days)	Gamma (36)	-	14.4 (36/36) (12 - 17.1)	M06S 2.6 mi @ 134/SE	15.4 (4/4) (14.5 - 17.0)		0

Notes:

[1] Mean and range are based upon detectible measurements only.
[2] (f) Fraction of detectible measurements at a specific location.
[3] Natural and not due to Plant influence.
[4] The specified LLD applies to the daughter nuclide of an equilibrium mixture of the parent and daughter nuclides. Per the BPT, the following values may be used for individual nuclide LLDs when equilibrium conditions are not met: 30 pCi/L for zirconium-95, 15 pCi/L for niobium-95, 60 pCi/L for barium-140, and 15 pCi/L for lanthanum-140.
[5] If no drinking water pathway exists, a value of 15 pCi/L may be used.
[6] Not required.

9 ERRATA TO PREVIOUS REPORTS

9.1 Errata to the MNGP AREOR

Included in this report are errata to the 2021 AREOR. During the 2022 NRC REMP Program Inspection, it was identified that there was a partial sample for air sampler M-1 for the week of August 18, 2021 through August 25, 2021. The air sampler was found not running when performing weekly filter collection and changeout. The partial sample was captured in Monticello QIM 501000055461 but not identified in the report. Any partial sample should be reported as a missed sample. The errata update the sample deviations described in Table 7.4-1 (page 37) and adds identifiers to the associated sample data tables noting partial samples (pages 48 through 52).

10 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM RESULTS

This section provides tabulated REMP monitoring results. Data below were analyzed by GEL. The results reported relate only to the items tested and to the samples as received by the laboratory. Copies of GEL's accreditations and certificates can be found at www.gel.com. The table notes, matrix abbreviations, and laboratory qualifiers common to each of the GEL analytical results tables are provided below.

Notes

1. LLDs are *a priori* values.
2. MDCs are calculated *a posteriori* value.
3. Gamma spectroscopy analysis results are calculated from a measurement using only one gamma energy line.
4. Results with either no qualifier, an M, or an L are considered positive results. While a U, UI, or ND are negative.

Matrix Abbreviations

AC	Airborne Cartridge
AP	Airborne Particulate
SE	Sediment
TA	Aquatic Tissue
TP	Plant Tissue
WG	Groundwater
WP	Drinking Water
WS	Surface Water

Qualifiers

L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
M	M if above MDC and less than LLD.
M	REMP Result >MDC/CL and <RDL
ND	Analyte concentration is not detected above the limits as defined as the "U" qualifier
U	Analyte was analyzed for, but not detected above the Minimum Detection Limit (MDL), Minimum Detectable Activity (MDA), MDC, or Limit of Detection (LOD)
UI	Gamma Spectroscopy – uncertain identification; these results were evaluated and found to be false positives, unless otherwise noted
X	Lab specific qualifier – see notes from data tables for details.

10.1 Detection of Activity

It is often not possible to say for certain when net radioactivity is present in samples at environmental background levels due to natural variations in counting instrument backgrounds and other factors. The data below is reported as determined by the lab with uncertainties and all data has been included (even results with negative numbers). Results with U, UI, or ND qualifiers are considered “not detected” and results with L, M, or blank qualifiers are considered to be “detected.”

AIRBORNE CARTRIDGE: RADIOIODINE

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
1/4/2022	4.15E-05 ± 1.52E-02 U	2.08E-03 ± 8.95E-03 U	3.58E-03 ± 1.22E-02 U	4.46E-03 ± 1.25E-02 U	-2.36E-03 ± 1.13E-02 U
1/12/2022	-2.09E-03 ± 7.74E-03 U	-8.32E-05 ± 6.63E-03 U	-5.07E-03 ± 8.11E-03 U	-8.49E-03 ± 1.09E-02 U	-3.37E-03 ± 8.39E-03 U
1/19/2022	2.06E-03 ± 8.28E-03 U	2.51E-03 ± 7.81E-03 U	-2.63E-03 ± 7.67E-03 U	-1.10E-03 ± 1.40E-02 U	2.30E-03 ± 6.86E-03 U
1/26/2022	2.43E-03 ± 8.82E-03 U	4.65E-03 ± 5.87E-03 U	-1.45E-03 ± 8.41E-03 U	1.23E-03 ± 8.93E-03 U	5.40E-03 ± 9.28E-03 U
2/1/2022	1.01E-02 ± 1.09E-02 U	2.41E-03 ± 8.43E-03 U	-1.68E-03 ± 1.13E-02 U	6.28E-03 ± 9.27E-03 U	-2.28E-04 ± 1.44E-02 U
2/9/2022	5.82E-04 ± 4.09E-03 U	-3.26E-03 ± 6.27E-03 U	1.01E-04 ± 4.56E-03 U	-1.44E-03 ± 4.99E-03 U	-9.74E-04 ± 4.65E-03 U
2/15/2022	5.95E-03 ± 1.33E-02 U	-8.08E-04 ± 1.21E-02 U	-1.79E-05 ± 8.00E-03 U	-5.82E-03 ± 1.05E-02 U	2.50E-03 ± 1.16E-02 U
2/23/2022	6.21E-03 ± 1.07E-02 U	-4.37E-03 ± 6.46E-03 U	6.39E-04 ± 5.96E-03 U	2.38E-04 ± 4.72E-03 U	3.49E-03 ± 7.36E-03 U
3/1/2022	5.03E-03 ± 6.30E-03 U	-1.73E-03 ± 9.14E-03 U	4.26E-03 ± 5.21E-03 U	2.12E-03 ± 7.10E-03 U	-2.81E-03 ± 6.21E-03 U
3/8/2022	9.01E-03 ± 1.88E-02 U	-1.02E-02 ± 1.53E-02 U	1.38E-03 ± 1.57E-02 U	1.89E-02 ± 2.86E-02 U	1.30E-02 ± 1.65E-02 U
3/16/2022	1.68E-04 ± 5.72E-03 U	1.88E-03 ± 6.99E-03 U	5.27E-04 ± 5.82E-03 U	-5.77E-03 ± 7.86E-03 U	5.16E-03 ± 6.84E-03 U
3/23/2022	6.88E-03 ± 6.49E-03 U	-2.81E-03 ± 8.18E-03 U	4.08E-04 ± 6.55E-03 U	5.90E-03 ± 8.33E-03 U	6.96E-03 ± 8.12E-03 U
3/30/2022	2.34E-03 ± 1.27E-02 U	1.30E-02 ± 1.28E-02 U	-1.01E-02 ± 1.28E-02 U	2.59E-03 ± 1.00E-02 U	2.62E-03 ± 1.21E-02 U
4/6/2022	4.88E-03 ± 6.82E-03 U	1.06E-03 ± 1.13E-02 U	5.76E-03 ± 8.01E-03 U	-1.63E-03 ± 1.15E-02 U	1.16E-02 ± 8.66E-03 U
4/13/2022	6.86E-03 ± 1.26E-02 U	9.05E-03 ± 1.58E-02 U	1.23E-02 ± 9.21E-03 UI	8.43E-03 ± 1.18E-02 U	9.57E-03 ± 1.48E-02 U
4/19/2022	3.73E-03 ± 1.20E-02 U	-4.69E-03 ± 1.50E-02 U	1.01E-02 ± 1.87E-02 U	-5.95E-03 ± 1.37E-02 U	-7.38E-03 ± 9.35E-03 U
4/27/2022	3.47E-03 ± 7.90E-03 U	1.72E-03 ± 9.33E-03 U	2.77E-03 ± 5.63E-03 U	8.95E-03 ± 9.57E-03 U	1.65E-03 ± 9.50E-03 U
5/4/2022	3.28E-04 ± 1.55E-02 U	1.17E-02 ± 1.48E-02 U	4.92E-03 ± 1.07E-02 U	2.88E-03 ± 9.42E-03 U	-1.02E-03 ± 1.14E-02 U
5/11/2022	-1.51E-04 ± 9.54E-03 U*	5.38E-03 ± 1.20E-02 U	2.24E-03 ± 2.02E-02 U	3.93E-03 ± 1.13E-02 U	-1.18E-03 ± 1.24E-02 U
5/18/2022	-9.32E-03 ± 2.12E-02 U	-1.31E-03 ± 1.21E-02 U	6.16E-04 ± 8.44E-03 U	-8.49E-03 ± 1.30E-02 U	3.70E-03 ± 1.22E-02 U
5/25/2022	1.94E-03 ± 1.14E-02 U	-7.39E-03 ± 1.09E-02 U	-8.12E-03 ± 1.69E-02 U	1.59E-04 ± 8.75E-03 U	4.16E-03 ± 1.46E-02 U
6/1/2022	-3.86E-03 ± 1.58E-02 U	3.62E-03 ± 1.67E-02 U	6.79E-04 ± 1.62E-02 U	1.41E-02 ± 2.71E-02 U	-1.80E-03 ± 2.41E-02 U
6/8/2022	-7.89E-04 ± 1.50E-02 U	-6.02E-03 ± 1.29E-02 U	3.96E-03 ± 1.28E-02 U	8.21E-03 ± 1.13E-02 U	-4.55E-03 ± 1.31E-02 U

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
6/15/2022	4.69E-03 ± 1.71E-02 U	5.54E-03 ± 7.35E-03 U	3.59E-03 ± 7.57E-03 U	9.30E-04 ± 1.02E-02 U	-2.96E-03 ± 1.15E-02 U
6/22/2022	8.40E-03 ± 1.44E-02 U	3.65E-03 ± 1.21E-02 U	1.16E-03 ± 1.01E-02 U	1.54E-03 ± 1.17E-02 U	3.87E-03 ± 1.45E-02 U
6/29/2022	1.35E-03 ± 1.25E-02 U	5.35E-03 ± 9.90E-03 U	1.35E-03 ± 1.12E-02 U	-1.93E-03 ± 1.44E-02 U	-4.21E-03 ± 1.13E-02 U
7/6/2022	3.53E-03 ± 2.11E-02 U	7.01E-03 ± 1.94E-02 U	8.20E-03 ± 1.45E-02 U	-5.09E-03 ± 1.83E-02 U	9.17E-03 ± 2.89E-02 U
7/13/2022	-1.24E-01 ± 1.80E-02 U	8.39E-04 ± 1.34E-02 U	7.22E-04 ± 1.11E-02 U	1.43E-03 ± 9.60E-03 U	6.03E-03 ± 1.05E-02 U
7/20/2022	-3.10E-03 ± 2.21E-02 U	0.00E+00 ± 1.74E-02 U	-5.31E-03 ± 2.19E-02 U	4.72E-04 ± 1.58E-02 U	6.52E-03 ± 2.61E-02 U
7/27/2022	-6.03E-04 ± 1.07E-02 U	-4.87E-03 ± 1.13E-02 U	1.99E-03 ± 1.67E-02 U	1.70E-04 ± 8.89E-03 U	8.77E-03 ± 1.33E-02 U
8/2/2022	1.81E-03 ± 8.50E-03 U	-5.87E-03 ± 1.00E-02 U	-1.01E-02 ± 1.08E-02 U	-2.03E-02 ± 1.77E-02 U	-2.66E-03 ± 1.35E-02 U
8/10/2022	2.32E-03 ± 1.16E-02 U	-3.55E-03 ± 1.12E-02 U	-7.11E-03 ± 1.18E-02 U	3.42E-03 ± 1.63E-02 U	2.55E-02 ± 2.76E-02 UI
8/17/2022	6.93E-03 ± 1.96E-02 U	3.19E-03 ± 1.28E-02 U	-6.16E-03 ± 1.63E-02 U	1.03E-02 ± 2.22E-02 U	3.68E-02 ± 2.55E-02 U
8/24/2022	1.12E-02 ± 7.55E-03 U	9.65E-04 ± 8.97E-03 U	2.62E-03 ± 8.26E-03 U	-4.74E-03 ± 5.88E-03 U	4.90E-04 ± 7.46E-03 U
8/31/2022	9.44E-03 ± 1.01E-02 U	-4.70E-04 ± 9.42E-03 U	-1.80E-03 ± 9.29E-03 U	4.37E-03 ± 9.12E-03 U	5.25E-03 ± 9.63E-03 U
9/7/2022	8.37E-03 ± 1.54E-02 U	-5.57E-03 ± 1.42E-02 U	2.31E-04 ± 1.60E-02 U	9.98E-04 ± 1.45E-02 U	8.52E-03 ± 1.30E-02 U
9/14/2022	6.80E-03 ± 9.37E-03 U	8.41E-03 ± 1.04E-02 U	-1.42E-03 ± 8.76E-03 U	1.38E-03 ± 7.30E-03 U	-2.11E-03 ± 7.80E-03 U
9/21/2022	1.40E-03 ± 1.46E-02 U	9.29E-03 ± 1.43E-02 U	8.20E-03 ± 1.50E-02 U	-2.77E-03 ± 1.45E-02 U	-1.27E-02 ± 1.60E-02 U
9/27/2022	1.41E-02 ± 3.26E-02 U	3.33E-02 ± 3.02E-02 U	1.03E-02 ± 2.44E-02 U	2.56E-03 ± 2.53E-02 U	6.94E-03 ± 2.21E-02 U
10/5/2022	5.67E-03 ± 5.92E-03 U	-2.45E-03 ± 8.27E-03 U	7.31E-03 ± 9.88E-03 U	-2.79E-03 ± 1.02E-02 U	-8.38E-03 ± 8.41E-03 U
10/12/2022	-3.26E-03 ± 1.15E-02 U	-1.22E-02 ± 1.78E-02 U	-5.22E-04 ± 1.60E-02 U	1.37E-02 ± 1.37E-02 U	5.64E-03 ± 1.53E-02 U
10/19/2022	3.02E-03 ± 2.05E-02 U	-3.05E-03 ± 2.58E-02 U	1.34E-02 ± 1.61E-02 U	-9.36E-04 ± 1.61E-02 U	8.72E-03 ± 2.55E-02 U
10/26/2022	1.81E-02 ± 2.15E-02 U	6.23E-03 ± 1.07E-02 U	1.39E-03 ± 7.32E-03 U	2.04E-03 ± 8.80E-03 U	5.28E-03 ± 7.63E-03 U
11/2/2022	-3.50E-03 ± 1.03E-02 U	7.76E-03 ± 1.39E-02 U	-5.28E-03 ± 9.13E-03 U	1.49E-03 ± 1.21E-02 U	7.81E-03 ± 8.87E-03 U
11/10/2022	-5.58E-03 ± 5.77E-03 U	-2.21E-03 ± 5.84E-03 U	-4.50E-03 ± 6.94E-03 U	4.49E-03 ± 4.54E-03 U	-1.73E-03 ± 5.94E-03 U
11/16/2022	6.29E-03 ± 1.48E-02 U	1.04E-02 ± 1.52E-02 U	9.75E-03 ± 1.38E-02 U	9.44E-04 ± 1.40E-02 U	2.54E-02 ± 2.32E-02 UI
11/23/2022	9.05E-03 ± 1.29E-02 U	-5.19E-03 ± 8.19E-03 U	-1.69E-03 ± 8.25E-03 U	-4.25E-03 ± 8.66E-03 U	-3.17E-03 ± 9.11E-03 U

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
11/30/2022	-9.83E-04 ± 1.03E-02 U	-1.89E-03 ± 1.02E-02 U	-1.24E-04 ± 9.80E-03 U	3.55E-03 ± 1.68E-02 U	-1.09E-02 ± 1.42E-02 U
12/7/2022	-9.00E-03 ± 1.29E-02 U	6.79E-03 ± 1.34E-02 U	4.96E-03 ± 1.04E-02 U	-2.50E-03 ± 8.76E-03 U	4.95E-03 ± 7.49E-03 U
12/13/2022	-2.87E-02 ± 3.34E-02 U	-1.18E-02 ± 3.69E-02 U	3.02E-02 ± 3.30E-02 U	-3.13E-02 ± 4.53E-02 U	-2.04E-02 ± 4.08E-02 U
12/20/2022	8.57E-03 ± 1.46E-02 U	5.96E-03 ± 1.18E-02 U	-1.14E-02 ± 1.64E-02 U	-8.00E-03 ± 1.77E-02 U	-6.24E-03 ± 1.81E-02 U
12/27/2022	-1.37E-03 ± 9.58E-03 U	-5.85E-03 ± 1.29E-02 U*	2.55E-03 ± 9.06E-03 U	-1.50E-03 ± 7.98E-03 U	-9.89E-04 ± 9.43E-03 U

Note:

* The M-1 air sampler (5/11/2022 sample date) and M-2 air sampler (12/27/2022 sample date) were found to not be running on the indicated sample collection dates. Partial samples were collected. Although results are provided, these are considered missed samples (Condition Reports 501000063192 and 501000069541, respectively).

AIRBORNE PARTICULATES: GROSS BETA

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
01/04/2022	0.114 ± 0.008	0.105 ± 0.008	0.108 ± 0.008	0.115 ± 0.008	0.126 ± 0.009
01/12/2022	0.061 ± 0.006	0.077 ± 0.006	0.058 ± 0.006	0.068 ± 0.006	0.063 ± 0.006
01/19/2022	0.065 ± 0.006	0.059 ± 0.006	0.064 ± 0.007	0.067 ± 0.007	0.062 ± 0.006
01/26/2022	0.071 ± 0.007	0.066 ± 0.006	0.061 ± 0.006	0.071 ± 0.007	0.073 ± 0.007
02/01/2022	0.064 ± 0.006	0.070 ± 0.007	0.060 ± 0.007	0.054 ± 0.006	0.063 ± 0.007
02/09/2022	0.061 ± 0.005	0.067 ± 0.006	0.060 ± 0.005	0.068 ± 0.006	0.072 ± 0.006
02/15/2022	0.053 ± 0.007	0.053 ± 0.006	0.049 ± 0.006	0.041 ± 0.005	0.059 ± 0.007
02/23/2022	0.058 ± 0.005	0.065 ± 0.006	0.060 ± 0.005	0.062 ± 0.005	0.062 ± 0.006
03/01/2022	0.072 ± 0.007	0.085 ± 0.008	0.073 ± 0.007	0.074 ± 0.007	0.078 ± 0.008
03/08/2022	0.051 ± 0.005	0.046 ± 0.005	0.052 ± 0.006	0.058 ± 0.007	0.057 ± 0.006
03/16/2022	0.037 ± 0.004	0.047 ± 0.005	0.038 ± 0.004	0.049 ± 0.006	0.046 ± 0.005
03/23/2022	0.028 ± 0.004	0.032 ± 0.005	0.028 ± 0.004	0.038 ± 0.006	0.031 ± 0.005
03/30/2022	0.028 ± 0.004	0.031 ± 0.005	0.027 ± 0.004	0.036 ± 0.005	0.030 ± 0.005
04/06/2022	0.023 ± 0.004	0.029 ± 0.005	0.023 ± 0.004	0.032 ± 0.005	0.031 ± 0.005
04/13/2022	0.017 ± 0.003	0.020 ± 0.004	0.020 ± 0.004	0.028 ± 0.005	0.022 ± 0.004
04/19/2022	0.025 ± 0.004	0.032 ± 0.005	0.028 ± 0.005	0.042 ± 0.006	0.029 ± 0.005
04/27/2022	0.025 ± 0.004	0.030 ± 0.004	0.024 ± 0.004	0.038 ± 0.005	0.028 ± 0.004
05/04/2022	0.031 ± 0.006	0.037 ± 0.006	0.023 ± 0.004	0.036 ± 0.006	0.041 ± 0.006
05/11/2022	0.031 ± 0.005*	0.049 ± 0.006	0.046 ± 0.006	0.046 ± 0.006	0.041 ± 0.006
05/18/2022	0.047 ± 0.009	0.039 ± 0.006	0.034 ± 0.005	0.040 ± 0.006	0.035 ± 0.005
05/25/2022	0.036 ± 0.006	0.036 ± 0.006	0.035 ± 0.006	0.038 ± 0.006	0.039 ± 0.006
06/01/2022	0.026 ± 0.005	0.030 ± 0.004	0.023 ± 0.004	0.028 ± 0.005	0.031 ± 0.005
06/08/2022	0.036 ± 0.005	0.034 ± 0.005	0.028 ± 0.004	0.032 ± 0.005	0.040 ± 0.005
06/15/2022	0.044 ± 0.006	0.043 ± 0.005	0.037 ± 0.005	0.041 ± 0.005	0.040 ± 0.005
06/22/2022	0.031 ± 0.005	0.031 ± 0.005	0.033 ± 0.005	0.035 ± 0.005	0.035 ± 0.005
06/29/2022	0.034 ± 0.005	0.039 ± 0.005	0.028 ± 0.004	0.036 ± 0.005	0.037 ± 0.005
07/06/2022	0.041 ± 0.005	0.047 ± 0.005	0.040 ± 0.005	0.040 ± 0.005	0.047 ± 0.006
07/13/2022	0.040 ± 0.005	0.043 ± 0.005	0.034 ± 0.005	0.041 ± 0.005	0.041 ± 0.005
07/20/2022	0.045 ± 0.005	0.051 ± 0.005	0.055 ± 0.006	0.056 ± 0.006	0.050 ± 0.006
07/27/2022	0.037 ± 0.005	0.038 ± 0.005	0.038 ± 0.005	0.034 ± 0.005	0.045 ± 0.006
08/02/2022	0.035 ± 0.005	0.041 ± 0.005	0.039 ± 0.006	0.038 ± 0.006	0.042 ± 0.006
08/10/2022	0.022 ± 0.003	0.027 ± 0.004	0.020 ± 0.003	0.025 ± 0.003	0.032 ± 0.004

08/17/2022	0.031 ± 0.004	0.030 ± 0.004	0.025 ± 0.003	0.030 ± 0.004	0.039 ± 0.004
08/24/2022	0.041 ± 0.004	0.042 ± 0.005	0.035 ± 0.004	0.037 ± 0.004	0.042 ± 0.004
08/31/2022	0.034 ± 0.004	0.036 ± 0.004	0.029 ± 0.004	0.034 ± 0.004	0.039 ± 0.004
09/07/2022	0.046 ± 0.005	0.035 ± 0.004	0.039 ± 0.004	0.036 ± 0.004	0.036 ± 0.004
09/14/2022	0.049 ± 0.005	0.045 ± 0.005	0.045 ± 0.005	0.052 ± 0.005	0.050 ± 0.005
09/21/2022	0.058 ± 0.005	0.067 ± 0.006	0.063 ± 0.006	0.057 ± 0.005	0.063 ± 0.005
09/27/2022	0.032 ± 0.004	0.031 ± 0.005	0.025 ± 0.004	0.029 ± 0.004	0.031 ± 0.004
10/05/2022	0.040 ± 0.004	0.037 ± 0.004	0.039 ± 0.004	0.040 ± 0.004	0.044 ± 0.004
10/12/2022	0.046 ± 0.005	0.044 ± 0.005	0.048 ± 0.005	0.052 ± 0.005	0.051 ± 0.005
10/19/2022	0.019 ± 0.003	0.016 ± 0.003	0.016 ± 0.003	0.015 ± 0.003	0.016 ± 0.003
10/26/2022	0.052 ± 0.005	0.053 ± 0.005	0.047 ± 0.005	0.062 ± 0.006	0.058 ± 0.005
11/02/2022	0.055 ± 0.005	0.056 ± 0.006	0.063 ± 0.005	0.058 ± 0.005	0.067 ± 0.006
11/10/2022	0.037 ± 0.004	0.034 ± 0.004	0.038 ± 0.004	0.035 ± 0.004	0.039 ± 0.004
11/16/2022	0.013 ± 0.003	0.018 ± 0.003	0.018 ± 0.003	0.020 ± 0.004	0.017 ± 0.003
11/23/2022	0.056 ± 0.005	0.053 ± 0.005	0.057 ± 0.005	0.052 ± 0.005	0.054 ± 0.005
11/30/2022	0.055 ± 0.005	0.052 ± 0.005	0.054 ± 0.005	0.054 ± 0.005	0.055 ± 0.005
12/07/2022	0.041 ± 0.005	0.042 ± 0.005	0.053 ± 0.006	0.044 ± 0.005	0.037 ± 0.004
12/13/2022	0.071 ± 0.006	0.077 ± 0.007	0.071 ± 0.006	0.069 ± 0.006	0.067 ± 0.006
12/20/2022	0.030 ± 0.004	0.028 ± 0.004	0.034 ± 0.004	0.030 ± 0.004	0.028 ± 0.004
12/27/2022	0.041 ± 0.004	0.009 ± 0.003 **M***	0.043 ± 0.004	0.043 ± 0.005	0.050 ± 0.005

Note:

* The M-1 air sampler (5/11/2022 sample date) and M-2 air sampler (12/27/2022 sample date) were found to not be running on the indicated sample collection dates. Partial samples were collected. Although results are provided, these are considered missed samples (Condition Reports 501000063192 and 501000069541, respectively).

AIRBORNE PARTICULATES: GAMMA ISOTOPIC

Air Station M-1	Qtr 1 (pCi/m³)	Qtr 2* (pCi/m³)	Qtr 3 (pCi/m³)	Qtr 4 (pCi/m³)
Barium-140	-1.60E-04 ± 4.04E-03 U	3.44E-03 ± 4.95E-03 U	1.97E-03 ± 5.17E-03 U	8.24E-03 ± 7.69E-03 U
Beryllium-7	6.52E-02 ± 7.75E-03	1.09E-01 ± 1.23E-02	9.58E-02 ± 1.04E-02	5.51E-02 ± 7.39E-03
Cerium-141	1.30E-05 ± 5.40E-04 U	-4.48E-04 ± 6.65E-04 U	4.48E-05 ± 9.83E-04 U	2.31E-05 ± 4.18E-04 U
Cerium-144	-2.92E-04 ± 1.33E-03 U	-5.45E-04 ± 1.29E-03 U	2.95E-04 ± 9.80E-04 U	-3.57E-05 ± 9.07E-04 U
Cesium-134	2.29E-04 ± 2.86E-04 U	1.19E-04 ± 3.51E-04 U	-7.90E-05 ± 2.89E-04 U	6.27E-05 ± 2.41E-04 U
Cesium-137	1.46E-04 ± 3.02E-04 U	-2.04E-04 ± 4.20E-04 U	1.16E-04 ± 2.51E-04 U	1.15E-04 ± 2.08E-04 U
Cobalt-58	-2.09E-04 ± 3.84E-04 U	-2.83E-04 ± 4.30E-04 U	-2.12E-05 ± 3.02E-04 U	-2.44E-04 ± 2.74E-04 U
Cobalt-60	-1.48E-04 ± 3.56E-04 U	1.57E-04 ± 4.14E-04 U	-6.52E-05 ± 3.42E-04 U	-4.03E-05 ± 3.01E-04 U
Lanthanum-140	-4.54E-04 ± 1.91E-03 U	-7.46E-05 ± 2.15E-03 U	-8.88E-04 ± 2.30E-03 U	3.28E-04 ± 1.46E-03 U
Manganese-54	1.34E-04 ± 3.20E-04 U	7.89E-05 ± 3.37E-04 U	1.52E-05 ± 2.65E-04 U	5.89E-05 ± 2.50E-04 U
Niobium-95	-1.97E-04 ± 4.43E-04 U	-4.50E-05 ± 3.56E-04 U	2.66E-05 ± 3.35E-04 U	-9.26E-05 ± 2.21E-04 U
Ruthenium-103	1.54E-04 ± 3.21E-04 U	-1.68E-04 ± 4.49E-04 U	1.64E-04 ± 3.54E-04 U	-1.82E-04 ± 2.49E-04 U
Ruthenium-106	5.65E-04 ± 2.15E-03 U	-9.86E-04 ± 3.41E-03 U	8.06E-04 ± 1.91E-03 U	3.25E-04 ± 1.72E-03 U
Zinc-65	-2.04E-04 ± 5.47E-04 U	5.84E-04 ± 7.92E-04 U	-9.27E-04 ± 7.21E-04 U	1.25E-04 ± 4.36E-04 U
Zirconium-95	-4.20E-05 ± 5.96E-04 U	3.61E-04 ± 6.07E-04 U	7.42E-05 ± 6.73E-04 U	1.37E-04 ± 5.86E-04 U

Note:

* Second quarter 2022 Gamma Isotopic at Air Station M-1 contains a partial sample for the week of 5/11/2022 through 5/18/2022. Although the partial result is provided, this is considered a missed sample (Condition Report 501000063192).

Air Station M-2	Qtr 1 (pCi/m3)	Qtr 2 (pCi/m3)	Qtr 3 (pCi/m3)	Qtr 4* (pCi/m3)
Bari**U**m-140	6.67E-04 ± 4.15E-03 U	-5.06E-05 ± 3.00E-03 U	2.13E-03 ± 4.31E-03 U	2.36E-03 ± 6.49E-03 U
Beryllium-7	7.52E-02 ± 9.58E-03	1.27E-01 ± 1.08E-02	8.34E-02 ± 8.02E-03	4.81E-02 ± 1.06E-02
Cerium-141	4.84E-05 ± 3.71E-04 U	4.30E-04 ± 7.54E-04 U	-6.54E-04 ± 4.83E-04 U	9.75E-05 ± 5.72E-04 U
Cerium-144	6.74E-04 ± 1.01E-03 U	4.17E-04 ± 1.11E-03 U	3.78E-04 ± 8.44E-04 U	-1.54E-03 ± 1.25E-03 U
Cesium-134	-1.91E-05 ± 2.61E-04 U	2.12E-04 ± 2.69E-04 U	-1.61E-05 ± 2.20E-04 U	1.83E-04 ± 2.77E-04 U
Cesium-137	-2.54E-04 ± 3.40E-04 U	6.24E-05 ± 2.39E-04 U	-9.06E-05 ± 2.43E-04 U	-3.17E-05 ± 2.84E-04 U
Cobalt-58	3.07E-04 ± 4.16E-04 U	-7.08E-05 ± 2.86E-04 U	1.73E-04 ± 2.50E-04 U	-1.36E-04 ± 3.45E-04 U
Cobalt-60	2.73E-06 ± 3.50E-04 U	-3.78E-05 ± 3.12E-04 U	-1.12E-04 ± 2.44E-04 U	1.44E-04 ± 3.16E-04 U
Lanthanum-140	-4.37E-04 ± 1.68E-03 U	1.35E-03 ± 1.64E-03 U	-2.97E-03 ± 2.73E-03 U	-3.81E-04 ± 2.58E-03 U
Manganese-54	1.76E-05 ± 2.99E-04 U	5.22E-05 ± 2.91E-04 U	1.32E-04 ± 2.12E-04 U	-3.01E-02 ± 2.82E-04 U
Niobium-95	3.65E-04 ± 4.00E-04 U	1.72E-04 ± 3.34E-04 U	1.88E-04 ± 3.15E-04 U	6.27E-04 ± 4.52E-04 U

Air Station M-2	Qtr 1 (pCi/m3)	Qtr 2 (pCi/m3)	Qtr 3 (pCi/m3)	Qtr 4* (pCi/m3)
Ruthenium-103	-2.39E-04 ± 3.72E-04 U	-9.93E-06 ± 3.44E-04 U	1.98E-04 ± 3.36E-04 U	-1.42E-04 ± 4.09E-04 U
Ruthenium-106	-9.86E-04 ± 2.63E-03 U	-3.58E-04 ± 2.56E-03 U	-1.19E-03 ± 1.56E-03 U	-6.84E-04 ± 2.43E-03 U
Zinc-65	-2.72E-04 ± 9.28E-04 U	2.34E-04 ± 6.11E-04 U	2.15E-04 ± 4.90E-04 U	-5.85E-04 ± 6.07E-04 U
Zirconium-95	-1.81E-04 ± 6.35E-04 U	-1.75E-04 ± 4.34E-04 U	1.85E-04 ± 4.15E-04 U	4.19E-04 ± 6.71E-04 U

Note:

* Fourth quarter 2022 Gamma Isotopic at Air Station M-2 contains a partial sample for the week of 12/27/2022 through 1/4/2023. Although the partial result is provided, this is considered a missed sample (Condition Report 501000069541).

Air Station M-3	Qtr 1 (pCi/m³)	Qtr 2 (pCi/m³)	Qtr 3 (pCi/m³)	Qtr 4 (pCi/m³)
Barium-140	7.98E-03 ± 1.17E-02 UI	1.04E-03 ± 3.12E-03 U	2.47E-03 ± 5.18E-03 U	-3.19E-03 ± 6.30E-03 U
Beryllium-7	6.02E-02 ± 8.73E-03	1.13E-01 ± 1.02E-02	8.23E-02 ± 8.57E-03	6.15E-02 ± 1.04E-02
Cerium-141	3.16E-04 ± 7.68E-04 U	-2.99E-04 ± 5.07E-04 U	-5.97E-05 ± 5.29E-04 U	4.43E-04 ± 6.16E-04 U
Cerium-144	2.97E-06 ± 1.14E-03 U	5.74E-04 ± 1.03E-03 U	-3.86E-04 ± 1.06E-03 U	-4.04E-05 ± 8.42E-04 U
Cesium-134	-3.19E-05 ± 3.28E-04 U	-6.58E-05 ± 2.97E-04 U	4.85E-04 ± 3.88E-04 UI	3.25E-04 ± 3.35E-04 U
Cesium-137	1.57E-04 ± 2.15E-04 U	-1.26E-04 ± 2.81E-04 U	-6.80E-05 ± 3.18E-04 U	-9.45E-05 ± 3.86E-04 U
Cobalt-58	2.86E-04 ± 2.71E-04 U	-2.19E-05 ± 3.18E-04 U	6.28E-05 ± 2.76E-04 U	-1.73E-04 ± 4.68E-04 U
Cobalt-60	6.74E-05 ± 2.92E-04 U	5.15E-05 ± 2.54E-04 U	3.31E-04 ± 2.64E-04 U	-2.33E-04 ± 4.17E-04 U
Lanthanum-140	1.20E-03 ± 1.70E-03 U	-1.25E-03 ± 1.40E-03 U	7.72E-04 ± 1.89E-03 U	-3.88E-04 ± 1.85E-03 U
Manganese-54	3.07E-06 ± 2.34E-04 U	-6.76E-05 ± 2.89E-04 U	2.65E-04 ± 2.59E-04 U	1.09E-04 ± 2.68E-04 U
Niobium-95	3.68E-04 ± 4.49E-04 U	-5.44E-05 ± 2.59E-04 U	1.08E-04 ± 2.96E-04 U	2.34E-04 ± 4.17E-04 U
Ruthenium-103	3.97E-04 ± 3.40E-04 U	7.19E-05 ± 2.98E-04 U	-1.09E-05 ± 3.39E-04 U	2.92E-04 ± 4.39E-04 U
Ruthenium-106	-4.34E-04 ± 2.40E-03 U	-5.79E-04 ± 1.67E-03 U	-3.75E-04 ± 2.57E-03 U	-3.64E-04 ± 2.66E-03 U
Zinc-65	-3.79E-04 ± 6.30E-04 U	3.98E-04 ± 4.56E-04 U	-1.24E-04 ± 5.86E-04 U	-4.82E-04 ± 7.45E-04 U
Zirconium-95	1.31E-04 ± 5.81E-04 U	2.12E-04 ± 4.76E-04 U	-4.79E-06 ± 5.48E-04 U	1.09E-04 ± 7.30E-04 U

Air Station M-4	Qtr 1 (pCi/m³)	Qtr 2 (pCi/m³)	Qtr 3 (pCi/m³)	Qtr 4 (pCi/m³)
Barium-140	-2.31E-03 ± 5.19E-03 U	8.91E-04 ± 4.56E-03 U	2.44E-03 ± 4.33E-03 U	2.70E-05 ± 7.19E-03 U
Beryllium-7	7.76E-02 ± 1.02E-02	1.17E-01 ± 1.36E-02	8.34E-02 ± 8.89E-03	4.97E-02 ± 7.92E-03
Cerium-141	-3.58E-05 ± 4.01E-04 U	3.71E-04 ± 1.28E-03 U	-2.13E-04 ± 4.73E-04 U	-2.50E-04 ± 6.81E-04 U
Cerium-144	-3.83E-04 ± 1.01E-03 U	-3.26E-04 ± 1.43E-03 U	-5.79E-04 ± 8.80E-04 U	-4.18E-04 ± 1.34E-03 U
Cesium-134	1.86E-04 ± 2.94E-04 U	-1.27E-04 ± 4.42E-04 U	1.67E-04 ± 2.55E-04 U	9.55E-05 ± 3.21E-04 U

Air Station M-4	Qtr 1 (pCi/m³)	Qtr 2 (pCi/m³)	Qtr 3 (pCi/m³)	Qtr 4 (pCi/m³)
Cesium-137	-1.73E-04 ± 3.75E-04 U	-7.46E-05 ± 3.69E-04 U	1.20E-04 ± 2.29E-04 U	4.84E-05 ± 3.76E-04 U
Cobalt-58	1.75E-04 ± 3.50E-04 U	-3.26E-04 ± 3.95E-04 U	-1.94E-04 ± 3.52E-04 U	1.80E-04 ± 4.68E-04 U
Cobalt-60	-9.45E-06 ± 3.97E-04 U	2.94E-04 ± 3.10E-04 U	-2.60E-04 ± 2.92E-04 U	8.79E-05 ± 4.23E-04 U
Lanthanum-140	2.94E-05 ± 1.09E-03 U	9.28E-04 ± 2.27E-03 U	2.09E-04 ± 1.66E-03 U	-1.26E-03 ± 2.77E-03 U
Manganese-54	-1.20E-04 ± 3.20E-04 U	1.34E-05 ± 3.64E-04 U	1.54E-04 ± 2.30E-04 U	9.83E-05 ± 3.48E-04 U
Niobium-95	-5.09E-05 ± 3.84E-04 U	-2.67E-04 ± 4.00E-04 U	-1.33E-04 ± 3.49E-04 U	4.43E-04 ± 4.78E-04 U
Ruthenium-103	2.06E-04 ± 3.88E-04 U	4.53E-05 ± 4.72E-04 U	8.70E-05 ± 2.79E-04 U	1.23E-04 ± 4.82E-04 U
Ruthenium-106	-3.08E-04 ± 2.69E-03 U	-6.93E-04 ± 2.94E-03 U	5.36E-04 ± 1.79E-03 U	1.97E-03 ± 1.95E-03 U
Zinc-65	-7.37E-06 ± 6.64E-04 U	2.18E-04 ± 7.63E-04 U	1.19E-04 ± 4.62E-04 U	-3.29E-04 ± 8.40E-04 U
Zirconium-95	-2.06E-04 ± 8.35E-04 U	3.14E-04 ± 6.79E-04 U	-2.16E-04 ± 5.92E-04 U	1.13E-04 ± 8.25E-04 U

Air Station M-5	Qtr 1 (pCi/m³)	Qtr 2 (pCi/m³)	Qtr 3 (pCi/m³)	Qtr 4 (pCi/m³)
Barium-140	-2.84E-04 ± 4.40E-03 U	-9.95E-04 ± 3.65E-03 U	-3.42E-03 ± 5.27E-03 U	-2.54E-03 ± 6.23E-03 U
Beryllium-7	7.51E-02 ± 9.26E-03	1.21E-01 ± 1.11E-02	9.17E-02 ± 8.37E-03	5.07E-02 ± 9.34E-03
Cerium-141	-8.99E-05 ± 4.70E-04 U	-8.91E-06 ± 4.37E-04 U	-1.76E-04 ± 6.51E-04 U	-3.18E-04 ± 5.50E-04 U
Cerium-144	2.61E-04 ± 1.15E-03 U	-7.38E-05 ± 1.42E-03 U	1.09E-03 ± 1.17E-03 U	5.81E-04 ± 9.71E-04 U
Cesium-134	1.75E-04 ± 3.13E-04 U	-2.66E-04 ± 2.83E-04 U	5.12E-05 ± 2.75E-04 U	-7.88E-05 ± 3.16E-04 U
Cesium-137	1.84E-05 ± 3.20E-04 U	-2.72E-04 ± 2.95E-04 U	2.13E-04 ± 2.34E-04 U	1.23E-04 ± 2.92E-04 U
Cobalt-58	-2.64E-05 ± 3.65E-04 U	5.02E-05 ± 3.60E-04 U	-1.25E-04 ± 2.75E-04 U	-2.67E-04 ± 3.40E-04 U
Cobalt-60	8.33E-05 ± 1.87E-04 U	2.26E-04 ± 3.69E-04 U	7.39E-05 ± 2.23E-04 U	1.41E-04 ± 2.85E-04 U
Lanthanum-140	-4.12E-04 ± 1.59E-03 U	3.19E-04 ± 1.63E-03 U	7.59E-04 ± 2.19E-03 U	-4.89E-03 ± 4.07E-03 U
Manganese-54	1.79E-05 ± 3.08E-04 U	-4.58E-05 ± 2.82E-04 U	-1.12E-04 ± 2.19E-04 U	3.16E-05 ± 3.46E-04 U
Niobium-95	2.59E-06 ± 3.31E-04 U	4.01E-05 ± 3.26E-04 U	-9.39E-05 ± 3.60E-04 U	3.63E-04 ± 3.83E-04 U
Ruthenium-103	-1.80E-04 ± 4.02E-04 U	-2.29E-04 ± 3.01E-04 U	1.08E-04 ± 3.62E-04 U	-4.45E-04 ± 4.00E-04 U
Ruthenium-106	1.06E-03 ± 2.31E-03 U	3.42E-04 ± 2.28E-03 U	-5.55E-04 ± 2.30E-03 U	-4.02E-04 ± 2.74E-03 U
Zinc-65	8.52E-05 ± 4.66E-04 U	1.02E-04 ± 6.36E-04 U	-4.39E-04 ± 5.92E-04 U	-2.08E-04 ± 7.37E-04 U
Zirconium-95	2.88E-04 ± 6.27E-04 U	2.09E-04 ± 5.22E-04 U	-9.61E-05 ± 5.82E-04 U	3.62E-04 ± 7.63E-04 U

SEDIMENT: GAMMA ISOTOPIC

M-8c Upstream of Plant	Qtr 2 (pCi/Kg, dry)	Qtr 4 (pCi/Kg, dry)
Barium-140	-3.7 ± 64.2 U	97.7 ± 128.0 U
Beryllium-7	477.0 ± 235.0	-55.7 ± 172.0 U
Cerium-144	33.6 ± 73.8 U	-13.6 ± 88.1 U
Cesium-134	12.6 ± 18.8 U	19.9 ± 42.1 U
Cesium-137	21.8 ± 30.6 U	34.1 ± 28.4 UI
Cobalt-58	10.1 ± 17.6 U	6.7 ± 17.8 U
Cobalt-60	9.6 ± 17.5 U	7.6 ± 20.6 U
Iron-59	-9.5 ± 33.8 U	-40.6 ± 48.6 U
Lanthanum-140	-2.2 ± 20.5 U	-10.0 ± 37.5 U
Manganese-54	5.6 ± 15.9 U	14.0 ± 21.5 U
Niobium-95	-12.6 ± 18.3 U	4.3 ± 22.9 U
Potassium-40	10200.0 ± 814.0	10100.0 ± 956.0
Ruthenium-103	2.0 ± 14.4 U	24.3 ± 19.0 U
Ruthenium-106	67.1 ± 137.0 U	60.4 ± 157.0 U
Zinc-65	14.9 ± 35.7 U	-22.3 ± 51.0 U
Zirconium-95	17.9 ± 25.3 U	-2.5 ± 42.9 U

M-9 Downstream of Plant	Qtr 2 (pCi/Kg, dry)	Qtr 4 (pCi/Kg, dry)
Barium-140	-50.2 ± 90.8 U	46.4 ± 210.0 U
Beryllium-7	191.0 ± 311.0 U	2230.0 ± 613.0
Cerium-144	-14.1 ± 90.7 U	45.7 ± 149.0 U
Cesium-134	39.3 ± 23.3 U	26.7 ± 32.1 U
Cesium-137	31.0 ± 39.7 UI	87.6 ± 55.6 UI
Cobalt-58	51.6 ± 60.3 UI	8.2 ± 33.6 U
Cobalt-60	1.4 ± 27.7 U	-7.8 ± 27.1 U
Iron-59	12.0 ± 40.4 U	-46.4 ± 69.5 U
Lanthanum-140	-17.4 ± 25.9 U	-66.0 ± 67.6 U
Manganese-54	14.5 ± 18.6 U	22.7 ± 27.6 U
Niobium-95	-9.7 ± 19.8 U	19.0 ± 33.9 U
Potassium-40	11600.0 ± 971.0	10200.0 ± 1220.0
Ruthenium-103	8.4 ± 17.7 U	-15.7 ± 29.0 U
Ruthenium-106	-15.0 ± 152.0 U	130.0 ± 214.0 U
Zinc-65	-17.1 ± 54.6 U	-6.6 ± 74.9 U
Zirconium-95	12.5 ± 31.9 U	-26.7 ± 57.4 U

M-15 Montissippi Park	Qtr 2 (pCi/Kg, dry)	Qtr 4 (pCi/Kg, dry)
Barium-140	108.0 ± 89.0 U	19.0 ± 103.0 U
Beryllium-7	-29.9 ± 136.0 U	351.0 ± 260.0
Cerium-144	53.2 ± 91.2 U	42.1 ± 85.1 U
Cesium-134	21.0 ± 30.7 U	5.9 ± 17.5 U
Cesium-137	81.3 ± 37.3 UI	15.8 ± 26.2 U
Cobalt-58	-19.8 ± 18.7 U	-8.5 ± 15.9 U
Cobalt-60	3.2 ± 22.5 U	-2.5 ± 16.8 U
Iron-59	-4.6 ± 43.5 U	-29.3 ± 43.0 U
Lanthanum-140	-13.5 ± 32.1 U	-6.1 ± 27.5 U
Manganese-54	0.4 ± 18.5 U	-3.7 ± 16.7 U
Niobium-95	11.2 ± 22.4 U	-0.5 ± 17.3 U
Potassium-40	9740.0 ± 890.0	13100.0 ± 861.0
Ruthenium-103	-6.4 ± 15.4 U	2.0 ± 15.3 U
Ruthenium-106	15.8 ± 167.0 U	93.3 ± 124.0 U
Zinc-65	-7.0 ± 40.4 U	-0.4 ± 48.1 U
Zirconium-95	19.8 ± 34.1 U	16.8 ± 38.1 U

TISSUE – FISH: GAMMA ISOTOPIC

(pCi/Kg, wet)	M-8c Upstream of Plant				M-9 Downstream of Plant			
	June		Sep		June		Sep	
	Fish 1	Fish 2	Fish 1	Fish 2	Fish 1	Fish 2	Fish 1	Fish 2
Barium-140	-22.0 ± 37.4 U	2.5 ± 33.4 U	6.4 ± 13.5 U	114.0 ± 99.6 U	-15.3 ± 17.8 U	7.6 ± 24.5 U	4.6 ± 13.4 U	8.8 ± 17.1 U
Cerium-144	-15.1 ± 38.9 U	-15.5 ± 33.9 U	8.7 ± 14.8 U	30.8 ± 37.2 U	-5.5 ± 17.8 U	-14.4 ± 24.9 U	-2.7 ± 18.2 U	12.4 ± 38.9 U
Cesium-134	7.3 ± 8.5 U	0.5 ± 7.4 U	-0.5 ± 3.0 U	-0.3 ± 6.8 U	0.7 ± 3.7 U	1.2 ± 5.0 U	1.8 ± 3.3 U	-1.3 ± 4.3 U
Cesium-137	-0.7 ± 8.5 U	10.2 ± 11.5 U	3.5 ± 4.6 U	5.1 ± 8.0 U	2.0 ± 4.1 U	2.1 ± 8.1 U	4.3 ± 5.6 U	1.3 ± 3.9 U
Cobalt-58	-0.9 ± 7.4 U	-1.0 ± 6.9 U	0.5 ± 2.9 U	-7.8 ± 8.3 U	0.1 ± 3.3 U	-3.7 ± 5.3 U	2.1 ± 2.9 U	2.3 ± 4.0 U
Cobalt-60	-2.6 ± 8.3 U	-0.5 ± 7.3 U	3.5 ± 3.1 U	-1.6 ± 7.9 U	-1.9 ± 3.8 U	-0.5 ± 5.3 U	1.3 ± 3.3 U	-0.4 ± 3.7 U
Iron-59	-9.0 ± 16.0 U	-4.4 ± 16.6 U	4.7 ± 6.8 U	-12.3 ± 21.9 U	-1.7 ± 7.3 U	3.0 ± 11.5 U	2.0 ± 8.4 U	-5.0 ± 8.6 U
Lanthanum-140	-4.4 ± 13.0 U	-3.0 ± 10.4 U	0.4 ± 3.7 U	-10.2 ± 48.7 U	-0.1 ± 3.2 U	-6.3 ± 9.2 U	5.3 ± 4.0 U	0.2 ± 4.2 U
Manganese-54	-2.6 ± 8.3 U	3.5 ± 7.5 U	1.2 ± 2.5 U	3.7 ± 6.5 U	3.8 ± 3.8 U	-4.0 ± 4.7 U	-0.3 ± 4.6 U	-1.3 ± 3.5 U
Niobium-95	-8.7 ± 9.3 U	-4.8 ± 9.2 U	3.5 ± 3.1 U	4.1 ± 9.1 U	0.8 ± 3.8 U	3.3 ± 5.0 U	-0.3 ± 3.0 U	3.6 ± 4.0 U
Potassium-40	2750.0 ± 313.0	2740.0 ± 310.0	3310.0 ± 186.0	3590.0 ± 369.0	3480.0 ± 217.0	3240.0 ± 257.0	3470.0 ± 213.0	3520.0 ± 222.0
Zinc-65	0.4 ± 16.6 U	-1.2 ± 17.9 U	0.5 ± 8.0 U	9.2 ± 22.0 U	-5.4 ± 9.7 U	1.1 ± 10.5 U	-2.8 ± 10.3 U	15.7 ± 9.7 U
Zirconium-95	-7.8 ± 12.7 U	-0.5 ± 12.4 U	1.8 ± 5.2 U	-6.5 ± 13.6 U	3.3 ± 6.9 U	2.1 ± 8.6 U	0.6 ± 6.0 U	6.2 ± 6.6 U

TISSUE – PLANT: GAMMA ISOTOPIC

pCi/Kg	M-41 Training Center				M-42 Biology Station Road			
	Jun	Jul	Aug	Sep	Jun	Jul	Aug	Sep
Cesium-134	-2.0 ± 8.1 U	3.4 ± 7.6 U	5.6 ± 15.0 U	0.0 ± 11.4 U	5.9 ± 10.8 U	16.1 ± 14.1 U	16.6 ± 14.0 U	-4.8 ± 12.1 U
Cesium-137	11.5 ± 15.5 U	5.1 ± 9.3 U	-6.6 ± 13.4 U	-7.3 ± 19.5 U	5.8 ± 10.8 U	-21.0 ± 18.7 U	6.7 ± 11.4 U	-4.8 ± 8.9 U
Cobalt-58	-0.4 ± 6.8 U	6.9 ± 8.6 U	5.6 ± 12.2 U	8.6 ± 10.1 U	-4.9 ± 11.4 U	-2.4 ± 11.9 U	10.2 ± 9.0 U	-0.9 ± 11.4 U
Cobalt-60	5.1 ± 9.2 U	0.9 ± 9.6 U	-0.7 ± 15.9 U	5.8 ± 10.4 U	-2.3 ± 11.6 U	1.9 ± 12.4 U	7.0 ± 12.0 U	14.3 ± 9.2 U
Iodine-131	-10.5 ± 11.3 U	2.2 ± 12.0 U	3.5 ± 15.8 U	18.6 ± 34.9 U	0.0 ± 13.1 U	0.6 ± 15.5 U	14.0 ± 17.9 U	-2.2 ± 24.7 U
Iron-59	-1.2 ± 16.5 U	8.0 ± 15.8 U	9.5 ± 26.7 U	0.2 ± 22.5 U	2.4 ± 23.9 U	-0.4 ± 20.1 U	0.7 ± 22.3 U	-1.0 ± 17.3 U
Manganese-54	-0.4 ± 7.5 U	6.4 ± 7.9 U	-3.7 ± 12.5 U	-13.8 ± 15.7 U	6.3 ± 10.2 U	-2.2 ± 10.7 U	7.5 ± 11.8 U	-3.0 ± 9.6 U
Niobium-95	-10.0 ± 10.7 U	1.6 ± 8.4 U	3.3 ± 14.4 U	2.1 ± 14.1 U	-0.5 ± 10.4 U	3.1 ± 11.1 U	8.9 ± 14.4 U	3.2 ± 9.8 U
Zinc-65	-13.0 ± 19.2 U	14.3 ± 20.5 U	13.4 ± 30.7 U	-13.2 ± 21.8 U	-16.3 ± 27.9 U	-1.6 ± 24.7 U	3.1 ± 22.1 U	4.5 ± 17.2 U

pCi/Kg	M-43 Imholte Farm			
	Jun	Jul	Aug	Sep
Cesium-134	0.8 ± 5.2 U	13.6 ± 13.1 U	7.9 ± 16.0 U	2.5 ± 8.1 U
Cesium-137	2.3 ± 6.5 U	7.5 ± 12.0 U	-17.5 ± 20.2 U	-1.5 ± 8.0 U
Cobalt-58	-2.1 ± 4.7 U	0.6 ± 10.5 U	-7.6 ± 12.2 U	-1.1 ± 7.5 U
Cobalt-60	-2.4 ± 5.6 U	1.5 ± 10.2 U	-1.1 ± 12.6 U	-0.6 ± 6.9 U
Iodine-131	4.2 ± 5.3 U	-0.3 ± 17.3 U	19.8 ± 25.5 U	-3.7 ± 20.9 U
Iron-59	11.5 ± 13.0 U	18.0 ± 27.1 U	11.2 ± 21.6 U	-2.4 ± 15.8 U
Manganese-54	0.7 ± 5.5 U	7.7 ± 11.6 U	0.5 ± 10.0 U	6.6 ± 7.0 U
Niobium-95	3.0 ± 5.2 U	-1.5 ± 10.9 U	-1.2 ± 9.6 U	7.0 ± 7.6 U
Zinc-65	5.4 ± 13.3 U	-10.8 ± 31.6 U	-15.4 ± 22.6 U	-1.1 ± 16.7 U

WATER: TRITIUM

pCi/L	Qtr 1	Qtr 2	Qtr 3	Qtr 4[1]
M-11 City of Monticello	-8.48 ± 168 U	-57 ± 173 U	4.9 ± 163 U	49.2 ± 229 U
M-12 Plant Well #11	13.1 ± 171 U	-151 ± 167 U	−113 ± 151 U	-138 ± 221 U
M-14 City of Minneapolis[1]	69.6 ± 206 U	9.42 ± 188 U	63.5E ± 214 U	25.0 ± 132 U
M-43 Imholte Farm	90.4 ± 168 U	-34.0 ± 165 U	-87.9 ± 150 U	-81.8 ± 213 U
M-55 Hasbrouck Residence	77.3 ± 173 U	-87.6 ± 170 U	−65.8 ± 152 U	40.8 ± 232 U
M-8 Upstream of Plant	108 ± 137 U	292 ± 286 U	-964 ± 234 U	60.8 ± 251 U
M-9 Downstream of Plant	276 ± 248 U	212 ± 281 U	12.7 ± 229 U	-65.9 ± 245 U

[1]Quarterly composite samples continued over into subsequent quarters. Q4 2022 composite sample collection continued into January 3, 2023.

WATER – DRINKING: GROSS BETA

M-14 City of Minneapolis	Gross Beta (pCi/L)
Jan	1.28 ± 2.25 **U**
Feb	1.54 ± 1.98 **U**
Mar	0.327 ± 2.07 **U**
Apr	2.97 ± 2.34 **M**
May	1.94 ± 2.32 **U**
Jun	0.261 ± 1.71 **U**
Jul	−1.89 ± 1.87 **U**
Aug	2.80 ± 2.52 **U**
Sep	1.84± 2.31 **U**
Oct	3.23 ± 2.26 **U**
Nov	1.09± 2.04 **U**
Dec	2.10 ± 1.99 **U**

WATER – GROUNDWATER: GAMMA ISOTOPIC

M-11 City of Monticello	Qtr 1 (pCi/L)	Qtr 2 (pCi/L)	Qtr 3 (pCi/L)	Qtr 4 (pCi/L)
Barium-140	-1.41E-01 ± 5.07E+00 U	-2.73E+00 ± 8.05E+00 U	1.44E−01 ± 8.31E+00 U	-2.16E+00 ± 1.13E+01 U
Cerium-144	3.81E+00 ± 6.93E+00 U	2.06E+00 ± 6.45E+00 U	-5.53E-02 ± 7.15E+00 U	5.43E+00 ± 1.53E+01 U
Cesium-134	4.69E-01 ± 1.10E+00 U	-3.55E-02 ± 1.00E+00 U	7.42E−01 ± 1.10E+00 U	2.78E-01 ± 1.78E+00 U
Cesium-137	-9.00E-01 ± 1.18E+00 U	3.39E-01 ± 1.01E+00 U	−1.85E+00 ± 2.56E+00 U	1.41E+00 ± 2.11E+00 U
Cobalt-58	-1.67E+00 ± 1.02E+00 U	-7.74E-01 ± 9.45E-01 U	6.22E−01 ± 1.11E+00 U	-1.13E+00 ± 2.19E+00 U
Cobalt-60	-5.81E-01 ± 9.73E-01 U	2.65E-01 ± 2.07E+00 U	1.01E+00 ± 1.17E+00 U	6.37E-01 ± 2.34E+00 U
Iron-59	1.08E+00 ± 2.12E+00 U	-5.60E-01 ± 2.34E+00 U	−1.13E+00 ± 2.35E+00 U	2.80E+00 ± 4.57E+00 U
Lanthanum-140	-1.60E+00 ± 1.78E+00 U	-1.26E+00 ± 2.84E+00 U	5.63E−01 ± 2.90E+00 U	6.39E-01 ± 4.88E+00 U
Manganese-54	2.19E-01 ± 1.05E+00 U	-3.09E-02 ± 9.62E-01 U	−7.77E−01 ± 1.21E+00 U	-1.90E+00 ± 2.20E+00 U
Niobium-95	-1.07E+00 ± 1.63E+00 U	-9.34E-01 ± 1.19E+00 U	−4.96E−01 ± 1.26E+00 U	6.80E-01 ± 2.33E+00 U
Zinc-65	5.16E-01 ± 2.61E+00 U	2.46E-01 ± 1.78E+00 U	−6.24E−01 ± 1.96E+00 U	3.79E+00 ± 4.76E+00 U
Zirconium-95	-2.11E-01 ± 1.78E+00 U	1.54E+00 ± 1.82E+00 U	−1.58E+00 ± 2.02E+00 U	-1.14E+00 ± 2.97E+00 U

M-12 Plant Well #11	Qtr 1 (pCi/L)	Qtr 2 (pCi/L)	Qtr 3 (pCi/L)	Qtr 4 (pCi/L)
Barium-140	4.67E+00 ± 5.10E+00 U	1.83E+00 ± 6.42E+00 U	5.46E+00 ± 7.58E+00 U	-6.71E+00 ± 2.35E+01 U
Cerium-144	-8.74E+00 ± 1.03E+01 U	2.34E+00 ± 5.08E+00 U	-1.13E+00 ± 7.36E+00 U	-1.55E+01 ± 2.55E+01 U
Cesium-134	7.77E-01 ± 1.07E+00 U	1.34E-01 ± 8.23E-01 U	−3.40E−01 ± 1.11E+00 U	-1.23E-01 ± 4.41E+00 U
Cesium-137	1.97E-01 ± 1.07E+00 U	5.06E-01 ± 8.18E-01 U	5.99E−01 ± 9.85E−01 U	9.54E-01 ± 4.62E+00 U
Cobalt-58	-2.30E-01 ± 8.68E-01 U	-1.81E-01 ± 8.91E-01 U	−3.39E−01 ± 1.23E+00 U	1.76E-02 ± 3.31E+00 U
Cobalt-60	7.20E-01 ± 1.06E+00 U	-1.42E-01 ± 7.69E-01 U	−3.59E−02 ± 1.03E+00 U	4.18E+00 ± 3.92E+00 U
Iron-59	-1.05E+00 ± 2.17E+00 U	7.11E-01 ± 1.85E+00 U	1.24E+00 ± 2.41E+00 U	4.35E+00 ± 6.49E+00 U
Lanthanum-140	-9.59E-01 ± 1.86E+00 U	4.33E-01 ± 2.60E+00 U	1.09E+00 ± 2.58E+00 U	2.46E+00 ± 5.12E+00 U
Manganese-54	1.81E-01 ± 1.09E+00 U	-1.61E-01 ± 8.04E-01 U	−3.33E−01 ± 1.05E+00 U	-5.85E-01 ± 3.54E+00 U
Niobium-95	8.43E-01 ± 1.10E+00 U	5.20E-01 ± 8.59E-01 U	6.04E−01 ± 1.14E+00 U	2.49E-01 ± 4.53E+00 U
Zinc-65	2.05E+00 ± 2.41E+00 U	-1.36E+00 ± 1.47E+00 U	3.00E−02 ± 2.42E+00 U	3.14E+00 ± 4.55E+00 U
Zirconium-95	2.15E+00 ± 1.97E+00 U	1.59E+00 ± 1.46E+00 U	−9.67E−02 ± 1.91E+00 U	-5.20E-01 ± 7.33E+00 U

M-43 Imholte Farm	Qtr 1 (pCi/L)	Qtr 2 (pCi/L)	Qtr 3 (pCi/L)	Qtr 4 (pCi/L)
Barium-140	3.68E-02 ± 5.19E+00 U	6.18E+00 ± 7.68E+00 U	1.23E+00 ± 6.67E+00 U	8.62E+00 ± 1.38E+01 U
Cerium-144	-2.74E+00 ± 7.58E+00 U	4.85E+00 ± 6.99E+00 U	3.31E+00 ± 6.42E+00 U	-9.08E-01 ± 1.42E+01 U
Cesium-134	-3.97E-01 ± 1.20E+00 U	1.02E+00 ± 1.01E+00 U	1.33E-01 ± 1.01E+00 U	-4.66E-02 ± 2.15E+00 U
Cesium-137	3.68E-01 ± 1.10E+00 U	-4.42E+00 ± 2.31E+00 U	5.22E-01 ± 1.98E+00 U	-6.96E-01 ± 2.33E+00 U
Cobalt-58	5.07E-01 ± 1.00E+00 U	-1.95E-01 ± 1.02E+00 U	-1.18E+00 ± 1.49E+00 U	-2.81E-01 ± 1.87E+00 U
Cobalt-60	-8.38E-01 ± 1.12E+00 U	-1.95E-01 ± 9.92E-01 U	2.62E-01 ± 1.06E+00 U	-6.26E-01 ± 2.21E+00 U
Iron-59	-6.89E-01 ± 2.09E+00 U	1.05E+00 ± 2.12E+00 U	-6.56E-01 ± 2.08E+00 U	-5.85E-01 ± 6.09E+00 U
Lanthanum-140	-1.56E-01 ± 1.87E+00 U	1.74E+00 ± 2.78E+00 U	-4.87E-01 ± 2.27E+00 U	-3.22E+00 ± 4.32E+00 U
Manganese-54	-6.81E-01 ± 1.04E+00 U	-3.85E-01 ± 9.51E-01 U	-3.16E-01 ± 8.84E-01 U	-1.01E+00 ± 2.53E+00 U
Niobium-95	2.32E-01 ± 2.16E+00 U	-1.21E+00 ± 1.72E+00 U	9.43E-02 ± 1.02E+00 U	1.69E+00 ± 2.46E+00 U
Zinc-65	2.71E-01 ± 2.41E+00 U	-9.87E-02 ± 1.95E+00 U	7.83E-01 ± 1.96E+00 U	9.48E-01 ± 4.58E+00 U
Zirconium-95	4.82E-01 ± 1.79E+00 U	-1.82E+00 ± 1.83E+00 U	-8.51E-01 ± 1.67E+00 U	-2.05E+00 ± 3.78E+00 U

M-55 Hasbrouck Residence	Qtr 1 (pCi/L)	Qtr 2 (pCi/L)	Qtr 3 (pCi/L)	Qtr 4 (pCi/L)
Barium-140	2.55E-01 ± 4.49E+00 U	-9.54E+00 ± 9.43E+00 U	−1.98E+00 ± 6.87E+00 U	-4.37E+00 ± 1.76E+01 U
Cerium-144	-6.16E-01 ± 5.74E+00 U	-9.23E-01 ± 5.05E+00 U	2.80E+00 ± 5.53E+00 U	5.62E-01 ± 1.48E+01 U
Cesium-134	5.99E-01 ± 9.61E-01 U	-1.58E+00 ± 1.48E+00 U	2.91E−01 ± 9.81E−01 U	1.02E+00 ± 3.76E+00 U
Cesium-137	-3.59E-01 ± 8.84E-01 U	-1.70E+00 ± 2.18E+00 U	7.05E−01 ± 9.53E−01 U	-3.67E+00 ± 3.88E+00 U
Cobalt-58	1.18E+00 ± 2.80E+00 U	-9.77E-01 ± 8.43E-01 U	5.86E−01 ± 9.17E−01 U	3.98E-01 ± 3.20E+00 U
Cobalt-60	-6.09E-01 ± 8.75E-01 U	2.41E+00 ± 1.43E+00 UI	5.97E−02 ± 8.69E−01 U	-1.32E+00 ± 3.73E+00 U
Iron-59	1.20E-01 ± 1.80E+00 U	8.78E-02 ± 1.85E+00 U	3.63E−01 ± 1.86E+00 U	2.05E-02 ± 6.32E+00 U
Lanthanum-140	-7.09E-01 ± 1.43E+00 U	-4.05E-01 ± 2.20E+00 U	−2.67E+00 ± 2.23E+00 U	2.42E+00 ± 5.23E+00 U
Manganese-54	6.17E-01 ± 1.53E+00 U	5.76E-01 ± 8.08E-01 U	−2.22E−01 ± 8.81E−01 U	4.01E-01 ± 2.90E+00 U
Niobium-95	8.53E-01 ± 9.79E-01 U	6.62E-01 ± 8.34E-01 U	−1.15E−01 ± 1.01E+00 U	1.48E+00 ± 4.25E+00 U
Zinc-65	1.05E-01 ± 2.17E+00 U	-8.08E-01 ± 1.51E+00 U	−5.20E−03 ± 1.89E+00 U	-7.95E+00 ± 9.15E+00 U
Zirconium-95	-8.37E-01 ± 1.51E+00 U	-1.29E+00 ± 1.42E+00 U	−8.55E−01 ± 1.64E+00 U	1.21E+00 ± 6.83E+00 U

WATER – DRINKING: GAMMA ISOTOPIC

M-14 City of Minneapolis

pCi/L	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Barium-140	-8.590 ± 15.400 U	22.200 ± 21.700 U	-17.100 ± 18.000 U	-7.270 ± 15.600 U	-10.400 ± 19.200 U	13.600 ± 11.800 U	2.830 ± 14.300 U	4.950 ± 14.500 U	-0.929 ± 8.590 U	-2.560 ± 10.800 U	-2.760 ± 11.800 U	-5.360 ± 13.600 U
Cerium-144	3.700 ± 13.700 U	0.212 ± 16.900 U	13.600 ± 17.800 U	-1.890 ± 10.900 U	1.090 ± 16.900 U	-6.190 ± 15.500 U	0.000 ± 17.200 U	-2.030 ± 14.800 U	2.370 ± 10.900 U	2.530 ± 11.900 U	-2.770 ± 13.700 U	-1.400 ± 9.280 U
Cesium-134	2.160 ± 2.140 U	1.370 ± 2.940 U	1.000 ± 2.660 U	-1.000 ± 1.670 U	2.470 ± 4.320 U	-0.493 ± 2.340 U	0.000 ± 2.130 U	0.935 ± 3.430 U	-0.960 ± 2.290 U	-0.117 ± 1.940 U	-1.060 ± 2.190 U	0.454 ± 1.210 U
Cesium-137	1.090 ± 1.980 U	0.638 ± 3.300 U	0.461 ± 2.140 U	-0.844 ± 1.500 U	-0.475 ± 4.740 U	0.126 ± 5.450 U	1.460 ± 2.460 U	-2.390 ± 2.600 U	-0.804 ± 1.690 U	-1.710 ± 1.960 U	0.772 ± 2.490 U	1.500 ± 1.870 U
Cobalt-58	-0.556 ± 2.200 U	0.035 ± 3.020 U	-1.600 ± 2.560 U	5.260 ± 3.650 UI	0.746 ± 2.620 U	0.223 ± 2.090 U	0.000 ± 1.850 U	-0.320 ± 2.080 U	-1.030 ± 1.650 U	1.840 ± 2.000 U	1.120 ± 2.290 U	0.513 ± 1.390 U
Cobalt-60	-0.068 ± 2.070 U	-3.400 ± 3.450 U	-0.541 ± 2.090 U	1.330 ± 1.590 U	1.430 ± 2.040 U	0.479 ± 2.320 U	0.000 ± 2.270 U	1.730 ± 2.740 U	1.820 ± 1.680 U	-0.062 ± 1.830 U	0.991 ± 2.300 U	-0.376 ± 1.150 U
Iron-59	-0.374 ± 4.810 U	2.910 ± 4.970 U	1.410 ± 4.750 U	-2.720 ± 4.010 U	-2.140 ± 6.770 U	-1.600 ± 5.000 U	0.000 ± 8.200 U	-2.710 ± 5.860 U	0.423 ± 2.310 U	1.330 ± 5.200 U	0.248 ± 4.020 U	-0.644 ± 2.840 U
Lanthanum-140	-0.715 ± 3.410 U	-3.380 ± 7.500 U	-1.260 ± 4.420 U	-1.770 ± 4.870 U	-2.780 ± 8.380 U	-1.660 ± 3.720 U	0.000 ± 5.980 U	1.490 ± 4.740 U	0.169 ± 1.900 U	0.654 ± 2.440 U	-2.240 ± 5.120 U	-2.120 ± 2.630 U
Manganese-54	0.142 ± 2.080 U	-0.055 ± 2.230 U	-2.330 ± 2.440 U	0.172 ± 1.620 U	0.627 ± 2.550 U	-1.860 ± 2.500 U	0.000 ± 2.500 U	-2.080 ± 2.190 U	-0.054 ± 1.620 U	-0.920 ± 1.850 U	-0.143 ± 2.280 U	0.143 ± 1.170 U
Niobium-95	-2.600 ± 2.710 U	-3.420 ± 3.750 U	-1.620 ± 2.570 U	0.401 ± 1.710 U	0.146 ± 3.210 U	0.315 ± 2.130 U	0.000 ± 3.170 U	-2.560 ± 3.620 U	-0.211 ± 1.660 U	-1.870 ± 1.920 U	-0.794 ± 2.530 U	1.970 ± 2.170 U
Zinc-65	-3.330 ± 5.510 U	0.706 ± 5.290 U	0.165 ± 5.920 U	-0.868 ± 3.250 U	-6.950 ± 5.000 U	1.240 ± 4.310 U	3.760 ± 4.960 U	-3.330 ± 5.130 U	0.644 ± 2.910 U	7.460 ± 6.840 UI	-0.712 ± 4.350 U	1.390 ± 2.710 U
Zirconium-95	2.950 ± 3.870 U	-1.380 ± 4.230 U	3.100 ± 3.690 U	-1.350 ± 2.700 U	0.347 ± 4.960 U	1.710 ± 3.690 U	0.000 ± 4.530 U	-0.230 ± 4.410 U	0.548 ± 3.070 U	3.240 ± 3.620 U	-2.550 ± 3.390 U	2.100 ± 2.310 U

WATER – SURFACE: GAMMA ISOTOPIC

M-8 Upstream of Plant

pCi/L	Jan[1]	Feb[1]	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec[1]
Barium-140	-	-	-2.090 ± 5.090 U	7.150 ± 23.100 U	6.560 ± 7.420 U	4.660 ± 12.800 U	-62.100 ± 103.000 U	6.030 ± 14.900 U	5.040 ± 10.200 U	2.500 ± 12.400 U	45.700 ± 30.000 U	-
Cerium-144	-	-	1.550 ± 6.030 U	2.830 ± 5.430 U	-4.560 ± 7.750 U	-2.530 ± 14.200 U	6.550 ± 11.100 U	-7.020 ± 9.180 U	-2.000 ± 10.600 U	24.600 ± 22.900 UI	1.730 ± 4.890 U	-
Cesium-134	-	-	0.032 ± 0.963 U	0.571 ± 0.714 U	-0.210 ± 1.180 U	-0.699 ± 2.160 U	-0.434 ± 1.880 U	1.150 ± 1.820 U	2.890 ± 2.740 U	-0.053 ± 2.560 U	0.212 ± 0.731 U	-
Cesium-137	-	-	0.111 ± 1.020 U	0.590 ± 0.726 U	0.501 ± 1.160 U	1.250 ± 2.450 U	2.530 ± 2.630 U	-0.867 ± 1.600 U	1.430 ± 1.890 U	3.920 ± 3.840 UI	1.410 ± 1.270 UI	-
Cobalt-58	-	-	0.732 ± 0.853 U	0.319 ± 0.940 U	0.181 ± 1.100 U	-2.820 ± 2.320 U	1.260 ± 2.660 U	0.983 ± 1.730 U	0.961 ± 1.880 U	-1.160 ± 2.170 U	0.157 ± 0.935 U	-
Cobalt-60	-	-	0.858 ± 0.916 U	-2.460 ± 1.690 U	-0.033 ± 1.110 U	-0.220 ± 2.320 U	-0.256 ± 1.890 U	0.244 ± 1.600 U	2.150 ± 2.110 U	0.252 ± 2.430 U	0.117 ± 0.672 U	-
Iron-59	-	-	-1.020 ± 1.900 U	-0.354 ± 2.480 U	-2.510 ± 2.050 U	0.167 ± 4.210 U	-0.244 ± 6.970 U	1.970 ± 4.000 U	-1.320 ± 3.840 U	1.520 ± 4.730 U	-1.500 ± 2.470 U	-
Lanthanum-140	-	-	0.213 ± 1.720 U	-3.240 ± 8.410 U	-1.940 ± 2.490 U	1.120 ± 4.410 U	13.200 ± 34.800 U	5.350 ± 9.140 U	-0.501 ± 4.200 U	-2.920 ± 4.550 U	-2.100 ± 10.500 U	-
Manganese-54	-	-	-0.146 ± 0.857 U	0.354 ± 0.742 U	0.741 ± 0.992 U	-2.100 ± 2.240 U	0.486 ± 1.820 U	1.760 ± 1.860 U	0.893 ± 1.890 U	-0.059 ± 2.010 U	-0.144 ± 0.690 U	-
Niobium-95	-	-	1.580 ± 1.820 UI	0.495 ± 1.140 U	0.814 ± 1.190 U	0.836 ± 2.460 U	-1.240 ± 2.760 U	0.425 ± 1.790 U	0.616 ± 2.140 U	1.150 ± 2.930 U	0.129 ± 1.050 U	-
Zinc-65	-	-	1.390 ± 1.960 U	-0.042 ± 1.620 U	-0.088 ± 2.210 U	1.070 ± 5.030 U	-2.440 ± 4.320 U	3.350 ± 3.710 U	-0.673 ± 4.340 U	-0.074 ± 4.440 U	-0.159 ± 1.450 U	-
Zirconium-95	-	-	1.130 ± 1.530 U	-0.891 ± 1.790 U	0.553 ± 2.030 U	-2.330 ± 4.300 U	3.310 ± 4.750 U	-2.090 ± 3.070 U	0.089 ± 3.480 U	1.070 ± 3.840 U	1.230 ± 1.880 U	-

Note:

[1] Sample unavailable due to unsafe condition for sampling resulting from frozen river conditions

M-9 Downstream of Plant

pCi/L	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec[1]
Barium-140	10.800 ± 35.000 U	33.700 ± 37.100 U	-0.969 ± 4.720 U	-5.420 ± 31.700 U	4.870 ± 6.950 U	25.000 ± 26.400 U	-8.210 ± 125.000 U	1.550 ± 19.800 U	8.780 ± 14.200 U	-0.173 ± 13.900 U	29.000 ± 21.100 U	7.240 ± 22.400 U
Cerium-144	3.350 ± 7.160 U	6.590 ± 7.890 U	-2.560 ± 5.950 U	-0.675 ± 6.180 U	-0.163 ± 6.970 U	-3.840 ± 16.200 U	13.100 ± 13.200 U	-0.201 ± 7.310 U	2.310 ± 13.100 U	16.400 ± 16.600 U	2.630 ± 4.950 U	-8.940 ± 12.700 U
Cesium-134	2.810 ± 2.160 UI	1.930 ± 1.460 U	0.314 ± 0.930 U	-0.724 ± 1.910 U	-0.118 ± 0.983 U	-0.182 ± 2.330 U	0.396 ± 1.440 U	1.550 ± 1.360 U	4.770 ± 3.460 UI	-1.030 ± 2.370 U	0.294 ± 0.752 U	1.490 ± 2.350 U
Cesium-137	0.176 ± 1.010 U	0.640 ± 3.050 U	-1.420 ± 2.590 U	1.210 ± 2.480 U	-1.060 ± 1.420 U	-0.897 ± 2.670 U	0.439 ± 2.260 U	-0.868 ± 2.290 U	0.976 ± 2.470 U	2.230 ± 2.560 U	0.214 ± 0.694 U	0.110 ± 2.080 U
Cobalt-58	0.700 ± 1.250 U	0.671 ± 1.690 U	0.316 ± 0.881 U	-0.126 ± 1.410 U	0.398 ± 1.040 U	0.615 ± 1.870 U	0.418 ± 1.930 U	-0.078 ± 1.340 U	-1.230 ± 2.670 U	0.728 ± 2.410 U	-0.854 ± 1.050 U	-0.050 ± 1.870 U
Cobalt-60	0.266 ± 2.060 U	-0.181 ± 1.320 U	0.234 ± 0.966 U	-0.621 ± 1.110 U	0.281 ± 0.914 U	-0.067 ± 2.370 U	0.409 ± 1.350 U	-0.822 ± 1.550 U	1.500 ± 2.170 U	-0.025 ± 2.470 U	0.797 ± 0.769 U	2.670 ± 2.410 U
Iron-59	2.380 ± 3.270 U	-2.850 ± 4.470 U	0.893 ± 1.830 U	-3.840 ± 3.300 U	-1.430 ± 2.000 U	1.760 ± 6.210 U	-3.110 ± 5.190 U	-1.630 ± 3.190 U	-1.110 ± 4.390 U	2.450 ± 6.900 U	-1.390 ± 2.380 U	-3.240 ± 6.100 U
Lanthanum-140	-2.650 ± 12.800 U	-6.590 ± 14.300 U	0.332 ± 1.580 U	-1.210 ± 10.700 U	1.440 ± 2.500 U	-0.500 ± 5.660 U	-2.720 ± 28.800 U	-2.360 ± 4.310 U	0.808 ± 3.980 U	-1.270 ± 3.480 U	1.470 ± 6.840 U	2.940 ± 8.170 U
Manganese-54	0.038 ± 0.997 U	1.240 ± 1.270 U	-0.755 ± 0.826 U	-1.860 ± 1.970 U	-0.479 ± 0.928 U	2.410 ± 1.880 U	0.200 ± 1.440 U	-0.239 ± 1.230 U	2.690 ± 3.020 U	0.111 ± 1.820 U	1.670 ± 0.964 U	0.964 ± 1.820 UI
Niobium-95	-2.200 ± 2.260 U	1.450 ± 3.860 U	0.254 ± 0.893 U	0.260 ± 1.410 U	0.425 ± 1.110 U	1.490 ± 2.300 U	0.638 ± 2.120 U	1.300 ± 1.610 U	2.820 ± 2.610 U	1.470 ± 3.070 U	0.999 ± 0.997 U	0.075 ± 2.570 U
Zinc-65	-0.656 ± 2.110 U	-0.082 ± 2.650 U	-1.480 ± 1.880 U	0.433 ± 2.040 U	-0.875 ± 1.930 U	1.990 ± 4.200 U	2.650 ± 3.300 U	-0.068 ± 3.320 U	0.675 ± 4.340 U	1.400 ± 4.630 U	0.449 ± 2.440 U	3.620 ± 5.120 U
Zirconium-95	-0.530 ± 2.630 U	1.810 ± 3.200 U	1.150 ± 1.510 U	-0.167 ± 2.470 U	0.456 ± 1.770 U	0.675 ± 5.530 U	0.217 ± 3.790 U	0.168 ± 2.640 U	-1.430 ± 4.650 U	1.990 ± 4.060 U	1.120 ± 1.730 U	-1.220 ± 3.960 U

Note:

[1]Q4 M9 data was collected at the beginning of January.

Data below were analyzed by EDC. The results reported relate only to the items tested and to the sample as received by the laboratory. The raw TLD results are corrected for individual element sensitivity and reader sensitivity and determined by QC results. Transit exposures are subtracted and the fade of the thermoluminescent response is compensated. The abbreviations common to each of the EDC analytical results tables are provided below.

Abbreviations

ISFSI	Independent Spent Fuel Storage Installation
TLD	Thermoluminescent Dosimeter
mR/Std. Qtr	Millirem per standard quarter (91 days)

DIRECT RADIATION – TLD: GAMMA

mrem/91 day	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Control				
M01C Kirchenbauer Farm	11.9 ± 0.6	13.4 ± 0.8	13.5 ± 0.6	15.2 ± 1.1
M02C Cty Rd 4 & 15	12.2 ± 0.6	12.2 ± 1	12.7 ± 0.5	15 ± 0.7
M03C Cty Rd 19 & Jason Ave	13.1 ± 0.8	14.1 ± 0.7	15.6 ± 0.7	16.3 ± 0.9
M04C Maple Lake Water Tower	12.6 ± 0.6	12.3 ± 0.7	13.5 ± 0.7	14.2 ± 0.7
Inner				
M01A Sherburne Ave. So.	13.9 ± 0.6	14.8 ± 0.7	15.4 ± 0.8	16.5 ± 1
M02A Sherburne Ave. So.	13.8 ± 0.9	14.3 ± 0.5	14.7 ± 0.8	16.4 ± 0.8
M03A Sherburne Ave. So.	12.7 ± 0.8	14.1 ± 0.8	14.1 ± 0.6	15.6 ± 0.8
M04A Biology Station Rd.	12.5 ± 0.5	12.9 ± 0.5	13.7 ± 0.8	14.9 ± 0.8
M05A Biology Station Rd.	12.8 ± 0.7	13.4 ± 0.6	14.6 ± 0.7	14.6 ± 1
M06A Biology Station Rd.	13.7 ± 0.6	14.8 ± 0.8	15.2 ± 0.7	16 ± 0.9
M07A Parking Lot H	12.8 ± 0.6	14.2 ± 0.7	14.9 ± 0.9	15.5 ± 0.9
M08A Parking Lot F	12.9 ± 0.6	14.3 ± 0.8	14.9 ± 1	15.9 ± 0.9
M09A County Road 75	13.5 ± 0.9	14.1 ± 0.6	15.9 ± 1	15.9 ± 0.9
M10A County Road 75	12.5 ± 0.6	14.4 ± 0.6	14.5 ± 0.7	16.1 ± 1.1
M11A County Road 75	13.9 ± 0.6	15.2 ± 0.7	15.9 ± 0.8	16.3 ± 0.9
M12A County Road 75	13.2 ± 0.5	14.3 ± 0.6	15.6 ± 0.7	See note 1
M13A North Boundary Rd.	13.6 ± 0.6	14.2 ± 0.9	13.9 ± 0.8	15.9 ± 1
M14A North Boundary Rd.	13.3 ± 0.6	14.3 ± 0.5	14.7 ± 0.5	16.6 ± 0.9
Outer				
M01B 117th Street	12.3 ± 0.8	12.9 ± 0.5	13.5 ± 0.8	15.1 ± 0.8
M02B County Road 11	14.2 ± 1	13.5 ± 0.7	13.5 ± 0.7	15.6 ± 1
M03B County Rd. 73 & 81	11.8 ± 0.8	11.2 ± 0.5	12.6 ± 0.9	14 ± 0.9
M04B County Rd. 73 (196th Street)	12.4 ± 0.7	12.7 ± 0.6	12.7 ± 0.8	15 ± 1
M05B City of Big Lake	13.3 ± 0.7	13.1 ± 0.5	13.7 ± 1	16 ± 1
M06B County Rd 14 & 196th Street	11.7 ± 0.5	13.4 ± 0.6	14 ± 0.9	14.2 ± 0.7
M07B Monticello Industrial Dr.	13.4 ± 0.7	14.1 ± 0.6	15.4 ± 0.7	16.3 ± 1
M08B Residence Hwy 25 & Davidson Ave	12.7 ± 0.5	13.2 ± 0.7	13.7 ± 0.6	15.2 ± 1
M09B Weinand Farm	13.3 ± 0.7	15.1 ± 0.7	See note 2	16.5 ± 0.7
M10B Reisewitz Farm - Acacia Ave	12.6 ± 0.7	14.5 ± 0.7	13.5 ± 0.9	15.5 ± 0.9
M11B Vanlith Farm - 97th Ave	13.6 ± 0.9	14.9 ± 0.7	15.4 ± 0.6	15.9 ± 1

mrem/91 day	Qtr 1	Qtr 2	Qtr 3	Qtr 4
M12B Lake Maria St. Park	13.4 ± 0.7	14.1 ± 0.8	14.4 ± 0.8	16.1 ± 0.9
M13B Bridgewater Sta.	13.5 ± 0.7	14.1 ± 0.6	14.8 ± 0.8	16.2 ± 0.8
M14B Anderson Res. - Cty Rd 111	14.1 ± 0.9	15.1 ± 0.5	15.7 ± 0.7	15.9 ± 1.1
M15B Red Oak Wild Bird Farm	12.7 ± 0.7	13.7 ± 0.5	13.6 ± 0.9	14.7 ± 0.9
M16B University Ave and Hancock St, Becker	13.9 ± 0.8	14 ± 0.6	13.2 ± 0.9	15.6 ± 1.1
Special Interest				
M01S 127th St. NE	12.1 ± 0.9	12.1 ± 0.5	12.8 ± 0.8	15.2 ± 0.8
M02S Krone Residence	12 ± 0.8	12 ± 0.6	12.4 ± 0.7	14.3 ± 0.9
M03S Big Oaks Park	13.7 ± 0.6	13.8 ± 0.6	14.8 ± 0.6	16.2 ± 0.9
M04S Pinewood School	13.5 ± 0.8	13.9 ± 0.8	15.3 ± 0.7	15 ± 1
M05S 20500 Co. Rd 11, Big Lake	13.2 ± 0.6	13.7 ± 0.7	14 ± 0.8	16.1 ± 0.9
M06S Monticello Public Works	14.7 ± 0.9	14.5 ± 0.6	15.3 ± 0.6	17 ± 0.8
I-11 OCA Fence South, on exit road	13.5 ± 0.7	13.8 ± 0.6	15 ± 0.8	15.9 ± 0.7
I-12 OCA Fence Middle, on exit road	13.8 ± 0.6	14 ± 0.6	14.9 ± 0.6	17.1 ± 1
I-13 OCA Fence North, on exit road	14.1 ± 0.8	14.7 ± 0.7	15.9 ± 0.8	16.5 ± 1

Notes:

[1] Location could not be sampled due to missing TLD (Condition Report 501000069800).

[2] Location could not be sampled due to missing TLD (Condition Report 501000067454).

DIRECT RADIATION – ISFSI: GAMMA

mrem/91 day		Type	Qtr1	Qtr2	Qtr3	Qtr4
I-01	NE corner of ISFS	Gamma	35.3 ± 1.6	37.6 ± 1.3	42.9 ± 2.8	44.6 ± 2.6
I-02	North side of ISFSI, center	Gamma	34.9 ± 1.8	34.3 ± 2.2	38.5 ± 2	38.8 ± 2
I-03	NW corner of ISFSI	Gamma	29.1 ± 2.8	29.4 ± 2.8	29.5 ± 1.4	31.2 ± 2
I-04	West side of ISFSI, middle	Gamma	70.1 ± 4	81.3 ± 17.8	74.7 ± 4	80.5 ± 5.2
I-05	West side of ISFSI, at center of array	Gamma	54.8 ± 5.7	57.6 ± 3.7	58 ± 5.9	55.3 ± 4.3
I-06	SW corner of ISFSI	Gamma	32.6 ± 2.7	27.6 ± 3.3	30 ± 1.9	36.1 ± 2.6
I-07	South side of ISFSI, center	Gamma	37 ± 3.7	31 ± 1.3	37.4 ± 2.2	38.4 ± 4.2
I-08	SE corner of ISFSI	Gamma	30.2 ± 2.6	29.2 ± 3.5	35.4 ± 4.5	36.8 ± 3.3
I-09	East side of ISFSI, at center of array	Gamma	61.4 ± 4.6	64.1 ± 6.1	66 ± 4.7	71.9 ± 5
I-10	East side of ISFSI, middle	Gamma	65.1 ± 4.2	60.6 ± 4.7	69.9 ± 9.1	69.1 ± 3.8

ARCADIS Design & Consultancy for natural and built assets

Appendix A

GEL Laboratories, LLC

2022 Annual Quality Assurance Report

GEL Laboratories LLC
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2022 ANNUAL QUALITY ASSURANCE REPORT

FOR THE

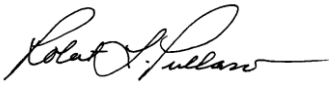
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

2022 ANNUAL QUALITY ASSURANCE REPORT

FOR THE

RADIOLOGICAL ENVIRONMENTAL

MONITORING PROGRAM (REMP)

Approved By  March 28, 2023

Robert L. Pullano
Director, Quality Systems

Date

Revision 2 for transcription and clarification

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2022 ANNUAL QUALITY ASSURANCE REPORT FOR THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

1. Introduction

GEL Laboratories, LLC (GEL) is a privately owned environmental laboratory dedicated to providing personalized client services of the highest quality. GEL was established as an analytical testing laboratory in 1981. Now a full service lab, our analytical divisions use state of the art equipment and methods to provide a comprehensive array of organic, inorganic, and radiochemical analyses to meet the needs of our clients.

At GEL, quality is emphasized at every level of personnel throughout the company. Management's ongoing commitment to good professional practice and to the quality of our testing services to our customers is demonstrated by their dedication of personnel and resources to develop, implement, assess, and improve our technical and management operations.

The purpose of GEL's quality assurance program is to establish policies, procedures, and processes to meet or exceed the expectations of our clients. To achieve this, all personnel that support these services to our clients are introduced to the program and policies during their initial orientation, and annually thereafter during company-wide training sessions.

GEL's primary goals are to ensure that all measurement data generated are scientifically and legally defensible, of known and acceptable quality per the data quality objectives (DQOs), and thoroughly documented to provide sound support for environmental decisions. In addition, GEL continues to ensure compliance with all contractual requirements, environmental standards, and regulations established by local, state and federal authorities.

GEL administers the QA program in accordance with the Quality Assurance Plan, GL-QS-B-001. Our Quality Systems include all quality assurance (QA) policies and quality control (QC) procedures necessary to plan, implement, and assess the work we perform. GEL's QA Program establishes a quality management system (QMS) that governs all of the activities of our organization.

This report entails the quality assurance program for the proficiency testing and environmental monitoring aspects of GEL for 2022 GEL's QA Program is designed to monitor the quality of analytical processing associated with environmental, radiobioassay, effluent (10 CFR Part 50), and waste (10 CFR Part 61) sample analysis.

This report covers the category of Radiological Environmental Monitoring Program (REMP) and includes:

- Intra-laboratory QC results analyzed during 2022.
- Inter-laboratory QC results analyzed during 2022 where known values are available.

2. Quality Assurance Programs for Inter-laboratory, Intra-laboratory and Third Party Cross-Check

In addition to internal and client audits, our laboratory participates in annual performance evaluation studies conducted by independent providers. We routinely participate in the following types of performance audits:

- Proficiency testing and other inter-laboratory comparisons
- Performance requirements necessary to retain certifications
- Evaluation of recoveries of certified reference and in-house secondary reference materials using statistical process control data.
- Evaluation of relative percent difference between measurements through SPC data.

We also participate in a number of proficiency testing programs for federal and state agencies and as required by contracts. It is our policy that no proficiency evaluation samples be analyzed in any special manner. Our annual performance evaluation participation generally includes a combination of studies that support the following:

- US Environmental Protection Agency Discharge Monitoring Report, Quality Assurance Program (DMR-QA). Annual national program sponsored by EPA for laboratories engaged in the analysis of samples associated with the NPDES monitoring program. Participation is mandatory for all holders of NPDES permits. The permit holder must analyze for all of the parameters listed on the discharge permit. Parameters include general chemistry, metals, BOD/COD, oil and grease, ammonia, nitrates, etc.

- Department of Energy Mixed Analyte Performance Evaluation Program (MAPEP). A semiannual program developed by DOE in support of DOE contractors performing waste analyses. Participation is required for all laboratories that perform environmental analytical measurements in support of environmental management activities. This program includes radioactive isotopes in water, soil, vegetation and air filters.

- ERA's MRAD-Multimedia Radiochemistry Proficiency test program. This program is for labs seeking certification for radionuclides in wastewater and solid waste. The program is conducted in strict compliance with USEPA National Standards for Water Proficiency study.

- ERA's InterLaB RadCheM Proficiency Testing Program for radiological analyses. This program completes the process of replacing the USEPA EMSL-LV Nuclear Radiation Assessment Division program discontinued in 1998. Laboratories seeking certification for radionuclide analysis in drinking water also use the study. This program is conducted in strict compliance with the USEPA National Standards for Water Proficiency Testing Studies. This program encompasses Uranium by EPA method 200.8 (for drinking water certification in Utah/Primary NELAP), gamma emitters, Gross Alpha/Beta, Iodine-131, naturally occurring radioactive isotopes, Strontium-89/90, and Tritium.

- ERA's Water Pollution (WP) biannual program for waste methodologies includes parameters for both organic and inorganic analytes.

- ERA's Water Supply (WS) biannual program for drinking water methodologies includes parameters for organic and inorganic analytes.

- Environmental Cross-Check Program administered by Eckert & Ziegler Analytics, Inc. This program encompasses radionuclides in water, soil, milk, naturally occurring radioactive isotopes in soil and air filters.

GEL procures single-blind performance evaluation samples from Eckert & Ziegler Analytics to verify the analysis of sample matrices processed at GEL. Samples are received on a quarterly basis. GEL's Third-Party Cross-Check Program provides environmental matrices encountered in a typical nuclear utility REMP. The Third-Party Cross-Check Program is intended to meet or exceed the inter-laboratory comparison program requirements discussed in NRC Regulatory Guide 4.15. Once performance evaluation samples have been prepared in accordance with the instructions provided by

the PT provider, samples are managed and analyzed in the same manner as environmental samples from GEL's clients.

3. Quality Assurance Program for Internal and External Audits

During each annual reporting period, at least one internal assessment of each area of the laboratory is conducted in accordance with the pre-established schedule from Standard Operating Procedure for the Conduct of Quality Audits, GL-QS-E-001. The annual internal audit plan is reviewed for adequacy and includes the scheduled frequency and scope of quality control actions necessary to GEL's QA program. Internal audits are conducted at least annually in accordance with a schedule approved by the Quality Systems Director. Supplier audits are contingent upon the categorization of the supplies and may or may not be conducted prior to the use of a supplier or subcontractor. Type I suppliers and subcontractors, regardless of how they were initially qualified, are re-evaluated at least once every three years.

In addition, prospective customers audit GEL during pre-contract audits. GEL hosts several external audits each year for both our clients and other programs. These programs include environmental monitoring, waste characterization, and radiobioassay. The following list of programs may audit GEL at least annually or up to every three years depending on the program.

- TNI, The NELAC Institute, National Environmental Laboratory Accreditation Program
- DOECAP, U.S. Department of Energy Consolidated Audit Program
- DOELAP, U.S. Department of Energy Laboratory Accreditation Program
- DOE QSAS, U.S. Department of Energy, Quality Systems for Analytical Services
- ISO/IEC 17025:2017
- A2LA, American Association for Laboratory Accreditation
- DoD ELAP, US Department of Defense Environmental Accreditation Program
- NUPIC, Nuclear Procurement Issues Committee
- South Carolina Department of Health and Environmental Control (SC DHEC)

The annual radiochemistry laboratory internal audit (22-RAD-001) was conducted in August and September, 2022. There were no findings or observations and four recommendations for improvements from this assessment.

4. Performance Evaluation Acceptance Criteria for Environmental Sample Analysis

GEL utilized an acceptance protocol based upon two performance models. For those inter-laboratory programs that already have established performance criteria for bias (i.e., MAPEP, and ERA/ELAP), GEL will utilize the criteria for the specific program. For intra-laboratory or third party quality control programs that do not have a specific acceptance criteria (i.e. the Eckert-Ziegler Analytics Environmental Cross-check Program), results will be evaluated in accordance with GEL's internal acceptance criteria.

5. Performance Evaluation Samples

Performance Evaluation (PE) results and internal quality control sample results are evaluated in accordance with GEL acceptance criteria. The first criterion concerns bias, which is defined as the deviation of any one result from the known value. The second criterion concerns precision, which deals with the ability of the measurement to be replicated by comparison of an individual result with the mean of all results for a given sample set.

At GEL, we also evaluate our analytical performance on a regular basis through statistical process control (SPC) acceptance criteria. Where feasible, this criterion is applied to both measures of precision and accuracy and is specific to sample matrix. We establish environmental process control limits at least annually.

For Radiochemistry analysis, quality control evaluation is based on static limits rather than those that are statistically derived. Our current process control limits are maintained in GEL's AlphaLIMS. We also measure precision with matrix duplicates and/or matrix spike duplicates. The upper and lower control limits (UCL and LCL respectively) for precision are plus or minus three times the standard deviation from the mean of a series of relative percent differences. The static precision criteria for radiochemical analyses are 0 - 20%, for activity levels exceeding the contract required detection limit (CRDL).

6. Quality Control Program for Environmental Sample Analysis

GEL's internal QA Program is designed to include QC functions such as instrumentation calibration checks (to insure proper instrument response), blank samples, instrumentation backgrounds, duplicates, as well as overall staff qualification analyses and statistical process controls. Both quality control and qualification analyses samples are used to be as similar as the matrix type of those samples submitted for analysis by the various laboratory clients. These performance test samples (or performance evaluation samples) are either actual sample submitted in duplicate in order to evaluate the precision of laboratory measurements, or fortified blank samples, which have been given a known quantity of a radioisotope that is in the interest to GEL's clients.

Accuracy (or Bias) is measured through laboratory control samples and/or matrix spikes, as well as surrogates and internal standards. The UCLs and LCLs for accuracy are plus or minus three times the standard deviation from the mean of a series of recoveries. The static limit for most radiochemical analyses is 75 - 125%. Specific instructions for out-of-control situations are provided in the applicable analytical SOP.

GEL's Laboratory Control Standard (LCS) is an aliquot of reagent water or other blank matrix to which known quantities of the method analytes are added in the laboratory. The LCS is analyzed exactly like a sample, and its purpose is to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurements. Some methods may refer to these samples as Laboratory Fortified Blanks (LFB). The requirement for recovery is between 75% and 125% for radiological analyses excluding drinking water matrix.

$$\text{Bias (\%)} = \frac{\text{(observed concentration)}}{\text{(known concentration)}} * 100\ \%$$

Precision is a data quality indicator of the agreement between measurements of the same property, obtained under similar conditions, and how well they conform to themselves. Precision is usually expressed as standard deviation, variance or range in either absolute or relative (percentage) terms.

GEL's laboratory duplicate (DUP or LCSD) is an aliquot of a sample taken from the same container and processed in the same manner under identical laboratory conditions. The aliquot is analyzed independently from the parent sample and the results are compared to measure precision and accuracy.

If a sample duplicate is analyzed, it will be reported as Relative Percent Difference (RPD). The RPD must be 20 percent or less, if both samples are greater than 5 times the MDC. If both results are less than 5 times MDC, then the RPD must be equal to or less than 100%. If one result is above the MDC and the other is below the MDC, then the RPD can be calculated using the MDC for the result of the one below the MDC. The RPD must be 100% or less. In the situation where both results are above the MDC but one result is greater than 5 times the MDC and the other is less than 5 times the MDC, the RPD must be less than or equal to 20%. If both results are below MDC, then the limits on % RPD are not applicable.

$$\text{Difference (\%)} = \frac{\text{(high duplicate result – low duplicate result)}}{\text{(average of results)}} * 100\ \%$$

7. Summary of Data Results

During 2022, forty-five (45) radioisotopes associated with seven (7) matrix types were analyzed under GEL's Performance Evaluation program in participation with ERA, MAPEP, and Eckert & Ziegler Analytics. Matrix types were representative of client analyses performed during 2022. Of the four hundred sixty-four (464) total results, 97.8% (454 of 464) were found to be acceptable within the PT providers three sigma or other statistical criteria. The list below contains the type of matrix evaluated by GEL.

- Air Filter
- Cartridge
- Water
- Milk
- Soil
- Liquid
- Vegetation

Graphs are provided in Figures 1-9 of this report to allow for the evaluation of trends or biases. These graphs include radioisotopes Cobalt-60, Cesium-137, Tritium, Strontium-90, Gross Alpha, Gross Beta, Iodine-131, Americium-241, and Plutonium-238.

8. Summary of Participation in the Eckert & Ziegler Analytics Environmental Cross-Check Program

Eckert & Ziegler Analytics provided samples for one hundred nineteen (113) individual environmental analyses. The accuracy of each result reported to Eckert & Ziegler Analytics, Inc. is measured by the ratio of GEL's result to the known value. All results fell within GEL's acceptance criteria (100% within acceptance).

9. Summary of Participation in the MAPEP Monitoring Program

MAPEP Series 46 and 47 were analyzed by the laboratory. Of the one hundred thirty-seven (137) analyses reported, 96.4% (132 out of 137) fell within the PT provider's acceptance criteria.

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10. Summary of Participation in the ERA MRaD PT Program

The ERA MRad program provided samples (MRAD-36 and MRAD-37) for one hundred sixty-three (163) individual environmental analyses reported. Of the 171 analyses reported, 98.8% (161 of the 163) fell within the PT provider's acceptance criteria.

11. Summary of Participation in the ERA PT Program

The ERA program provided samples (RAD-128, RAD-129 and RAD-130) for forty-seven (47) individual environmental analyses. Of the 47 analyses, 93.6% fell within the PT provider's acceptance criteria.

All corrective actions for unacceptable PTs are summarized in Table 8.

12. Corrective Action Request and Report (CARR)

There are two categories of corrective action at GEL. One is corrective action implemented at the analytical and data review level in accordance with the analytical SOP. The other is formal corrective action documented by the Quality Systems Team in accordance with GL-QS-E-002. A formal corrective action is initiated when a nonconformance reoccurs or is so significant that permanent elimination or prevention of

the problem is required. Formal corrective action investigations include root cause analysis.

GEL includes quality requirements in most analytical standard operating procedures to ensure that data are reported only if the quality control criteria are met or the quality control measures that did not meet the acceptance criteria are documented. A formal corrective action is implemented according to GL-QS-E-002 for Conducting Corrective/Preventive Action and Identifying Opportunities for Improvement. Recording and documentation is performed following guidelines stated in GL-QS-E-012 for Client NCR Database Operation.

Any employee at GEL can identify and report a nonconformance and request that corrective action be taken. Any GEL employee can participate on a corrective action team as requested by the QS team or Group Leaders. The steps for conducting corrective action are detailed in GL-QS-E-002. In the event that correctness or validity of the laboratory's test results in doubt, the laboratory will take corrective action. If investigations show that the results have been impacted, affected clients will be informed of the issue in writing within five (5) calendar days of the discovery.

Table 8 provides the status of CARRs for radiological performance testing during 2022. **It has been determined that causes of the unacceptable results did not impact any data reported to our clients.**

13. References

1. GEL Quality Assurance Plan, GL-QS-B-001
2. GEL Standard Operating Procedure for the Conduct of Quality Audits, GL-QS-E-001
3. GEL Standard Operating Procedure for Conducting Corrective/Preventive Action and Identifying Opportunities for Improvement, GL-QS-E-002
4. GEL Standard Operating Procedure for AlphaLIMS Documentation of Nonconformance Reporting and Dispositioning and Control of Nonconforming Items, GL-QS-E-004
5. GEL Standard Operating Procedure for Handling Proficiency Evaluation Samples, GL-QS-E-013
6. GEL Standard Operating Procedure for Quality Assurance Measurement Calculations and Processes, GL-QS-E-014
7. 40 CFR Part 136 Guidelines Establishing Test Procedures for the Analysis of Pollutants
8. ISO/IEC 17025-2017, General Requirements for the Competence of Testing and Calibration Laboratories
9. ANSI/ASQC E4-1994, Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs, American National Standard
10. 2016 TNI Standard, The NELAC Institute, National Environmental Accreditation Program
11. MARLAP, Multi-Agency Radiological Laboratory Analytical Protocols
12. 10 CFR Part 21, Reporting of Defects and Noncompliance
13. 10 CFR Part 50 Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants
14. 10 CFR Part 61, Licensing Requirements for Land Disposal and Radioactive Waste
15. NRC REG Guide 4.15 and NRC REG Guide 4.8

TABLE 1

2022 RADIOLOGICAL PROFICIENCY TESTING RESULTS AND ACCEPTANCE CRITERIA

PT Provider	Quarter / Year	Report Closing / Received Date	Sample Number	Sample Media	Units	Analyte	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Barium-133	65.2	63	52.4 - 69.4	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Cesium-134	81.9	84.9	69.6 - 93.4	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Cesium-137	29.5	29.3	25.2 - 35.3	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Cobalt-60	112	102	91.8 - 114	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Zinc-65	345	312	281 - 364	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Gross Alpha	32.1	32.5	16.6 - 42.1	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Gross Alpha	32.2	32.5	16.6 - 42.1	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Gross Beta	63.8	68.3	47.4 - 75.1	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Radium-226	12.6	9.53	7.14 - 11.1	**Not Acceptable**
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Radium-228	11.5	8.71	5.59 - 11.0	**Not Acceptable**
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Uranium (Nat)	66.3	69	56.4 - 75.9	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	µg/L	Uranium (mass)	109.74	101	82.5 - 111	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	µg/L	Uranium (mass)	109.74	101	82.5 - 111	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	µg/L	Uranium (mass)	109.74	101	82.5 - 111	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Tritium	21500	22200	19500 - 24400	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Tritium	21200	22200	19500 - 24400	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-89	72.8	65	52.7 - 73.0	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-89	77.7	65	52.7 - 73.0	**Not Acceptable**
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-90	43.7	40.8	30.0 - 46.9	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-90	42.6	40.8	30.0 - 46.9	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Iodine-131	18.8	21.1	17.5 - 25.3	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Iodine-131	23.7	21.1	17.5 - 25.3	Acceptable
ERA	2nd/2021	5/25/2021	RAD 125	Water	pCi/L	Radium-226	14.2	19.3	14.3 - 22.0	Acceptable
ERA	2nd/2021	5/25/2021	RAD 125	Water	pCi/L	Radium-228	9.98	10.3	6.71 - 12.8	Acceptable
ERA	2nd/2021	5/25/2021	RAD 125	Water	pCi/L	Strontium-89	59.3	63.5	51.4 - 71.5	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Actinium-228	1710	1670	1100 - 2100	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Bismuth-212	2130	1840	527 - 2740	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Bismuth-214	888	790	379 - 1180	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-134	6470	6620	4530 - 7910	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-134	6470	6620	4530 - 7910	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-137	7680	6760	5110 - 8550	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cobalt-60	3110	2820	2220 - 3480	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Lead-212	1880	1630	1140 - 2060	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Lead-214	1090	838	352 - 1320	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Manganese-54	<24.3	<555	<555	Acceptable
ERA	2nd/202	5/27/202	MRAD-36	Soil	pCi/kg	Plutonium-238	260	289	144 - 439	Acceptable

	2	2								
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Plutonium-239	1290	1180	643 - 1700	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Potassium-40	40500	37900	26100 - 45300	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Strontium-90	7090	6720	2090 - 10500	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Thorium-234	4900	3390	1280 - 5810	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-234	3830	3410	1600 - 4470	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-234	4120	3410	1600 - 4470	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-234	3830	3410	1600 - 4470	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-238	4080	3390	1860 - 4550	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-238	4060	3390	1860 - 4550	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-Total	8170	6960	3860 - 9000	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-Total	8366	6960	3860 - 9000	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-Total	8170	6960	3860 - 9000	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	µg/kg	Uranium (mass)	12300	10100	4560 - 13600	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Zinc-65	6450	5070	4050 - 6920	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Americium-241	1670	1850	1140 - 2610	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-134	1900	2450	1630 - 3260	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Cesium-137	1330	1460	1120 - 1970	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Cesium-137	1330	1460	1120 - 1970	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Cobalt-60	822	902	708 - 1180	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Curium-244	1270	1530	863 - 1900	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Manganese-54	<25.2	<207	<207	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Plutonium-238	3470	3640	2520 - 4690	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Plutonium-239	3400	3540	2450 - 4480	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Potassium-40	32400	33300	25000 - 42200	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Strontium-90	5170	4340	2450 - 5660	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Uranium-234	3750	3980	2800 - 5080	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Uranium-238	3850	3940	2780 - 4930	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Uranium-Total	7800	8110	5180 - 10900	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	µg/kg	Uranium (mass)	11500	11800	9060 - 14600	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Zinc-65	564	545	407 - 808	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Americium-241	22.6	21	15.0 - 28.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Cesium-134	497	549	356 - 673	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Cesium-137	1320	1320	1080 - 1730	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Cobalt-60	905	885	752 - 1120	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Iron-55	110	127	46.4 - 203	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Manganese-54	<4.39	<35.0	<35.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Plutonium-238	27.1	29.6	22.3 - 36.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Plutonium-239	44.5	49.7	37.2 - 60.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Strontium-90	38	31.1	19.7 - 42.3	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-234	59.1	67.3	49.9 - 78.9	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-234	62.3	67.3	49.9 - 78.9	Acceptable

ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-238	61.5	66.7	50.4 - 79.6	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-238	63.6	66.7	50.4 - 79.6	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-Total	124	137	100 - 162	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-Total	128.9	137	100 - 162	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	µg/Filter	Uranium (mass)	184	200	160 - 234	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	µg/Filter	Uranium (mass)	190	200	160 - 234	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Zinc-65	730	671	550 - 1030	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Zinc-65	730	671	550 - 1030	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Gross Alpha	98.4	94.2	49.2 - 155	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Gross Beta	71.5	66.8	40.5 - 101	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Americium-241	65	74.6	51.2 - 95.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-134	1620	1720	1300 - 1890	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-134	1620	1720	1300 - 1890	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-134	1620	1720	1300 - 1890	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-137	1130	1120	959 - 1270	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-137	1130	1120	959 - 1270	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-137	1130	1120	959 - 1270	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cobalt-60	2880	2710	2340 - 3110	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Iron-55	1270	1140	670 - 1660	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Manganese-54	<8.37	<71.0	<71.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Plutonium-238	116	147	88.4 - 190	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Plutonium-239	56	71.9	44.5 - 88.6	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Strontium-90	639	628	452 - 776	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-234	41.2	44.1	33.6 - 50.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-234	44	44.1	33.6 - 50.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-238	44.7	43.7	33.9 - 51.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-238	43.5	43.7	33.9 - 51.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-Total	88.9	89.8	70.0 - 102	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-Total	89.5	89.8	70.0 - 102	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	µg/L	Uranium (mass)	134	131	106 - 149	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	µg/L	Uranium (mass)	130	131	106 - 149	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Zinc-65	1320	1220	1090 - 1540	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Gross Alpha	74.5	79.4	29.0 - 109	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Tritium	28000	28200	21300 - 34300	Acceptable
ERA	2nd/2022	5/23/2022	RAD -129	Water	pCi/L	Radium-226	8.15	9.46	7.09 - 11.1	Acceptable
ERA	2nd/2022	5/23/2022	RAD -129	Water	pCi/L	Radium-228	3.06	3.18	1.71 - 4.63	Acceptable
ERA	2nd/2022	5/23/2022	RAD -129	Water	pCi/L	Strontium-89	67.6	67.9	55.3 - 76.1	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Barium-133	40.1	38.2	30.9 - 42.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Cesium-134	84.7	88.6	72.7 - 97.5	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Cesium-137	177	170	153 - 189	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Cesium-137	177	170	153 - 189	Acceptable
ERA	3rd	08/29/22	RAD-130	Water	pCi/L	Cobalt-60	79	72.4	65.2 - 82.1	Acceptable

	/2022									
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Zinc-65	363	326	293 - 380	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Gross Alpha	54.3	60.2	31.5 - 74.8	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Gross Alpha	58.8	60.2	31.5 - 74.8	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Gross Alpha	58.8	60.2	31.5 - 74.8	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Gross Beta	22.5	17.7	10.1 - 25.9	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Gross Beta	22.5	17.7	10.1 - 25.9	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Radium-226	12.1	13.1	9.77 - 15.1	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Radium-228	8.05	8.4	5.38 - 10.6	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Radium-228	7.91	8.4	5.38 - 10.6	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Uranium (Nat)	53.6	54	44.0 - 59.5	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	µg/L	Uranium (mass)	74.525	78.8	64.2 - 86.8	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Tritium	20200	22100	19400 - 24300	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Strontium-89	48.4	49.6	39.0 - 57.0	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Strontium-89	47.4	49.6	39.0 - 57.0	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Strontium-90	12.8	11.2	7.62 - 13.8	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Strontium-90	11.9	11.2	7.62 - 13.8	Acceptable
ERA	3rd /2022	08/29/22	RAD-130	Water	pCi/L	Iodine-131	28.9	27.7	23.0 - 32.5	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Actinium-228	1550	1670	1100 - 2100	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Americium-241	187	147	79.4 - 208	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Bismuth-212	1460	1670	478 - 2490	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Bismuth-214	592	790	379 - 1180	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Bismuth-214	592	790	379 - 1180	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Cesium-134	8710	9600	6560 - 11500	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Cesium-137	8080	7890	5970 - 9980	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Cobalt-60	1490	1500	1180 - 1850	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Lead-212	1820	1630	1140 - 2060	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Lead-214	735	838	352 - 1320	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Manganese-54	<32.1	<555	<555	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Plutonium-238	1100	1100	549 - 1670	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Plutonium-239	948	967	527 - 1390	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Potassium-40	41300	43100	29700 - 51500	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Strontium-90	5310	6270	1950 - 9770	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Thorium-234	3920	3320	1250 - 5690	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-234	3410	3350	1570 - 4390	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-234	3640	3350	1570 - 4390	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-238	3880	3320	1820 - 4460	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-Total	7520	6830	3790 - 8830	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	µg/kg	Uranium (mass)	11600	9960	4490 - 13400	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Zinc-65	4300	3990	3190 - 5440	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Americium-241	3650	3560	2200 - 5030	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Cesium-134	1820	1860	1230 - 2480	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Cesium-137	2560	2300	1770 - 3100	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Cobalt-60	528	496	389 - 648	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Curium-244	957	1100	620 - 1370	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Manganese-54	<27.4	<207	<207	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Plutonium-238	1320	1300	900 - 1680	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Plutonium-239	1190	1170	809 - 1480	Acceptable

ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Strontium-90	4560	2960	1670 - 3860	**Not Acceptable**
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Uranium-234	1090	1090	766 - 1390	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Uranium-238	1100	1080	763 - 1350	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Uranium-Total	2230	2220	1420 - 2990	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	µg/kg	Uranium (mass)	3300	3240	2490 - 4010	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Zinc-65	665	512	382 - 759	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Americium-241	41.2	38.8	27.7 - 51.7	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Cesium-134	286	325	211 - 399	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Cesium-137	739	795	653 - 1040	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Cobalt-60	203	191	162 - 243	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Iron-55	107	122	44.5 - 195	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Manganese-54	<2.38	<35.0	<35.0	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Plutonium-238	29.9	29.9	22.6 - 36.7	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Plutonium-239	12.1	13	9.73 - 15.7	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Strontium-90	130	133	84.1 - 181	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-234	68.1	71.5	53.0 - 83.8	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-234	69.9	71.5	53.0 - 83.8	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-238	70.1	70.9	53.5 - 84.6	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-238	72.3	70.9	53.5 - 84.6	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-Total	141	146	107 - 173	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-Total	142.2	146	107 - 173	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	µg/Filter	Uranium (mass)	210	212	170 - 248	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	µg/Filter	Uranium (mass)	216	212	170 - 248	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Zinc-65	133	120	98.4 - 183	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Gross Alpha	57.8	55.5	29.0 - 91.4	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Gross Beta	68.2	64.8	39.3 - 97.9	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Americium-241	100	96.2	66.0 - 123	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Cesium-134	452	483	365 - 531	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Cesium-137	1220	1250	1070 - 1420	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Cobalt-60	1500	1420	1220 - 1630	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Iron-55	867	926	544 - 1350	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Manganese-54	<5.46	<71.0	<71.0	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Plutonium-238	44.5	52.6	31.6 - 68.2	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Plutonium-239	94.4	117	72.5 - 144	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Strontium-90	283	224	161 - 277	**Not Acceptable**
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-234	140	153	116 - 175	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-234	145	153	116 - 175	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-238	147	152	118 - 179	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-238	156	152	118 - 179	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-Total	296	312	243 - 356	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-Total	301	312	243 - 356	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	µg/L	Uranium (mass)	442	455	369 - 516	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	µg/L	Uranium (mass)	468	455	369 - 516	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Zinc-65	145	122	109 - 154	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Gross Alpha	46.6	42.7	15.6 - 58.9	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Gross Beta	93.6	111	55.5 - 153	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Tritium	16900	18800	14200 - 22900	Acceptable
EZA	1st/2022	05/20/22	E13655	Cartridge	pCi	Iodine-131	8.98E+01	8.72E+01	1.03	Acceptable
EZA	1st/2022	05/20/22	E13656	Milk	pCi/L	Strontium-89	9.30E+01	9.68E+01	0.96	Acceptable
EZA	1st/2022	05/20/22	E13656	Milk	pCi/L	Strontium-90	8.41E+00	1.26E+01	0.67	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cerium-141	8.31E+01	6.46E+01	1.29	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cobalt-58	1.66E+0	1.64E+02	1.04	Acceptable

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EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cobalt-60	2.96E+02	3.02E+02	0.98	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Chromium-51	3.92E+02	3.39E+02	1.16	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cesium-134	1.68E+02	1.82E+02	0.92	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cesium-137	2.41E+02	2.23E+02	1.08	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Manganese-54	1.76E+02	1.64E+02	1.07	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Iron-59	1.91E+02	1.85E+02	1.03	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Iodine-131	1.19E+02	9.67E+01	1.23	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Zinc-65	2.62E+02	2.46E+02	1.06	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cerium-141	7.12E+01	7.61E+01	0.94	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cobalt-58	2.05E+02	1.93E+02	1.06	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cobalt-60	3.79E+02	3.55E+02	1.07	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cesium-134	2.00E+02	2.14E+02	0.93	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cesium-137	2.65E+02	2.63E+02	1.01	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Iodine-131	9.35E+01	8.76E+01	1.07	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Iron-59	2.39E+02	2.18E+02	1.10	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Manganese-54	2.07E+02	1.93E+02	1.07	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Zinc-65	3.25E+02	2.90E+02	1.12	Acceptable
EZA	2nd/2022	08/24/22	E13659	Cartridge	pCi	Iodine-131	8.77E+01	8.53E+01	1.03	Acceptable
EZA	2nd/2022	08/24/22	E13660	Milk	pCi/L	Strontium-89	6.76E+01	8.72E+01	0.78	Acceptable
EZA	2nd/2022	08/24/22	E13660	Milk	pCi/L	Strontium-90	1.07E+01	1.45E+01	0.74	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cerium-141	1.68E+02	1.71E+02	0.98	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cobalt-58	1.51E+02	1.59E+02	0.95	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cobalt-60	3.04E+02	2.99E+02	1.02	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Chromium-51	4.53E+02	4.25E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cesium-134	1.92E+02	2.12E+02	0.91	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cesium-137	2.51E+02	2.52E+02	1.00	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Iron-59	2.29E+02	1.94E+02	1.18	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Iodine-131	8.45E+01	9.05E+01	0.93	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Manganese-54	2.95E+02	2.83E+02	1.04	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Zinc-65	3.90E+02	3.66E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cerium-141	1.54E+02	1.39E+02	1.11	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cobalt-58	1.38E+02	1.28E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cobalt-60	2.58E+02	2.42E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Chromium-51	3.66E+02	3.44E+02	1.06	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cesium-134	1.68E+02	1.72E+02	0.98	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cesium-137	2.12E+02	2.04E+02	1.04	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Iron-59	1.71E+02	1.57E+02	1.09	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Iodine-131	8.47E+01	9.12E+01	0.93	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Manganese-54	2.57E+02	2.29E+02	1.12	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Zinc-65	3.09E+02	2.96E+02	1.04	Acceptable
EZA	2nd/2022	06/16/22	E13659	Cartridge	pCi	Iodine-131	8.77E+01	8.53E+01	103	Acceptable

EZA	2nd/2022	06/16/22	E13660	Milk	pCi/L	Strontium-89	6.76E+01	8.72E+01	0.78	Acceptable
EZA	2nd/2022	06/16/22	E13660	Milk	pCi/L	Strontium-90	1.07E+01	1.45E+01	0.74	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cerium-141	1.68E+02	1.71E+02	0.98	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cobalt-58	1.51E+02	1.59E+02	0.95	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cobalt-60	3.04E+02	2.99E+02	1.02	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Chromium-51	4.53E+02	4.25E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cesium-134	1.92E+02	2.12E+02	0.91	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cesium-137	2.51E+02	2.52E+02	1.00	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Manganese-54	2.95E+02	2.83E+02	1.02	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Iron-59	2.29E+02	1.94E+02	1.18	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Iodine-131	8.45E+01	9.05E+01	0.93	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Zinc-65	3.90E+02	3.66E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cerium-141	1.54E+02	1.39E+02	1.11	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cobalt-58	1.38E+02	1.28E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cobalt-60	2.58E+02	2.42E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cesium-134	1.68E+02	1.72E+02	0.98	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cesium-137	2.12E+02	2.04E+02	1.04	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Iodine-131	8.47E+01	9.12E+01	0.93	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Iron-59	1.71E+02	1.57E+02	1.09	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Manganese-54	2.57E+02	2.29E+02	1.12	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Zinc-65	3.09E+02	2.96E+02	1.04	Acceptable
EZA	3rd/2022	11/22/22	E13663	Cartridge	pCi	Iodine-131	7.97E+01	8.35E+01	0.95	Acceptable
EZA	3rd/2022	11/22/22	E13664	Milk	pCi/L	Strontium-89	9.54E+01	8.91E+01	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13664	Milk	pCi/L	Strontium-90	8.87E+00	1.36E+01	0.65	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cerium-141	1.52E+02	1.61E+02	0.94	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cobalt-58	1.87E+02	1.89E+02	0.99	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cobalt-60	2.65E+02	2.60E+02	1.02	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Chromium-51	4.63E+02	4.56E+02	1.02	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cesium-134	2.31E+02	2.52E+02	0.92	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cesium-137	2.24E+02	2.22E+02	1.01	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Iron-59	1.91E+02	1.73E+02	1.10	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Iodine-131	9.28E+01	9.42E+01	0.99	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Manganese-54	2.97E+02	2.82E+02	1.05	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Zinc-65	3.98E+02	3.73E+02	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cerium-141	1.29E+02	1.26E+02	1.02	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cobalt-58	1.49E+02	1.48E+02	1.01	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cobalt-60	2.17E+02	2.04E+02	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Chromium-51	3.84E+02	3.57E+02	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cesium-134	1.84E+02	1.98E+02	0.93	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cesium-137	1.79E+02	1.74E+02	1.03	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Iron-59	1.57E+02	1.36E+02	1.16	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Iodine-131	8.96E+0	8.80E+01	1.02	Acceptable

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EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Manganese-54	2.30E+02	2.21E+02	1.04	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Zinc-65	3.42E+05	2.93E+02	1.17	Acceptable
EZA	4th/2022	2/15/23	E13667	Cartridge	pCi	Iodine-131	8.96E+01	9.18E+01	0.98	Acceptable
EZA	4th/2022	2/15/23	E13668	Milk	pCi/L	Strontium-89	9.93E+01	9.04E+01	1.10	Acceptable
EZA	4th/2022	2/15/23	E13668	Milk	pCi/L	Strontium-90	1.28E+01	1.50E+01	0.86	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cerium-141	2.32E+02	2.25E+02	1.03	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cobalt-58	2.35E+02	2.30E+02	1.02	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cobalt-60	2.85E+02	2.90E+02	0.98	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Chromium-51	4.62E+02	4.64E+02	0.99	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cesium-134	1.76E+02	1.91E+02	0.92	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cesium-137	2.16E+02	2.19E+02	0.99	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Iron-59	2.31E+02	1.98E+02	1.17	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Iodine-131	1.02E+02	9.51E+01	1.07	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Manganese-54	2.64E+02	2.52E+02	1.05	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Zinc-65	3.50E+02	3.05E+02	1.15	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cerium-141	2.33E+02	2.24E+02	1.04	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cobalt-58	2.54E+02	2.29E+02	1.07	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cobalt-60	2.97E+02	2.89E+02	1.03	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Chromium-51	5.24E+02	4.62E+02	1.13	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cesium-134	1.71E+02	1.91E+02	0.90	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cesium-137	2.17E+02	2.18E+02	1.00	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Iron-59	2.32E+02	1.97E+02	1.18	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Iodine-131	9.96E+01	9.63E+01	1.03	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Manganese-54	2.72E+02	2.51E+02	1.08	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Zinc-65	3.36E+02	3.04E+02	1.11	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrF46	Filter	Bq/smpl	Gross Alpha	0.864	1.77	0.53-3.01	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrF46	Filter	Bq/smpl	Gross Beta	0.639	0.649	0.325-0.974	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrW46	Water	Bq/L	Gross Alpha	0.782	0.87	0.26-1.48	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrW46	Water	Bq/L	Gross Beta	2.40	2.50	1.25-3.75	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Americium-241	56.2	72	50.4-93.6	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cesium-134	741	890	623-1157	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cesium-137	369	365	256-475	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cobalt-57	1450	1400	980-1820	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cobalt-60	411	443	310-576	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Iron-55	725	1100	770-1430	**Not Acceptable**
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Manganese-54	1140	1140	798-1482	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	766	780	546-1014	482-896	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Plutonium-238	54.2	56	39.2-72.8	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Plutonium-239/240	41.1	41	28.7-53.3	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Potassium-40	598	596	417-775	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Strontium-90	560	677	474-880	Acceptable

MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Technetium-99	506	778	545-1011	**Not Acceptable**
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Thorium 228	45.8	43	30-56	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Thorium 230	49	38	27-49	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Thorium 232	39.5	42	29-55	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	U-234/233	46	44	30.8-57.2	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Uranium-238	126	123	86-160	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Zinc-65	-0.659		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Americium-241	0.271	0.335	0.249-0.462	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cesium-134	-0.0355		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cesium-137	7.9	7.64	5.35-9.93	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cobalt-57	37	36	25.2-46.8	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cobalt-60	9.64	9.3	6.5-12.1	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Hydrogen-3	303	300	210-390	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Iron-55	27.1	26.9	18.8-35.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Manganese-54	19.8	18.9	13.2-24.6	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Nickel-63	31.7	34	23.8-44.2	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Plutonium-238	0.992	1.07	0.75-1.39	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Plutonium-239/240	1.07	1.19	0.83-1.55	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Potassium-40	-875		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Radium-226	0.871	0.8	0.6-1.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Strontium-90	14.9	12.9	5.5-10.3	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Technetium-99	7.89	7.9	5.5-10.3	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Uranium-234/233	1.52	1.5	1.1-2.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Uranium-238	1.55	1.54	1.08-2.00	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Zinc-65	29.3	26.2	18.3-34.1	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	ug/smpl	Uranium-235	0.0407	0.041	0.029-0.053	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	ug/smpl	Uranium-238	5.8	5.35	3.75-6.96	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	ug/smpl	Uranium-Total	5.84	5.4	3.8-7.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Americium-241	0.0392	0.0439	0.307-0.0571	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cesium-134	0.936	0.93	0.65-1.21	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cesium-137	0.759	0.726	0.0508-0.944	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cobalt-57	0		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cobalt-60	0.831	0.72	0.50-0.84	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Manganese-54	0.00527		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Plutonium-238	0.0212	0.0221	0.0155-0.0287	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Plutonium-239/240	0.0142	0.0141	0.0099-0.0183	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Strontium-90	0.5	0.54	0.38-0.70	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Uranium-234/233	0.063	0.06	0.045-0.083	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Uranium-238	0.0685	0.067	0.047-0.087	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Zinc-65	0.0755		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Americium-241	0.0892	0.101	0.071-0.131	Acceptable
MAPEP	2nd/202	06/15/22	MAPEP-22-	veg	Bq/smpl	Cesium-134	7.04	7.61	5.33-9.89	**Not Acceptable**

	2		RdV46							
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Cesium-137	1.57	1.52	1.06-1.98	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Cobalt-57	5.06	5.09	3.56-6.62	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Cobalt-60	-0.077		2.09-3.89	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Manganese-54	2.7	2.59	1.81-3.37	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Plutonium-238	0.267	0.27	0.019-0.035	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Plutonium-239/240	0.625	0.0594	0.0416-0.0772	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Strontium-90	1.12	0.789	0.552-1.026	**Not Acceptable**
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Uranium-234/233	0.0763	0.071	0.050-0.092	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Uranium-238	0.0746	0.074	0.052-0.096	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Zinc-65	1.53	1.47	1.03-1.91	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrF47	Filter	Bq/sample	Gross Alpha	0.378	0.90	0.27-1.53	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrF47	Filter	Bq/sample	Gross Beta	1.25	1.31	0.66-1.97	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrW47	Water	Bq/L	Gross Alpha	0.978	0.871	0.261-1.481	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrW47	Water	Bq/L	Gross Beta	4.57	5.20	2.60-7.80	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Americium-241	96.8	99.2	69.4-129.0	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cesium-134	564	627	439-815	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cesium-137	0.284		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cobalt-57	856	786	550-1022	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cobalt-60	0.429		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Iron-55	628	740	518-962	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Manganese-54	888	841	589-1093	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Nickel-63	20.0		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Plutonium-238	0.285	0.56	Sens. Evaluation	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Plutonium-239/240	110	113	79-147	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Plutonium-241	22.7	26.8	Sens. Evaluation	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Potassium-40	561	537	376-698	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Strontium-90	842	852	596-1108	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Thorium-228	55	49	34-64	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Thorium-230	49.6	43	30-56	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Thorium-232	51	47	33-61	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Technetium-99	979	1000	700-1300	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	U-234/233	88.9	50.8	35.6-66.0	**Not Acceptable**
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Uranium-238	196	157	110-204	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Zinc-65	1240	1140	798-1482	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Americium-241	0.414	0.327	0.229-0.425	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cesium-134	15.9	17.1	12.0-22.2	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cesium-137	17.80	16.8	11.8-21.8	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cobalt-57	30.4	30.0	21.0-39.0	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cobalt-60	17.8	17.0	11.9-22.1	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Hydrogen-3	350	395	277-514	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Iron-55	22.9	27.8	19.5-36.1	Acceptable

MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Manganese-54	-0.0317		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Nickel-63	35.7	32.9	23.0-42.8	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Plutonium-238	0.881	0.985	0.690-1.281	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Plutonium-239/240	0.943	1.070	0.749-1.391	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Potassium-40	-0.850		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Radium-226	0.471	0.511	0.358-0.664	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Strontium-90	7.49	7.73	5.41-10.05	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Technetium-99	-0.206		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Uranium-234/233	1.3100	1.3400	0.96-1.78	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Uranium-238	0.851	0.84	0.59-1.09	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Zinc-65	12.6	11.3	7.9-14.7	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	ug/sample	Uranium-235	0.0803	0.0743	0550-0.0966	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	ug/sample	Uranium-238	11.6	10.4	7.3-13.5	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	ug/sample	Uranium-Total	11.680	10.5	7.4-13.7	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Americium-241	0.0953	0.0899	0.0629-0.1169	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cesium-134	0.0435		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cesium-137	1.66	1.530	1.07-1.99	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cobalt-57	3.32	3.32	2.32-4.32	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cobalt-60	2.00	1.99	1.39-2.59	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Manganese-54	1.97	1.88	1.32-2.44	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Plutonium-238	0.1110	0.1160	0.081-0.151	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Plutonium-239/240	0.0854	0.0936	0.0655-0.1217	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Strontium-90	1.580	1.620	1.13-2.11	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Uranium-234/233	0.132	0.125	0.088-0.163	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Uranium-238	0.14	0.130	0.091-0.169	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Zinc-65	1.77	1.58	1.11-2.05	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Americium-241	0.1890	0.1890	0.132-0.246	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cesium-134	-0.002		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cesium-137	1.18	1.083	0.758-1.408	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cobalt-57	0.0163		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cobalt-60	4.84	4.62	3.23-6.01	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Manganese-54	2.42	2.43	1.70-3.16	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Plutonium-238	0.1490	0.156	0.109-0.203	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Plutonium-239/240	0.14900	1.162	0.113-0.211	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Strontium-90	1.78	1.60	1.12-208	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Uranium-234/233	0.1330	0.1260	0.088-0.164	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Uranium-238	0.135	0.130	0.091-0.169	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Zinc-65	8.21	7.49	5.24-9.74	Acceptable

TABLE 2
2022 ECKERT & ZIEGLER ANALYTICS PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Closing / Received Date	Sample Number	Sample Media	Units	Analyte	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
EZA	1st/2022	05/20/22	E13655	Cartridge	pCi	Iodine-131	8.98E+01	8.72E+01	1.03	Acceptable
EZA	1st/2022	05/20/22	E13656	Milk	pCi/L	Strontium-89	9.30E+01	9.68E+01	0.96	Acceptable
EZA	1st/2022	05/20/22	E13656	Milk	pCi/L	Strontium-90	8.41E+00	1.26E+01	0.67	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cerium-141	8.31E+01	6.46E+01	1.29	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cobalt-58	1.66E+02	1.64E+02	1.04	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cobalt-60	2.96E+02	3.02E+02	0.98	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Chromium-51	3.92E+02	3.39E+02	1.16	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cesium-134	1.68E+02	1.82E+02	0.92	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Cesium-137	2.41E+02	2.23E+02	1.08	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Manganese-54	1.76E+02	1.64E+02	1.07	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Iron-59	1.91E+02	1.85E+02	1.03	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Iodine-131	1.19E+02	9.67E+01	1.23	Acceptable
EZA	1st/2022	05/20/22	E13657	Milk	pCi/L	Zinc-65	2.62E+02	2.46E+02	1.06	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cerium-141	7.12E+01	7.61E+01	0.94	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cobalt-58	2.05E+02	1.93E+02	1.06	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cobalt-60	3.79E+02	3.55E+02	1.07	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cesium-134	2.00E+02	2.14E+02	0.93	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Cesium-137	2.65E+02	2.63E+02	1.01	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Iodine-131	9.35E+01	8.76E+01	1.07	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Iron-59	2.39E+02	2.18E+02	1.10	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Manganese-54	2.07E+02	1.93E+02	1.07	Acceptable
EZA	1st/2022	05/20/22	E13658	Water	pCi/L	Zinc-65	3.25E+02	2.90E+02	1.12	Acceptable
EZA	2nd/2022	06/16/22	E13659	Cartridge	pCi	Iodine-131	8.77E+01	8.53E+01	103	Acceptable
EZA	2nd/2022	06/16/22	E13660	Milk	pCi/L	Strontium-89	6.76E+01	8.72E+01	0.78	Acceptable
EZA	2nd/2022	06/16/22	E13660	Milk	pCi/L	Strontium-90	1.07E+01	1.45E+01	0.74	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cerium-141	1.68E+02	1.71E+02	0.98	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cobalt-58	1.51E+02	1.59E+02	0.95	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cobalt-60	3.04E+02	2.99E+02	1.02	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Chromium-51	4.53E+02	4.25E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cesium-134	1.92E+02	2.12E+02	0.91	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Cesium-137	2.51E+02	2.52E+02	1.00	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Manganese-54	2.95E+02	2.83E+02	1.02	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Iron-59	2.29E+02	1.94E+02	1.18	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Iodine-131	8.45E+01	9.05E+01	0.93	Acceptable
EZA	2nd/2022	06/16/22	E13661	Milk	pCi/L	Zinc-65	3.90E+02	3.66E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cerium-141	1.54E+02	1.39E+02	1.11	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cobalt-58	1.38E+02	1.28E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cobalt-60	2.58E+02	2.42E+02	1.07	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cesium-134	1.68E+02	1.72E+02	0.98	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Cesium-137	2.12E+02	2.04E+02	1.04	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Iodine-131	8.47E+01	9.12E+01	0.93	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Iron-59	1.71E+02	1.57E+02	1.09	Acceptable
EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Manganese-54	2.57E+02	2.29E+02	1.12	Acceptable

EZA	2nd/2022	06/16/22	E13662	Water	pCi/L	Zinc-65	3.09E+02	2.96E+02	1.04	Acceptable
EZA	2nd/2022	08/24/22	E13659	Cartridge	pCi	Iodine-131	8.77E+01	8.53E+01	1.03	Acceptable
EZA	2nd/2022	08/24/22	E13660	Milk	pCi/L	Strontium-89	6.76E+01	8.72E+01	0.78	Acceptable
EZA	2nd/2022	08/24/22	E13660	Milk	pCi/L	Strontium-90	1.07E+01	1.45E+01	0.74	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cerium-141	1.68E+02	1.71E+02	0.98	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cobalt-58	1.51E+02	1.59E+02	0.95	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cobalt-60	3.04E+02	2.99E+02	1.02	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Chromium-51	4.53E+02	4.25E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cesium-134	1.92E+02	2.12E+02	0.91	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Cesium-137	2.51E+02	2.52E+02	1.00	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Iron-59	2.29E+02	1.94E+02	1.18	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Iodine-131	8.45E+01	9.05E+01	0.93	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Manganese-54	2.95E+02	2.83E+02	1.04	Acceptable
EZA	2nd/2022	08/24/22	E13361	Milk	pCi/L	Zinc-65	3.90E+02	3.66E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cerium-141	1.54E+02	1.39E+02	1.11	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cobalt-58	1.38E+02	1.28E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cobalt-60	2.58E+02	2.42E+02	1.07	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Chromium-51	3.66E+02	3.44E+02	1.06	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cesium-134	1.68E+02	1.72E+02	0.98	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Cesium-137	2.12E+02	2.04E+02	1.04	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Iron-59	1.71E+02	1.57E+02	1.09	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Iodine-131	8.47E+01	9.12E+01	0.93	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Manganese-54	2.57E+02	2.29E+02	1.12	Acceptable
EZA	2nd/2022	08/24/22	E13662	Water	pCi/L	Zinc-65	3.09E+02	2.96E+02	1.04	Acceptable
EZA	3rd/2022	11/22/22	E13663	Cartridge	pCi	Iodine-131	7.97E+01	8.35E+01	0.95	Acceptable
EZA	3rd/2022	11/22/22	E13664	Milk	pCi/L	Strontium-89	9.54E+01	8.91E+01	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13664	Milk	pCi/L	Strontium-90	8.87E+00	1.36E+01	0.65	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cerium-141	1.52E+02	1.61E+02	0.94	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cobalt-58	1.87E+02	1.89E+02	0.99	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cobalt-60	2.65E+02	2.60E+02	1.02	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Chromium-51	4.63E+02	4.56E+02	1.02	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cesium-134	2.31E+02	2.52E+02	0.92	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Cesium-137	2.24E+02	2.22E+02	1.01	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Iron-59	1.91E+02	1.73E+02	1.10	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Iodine-131	9.28E+01	9.42E+01	0.99	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Manganese-54	2.97E+02	2.82E+02	1.05	Acceptable
EZA	3rd/2022	11/22/22	E13665	Milk	pCi/L	Zinc-65	3.98E+02	3.73E+02	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cerium-141	1.29E+02	1.26E+02	1.02	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cobalt-58	1.49E+02	1.48E+02	1.01	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cobalt-60	2.17E+02	2.04E+02	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Chromium-51	3.84E+02	3.57E+02	1.07	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cesium-134	1.84E+02	1.98E+02	0.93	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Cesium-137	1.79E+02	1.74E+02	1.03	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Iron-59	1.57E+02	1.36E+02	1.16	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Iodine-131	8.96E+01	8.80E+01	1.02	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Manganese-54	2.30E+02	2.21E+02	1.04	Acceptable
EZA	3rd/2022	11/22/22	E13666	Water	pCi/L	Zinc-65	3.42E+05	2.93E+02	1.17	Acceptable
EZA	4th/2022	2/15/23	E13667	Cartridge	pCi	Iodine-131	8.96E+01	9.18E+01	0.98	Acceptable
EZA	4th/2022	2/15/23	E13668	Milk	pCi/L	Strontium-89	9.93E+01	9.04E+01	1.10	Acceptable
EZA	4th/2022	2/15/23	E13668	Milk	pCi/L	Strontium-90	1.28E+01	1.50E+01	0.86	Acceptable

EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cerium-141	2.32E+02	2.25E+02	1.03	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cobalt-58	2.35E+02	2.30E+02	1.02	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cobalt-60	2.85E+02	2.90E+02	0.98	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Chromium-51	4.62E+02	4.64E+02	0.99	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cesium-134	1.76E+02	1.91E+02	0.92	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Cesium-137	2.16E+02	2.19E+02	0.99	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Iron-59	2.31E+02	1.98E+02	1.17	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Iodine-131	1.02E+02	9.51E+01	1.07	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Manganese-54	2.64E+02	2.52E+02	1.05	Acceptable
EZA	4th/2022	2/15/23	E13669	Milk	pCi/L	Zinc-65	3.50E+02	3.05E+02	1.15	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cerium-141	2.33E+02	2.24E+02	1.04	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cobalt-58	2.54E+02	2.29E+02	1.07	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cobalt-60	2.97E+02	2.89E+02	1.03	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Chromium-51	5.24E+02	4.62E+02	1.13	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cesium-134	1.71E+02	1.91E+02	0.90	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Cesium-137	2.17E+02	2.18E+02	1.00	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Iron-59	2.32E+02	1.97E+02	1.18	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Iodine-131	9.96E+01	9.63E+01	1.03	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Manganese-54	2.72E+02	2.51E+02	1.08	Acceptable
EZA	4th/2022	2/15/23	E13670	Water	pCi/L	Zinc-65	3.36E+02	3.04E+02	1.11	Acceptable

TABLE 3

2022 DEPARTMENT OF ENERGY MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP) RESULTS

PT Provider	Quarter / Year	Report Closing / Received Date	Sample Number	Sample Media	Units	Analyte	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrF46	Filter	Bq/smpl	Gross Alpha	0.864	1.77	0.53-3.01	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrF46	Filter	Bq/smpl	Gross Beta	0.639	0.649	0.325-0.974	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrW46	Water	Bq/L	Gross Alpha	0.782	0.87	0.26-1.48	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-GrW46	Water	Bq/L	Gross Beta	2.40	2.50	1.25-3.75	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Americium-241	56.2	72	50.4-93.6	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cesium-134	741	890	623-1157	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cesium-137	369	365	256-475	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cobalt-57	1450	1400	980-1820	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Cobalt-60	411	443	310-576	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Iron-55	725	1100	770-1430	**Not Acceptable**
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Manganese-54	1140	1140	798-1482	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	766	780	546-1014	482-896	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Plutonium-238	54.2	56	39.2-72.8	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Plutonium-239/240	41.1	41	28.7-53.3	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Potassium-40	598	596	417-775	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Strontium-90	560	677	474-880	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Technetium-99	506	778	545-1011	Not Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Thorium 228	45.8	43	30-56	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Thorium 230	49	38	27-49	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Thorium 232	39.5	42	29-55	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	U-234/233	46	44	30.8-57.2	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Uranium-238	126	123	86-160	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaS46	Soil	Bq/Kg	Zinc-65	-0.659		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Americium-241	0.271	0.335	0.249-0.462	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cesium-134	-0.0355		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cesium-137	7.9	7.64	5.35-9.93	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cobalt-57	37	36	25.2-46.8	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Cobalt-60	9.64	9.3	6.5-12.1	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Hydrogen-3	303	300	210-390	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Iron-55	27.1	26.9	18.8-35.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Manganese-54	19.8	18.9	13.2-24.6	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Nickel-63	31.7	34	23.8-44.2	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Plutonium-238	0.992	1.07	0.75-1.39	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Plutonium-239/240	1.07	1.19	0.83-1.55	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Potassium-40	-875		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Radium-226	0.871	0.8	0.6-1.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Strontium-90	14.9	12.9	5.5-10.3	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Technetium-99	7.89	7.9	5.5-10.3	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Uranium-234/233	1.52	1.5	1.1-2.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Uranium-238	1.55	1.54	1.08-2.00	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-MaW46	Water	Bq/L	Zinc-65	29.3	26.2	18.3-34.1	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	ug/smpl	Uranium-235	0.0407	0.041	0.029-0.053	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	ug/smpl	Uranium-238	5.8	5.35	3.75-6.96	Acceptable

MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	ug/smpl	Uranium-Total	5.84	5.4	3.8-7.0	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Americium-241	0.0392	0.0439	0.307-0.0571	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cesium-134	0.936	0.93	0.65-1.21	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cesium-137	0.759	0.726	0.0508-0.944	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cobalt-57	0		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Cobalt-60	0.831	0.72	0.50-0.84	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Manganese-54	0.00527		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Plutonium-238	0.0212	0.0221	0.0155-0.0287	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Plutonium-239/240	0.0142	0.0141	0.0099-0.0183	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Strontium-90	0.5	0.54	0.38-0.70	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Uranium-234/233	0.063	0.06	0.045-0.083	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Uranium-238	0.0685	0.067	0.047-0.087	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdF46	Filter	Bq/smpl	Zinc-65	0.0755		False pos. test	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Americium-241	0.0892	0.101	0.071-0.131	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Cesium-134	7.04	7.61	5.33-9.89	Not Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Cesium-137	1.57	1.52	1.06-1.98	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Cobalt-57	5.06	5.09	3.56-6.62	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Cobalt-60	-0.077		2.09-3.89	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Manganese-54	2.7	2.59	1.81-3.37	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Plutonium-238	0.267	0.27	0.019-0.035	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Plutonium-239/240	0.625	0.0594	0.0416-0.0772	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Strontium-90	1.12	0.789	0.552-1.026	**Not Acceptable**
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Uranium-234/233	0.0763	0.071	0.050-0.092	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Uranium-238	0.0746	0.074	0.052-0.096	Acceptable
MAPEP	2nd/2022	06/15/22	MAPEP-22-RdV46	veg	Bq/smpl	Zinc-65	1.53	1.47	1.03-1.91	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrF47	Filter	Bq/sample	Gross Alpha	0.378	0.90	0.27-1.53	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrF47	Filter	Bq/sample	Gross Beta	1.25	1.31	0.66-1.97	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrW47	Water	Bq/L	Gross Alpha	0.978	0.871	0.261-1.481	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-GrW47	Water	Bq/L	Gross Beta	4.57	5.20	2.60-7.80	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Americium-241	96.8	99.2	69.4-129.0	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cesium-134	564	627	439-815	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cesium-137	0.284		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cobalt-57	856	786	550-1022	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Cobalt-60	0.429		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Iron-55	628	740	518-962	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Manganese-54	888	841	589-1093	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Nickel-63	20.0		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Plutonium-238	0.285	0.56	Sens. Evaluation	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Plutonium-239/240	110	113	79-147	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Plutonium-241	22.7	26.8	Sens. Evaluation	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Potassium-40	561	537	376-698	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Strontium-90	842	852	596-1108	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Thorium-228	55	49	34-64	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Thorium-230	49.6	43	30-56	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Thorium-232	51	47	33-61	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Technetium-99	979	1000	700-1300	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	U-234/233	88.9	50.8	35.6-66.0	**Not Acceptable**
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Uranium-238	196	157	110-204	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaS47	Soil	Bq/Kg	Zinc-65	1240	1140	798-1482	Acceptable

MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Americium-241	0.414	0.327	0.229-0.425	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cesium-134	15.9	17.1	12.0-22.2	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cesium-137	17.80	16.8	11.8-21.8	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cobalt-57	30.4	30.0	21.0-39.0	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Cobalt-60	17.8	17.0	11.9-22.1	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Hydrogen-3	350	395	277-514	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Iron-55	22.9	27.8	19.5-36.1	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Manganese-54	-0.0317		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Nickel-63	35.7	32.9	23.0-42.8	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Plutonium-238	0.881	0.985	0.690-1.281	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Plutonium-239/240	0.943	1.070	0.749-1.391	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Potassium-40	-0.850		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Radium-226	0.471	0.511	0.358-0.664	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Strontium-90	7.49	7.73	5.41-10.05	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Technetium-99	-0.206		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Uranium-234/233	1.3100	1.3400	0.96-1.78	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Uranium-238	0.851	0.84	0.59-1.09	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-MaW47	Water	Bq/L	Zinc-65	12.6	11.3	7.9-14.7	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	ug/sample	Uranium-235	0.0803	0.0743	0550-0.0966	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	ug/sample	Uranium-238	11.6	10.4	7.3-13.5	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	ug/sample	Uranium-Total	11.680	10.5	7.4-13.7	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Americium-241	0.0953	0.0899	0.0629-0.1169	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cesium-134	0.0435		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cesium-137	1.66	1.530	1.07-1.99	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cobalt-57	3.32	3.32	2.32-4.32	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Cobalt-60	2.00	1.99	1.39-2.59	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Manganese-54	1.97	1.88	1.32-2.44	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Plutonium-238	0.1110	0.1160	0.081-0.151	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Plutonium-239/240	0.0854	0.0936	0.0655-0.1217	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Strontium-90	1.580	1.620	1.13-2.11	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Uranium-234/233	0.132	0.125	0.088-0.163	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Uranium-238	0.14	0.130	0.091-0.169	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdF47	Filter	Bq/sample	Zinc-65	1.77	1.58	1.11-2.05	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Americium-241	0.1890	0.1890	0.132-0.246	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cesium-134	-0.002		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cesium-137	1.18	1.083	0.758-1.408	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cobalt-57	0.0163		False Pos Test	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Cobalt-60	4.84	4.62	3.23-6.01	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Manganese-54	2.42	2.43	1.70-3.16	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Plutonium-238	0.1490	0.156	0.109-0.203	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Plutonium-239/240	0.14900	1.162	0.113-0.211	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Strontium-90	1.78	1.60	1.12-208	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Uranium-234/233	0.1330	0.1260	0.088-0.164	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Uranium-238	0.135	0.130	0.091-0.169	Acceptable
MAPEP	4th/2022	12/15/22	MAPEP-22-RdV47	Vegetation	Bq/sample	Zinc-65	8.21	7.49	5.24-9.74	Acceptable

TABLE 4

2022 ERA PROGRAM PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Closing / Received Date	Sample Number	Sample Media	Units	Analyte	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Barium-133	65.2	63	52.4 - 69.4	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Cesium-134	81.9	84.9	69.6 - 93.4	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Cesium-137	29.5	29.3	25.2 - 35.3	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Cobalt-60	112	102	91.8 - 114	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Zinc-65	345	312	281 - 364	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Gross Alpha	32.1	32.5	16.6 - 42.1	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Gross Alpha	32.2	32.5	16.6 - 42.1	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Gross Beta	63.8	68.3	47.4 - 75.1	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Radium-226	12.6	9.53	7.14 - 11.1	**Not Acceptable**
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Radium-228	11.5	8.71	5.59 - 11.0	**Not Acceptable**
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Uranium (Nat)	66.3	69	56.4 - 75.9	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	µg/L	Uranium (mass)	109.74	101	82.5 - 111	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	µg/L	Uranium (mass)	109.74	101	82.5 - 111	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	µg/L	Uranium (mass)	109.74	101	82.5 - 111	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Tritium	21500	22200	19500 - 24400	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Tritium	21200	22200	19500 - 24400	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-89	72.8	65	52.7 - 73.0	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-89	77.7	65	52.7 - 73.0	**Not Acceptable**
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-90	43.7	40.8	30.0 - 46.9	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Strontium-90	42.6	40.8	30.0 - 46.9	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Iodine-131	18.8	21.1	17.5 - 25.3	Acceptable
ERA	1st/2022	2/28/2022	RAD-128	Water	pCi/L	Iodine-131	23.7	21.1	17.5 - 25.3	Acceptable
ERA	2nd/2022	5/23/2022	RAD 129	Water	pCi/L	Radium-226	8.15	9.46	7.09 - 11.1	Acceptable
ERA	2nd/2022	5/23/2022	RAD 129	Water	pCi/L	Radium-228	3.06	3.18	1.71 - 4.63	Acceptable
ERA	2nd/2022	5/23/2022	RAD 129	Water	pCi/L	Strontium-89	67.6	67.9	55.3 - 76.1	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Barium-133	40.1	38.2	30.9 - 42.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Cesium-134	84.7	88.6	72.7 - 97.5	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Cesium-137	177	170	153 - 189	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Cesium-137	177	170	153 - 189	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Cobalt-60	79	72.4	65.2 - 82.1	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Zinc-65	363	326	293 - 380	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Gross Alpha	54.3	60.2	31.5 - 74.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Gross Alpha	58.8	60.2	31.5 - 74.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Gross Alpha	58.8	60.2	31.5 - 74.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Gross Beta	22.5	17.7	10.1 - 25.9	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Gross Beta	22.5	17.7	10.1 - 25.9	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Radium-226	12.1	13.1	9.77 - 15.1	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Radium-228	8.05	8.4	5.38 - 10.6	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Radium-228	7.91	8.4	5.38 - 10.6	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Uranium (Nat)	53.6	54	44.0 - 59.5	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	µg/L	Uranium (mass)	74.525	78.8	64.2 - 86.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Tritium	20200	22100	19400 - 24300	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Strontium-89	48.4	49.6	39.0 - 57.0	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Strontium-89	47.4	49.6	39.0 - 57.0	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Strontium-90	12.8	11.2	7.62 - 13.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Strontium-90	11.9	11.2	7.62 - 13.8	Acceptable
ERA	3rd/2022	08/29/22	RAD-130	Water	pCi/L	Iodine-131	28.9	27.7	23.0 - 32.5	Acceptable

TABLE 5

2022 ERA PROGRAM (MRAD) PERFORMANCE EVALUATION RESULTS

PT Provider	Quarter / Year	Report Closing / Received Date	Sample Number	Sample Media	Units	Analyte	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Actinium-228	1710	1670	1100 - 2100	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Bismuth-212	2130	1840	527 - 2740	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Bismuth-214	888	790	379 - 1180	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-134	6470	6620	4530 - 7910	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-134	6470	6620	4530 - 7910	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-137	7680	6760	5110 - 8550	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cobalt-60	3110	2820	2220 - 3480	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Lead-212	1880	1630	1140 - 2060	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Lead-214	1090	838	352 - 1320	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Manganese-54	<24.3	<555	<555	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Plutonium-238	260	289	144 - 439	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Plutonium-239	1290	1180	643 - 1700	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Potassium-40	40500	37900	26100 - 45300	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Strontium-90	7090	6720	2090 - 10500	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Thorium-234	4900	3390	1280 - 5810	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-234	3830	3410	1600 - 4470	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-234	4120	3410	1600 - 4470	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-234	3830	3410	1600 - 4470	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-238	4080	3390	1860 - 4550	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-238	4060	3390	1860 - 4550	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-Total	8170	6960	3860 - 9000	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-Total	8366	6960	3860 - 9000	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Uranium-Total	8170	6960	3860 - 9000	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	µg/kg	Uranium (mass)	12300	10100	4560 - 13600	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Zinc-65	6450	5070	4050 - 6920	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Americium-241	1670	1850	1140 - 2610	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Soil	pCi/kg	Cesium-134	1900	2450	1630 - 3260	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Cesium-137	1330	1460	1120 - 1970	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Cesium-137	1330	1460	1120 - 1970	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Cobalt-60	822	902	708 - 1180	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Curium-244	1270	1530	863 - 1900	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Manganese-54	<25.2	<207	<207	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Plutonium-238	3470	3640	2520 - 4690	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Plutonium-239	3400	3540	2450 - 4480	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Potassium-40	32400	33300	25000 - 42200	Acceptable

ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Strontium-90	5170	4340	2450 - 5660	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Uranium-234	3750	3980	2800 - 5080	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Uranium-238	3850	3940	2780 - 4930	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Uranium-Total	7800	8110	5180 - 10900	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	µg/kg	Uranium (mass)	11500	11800	9060 - 14600	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	veg	pCi/kg	Zinc-65	564	545	407 - 808	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Americium-241	22.6	21	15.0 - 28.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Cesium-134	497	549	356 - 673	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Cesium-137	1320	1320	1080 - 1730	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Cobalt-60	905	885	752 - 1120	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Iron-55	110	127	46.4 - 203	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Manganese-54	<4.39	<35.0	<35.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Plutonium-238	27.1	29.6	22.3 - 36.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Plutonium-239	44.5	49.7	37.2 - 60.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Strontium-90	38	31.1	19.7 - 42.3	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-234	59.1	67.3	49.9 - 78.9	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-234	62.3	67.3	49.9 - 78.9	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-238	61.5	66.7	50.4 - 79.6	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-238	63.6	66.7	50.4 - 79.6	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-Total	124	137	100 - 162	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Uranium-Total	128.9	137	100 - 162	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	µg/Filter	Uranium (mass)	184	200	160 - 234	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	µg/Filter	Uranium (mass)	190	200	160 - 234	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Zinc-65	730	671	550 - 1030	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Zinc-65	730	671	550 - 1030	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Gross Alpha	98.4	94.2	49.2 - 155	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Filter	pCi/Filter	Gross Beta	71.5	66.8	40.5 - 101	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Americium-241	65	74.6	51.2 - 95.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-134	1620	1720	1300 - 1890	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-134	1620	1720	1300 - 1890	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-134	1620	1720	1300 - 1890	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-137	1130	1120	959 - 1270	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-137	1130	1120	959 - 1270	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cesium-137	1130	1120	959 - 1270	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Cobalt-60	2880	2710	2340 - 3110	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Iron-55	1270	1140	670 - 1660	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Manganese-54	<8.37	<71.0	<71.0	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Plutonium-238	116	147	88.4 - 190	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Plutonium-239	56	71.9	44.5 - 88.6	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Strontium-90	639	628	452 - 776	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-234	41.2	44.1	33.6 - 50.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-	Water	pCi/L	Uranium-234	44	44.1	33.6 - 50.4	Acceptable

			36							
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-238	44.7	43.7	33.9 - 51.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-238	43.5	43.7	33.9 - 51.4	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-Total	88.9	89.8	70.0 - 102	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Uranium-Total	89.5	89.8	70.0 - 102	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	µg/L	Uranium (mass)	134	131	106 - 149	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	µg/L	Uranium (mass)	130	131	106 - 149	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Zinc-65	1320	1220	1090 - 1540	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Gross Alpha	74.5	79.4	29.0 - 109	Acceptable
ERA	2nd/2022	5/27/2022	MRAD-36	Water	pCi/L	Tritium	28000	28200	21300 - 34300	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Actinium-228	1550	1670	1100 - 2100	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Americium-241	187	147	79.4 - 208	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Bismuth-212	1460	1670	478 - 2490	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Bismuth-214	592	790	379 - 1180	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Bismuth-214	592	790	379 - 1180	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Cesium-134	8710	9600	6560 - 11500	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Cesium-137	8080	7890	5970 - 9980	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Cobalt-60	1490	1500	1180 - 1850	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Lead-212	1820	1630	1140 - 2060	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Lead-214	735	838	352 - 1320	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Manganese-54	<32.1	<555	<555	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Plutonium-238	1100	1100	549 - 1670	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Plutonium-239	948	967	527 - 1390	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Potassium-40	41300	43100	29700 - 51500	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Strontium-90	5310	6270	1950 - 9770	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Thorium-234	3920	3320	1250 - 5690	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-234	3410	3350	1570 - 4390	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-234	3640	3350	1570 - 4390	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-238	3880	3320	1820 - 4460	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Uranium-Total	7520	6830	3790 - 8830	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	µg/kg	Uranium (mass)	11600	9960	4490 - 13400	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Soil	pCi/kg	Zinc-65	4300	3990	3190 - 5440	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Americium-241	3650	3560	2200 - 5030	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Cesium-134	1820	1860	1230 - 2480	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Cesium-137	2560	2300	1770 - 3100	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Cobalt-60	528	496	389 - 648	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Curium-244	957	1100	620 - 1370	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Manganese-54	<27.4	<207	<207	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Plutonium-238	1320	1300	900 - 1680	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Plutonium-239	1190	1170	809 - 1480	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Strontium-90	4560	2960	1670 - 3860	**Not Acceptable**
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Uranium-234	1090	1090	766 - 1390	Acceptable

ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Uranium-238	1100	1080	763 - 1350	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Uranium-Total	2230	2220	1420 - 2990	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	µg/kg	Uranium (mass)	3300	3240	2490 - 4010	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Vegetation	pCi/kg	Zinc-65	665	512	382 - 759	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Americium-241	41.2	38.8	27.7 - 51.7	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Cesium-134	286	325	211 - 399	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Cesium-137	739	795	653 - 1040	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Cobalt-60	203	191	162 - 243	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Iron-55	107	122	44.5 - 195	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Manganese-54	<2.38	<35.0	<35.0	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Plutonium-238	29.9	29.9	22.6 - 36.7	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Plutonium-239	12.1	13	9.73 - 15.7	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Strontium-90	130	133	84.1 - 181	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-234	68.1	71.5	53.0 - 83.8	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-234	69.9	71.5	53.0 - 83.8	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-238	70.1	70.9	53.5 - 84.6	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-238	72.3	70.9	53.5 - 84.6	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-Total	141	146	107 - 173	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Uranium-Total	142.2	146	107 - 173	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	µg/Filter	Uranium (mass)	210	212	170 - 248	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	µg/Filter	Uranium (mass)	216	212	170 - 248	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Zinc-65	133	120	98.4 - 183	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Gross Alpha	57.8	55.5	29.0 - 91.4	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Filter	pCi/Filter	Gross Beta	68.2	64.8	39.3 - 97.9	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Americium-241	100	96.2	66.0 - 123	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Cesium-134	452	483	365 - 531	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Cesium-137	1220	1250	1070 - 1420	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Cobalt-60	1500	1420	1220 - 1630	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Iron-55	867	926	544 - 1350	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Manganese-54	<5.46	<71.0	<71.0	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Plutonium-238	44.5	52.6	31.6 - 68.2	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Plutonium-239	94.4	117	72.5 - 144	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Strontium-90	283	224	161 - 277	**Not Acceptable**
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-234	140	153	116 - 175	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-234	145	153	116 - 175	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-238	147	152	118 - 179	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-238	156	152	118 - 179	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-Total	296	312	243 - 356	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Uranium-Total	301	312	243 - 356	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	µg/L	Uranium (mass)	442	455	369 - 516	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	µg/L	Uranium (mass)	468	455	369 - 516	Acceptable
ERA	4th/2022	11/21/22	MRAD-	Water	pCi/L	Zinc-65	145	122	109 - 154	Acceptable

			37							
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Gross Alpha	46.6	42.7	15.6 - 58.9	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Gross Beta	93.6	111	55.5 - 153	Acceptable
ERA	4th/2022	11/21/22	MRAD-37	Water	pCi/L	Tritium	16900	18800	14200 - 22900	Acceptable

FIGURE 1

COBALT-60 PERFORMANCE EVALUATION RESULTS AND % BIAS

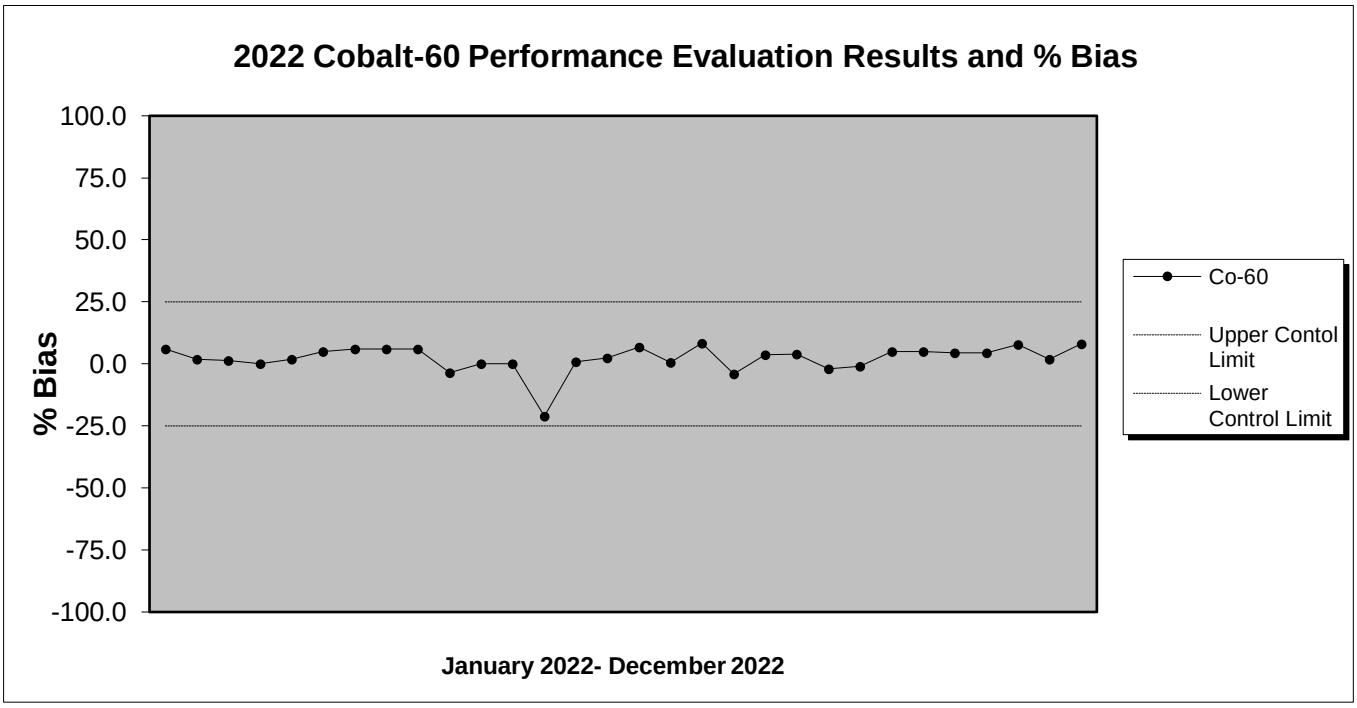

FIGURE 2

CESIUM-137 PERFORMANCE EVALUATION RESULTS AND % BIAS

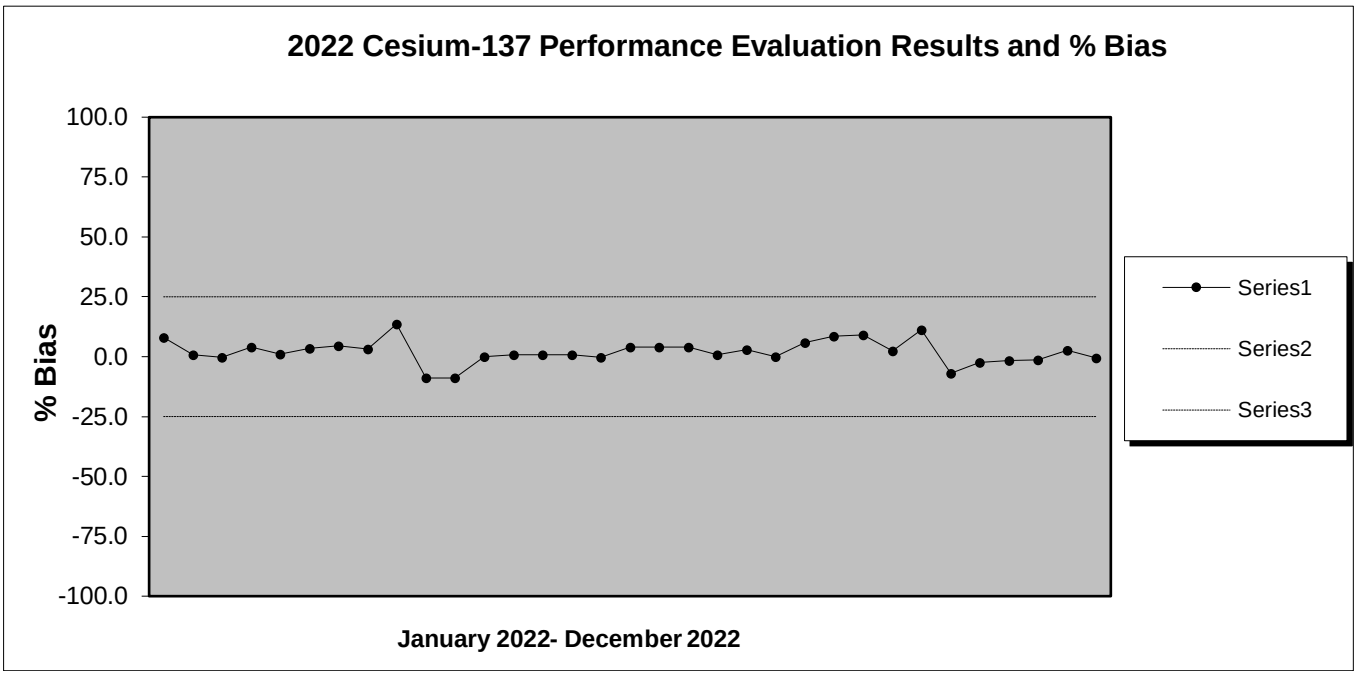

FIGURE 3

TRITIUM PERFORMANCE EVALUATION RESULTS AND % BIAS

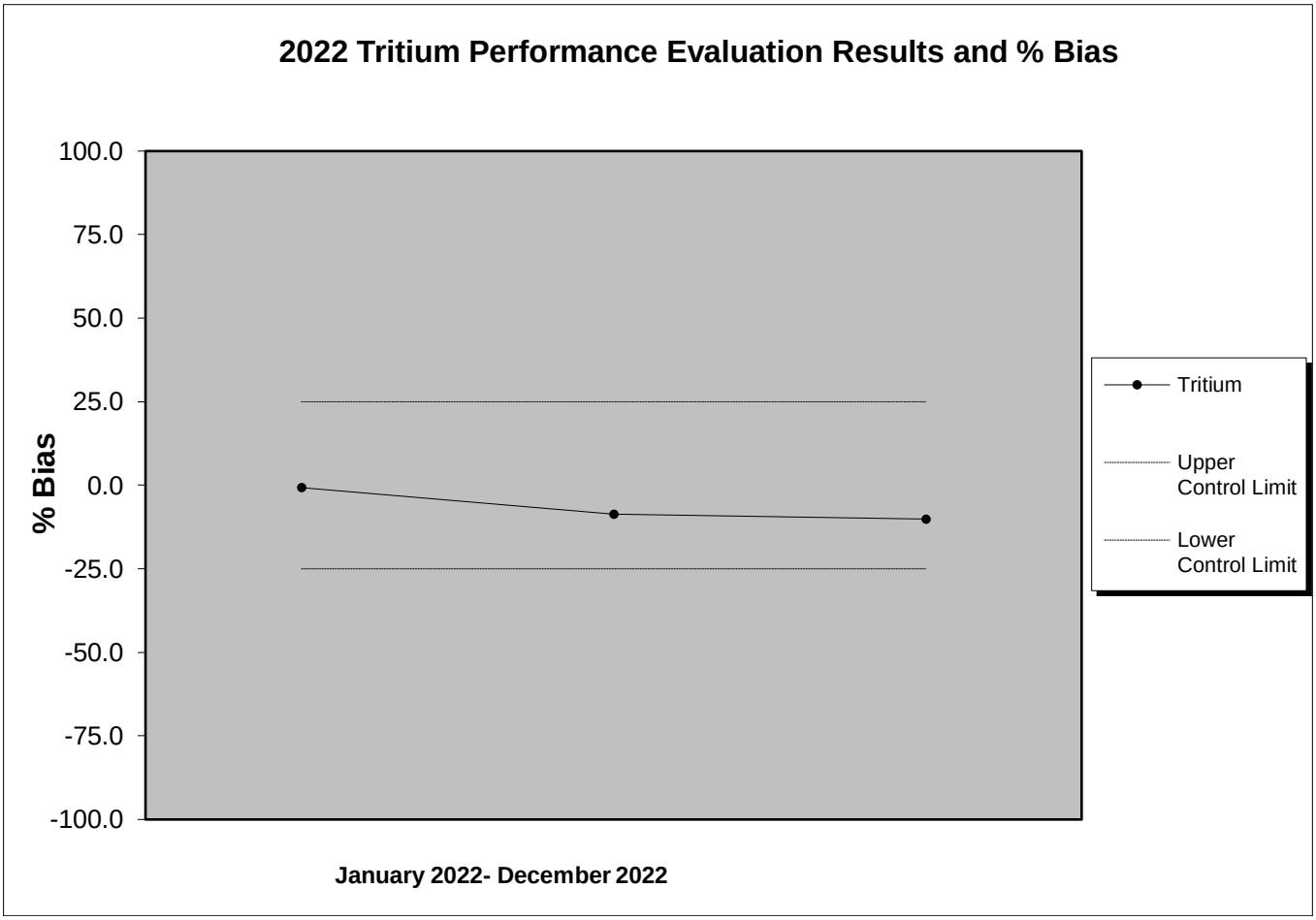

FIGURE 4

STRONTIUM-90 PERFORMANCE EVALUATION RESULTS AND % BIAS

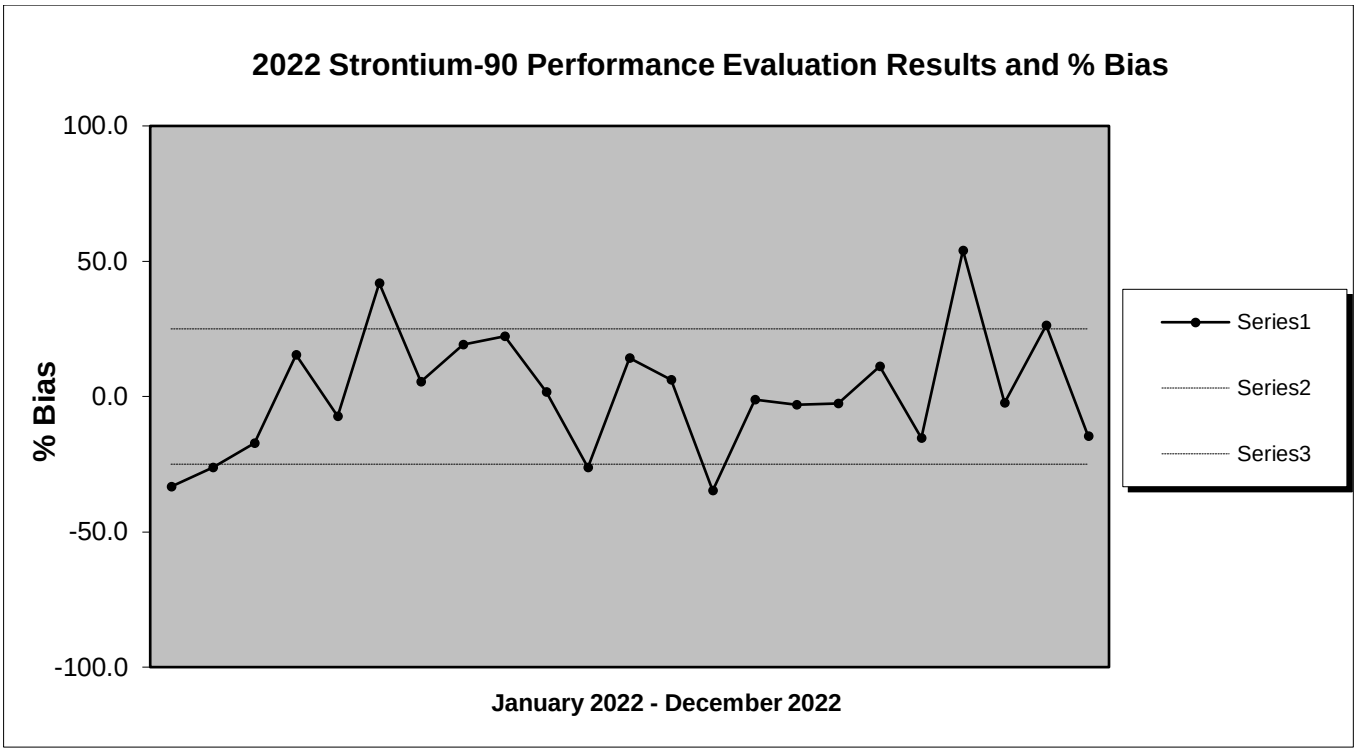

FIGURE 5

GROSS ALPHA PERFORMANCE EVALUATION RESULTS AND % BIAS

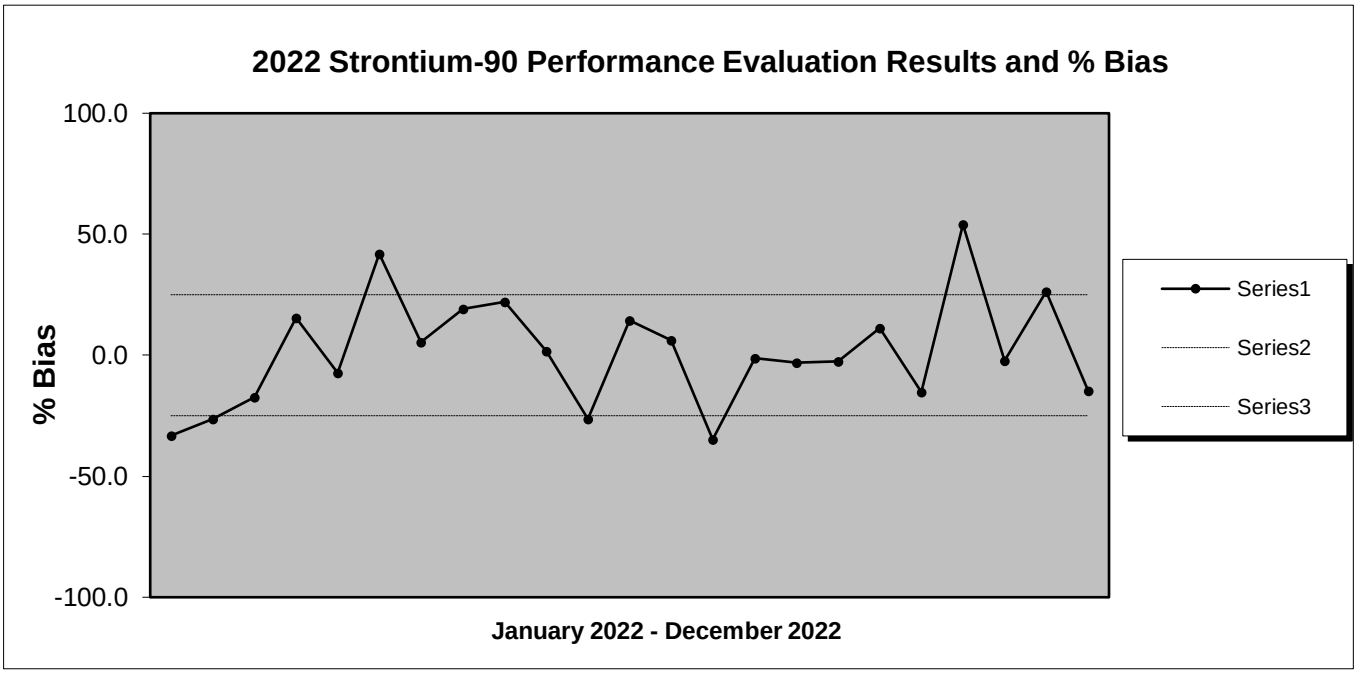

FIGURE 6

GROSS BETA PERFORMANCE EVALUATION RESULTS AND % BIAS

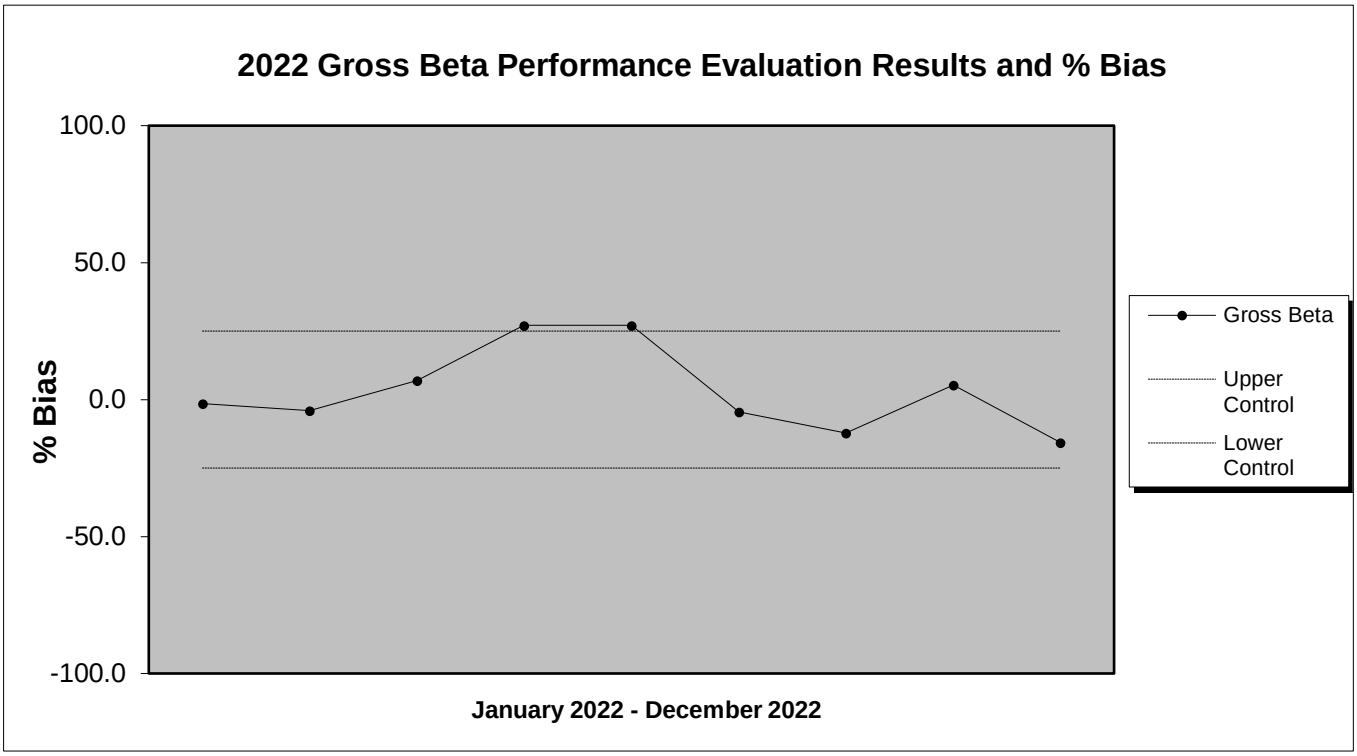

FIGURE 7

IODINE-131 PERFORMANCE EVALUATION RESULTS AND % BIAS

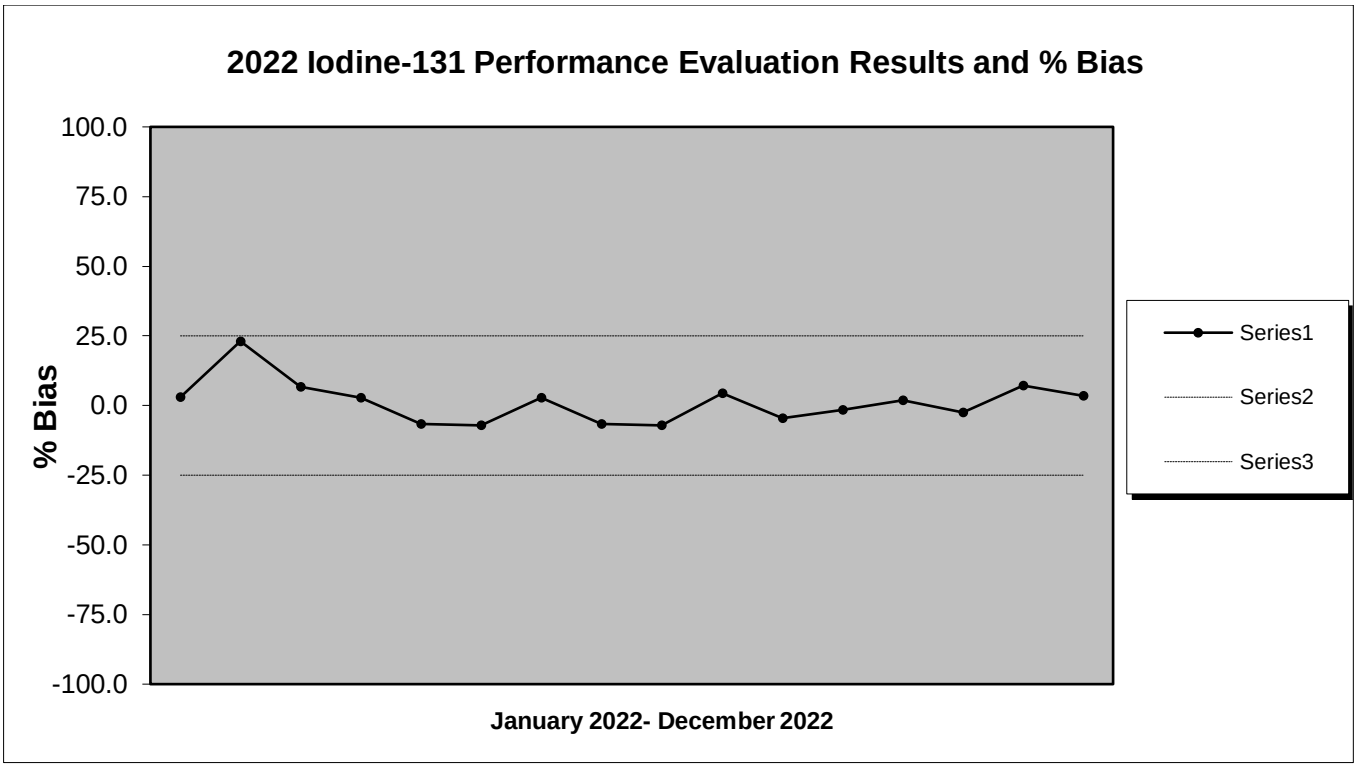

FIGURE 8

AMERICIUM-241 PERFORMANCE EVALUATION RESULTS AND % BIAS

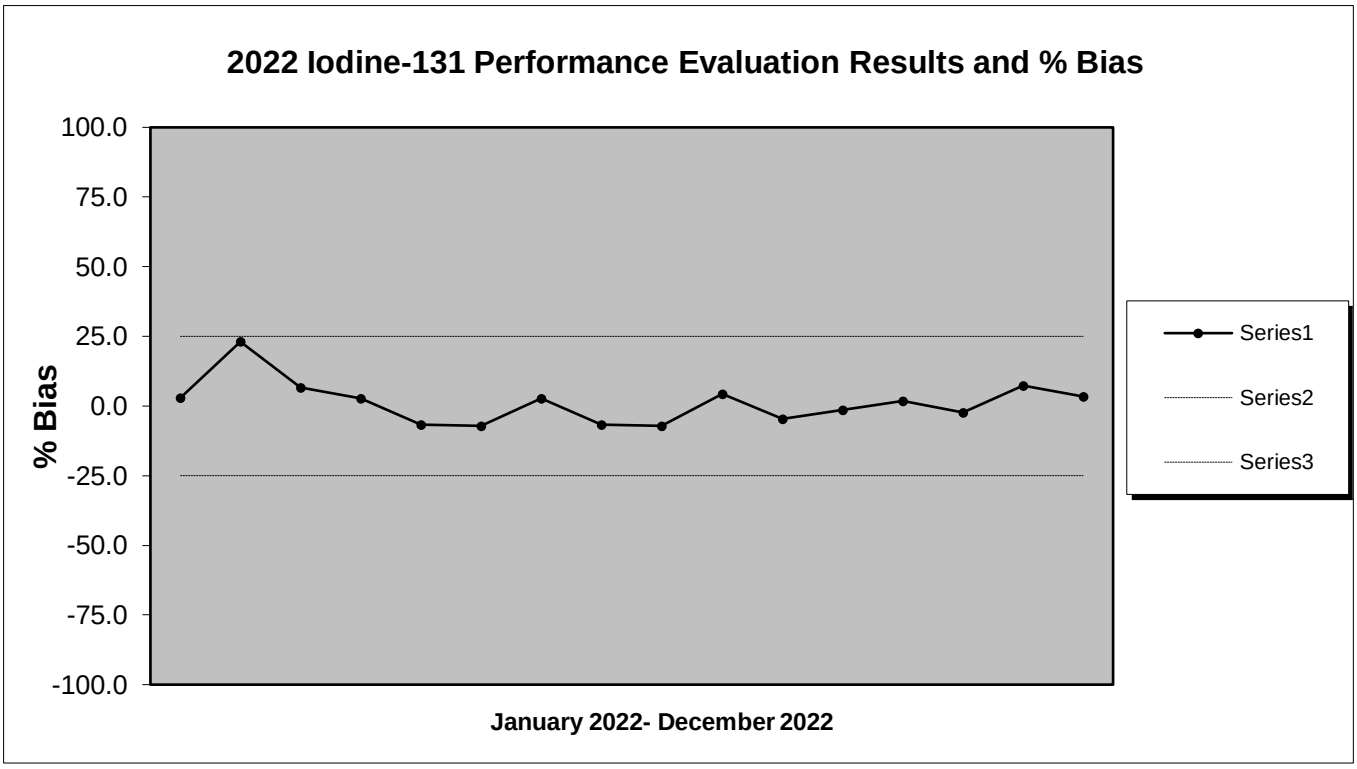

FIGURE 9

PLUTONIUM-238 PERFORMANCE EVALUATION RESULTS AND % BIAS

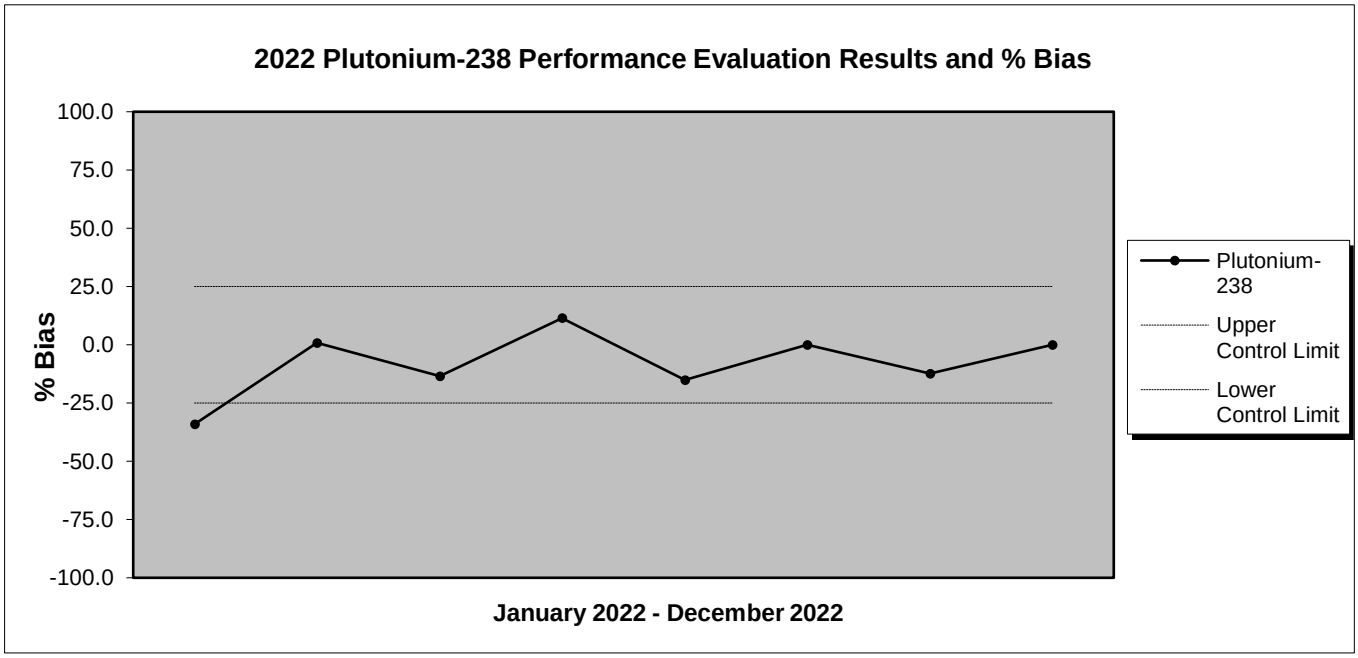

TABLE 6

REMP INTRA-LABORATORY DATA SUMMARY: BIAS AND PRECISION BY MATRIX

2022 REMP Intra Laboratory	Bias Criteria (+ / - 25%		Precision Criteria (Note 1)	
	WITHIN CRITERIA	OUTSIDE CRITERIA	WITHIN CRITERIA	OUTSIDE CRITERIA
DRINKING WATER				
Gross Alpha Non Vol Beta	471	0	498	0
LIQUID				
Gross Alpha Non Vol Beta	181	0	484	0
FILTER				
Gross A & B	1726	0	1415	0
AIR CHARCOAL				
Gamma Iodine 131 RAD A-013	1701	0	2570	0
Carbon-14 (Ascarite/Soda Lime Filter per Liter)	155	0	155	0
SOLID				
LSC Iron-55	30	0	30	0
LSC Nickel 63	25	0	25	0
Tritium	12	0	12	0
VEGETATION				
Carbon-14	12	0	12	0
LIQUID				
Tritium	1281	0	1626	0
Gamma Spec Liquid RAD A-013 with Ba, La	434	0	939	0
MILK				
Gamma Spec Liquid RAD A-013 with Ba, La	209	0	615	0
Gamma Iodine-131	56	0	606	0
Gas Flow Sr 2nd count	209	0	257	0
LIQUID				
Iodine-131	0	0	341	0
TISSUE				
Tritium	12	0	12	0
LIQUID				
Gamma Spec Liquid RAD A-013 with Iodine	119	0	444	0
DRINKING WATER				
Iodine-131	0	0	199	0
Gamma Spec Liquid RAD A-013 with Ba, La	166	0	282	0
LIQUID				
Gas Flow Sr 2nd count	83	0	84	0

VEGETATION				
Gamma Spec Solid RAD A-013 with Iodine	327	0	467	0
SOLID				
Gas Flow Sr 2nd count	44	0	54	0
DRINKING WATER				
Gamma Spec Liquid RAD A-013 with Iodine	0	0	53	0
FILTER				
Gamma Spec Filter	188	0	395	0
LIQUID				
LSC Iron-55	74	0	89	0
DRINKING WATER				
LSC Iron-55	68	0	47	0
LIQUID				
LSC Nickel 63	69	0	90	0
DRINKING WATER				
LSC Nickel 63	68	0	47	0
Tritium	146	0	165	0
SOLID				
Gamma Spec Solid RAD A-013 with Iodine	138	0	239	0
DRINKING WATER				
Gamma Iodine-131	123	0	145	0
LIQUID				
Gas Flow Total Strontium	100	0	112	0
DRINKING WATER				
Gas Flow Total Strontium	100	0	93	0
VEGETATION				
Gamma Spec Solid RAD A-013	34	0	34	0
FILTER				
Gas Flow Sr 2nd Count	17	0	22	0
MILK				
Gas Flow Total Strontium	74	0	69	0
SOLID				
Gamma Spec Solid RAD A-013	34	8	47	0
TISSUE				
Gamma Spec Solid RAD A-013	185	0	209	0
Gamma Spec Solid RAD A-013 with Iodine	81	0	86	0
Gas Flow Total Strontium	42	0	42	0
DRINKING WATER				
Gas Flow Sr 2nd count	7	0	7	0
SOLID				
Gas Flow Total Strontium	20	0	20	0

LIQUID				
Gamma Spec Liquid RAD A-013	16	0	16	0
VEGETATION				
Gas Flow Total Strontium	27	0	27	0
Gas Flow Sr 2nd count	19	0	28	0
TISSUE				
Gas Flow Sr 2nd count	49	0	49	0
TOTAL	**8932**		**12665**	

Note 1: The RPD must be 20 percent or less, if both samples are greater than 5 times the MDC. If both results are less than 5 times MDC, then the RPD must be equal to or less than 100%. If one result is above the MDC and the other is below the MDC, then the RPD can be calculated using the MDC for the result of the one below the MDC. The RPD must be 100% or less. In the situation where both results are above the MDC but one result is greater than 5 times the MDC and the other is less than 5 times the MDC, the RPD must be less than or equal to 20%. If both results are below MDC, then the limits on % RPD are not applicable.

TABLE 7

ALL RADIOLOGICAL INTRA-LABORATORY DATA SUMMARY:
BIAS AND PRECISION BY MATRIX:

2022 Intra Laboratory	Bias Criteria (+ / - 25%		Precision Criteria (Note 1)	
LIQUID				
Gas Flow Radium 228	19	0	16	0
DRINKING WATER				
Gas Flow Radium 228	364	0	387	0
Lucas Cell Radium-226	443	0	465	0
LIQUID				
Iodine-131	0	0	352	0
DRINKING WATER				
Tritium	151	0	170	0
AIR CHARCOAL				
Gamma Iodine 129	52	0	52	0
FILTER				
Gas Flow Total Strontium	5	0	12	0
LIQUID				
ICP-MS Uranium-233, 234 in Liquid	48	0	57	0
ICP-MS Uranium-235, 236, 238 Prep in Liquid	45	0	73	0
ICP-MS Uranium-235, 236, 238 in Liquid	58	0	98	0
SOLID				
Gamma Spec Solid RAD A-013 (pCi/Sample)	57	0	82	0
LIQUID				
Alpha Spec Polonium	41	0	134	0
SOLID				
Total Activity,	19	0	31	0
FILTER				
Gas Flow Lead 210	0	0	22	0
ICP-MS Uranium-234, 235, 236, 238 in Filter	32	0	160	0
LIQUID				
Gamma Iodine 131 RAD A-013	12	0	12	0
Gross Alpha/Beta	0	0	18	0
DRINKING WATER				
Gas Flow Strontium 90	68	0	47	0
VEGETATION				
Tritium	67	0	72	0
LIQUID				

Radium 226 + 228 Sum (Result and TPU only)	148	0	167	0
FILTER				
Filter Prep	16	0	60	0
VEGETATION				
Gas Flow Sr 2nd count	19	0	28	0
TISSUE				
LSC Plutonium	10	0	10	0
SOLID				
Gas Flow Strontium 90	26	0	27	0
LIQUID				
Gamma Spec Drinking Water RAD A-013	16	0	16	0
MILK				
Gas Flow Strontium 90	41	0	52	0
LIQUID				
Lucas Cell Radium 226	2344	0	3458	0
Technetium-99	4280	0	4184	0
SOLID				
LSC Plutonium	1683	0	1762	0
FILTER				
Alpha Spec U	68	0	320	0
Alpha Spec Uranium	476	0	1053	0
LIQUID				
LSC Nickel 63	620	0	923	0
FILTER				
Carbon-14	27	0	538	0
LIQUID				
Alpha Spec Uranium	3046	0	4469	0
FILTER				
Gamma Spec Filter RAD A-013	1117	0	1510	0
LIQUID				
Gas Flow Total Strontium	643	0	758	0
Gas Flow Total Alpha Radium	60	0	56	0
DRINKING WATER				
LSC Iron-55	68	0	47	0
Gamma Spec Liquid RAD A-013 with Iodine	0	0	53	0
SOLID				
ICP-MS U-234, 235, 236, 238 Prep per sample	53	0	53	0
LIQUID				
LSC Calcium 45	70	0	70	0
MILK				

Gamma Spec Liquid RAD A-013 with Ba, La	209	0	615	0
Gamma Iodine-131	56	0	606	0
FILTER				
Alpha Spec Plutonium	60	0	60	0
Gamma Spec Filter RAD A-013 Direct Count	5	0	48	0
SOLID				
Tritium	111	0	111	0
DRINKING WATER				
Gamma Spec Liquid RAD A-013	45	0	45	0
FILTER				
ICP-MS Tc-99 in Filter	0	0	29	0
DRINKING WATER				
Alpha Spec Am241 Curium	10	0	10	0
Alpha Spec Plutonium	10	0	10	0
SOLID				
LSC Calcium 45	5	0	16	0
VEGETATION				
Alpha Spec Uranium	1	0	11	0
FILTER				
Gamma I-131, filter	21	0	21	0
VEGETATION				
Gamma Spec Solid RAD A-013 (pCi/Sample)	11	0	11	0
FILTER				
Laboratory Sample composite-Filters	0	0	15	0
LIQUID				
Total Activity,	21	0	31	0
FILTER				
Carbon-14 Direct Count	0	0	10	0
TISSUE				
Gas Flow Sr 2nd count	59	0	59	0
VEGETATION				
Gas Flow Total Strontium	27	0	27	0
TOTAL	**128585**		**162627**	

Note 1: The RPD must be 20 percent or less, if both samples are greater than 5 times the MDC. If both results are less than 5 times MDC, then the RPD must be equal to or less than 100%. If one result is above the MDC and the other is below the MDC, then the RPD can be calculated using the MDC for the result of the one below the MDC. The RPD must be 100% or less. In the situation where both results are above the MDC but one result is greater than 5 times the MDC and the other is less than 5 times the MDC, the RPD must be less than or equal to 20%. If both results are below MDC, then the limits on % RPD are not applicable.

TABLE 8

2022 CORRECTIVE ACTION REPORT SUMMARY

CORRECTIVE ACTION & PE FAILURE	DISPOSITION

Summary of RAD-128 Drinking Water Study Unacceptable Ratings

Sample ID	Parm	Reported Value	Reference Value	Acceptance Range
Naturals	Radium-226	12.6 pCi/L	9.53 pCi/L	7.14-11.1 pCi/
Naturals	Radium-228 (9320)	11.5 pCi/L	8.71 pCi/L	5.59-11.0 pCi/
Strontium 89/90	Strontium-89	77.7 pCi/L	65.0 pCi/L	52.7-73.0 pCi/

Containment Actions, if any:

Radium-226: The laboratory reviewed the data of the original analysis, and no anomalies were noted. A review of the sample preparation processes and data set did not reveal any errors or possible contributors to the high bias. The sample was reanalyzed, and the result was within the acceptance range demonstrating that the process is under control and the unacceptable result is due to an unknown error.

Radium-228: The Batch data was reviewed by the laboratory, and it was noted that initial counts of the sample preparations were within the acceptance range but were recounted due to a high Relative Percent Difference (RPD). The sample was reanalyzed, and the results were within the acceptance range; therefore, an unidentified error occurred during the initial process.

Strontium-89: The result for Strontium-89 was 120% of the known value with the acceptance range limit of 112%. The laboratory reviewed the method for possible contributors to the bias and no anomalies were noted. The LCS trend charts and calibration were review and no errors were found. Due to the short half-life of Sr-89, the sample could not be reanalyzed for confirmation.

Root Causes:

The laboratory could not definitively identify the cause of the high bias in the results for these parameters. The lab will continue to monitor the recoveries of these parameters to ensure that there are no continued issues. The laboratory met acceptance criteria for these isotopes during the next RAD study (RAD 129)

CORRECTIVE ACTION & PE FAILURE

DISPOSITION

Sample ID	Parm	Reported Value	Reference Value	Acceptance Range
MAPEP-22-MaS46 (Radiological)	Fe-55 Tc-99	725 Bq/kg 506 Bq/kg	1100 Bq/kg 778 Bq/kg	770-1430 Bq/kg 545-1011 Bq/kg
MAPEP-22-RdV46	Sr-90	1.12 Bq/sample	0.789 Bq/sample	0.552-1.026 Bq/sample

Containment Actions, if any:

Upon receipt of the PT report, an investigation was initiated by the Quality Department and a Corrective Action (CARR) team assembled. The team consisted of representatives from the affected areas. The sample preparation and analytical processes were reviewed. This included review of reagents and standards used in the sample preparation steps, calibration records, process control samples, and interviews with the analysts.

The investigation determined that the laboratory met all quality control criteria specified in each method. Additionally, all internal procedures and policies were performed as required. These failures were tracked through GEL's internal non conformance system.

Root Cause(s):

MAPEP-22-MaS46 (Radiological):
Fe-55:

The laboratory reviewed the data and noted that the tracer recoveries for this analysis were higher than typical soil tracer recoveries. The higher tracer recoveries possibly contributed to the low bias seen in the result.

Tc-99:

The laboratory reviewed both the inorganic and radiological data for contributors to the low bias. Both analyses include the addition of Hydrofluoric Acid to the 1M Hydrochloric leach process. The laboratory has concluded that since both the reported results were low, the HF leach may not have been performed long enough for the HF to effectively isolate the Technetium.

MAPEP-22-RdV46:

The data for the Sr-90 analysis was reviewed and no anomalies were noted. The QC in the analysis batch met acceptance criteria. The laboratory evaluated both the prep

	and instrument processes for possible areas of contamination that contributed to the positive bias. A definitive source was not determined.

CORRECTIVE ACTION & PE FAILURE	DISPOSITION

Sample ID	Parm	Reported Value	Reference Value	Acceptance Range
MAPEP-22-MaS47 (Radiological)	U-234 U-238 (W)	88.9 Bq/kg 196 Bq/kg	50.8 Bq/kg 157 Bq/kg	35.6-66.0 Bq/kg 110-204 Bq/kg

Containment Actions, if any:

Upon receipt of the PT report, an investigation was initiated by the Quality Department and a Corrective Action (CARR) team assembled. The team consisted of representatives from the affected areas. The sample preparation and analytical processes were reviewed. This included review of reagents and standards used in the sample preparation steps, calibration records, process control samples, and interviews with the analysts.

The investigation determined that the laboratory met all quality control criteria specified in each method. Additionally, all internal procedures and policies were performed as required. These failures were tracked through GEL's internal non-conformance system.

A review of the spectral data and calculations was performed, and no errors were found. A recount of the samples was performed to see if there were any counting issues that would result in the higher bias. Recount data verified original results. A reanalysis was performed via alpha spec, utilizing an HF, HNO3, HCL complete digestion procedure (GEL-RAD-A-011). Reanalysis results averaged between 83%-104% for U-234 and 92%-102% for U-238. Possible issues with original analysis could include: analyst errors in tracing or aliquoting, tracer low bias (a different secondary tracer was used on the reanalysis, however control charts of the original tracer indicated no bias), or possible contamination issues from the NaOH fusion method (original prep) and/or the crucibles used for the fusion. Although contamination is a probable cause, the batch blank gave no indication of a contamination issues. A review of the cleaning procedure for the crucibles was performed and no

issues were identified.

	Root Cause(s): The laboratory could not definitively identify the cause of the high bias in the results for these parameters. The lab will continue to monitor the recoveries of these parameters in all methods to ensure that there are no continued issues..
	Containment Actions, if any: Upon receipt of the PT report, an investigation was initiated by the Quality Department and a Corrective Action (CARR) team assembled. The team consisted of representatives from the affected areas. The sample preparation and analytical processes were reviewed. This included review of reagents and standards used in the sample preparation steps, calibration records, process control samples, and interviews with the analysts. The investigation determined that the laboratory met all quality control criteria specified in each method. Additionally, all internal procedures and policies were performed as required. These failures were tracked through GEL's internal non-conformance system
	The lab will continue to monitor the recoveries of these parameters to ensure that there are no continued issues. During the analysis time period for MRAD-37, the laboratory successfully completed the analysis of Strontium-90 in these matrices in PT study MAPEP-47. In which, the samples were prepared and analyzed by the same processes and procedures

Sample ID	Parm	Reported Value	Reference Value	Acceptance Range
MRAD 37 Vegetation	Strontium-90	4560 pCi/kg	2960 pCi/kg	1670-3860 pCi/L
MRAD 37 Water	Strontium-90	283 pCi/L	224 pCi/L	161-277 pCi/L

Appendix B

Environmental Dosimetry Company

Annual Quality Assurance Status Report

January – December 2022

ENVIRONMENTAL DOSIMETRY COMPANY

ANNUAL QUALITY ASSURANCE STATUS REPORT

January - December 2022

Prepared By: _____ Date: 3/24/23

Approved By: _____ Date: 3/24/23

Environmental Dosimetry Company
10 Ashton Lane
Sterling, MA 01564

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EXECUTIVE SUMMARY

Routine quality control (QC) testing was performed for dosimeters issued by the Environmental Dosimetry Company (EDC) .

During this annual period100% (72/72) of the individual dosimeters, evaluated against the EDC internal performance acceptance criteria (high-energy photons only), met the criterion for accuracy and 100% (72/72) met the criterion for precision (Table 1). In addition, 100% (12/12) of the dosimeter sets evaluated against the internal tolerance limits met EDC acceptance criteria (Table 2) and 100% (6/6) of independent testing passed the performance criteria (Table 3). Trending graphs, which evaluate performance statistic for high-energy photon irradiations and co-located stations are given in Appendix A.

One internal assessment was performed in 2022.There were no findings.

I. INTRODUCTION

The TLD systems at the Environmental Dosimetry Company (EDC) are calibrated and operated to ensure consistent and accurate evaluation of TLDs. The quality of the dosimetric results reported to EDC clients is ensured by in-house performance testing and independent performance testing by EDC clients, and both internal and client directed program assessments.

The purpose of the dosimetry quality assurance program is to provide performance documentation of the routine processing of EDC dosimeters. Performance testing provides a statistical measure of the bias and precision of dosimetry processing against a reliable standard, which in turn points out any trends or performance changes. Two programs are used:

A. QC Program

Dosimetry quality control tests are performed on EDC Panasonic 814 Environmental dosimeters. These tests include: (1) the in-house testing program coordinated by the EDC QA Officer and (2) independent test perform by EDC clients. In-house test are performed using six pairs of 814 dosimeters, a pair is reported as an individual result and six pairs are reported as the mean result. Results of these tests are described in this report.

Excluded from this report are instrumentation checks. Although instrumentation checks represent an important aspect of the quality assurance program, they are not included as process checks in this report. Instrumentation checks represent between 5-10% of the TLDs processed.

B. QA Program

An internal assessment of dosimetry activities is conducted annually by the Quality Assurance Officer (Reference 1). The purpose of the assessment is to review procedures, results, materials or components to identify opportunities to improve or enhance processes and/or services.

II. PERFORMANCE EVALUATION CRITERIA

A. Acceptance Criteria for Internal Evaluations

1. Bias

For each dosimeter tested, the measure of bias is the percent deviation of the reported result relative to the delivered exposure. The percent deviation relative to the delivered exposure is calculated as follows:

$$\frac{\left(H_i' - H_i\right)}{H_i} 100$$

where:

H_i' = the corresponding reported exposure for the i^{th} dosimeter (i.e., the reported exposure)

H_i = the exposure delivered to the i^{th} irradiated dosimeter (i.e., the delivered exposure)

2. Mean Bias

For each group of test dosimeters, the mean bias is the average percent deviation of the reported result relative to the delivered exposure. The mean percent deviation relative to the delivered exposure is calculated as follows:

$$\sum\left(\frac{\left(H_i' - H_i\right)}{H_i}\right)100\left(\frac{1}{n}\right)$$

where:

H_i' = the corresponding reported exposure for the i^{th} dosimeter (i.e., the reported exposure)

H_i = the exposure delivered to the i^{th} irradiated test dosimeter (i.e., the delivered exposure)

n = the number of dosimeters in the test group

Precision

For a group of test dosimeters irradiated to a given exposure, the measure of precision is the percent deviation of individual results relative to the mean reported exposure. At least two values are required for the determination of precision. The measure of precision for the i^{th} dosimeter is:

$$\left(\frac{\left(H_i' - \bar{H}\right)}{\bar{H}}\right)100$$

where:

H_i' = the reported exposure for the i^{th} dosimeter (i.e., the reported exposure)

$\bar{H}$ = the mean reported exposure; i.e., $\bar{H} = \sum H_i'\left(\frac{1}{n}\right)$

n = the number of dosimeters in the test group

3. EDC Internal Tolerance Limits

All evaluation criteria are taken from the “EDC Quality System Manual,” (Reference 2). These criteria are only applied to individual test dosimeters irradiated with high-energy photons (Cs-137) and are as follows for Panasonic Environmental dosimeters: ± 15% for bias and ± 12.8% for precision.

B. QC Investigation Criteria and Result Reporting

EDC Quality System Manual (Reference 2) specifies when an investigation is required due to a QC analysis that has failed the EDC bias criteria. The criteria are as follows:

1. No investigation is necessary when an individual QC result falls outside the QC performance criteria for accuracy.

2. Investigations are initiated when the mean of a QC processing batch is outside the performance criterion for bias.

C. Reporting of Environmental Dosimetry Results to EDC Customers

1. All results are to be reported in a timely fashion.

4. If the QA Officer determines that an investigation is required for a process, the results shall be issued as normal. If the QC results prompting the investigation have a mean bias from the known of greater than ±20%, the results shall be issued with a note indicating that they may be updated in the future, pending resolution of a QA issue.

5. Environmental dosimetry results do not require updating if the investigation has shown that the mean bias between the original results and the corrected results, based on applicable correction factors from the investigation, does not exceed ±20%.

III. DATA SUMMARY FOR ISSUANCE PERIOD JANUARY-DECEMBER 2022

A. General Discussion

Results of performance tests conducted are summarized and discussed in the following sections. Summaries of the performance tests for the reporting period are given in Tables 1 through 3 and Figures 1 through 4.

Table 1 provides a summary of individual dosimeter results evaluated against the EDC internal acceptance criteria for high-energy photons only. During this period100% (72/72) of the individual dosimeters, evaluated against these criteria, met the tolerance limits for accuracy and 100% (72/72) met the criterion for precision. A graphical interpretation is provided in Figures 1 and 2.

Table 2 provides the bias and standard deviation results for each group (N=6) of dosimeters evaluated against the internal tolerance criteria. Overall,100% (12/12) of the dosimeter sets, evaluated against the internal tolerance performance criteria, met these criteria. A graphical interpretation is provided in Figure 3.

Table 3 presents the independent blind spike results for dosimeters processed during this annual period. All results passed the performance acceptance criterion. Figure 4 is a graphical interpretation of Seabrook Station blind co-located station results.

B. Result Trending

One of the main benefits of performing quality control tests on a routine basis is to identify trends or performance changes. The results of the Panasonic environmental dosimeter performance tests are presented in Appendix A. The results are evaluated against each of the performance criteria listed in Section II, namely: individual dosimeter accuracy, individual dosimeter precision, and mean bias.

All of the results presented in Appendix A are plotted sequentially by processing date.

IV. STATUS OF EDC CONDITION REPORTS (CR)

No condition reports were issued during this annual period.

V. STATUS OF AUDITS/ASSESSMENTS

1. Internal

EDC Internal Quality Assurance Assessment was conducted during the fourth quarter 2022. There were no findings identified.

2. External

None.

VI. PROCEDURES AND MANUALS REVISED DURING JANUARY - DECEMBER 2022

Two procedures were reissued with no changes as part of the 5 year review cycle.

VII. CONCLUSION AND RECOMMENDATIONS

The quality control evaluations continue to indicate the dosimetry processing programs at the EDC satisfy the criteria specified in the Quality System Manual. The EDC demonstrated the ability to meet all applicable acceptance criteria.

VIII. REFERENCES

1. EDC Quality Control and Audit Assessment Schedule, 2022.

2. EDC Manual 1, Quality System Manual, Rev. 4, September 28, 2020.

TABLE 1

PERCENTAGE OF INDIVIDUAL DOSIMETERS THAT PASSED EDC INTERNAL CRITERIA JANUARY – DECEMBER 2022[(1), (2)]

Dosimeter Type	Number Tested	% Passed Bias Criteria	% Passed Precision Criteria
Panasonic Environmental	72	100	100

[(1)]This table summarizes results of tests conducted by EDC.
[(2)]Environmental dosimeter results are free in air.

TABLE 2

MEAN DOSIMETER ANALYSES (N=6) JANUARY – DECEMBER 2022[(1), (2)]

Process Date	Exposure Level	Mean Bias %	Standard Deviation %	Tolerance Limit +/-15%
4/25/2022	43	1.2	1.8	Pass
4/27/2022	62	6.2	1.0	Pass
5/05/2022	99	2.3	0.7	Pass
7/26/2022	34	-2.6	1.2	Pass
7/27/2022	81	0.6	1.7	Pass
8/07/2022	107	-3.5	0.7	Pass
10/27/2022	52	1.8	0.9	Pass
11/02/2022	76	2.0	0.9	Pass
11/07/2022	27	7.0	0.7	Pass
01/24/2023	38	1.5	1.7	Pass
01/26/2023	115	-0.3	2.0	Pass
02/14/2023	49	2.3	4.0	Pass

[(1)]This table summarizes results of tests conducted by EDC for TLDs issued in 2022.
[(2)]Environmental dosimeter results are free in air.

TABLE 3
SUMMARY OF INDEPENDENT DOSIMETER TESTING JANUARY – DECEMBER 2022[(1), (2)]

Issuance Period	Client	Mean Bias %	Standard Deviation %	Pass / Fail
1st Qtr. 2022	Millstone	-0.6	0.6	Pass
2nd Qtr.2022	Millstone	-3.9	1.0	Pass
3rd Qtr. 2022	Millstone	0.1	0.5	Pass
4th Qtr.2022	Millstone	-2.6	1.2	Pass
4th Qtr.2022	PSEG(PNNL) 48mR	1.1	1.5	Pass
4th Qtr.2022	PSEG(PNNL) 95mR	0.7	0.3	Pass
4th Qtr.2022	PSEG(PNNL) 143mR	2.3	0.8	Pass
4th Qtr.2022	PSEG(PNNL) 190mR	1.4	0.8	Pass
4th Qtr.2022	SONGS	-5.6	1.1	Pass

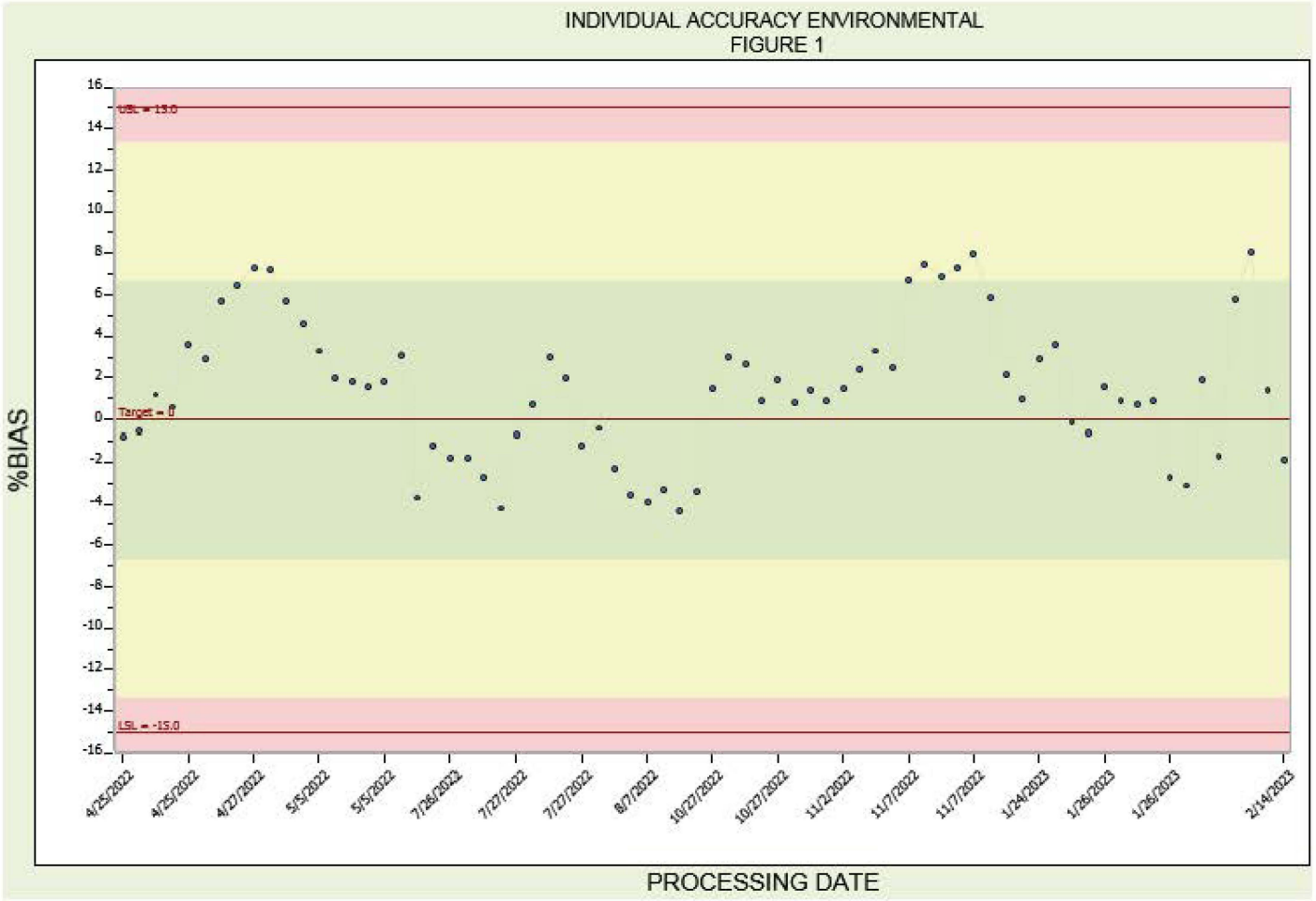
[(1)]Performance criteria are +/- 15%.
[(2)]Blind spike irradiations using Cs-137

APPENDIX A

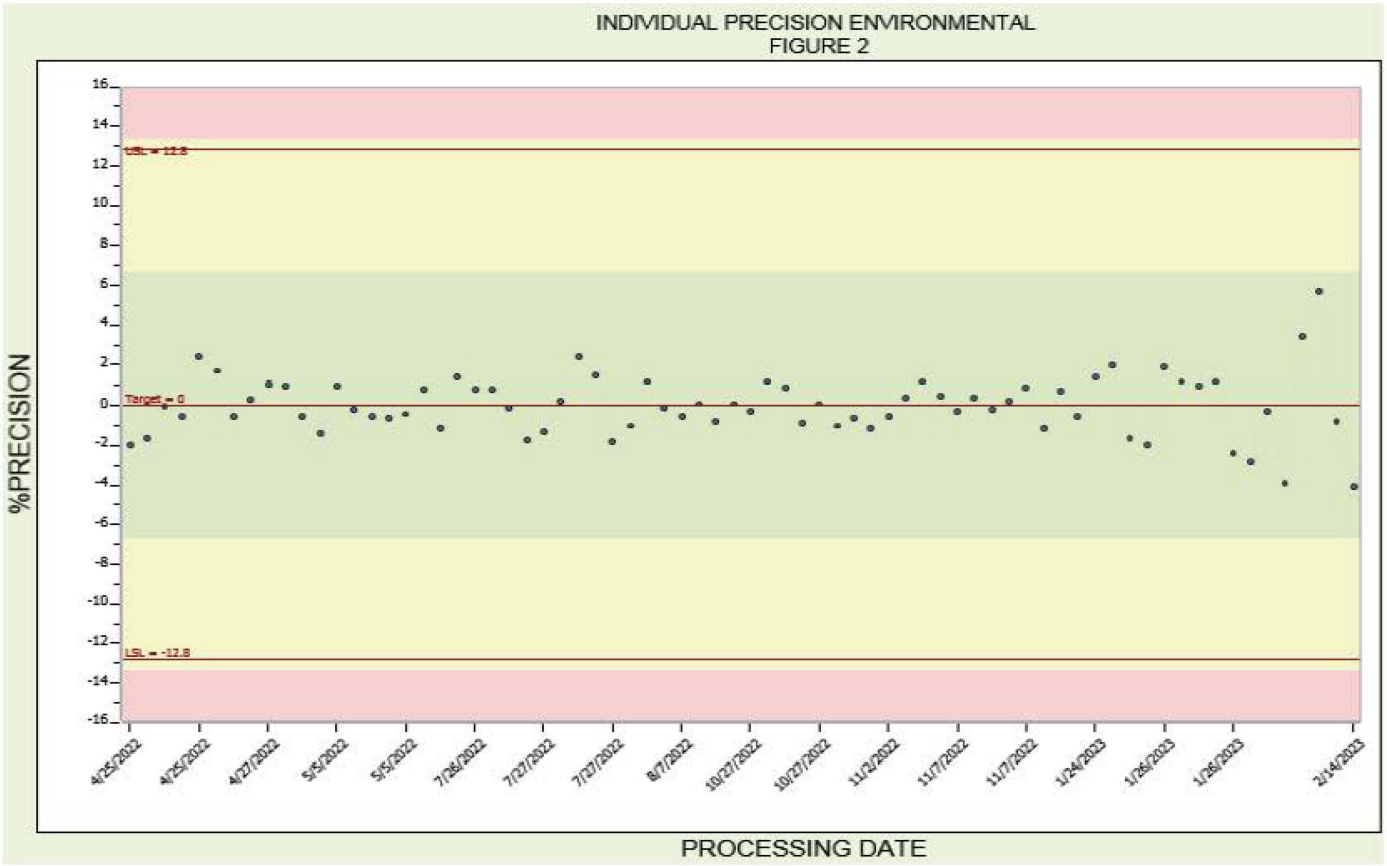
DOSIMETRY QUALITY CONTROL TRENDING GRAPHS

ISSUE PERIOD JANAURY - DECEMBER 2022

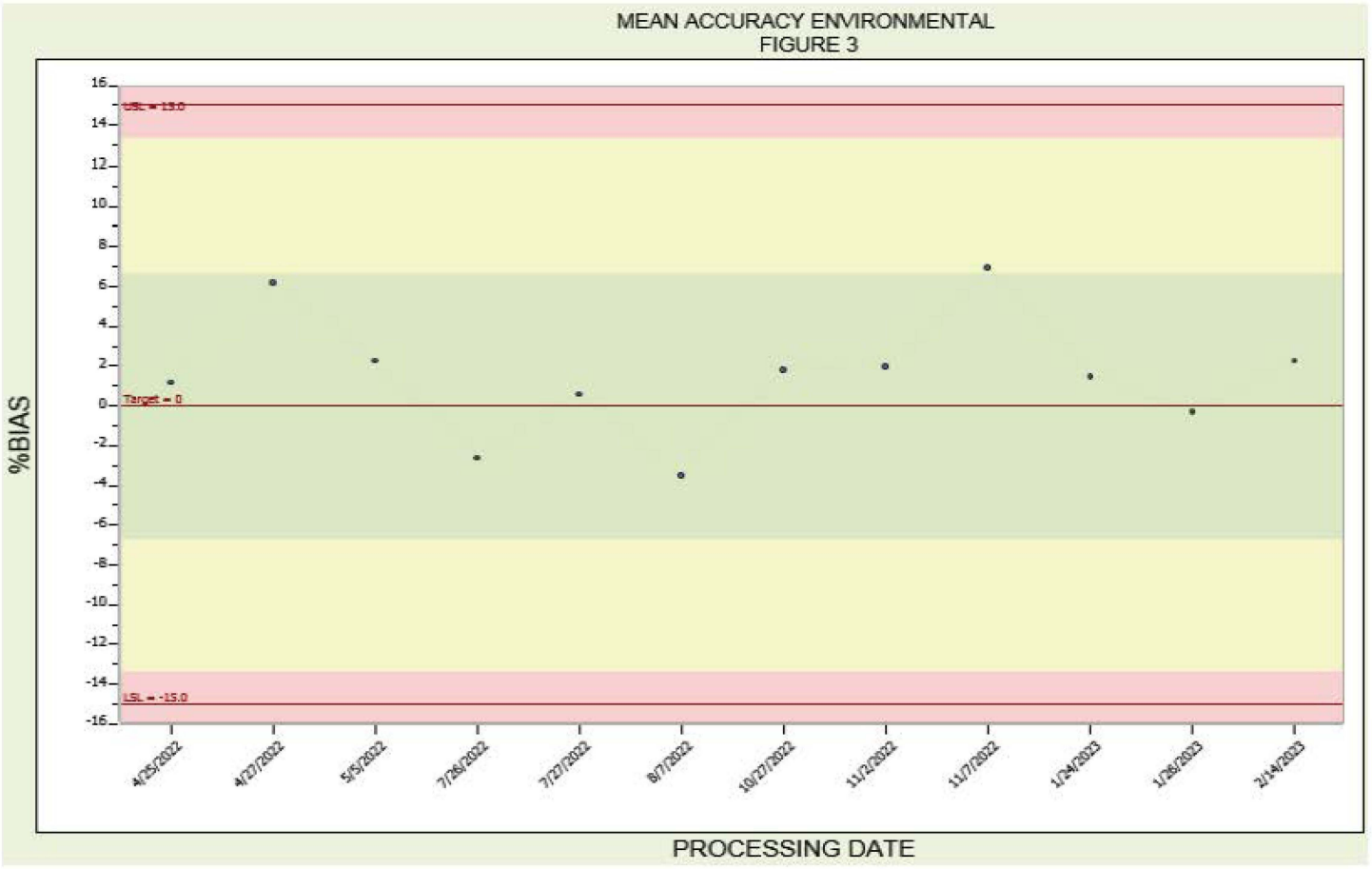
INDIVIDUAL ACCURACY ENVIRONMENTAL
FIGURE 1



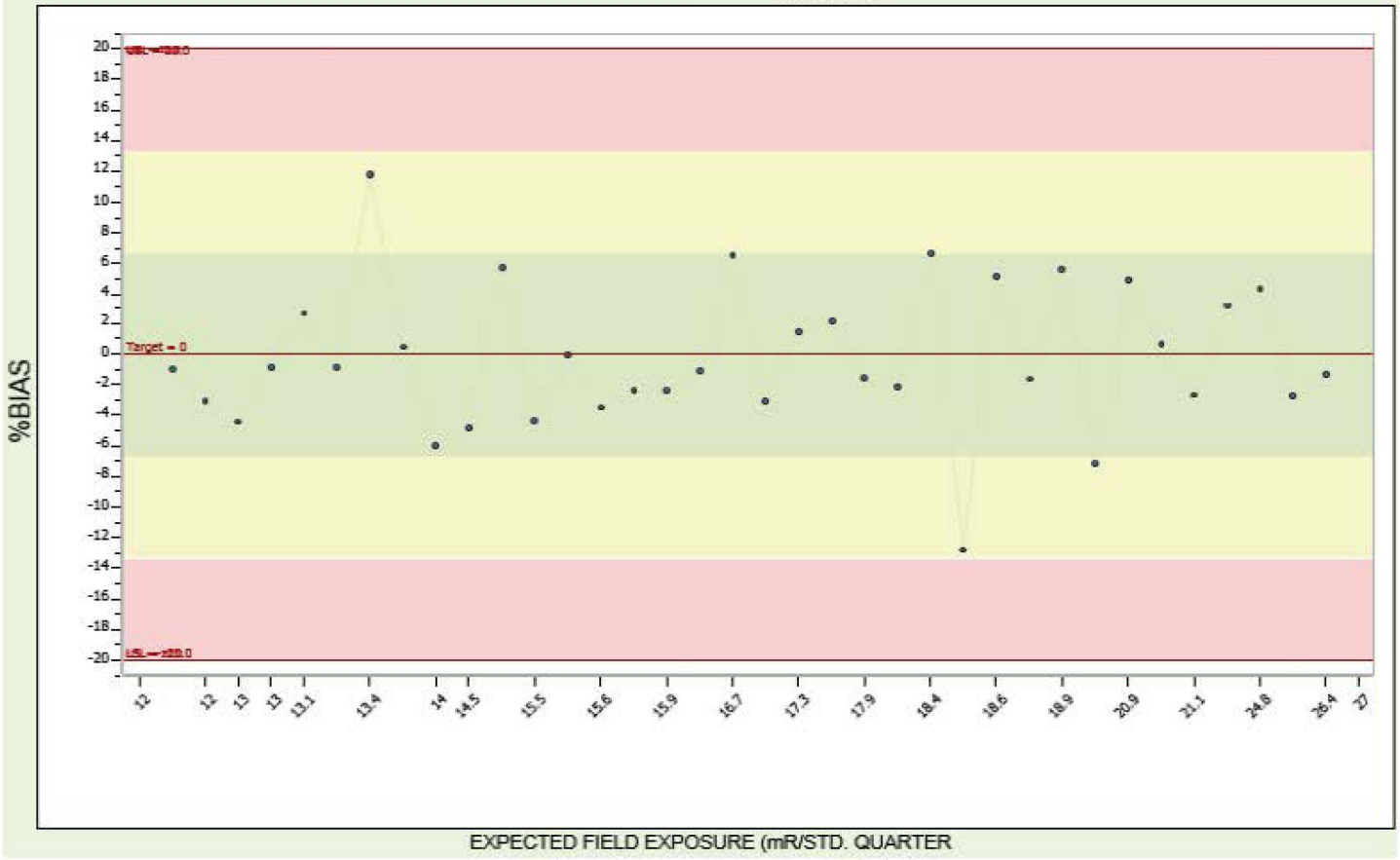
INDIVIDUAL PRECISION ENVIRONMENTAL
FIGURE 2



MEAN ACCURACY ENVIRONMENTAL
FIGURE 3



SEABROOK C0-LOCATE ACCURACY
FIGURE 4



EXPECTED FIELD EXPOSURE (mR/STD. QUARTER

ARCADIS Design & Consultancy for natural and built assets

ENCLOSURE 2

2021 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT , Supplemental Information

2021 ANNUAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM UPDATES

JANUARY 1 – DECEMBER 31, 2021

6 Pages Follow

7 ENVIRONMENTAL SAMPLING MODIFICATIONS

7.1 Program Modifications

There were no programmatic changes to environmental sampling in 2021.

7.2 Change of Sampling Procedures

There were no changes to sampling procedures in 2021.

7.3 Change of Analysis Procedures

There were no changes to the analysis procedures in 2021.

7.4 Sample Deviations and Unavailable Analyses

Table 7.4-1 lists the deviations from the required REMP sample collection in 2021. Despite these sample deviations, 99.5 percent of the required samples were successfully obtained and analyzed.

Table 7.4-1: Sample Deviations and Unavailable Analyses

Sample Type	Analysis	Location	Collection Date or Period	Reason for not conducting REMP as required	Corrective Action	Condition Report
Surface Water	Gamma Isotopic Tritium	M-8C	Composite - Gamma: Jan, Feb, Dec 2021[1]	Unsafe condition for sampling due frozen river surface	Sample obtained when water thawed	501000047555
Fish	Gamma Isotopic	M-8C, M-9	July 2021	Due to river conditions, electrofishing could not be conducted to obtain shorthead redhorse samples	Additional bass were collected instead	501000055871
TLD	Direct Radiation	M05S	Quarter 4 2021 (Oct through Dec 2021)	TLD was missing	Initiated a search, re-secured TLD holder caps for replacement TLD	501000059469
Air	Gamma Isotopic, Iodine-131, Gross Beta, Tritium	M-1	August 18-25 2021	Air sampler found not running due to GFCI trip. Restarted sampler and verified running. Any partial sample is considered a missing sample.	Restarted sampler and verified running. Results are still reported in Section 10.	501000055461

Notes:

[1] January and February samples could not be collected, but samples were collected in March. The quarterly composite for tritium therefore only includes March. For the quarter 4 composite sample, data was only collected for October and November.

AIRBORNE CARTRIDGE: RADIOIODINE

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
1/6/2021	3.05E-04 ± 8.05E-03 U	-6.27E-04 ± 6.35E-03 U	3.88E-03 ± 8.33E-03 U	7.97E-03 ± 1.25E-02 U	1.41E-03 ± 9.36E-03 U
1/13/2021	4.18E-03 ± 7.06E-03 U	-6.62E-03 ± 6.84E-03 U	-2.86E-03 ± 5.16E-03 U	-5.44E-03 ± 7.38E-03 U	-2.49E-03 ± 7.53E-03 U
1/20/2021	-2.27E-04 ± 7.85E-03 U	-1.69E-03 ± 5.37E-03 U	6.62E-03 ± 7.37E-03 U	-3.74E-04 ± 7.91E-03 U	7.39E-04 ± 6.47E-03 U
1/27/2021	7.11E-03 ± 9.27E-03 U	1.59E-03 ± 1.08E-02 U	-3.73E-03 ± 9.08E-03 U	-4.42E-03 ± 9.90E-03 U	-9.63E-04 ± 9.66E-03 U
2/3/2021	3.58E-03 ± 5.33E-03 U	2.21E-03 ± 4.51E-03 U	-4.56E-03 ± 5.45E-03 U	1.01E-03 ± 8.41E-03 U	-1.69E-03 ± 7.06E-03 U
2/10/2021	2.57E-03 ± 6.82E-03 U	-1.39E-03 ± 1.03E-02 U	2.47E-03 ± 7.53E-03 U	5.29E-03 ± 6.67E-03 U	3.12E-03 ± 7.23E-03 U
2/17/2021	-2.03E-03 ± 5.16E-03 U	-2.41E-03 ± 6.48E-03 U	6.40E-03 ± 7.24E-03 U	-5.56E-03 ± 1.09E-02 U	-6.34E-03 ± 5.61E-03 U
2/24/2021	5.21E-04 ± 7.67E-03 U	-8.27E-03 ± 1.27E-02 U	7.72E-03 ± 9.29E-03 U	2.30E-03 ± 1.44E-02 U	1.16E-03 ± 1.25E-02 U
3/3/2021	2.18E-03 ± 9.20E-03 U	1.48E-03 ± 8.27E-03 U	-1.11E-04 ± 5.77E-03 U	4.85E-03 ± 8.26E-03 U	1.23E-02 ± 8.70E-03 UI
3/10/2021	4.53E-03 ± 7.65E-03 U	7.45E-03 ± 8.52E-03 U	-4.71E-03 ± 1.00E-02 U	-7.11E-03 ± 9.82E-03 U	-2.47E-04 ± 8.49E-03 U
3/17/2021	4.80E-03 ± 1.08E-02 U	6.85E-03 ± 9.20E-03 U	-1.52E-03 ± 1.32E-02 U	2.05E-03 ± 9.11E-03 U	5.72E-03 ± 1.37E-02 U
3/24/2021	-1.17E-03 ± 5.75E-03 U	-3.36E-03 ± 9.41E-03 U	-4.45E-03 ± 5.74E-03 U	3.20E-03 ± 9.23E-03 U	-2.67E-03 ± 8.10E-03 U
3/30/2021	4.67E-03 ± 9.67E-03 U	2.39E-04 ± 9.08E-03 U	6.07E-04 ± 1.02E-02 U	-1.06E-03 ± 9.22E-03 U	6.28E-03 ± 8.27E-03 U
4/7/2021	-4.48E-03 ± 6.29E-03 U	8.59E-03 ± 8.48E-03 U	2.24E-03 ± 9.41E-03 U	-5.72E-03 ± 9.65E-03 U	-1.72E-03 ± 8.98E-03 U
4/14/2021	-2.08E-02 ± 1.54E-02 U	7.66E-03 ± 1.07E-02 U	4.22E-03 ± 8.89E-03 U	-6.17E-03 ± 1.46E-02 U	3.04E-03 ± 1.03E-02 U
4/21/2021	5.07E-03 ± 7.30E-03 U	2.97E-03 ± 1.18E-02 U	-4.07E-03 ± 8.65E-03 U	-3.49E-03 ± 7.09E-03 U	-8.68E-04 ± 7.29E-03 U
4/27/2021	2.18E-03 ± 1.71E-02 U	-1.11E-02 ± 1.40E-02 U	-2.80E-03 ± 1.41E-02 U	1.03E-02 ± 1.04E-02 U	-7.16E-03 ± 2.28E-02 U
5/5/2021	0.00E+00 ± 8.23E-03 U	-1.62E-03 ± 8.75E-03 U	-1.63E-03 ± 1.17E-02 U	1.34E-02 ± 1.76E-02 U	-4.87E-03 ± 9.16E-03 U
5/12/2021	1.40E-03 ± 9.10E-03 U	-1.35E-03 ± 8.16E-03 U	-7.75E-04 ± 5.73E-03 U	-7.05E-04 ± 8.25E-03 U	-1.50E-03 ± 7.20E-03 U
5/19/2021	5.93E-03 ± 9.99E-03 U	3.91E-03 ± 9.35E-03 U	4.87E-03 ± 6.21E-03 U	1.04E-02 ± 1.51E-02 U	-1.81E-03 ± 1.02E-02 U
5/26/2021	3.84E-03 ± 1.64E-02 U	-1.06E-03 ± 1.30E-02 U	-1.36E-02 ± 1.89E-02 U	6.22E-03 ± 9.79E-03 U	6.85E-03 ± 7.09E-03 U
6/2/2021	1.18E-02 ± 1.19E-02 U	-4.32E-03 ± 1.40E-02 U	-4.41E-03 ± 1.47E-02 U	-7.75E-03 ± 9.99E-03 U	7.25E-03 ± 1.69E-02 U
6/9/2021	-7.08E-03 ± 1.10E-02 U	-2.94E-04 ± 1.28E-02 U	4.35E-03 ± 8.82E-03 U	-4.26E-04 ± 9.58E-03 U	-7.93E-03 ± 1.82E-02 U
6/16/2021	-2.34E-03 ± 1.27E-02 U	-3.17E-04 ± 1.50E-02 U	-2.31E-03 ± 8.18E-03 U	1.20E-03 ± 1.71E-02 U	2.30E-03 ± 1.12E-02 U
6/23/2021	4.20E-04 ± 7.47E-03 U	2.22E-03 ± 1.16E-02 U	-4.29E-06 ± 7.23E-03 U	3.80E-03 ± 8.16E-03 U	4.36E-03 ± 8.90E-03 U
6/29/2021	1.39E-03 ± 7.08E-03 U	1.14E-03 ± 1.07E-02 U	4.91E-03 ± 9.50E-03 U	-3.14E-03 ± 1.32E-02 U	-1.98E-04 ± 8.53E-03 U
7/6/2021	4.64E-03 ± 6.49E-03 U	-2.97E-03 ± 9.61E-03 U	5.26E-03 ± 8.01E-03 U	1.80E-03 ± 5.88E-03 U	4.05E-03 ± 8.81E-03 U
7/21/2021	-2.72E-03 ± 6.65E-03 U	3.10E-03 ± 7.49E-03 U	7.45E-03 ± 9.08E-03 U	3.44E-03 ± 5.83E-03 U	9.11E-04 ± 7.87E-03 U
7/28/2021	6.64E-03 ± 9.11E-03 U	1.26E-02 ± 1.26E-02 U	-3.13E-03 ± 8.46E-03 U	2.11E-02 ± 2.06E-02 U	1.81E-05 ± 1.36E-02 U
8/4/2021	1.35E-03 ± 1.18E-02 U	4.97E-05 ± 8.81E-03 U	6.82E-04 ± 9.29E-03 U	-2.62E-03 ± 1.03E-02 U	-1.11E-02 ± 2.19E-02 U

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
8/11/2021	-1.28E-02 ± 1.49E-02 U	5.76E-04 ± 7.80E-03 U	6.99E-03 ± 8.50E-03 U	-1.04E-03 ± 7.81E-03 U	3.07E-04 ± 1.03E-02 U
8/18/2021	3.83E-03 ± 9.82E-03 U	3.58E-03 ± 7.18E-03 U	-4.43E-03 ± 5.63E-03 U	-6.65E-03 ± 6.03E-03 U	-1.83E-03 ± 1.77E-02 U
8/25/2021	3.36E-03 ± 9.04E-03 U*	-5.14E-03 ± 7.02E-03 U	3.56E-03 ± 7.74E-03 U	-6.43E-03 ± 5.53E-03 U	6.72E-03 ± 8.02E-03 U
9/1/2021	1.37E-03 ± 6.55E-03 U	-3.62E-03 ± 7.07E-03 U	6.19E-05 ± 1.10E-02 U	7.10E-03 ± 5.91E-03 U	4.08E-03 ± 6.27E-03 U
9/8/2021	2.14E-03 ± 1.14E-02 U	3.74E-03 ± 6.79E-03 U	-2.90E-03 ± 7.68E-03 U	9.19E-03 ± 1.09E-02 U	-7.26E-03 ± 8.98E-03 U
9/15/2021	7.09E-05 ± 7.45E-03 U	-2.33E-03 ± 6.76E-03 U	3.85E-03 ± 9.75E-03 U	-2.07E-03 ± 8.48E-03 U	7.38E-03 ± 7.71E-03 U
9/22/2021	-4.14E-03 ± 6.61E-03 U	-1.45E-03 ± 7.29E-03 U	-2.05E-03 ± 5.67E-03 U	-2.79E-03 ± 7.65E-03 U	3.10E-03 ± 1.09E-02 U
9/28/2021	2.09E-03 ± 6.95E-03 U	2.60E-04 ± 1.25E-02 U	5.48E-03 ± 1.15E-02 U	8.61E-03 ± 9.07E-03 UI	-9.16E-03 ± 8.96E-03 U
10/6/2021	-1.13E-03 ± 7.90E-03 U	-2.34E-03 ± 1.08E-02 U	3.10E-03 ± 8.39E-03 U	7.36E-03 ± 9.00E-03 U	-1.09E-05 ± 7.70E-03 U
10/12/2021	1.43E-03 ± 8.94E-03 U	5.00E-05 ± 9.77E-03 U	-1.26E-03 ± 7.84E-03 U	1.53E-03 ± 8.19E-03 U	3.76E-03 ± 9.15E-03 U
10/19/2021	-9.62E-04 ± 7.29E-03 U	1.83E-03 ± 9.87E-03 U	-3.28E-03 ± 7.65E-03 U	-3.56E-04 ± 5.96E-03 U	1.49E-02 ± 1.60E-02 UI
10/26/2021	-5.82E-03 ± 1.50E-02 U	-5.16E-03 ± 1.26E-02 U	-2.57E-03 ± 1.34E-02 U	-1.02E-02 ± 2.19E-02 U	9.15E-03 ± 1.34E-02 U
11/3/2021	1.83E-03 ± 9.94E-03 U	1.83E-03 ± 8.50E-03 U	3.65E-03 ± 7.35E-03 U	-2.44E-03 ± 9.05E-03 U	1.17E-03 ± 7.77E-03 U
11/10/2021	-4.96E-04 ± 6.44E-03 U	8.94E-05 ± 6.15E-03 U	-3.45E-03 ± 7.85E-03 U	-7.94E-04 ± 8.41E-03 U	1.09E-04 ± 7.05E-03 U
11/16/2021	-7.96E-04 ± 7.78E-03 U	1.69E-03 ± 9.20E-03 U	5.61E-03 ± 1.08E-02 U	-4.54E-03 ± 9.30E-03 U	-2.32E-03 ± 7.41E-03 U
11/23/2021	-1.99E-03 ± 9.68E-03 U	-2.46E-03 ± 7.29E-03 U	-2.20E-04 ± 8.01E-03 U	7.50E-03 ± 2.23E-02 U	-3.07E-03 ± 8.00E-03 U
7/14/2021	-7.38E-04 ± 6.43E-03 U	-4.91E-03 ± 7.60E-03 U	-1.66E-03 ± 6.26E-03 U	1.99E-03 ± 6.55E-03 U	-2.48E-03 ± 1.35E-02 U
11/30/2021	-3.22E-03 ± 8.64E-03 U	-2.39E-03 ± 6.45E-03 U	-8.27E-04 ± 7.14E-03 U	-1.42E-03 ± 7.19E-03 U	1.69E-03 ± 8.63E-03 U
12/8/2021	-4.37E-03 ± 1.07E-02 U	-1.53E-03 ± 1.85E-02 U	2.78E-03 ± 8.10E-03 U	-2.37E-03 ± 1.58E-02 U	4.97E-03 ± 1.06E-02 U
12/15/2021	-1.78E-03 ± 6.88E-03 U	-6.43E-04 ± 6.47E-03 U	-2.29E-04 ± 6.99E-03 U	2.39E-03 ± 6.57E-03 U	2.18E-03 ± 5.25E-03 U
12/21/2021	5.44E-03 ± 1.09E-02 U	3.26E-03 ± 1.02E-02 U	7.18E-04 ± 9.69E-03 U	8.65E-03 ± 2.01E-02 U	-7.16E-03 ± 1.01E-02 U
12/28/2021	5.03E-03 ± 1.54E-02 U	1.01E-02 ± 2.99E-02 U	1.92E-02 ± 2.11E-02 U	1.43E-03 ± 1.92E-02 U	9.60E-03 ± 1.73E-02 U

* Partial sample for Air Station M-1 during week of August 18 through 25, 2021.

AIRBORNE PARTICULATES: GROSS BETA

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
1/6/2021	0.075 ± 0.006	0.082 ± 0.007	0.080 ± 0.007	0.082 ± 0.007	0.091 ± 0.007
1/13/2021	0.066 ± 0.006	0.058 ± 0.006	0.057 ± 0.006	0.064 ± 0.006	0.068 ± 0.007
1/20/2021	0.056 ± 0.006	0.057 ± 0.006	0.059 ± 0.006	0.057 ± 0.006	0.058 ± 0.006
1/27/2021	0.034 ± 0.004	0.035 ± 0.005	0.030 ± 0.004	0.028 ± 0.004	0.032 ± 0.004
2/3/2021	0.056 ± 0.006	0.048 ± 0.005	0.051 ± 0.005	0.057 ± 0.006	0.059 ± 0.006
2/10/2021	0.052 ± 0.005	0.058 ± 0.006	0.061 ± 0.006	0.058 ± 0.006	0.058 ± 0.006
2/17/2021	0.051 ± 0.005	0.056 ± 0.006	0.050 ± 0.005	0.053 ± 0.006	0.062 ± 0.006
2/24/2021	0.076 ± 0.006	0.089 ± 0.007	0.085 ± 0.007	0.100 ± 0.008	0.102 ± 0.008
3/3/2021	0.038 ± 0.005	0.036 ± 0.005	0.040 ± 0.005	0.043 ± 0.005	0.043 ± 0.005
3/10/2021	0.043 ± 0.005	0.051 ± 0.006	0.043 ± 0.005	0.050 ± 0.006	0.045 ± 0.005
3/17/2021	0.036 ± 0.005	0.037 ± 0.005	0.033 ± 0.004	0.036 ± 0.005	0.037 ± 0.005
3/24/2021	0.034 ± 0.004	0.034 ± 0.005	0.029 ± 0.004	0.040 ± 0.005	0.038 ± 0.005
3/30/2021	0.027 ± 0.004	0.031 ± 0.005	0.031 ± 0.005	0.036 ± 0.005	0.037 ± 0.005
4/7/2021	0.049 ± 0.005	0.053 ± 0.006	0.045 ± 0.005	0.045 ± 0.005	0.050 ± 0.005
4/14/2021	0.011 ± 0.003	0.009 ± 0.003 M	0.009 ± 0.003 M	0.009 ± 0.003 M	0.012 ± 0.003
4/21/2021	0.025 ± 0.004	0.029 ± 0.004	0.029 ± 0.004	0.029 ± 0.004	0.026 ± 0.004
4/27/2021	0.038 ± 0.005	0.041 ± 0.005	0.046 ± 0.006	0.043 ± 0.005	0.039 ± 0.005
5/5/2021	0.030 ± 0.004	0.029 ± 0.004	0.028 ± 0.004	0.030 ± 0.004	0.034 ± 0.005
5/12/2021	0.017 ± 0.003	0.020 ± 0.004	0.021 ± 0.004	0.023 ± 0.004	0.016 ± 0.003
5/19/2021	0.031 ± 0.004	0.034 ± 0.005	0.027 ± 0.004	0.032 ± 0.004	0.031 ± 0.004
5/26/2021	0.024 ± 0.004	0.019 ± 0.004	0.021 ± 0.004	0.022 ± 0.004	0.023 ± 0.004
6/2/2021	0.022 ± 0.004	0.023 ± 0.004	0.025 ± 0.004	0.019 ± 0.003	0.023 ± 0.004
6/9/2021	0.039 ± 0.005	0.041 ± 0.005	0.039 ± 0.005	0.036 ± 0.005	0.041 ± 0.005
6/16/2021	0.027 ± 0.004	0.026 ± 0.004	0.026 ± 0.004	0.025 ± 0.004	0.029 ± 0.004
6/23/2021	0.021 ± 0.004	0.020 ± 0.004	0.021 ± 0.004	0.019 ± 0.004	0.022 ± 0.004
6/29/2021	0.032 ± 0.005	0.036 ± 0.006	0.027 ± 0.005	0.033 ± 0.005	0.032 ± 0.005
7/6/2021	0.041 ± 0.005	0.038 ± 0.005	0.036 ± 0.005	0.034 ± 0.005	0.041 ± 0.005
7/21/2021	0.025 ± 0.003	0.032 ± 0.004	0.026 ± 0.004	0.029 ± 0.004	0.027 ± 0.004
7/28/2021	0.041 ± 0.005	0.047 ± 0.006	0.037 ± 0.005	0.041 ± 0.005	0.044 ± 0.005
8/4/2021	0.059 ± 0.006	0.061 ± 0.006	0.057 ± 0.006	0.061 ± 0.006	0.057 ± 0.006
8/11/2021	0.054 ± 0.006	0.042 ± 0.005	0.042 ± 0.005	0.038 ± 0.005	0.050 ± 0.007
8/18/2021	0.050 ± 0.005 *	0.052 ± 0.006	0.047 ± 0.005	0.041 ± 0.005	0.049 ± 0.005
8/25/2021	0.038 ± 0.005	0.043 ± 0.005	0.043 ± 0.005	0.041 ± 0.005	0.052 ± 0.006
9/1/2021	0.048 ± 0.006	0.045 ± 0.005	0.054 ± 0.006	0.047 ± 0.005	0.053 ± 0.006
9/8/2021	0.036 ± 0.005	0.038 ± 0.005	0.044 ± 0.005	0.044 ± 0.005	0.045 ± 0.005
9/15/2021	0.041 ± 0.005	0.045 ± 0.005	0.041 ± 0.005	0.044 ± 0.005	0.040 ± 0.005

Sample Date	Air Station M-1 (pCi/m³)	Air Station M-2 (pCi/m³)	Air Station M-3 (pCi/m³)	Air Station M-4 (pCi/m³)	Air Station M-5 (pCi/m³)
9/22/2021	0.048 ± 0.006	0.039 ± 0.005	0.042 ± 0.005	0.038 ± 0.005	0.044 ± 0.005
9/28/2021	0.049 ± 0.005	0.041 ± 0.005	0.045 ± 0.005	0.042 ± 0.005	0.052 ± 0.006
10/6/2021	0.049 ± 0.006	0.054 ± 0.006	0.047 ± 0.006	0.054 ± 0.006	0.051 ± 0.006
10/12/2021	0.035 ± 0.004	0.038 ± 0.004	0.033 ± 0.004	0.041 ± 0.005	0.038 ± 0.004
10/19/2021	0.054 ± 0.006	0.060 ± 0.006	0.058 ± 0.006	0.053 ± 0.006	0.057 ± 0.006
10/26/2021	0.082 ± 0.007	0.074 ± 0.007	0.068 ± 0.006	0.071 ± 0.006	0.072 ± 0.006
11/3/2021	0.033 ± 0.005	0.034 ± 0.005	0.032 ± 0.004	0.031 ± 0.005	0.037 ± 0.005
11/10/2021	0.036 ± 0.005	0.033 ± 0.004	0.029 ± 0.004	0.034 ± 0.004	0.040 ± 0.005
11/16/2021	0.064 ± 0.006	0.061 ± 0.006	0.056 ± 0.006	0.061 ± 0.006	0.064 ± 0.006
11/23/2021	0.024 ± 0.004	0.024 ± 0.004	0.022 ± 0.004	0.021 ± 0.004	0.024 ± 0.004
7/14/2021	0.044 ± 0.005	0.046 ± 0.005	0.042 ± 0.005	0.051 ± 0.006	0.046 ± 0.005
11/30/2021	0.051 ± 0.005	0.053 ± 0.006	0.050 ± 0.005	0.054 ± 0.006	0.051 ± 0.005
12/8/2021	0.036 ± 0.004	0.034 ± 0.004	0.031 ± 0.004	0.040 ± 0.005	0.039 ± 0.005
12/15/2021	0.068 ± 0.006	0.058 ± 0.006	0.055 ± 0.005	0.064 ± 0.006	0.068 ± 0.006
12/21/2021	0.063 ± 0.006	0.061 ± 0.006	0.055 ± 0.006	0.063 ± 0.007	0.070 ± 0.007
12/28/2021	0.104 ± 0.008	0.094 ± 0.008	0.093 ± 0.008	0.105 ± 0.008	0.102 ± 0.008

* Partial sample for Air Station M-1 during week of August 18 through 25, 2021.

AIRBORNE PARTICULATES: GAMMA ISOTOPIC

Air Station M-1	Qtr 1 (pCi/m³)	Qtr 2 (pCi/m³)	Qtr 3* (pCi/m³)	Qtr 4 (pCi/m³)
Barium-140	1.36E-03 ± 2.33E-03 U	2.26E-04 ± 2.09E-03 U	6.39E-04 ± 4.20E-03 U	1.58E-03 ± 2.82E-03 U
Beryllium-7	6.78E-02 ± 8.23E-03	8.87E-02 ± 8.19E-03	9.04E-02 ± 1.02E-02	6.57E-02 ± 7.92E-03
Cerium-141	-6.12E-04 ± 4.07E-04 U	3.22E-04 ± 6.47E-04 U	-2.19E-04 ± 4.40E-04 U	-3.38E-04 ± 5.10E-04 U
Cerium-144	1.26E-04 ± 9.72E-04 U	2.57E-04 ± 9.55E-04 U	1.16E-03 ± 9.19E-04 U	-3.83E-05 ± 1.40E-03 U
Cesium-134	-1.74E-04 ± 2.87E-04 U	1.23E-04 ± 2.71E-04 U	2.44E-04 ± 2.70E-04 U	1.74E-04 ± 3.44E-04 U
Cesium-137	-2.06E-04 ± 2.83E-04 U	-3.39E-06 ± 1.93E-04 U	3.11E-05 ± 2.43E-04 U	2.64E-04 ± 2.85E-04 U
Cobalt-58	2.88E-05 ± 2.31E-04 U	-3.06E-05 ± 2.54E-04 U	-1.39E-04 ± 3.88E-04 U	-6.56E-05 ± 3.00E-04 U
Cobalt-60	-3.84E-05 ± 2.55E-04 U	-1.05E-04 ± 2.70E-04 U	-1.31E-04 ± 3.52E-04 U	-1.63E-04 ± 3.11E-04 U
Lanthanum-140	-3.85E-04 ± 8.21E-04 U	3.89E-04 ± 9.83E-04 U	-8.02E-04 ± 2.05E-03 U	-2.88E-04 ± 1.12E-03 U
Manganese-54	5.75E-05 ± 2.85E-04 U	-1.51E-04 ± 2.64E-04 U	1.72E-04 ± 2.95E-04 U	1.31E-04 ± 2.77E-04 U
Niobium-95	-8.19E-05 ± 2.48E-04 U	1.79E-04 ± 3.51E-04 U	-1.26E-04 ± 3.01E-04 U	4.36E-04 ± 3.22E-04 U
Ruthenium-103	-6.10E-05 ± 2.82E-04 U	1.10E-04 ± 2.57E-04 U	7.90E-05 ± 3.50E-04 U	1.51E-04 ± 3.46E-04 U
Ruthenium-106	-8.31E-04 ± 1.87E-03 U	2.32E-04 ± 1.96E-03 U	-2.11E-03 ± 2.70E-03 U	-1.46E-03 ± 3.03E-03 U
Zinc-65	-6.79E-05 ± 6.08E-04 U	1.25E-04 ± 5.39E-04 U	3.75E-04 ± 6.53E-04 U	-8.04E-04 ± 7.24E-04 U

Air Station M-1	Qtr 1 (pCi/m³)	Qtr 2 (pCi/m³)	Qtr 3* (pCi/m³)	Qtr 4 (pCi/m³)
Zirconium-95	3.10E-04 ± 4.36E-04 U	4.49E-06 ± 4.60E-04 U	-7.36E-05 ± 4.89E-04 U	7.84E-05 ± 5.31E-04 U

* Partial sample for Air Station M-1 during week of August 18 through 25, 2021.

Air Station M-2	Qtr 1 (pCi/m³)	Qtr 2 (pCi/m³)	Qtr 3 (pCi/m³)	Qtr 4 (pCi/m³)
Barium-140	-4.51E-04 ± 1.96E-03 U	3.24E-03 ± 3.84E-03 UI	2.60E-03 ± 3.78E-03 U	4.77E-04 ± 2.32E-03 U
Beryllium-7	8.05E-02 ± 7.39E-03	1.06E-01 ± 9.21E-03	1.09E-01 ± 1.01E-02	5.32E-02 ± 7.26E-03
Cerium-141	1.21E-04 ± 3.24E-04 U	2.11E-04 ± 3.41E-04 U	-4.03E-04 ± 5.34E-04 U	8.99E-05 ± 8.93E-04 U
Cerium-144	-8.95E-04 ± 9.27E-04 U	-4.87E-04 ± 9.84E-04 U	-2.06E-04 ± 1.13E-03 U	1.07E-03 ± 1.75E-03 U
Cesium-134	-1.55E-05 ± 2.14E-04 U	-4.20E-05 ± 2.16E-04 U	6.58E-05 ± 2.23E-04 U	1.61E-04 ± 3.39E-04 U
Cesium-137	6.81E-05 ± 2.05E-04 U	-1.48E-05 ± 2.96E-04 U	2.08E-06 ± 2.56E-04 U	-5.00E-05 ± 2.48E-04 U
Cobalt-58	1.12E-04 ± 2.81E-04 U	-9.37E-05 ± 3.30E-04 U	1.55E-05 ± 3.12E-04 U	-3.55E-05 ± 3.13E-04 U
Cobalt-60	4.87E-05 ± 2.75E-04 U	2.63E-04 ± 2.68E-04 U	1.33E-04 ± 2.94E-04 U	-9.56E-05 ± 3.65E-04 U
Lanthanum-140	-9.52E-04 ± 8.82E-04 U	3.31E-04 ± 1.20E-03 U	-1.27E-03 ± 1.48E-03 U	-2.12E-04 ± 1.15E-03 U
Manganese-54	-4.92E-06 ± 2.63E-04 U	-5.81E-05 ± 2.50E-04 U	1.85E-04 ± 2.13E-04 U	2.01E-04 ± 2.56E-04 U
Niobium-95	1.40E-04 ± 2.57E-04 U	2.37E-04 ± 2.88E-04 U	-2.12E-05 ± 3.13E-04 U	-4.03E-04 ± 4.35E-04 U
Ruthenium-103	1.64E-05 ± 2.46E-04 U	-1.66E-04 ± 2.51E-04 U	2.86E-04 ± 3.27E-04 U	-1.89E-05 ± 2.62E-04 U
Ruthenium-106	6.81E-04 ± 1.85E-03 U	-1.45E-03 ± 2.50E-03 U	8.70E-04 ± 1.91E-03 U	1.99E-04 ± 2.08E-03 U
Zinc-65	-1.50E-04 ± 6.37E-04 U	7.36E-04 ± 6.84E-04 U	-1.66E-04 ± 6.75E-04 U	-2.79E-04 ± 5.24E-04 U
Zirconium-95	1.73E-05 ± 4.40E-04 U	-1.16E-04 ± 5.70E-04 U	-2.15E-04 ± 6.19E-04 U	4.27E-05 ± 5.10E-04 U