Quarterly Report

Calendar Year 2024 – Second Quarter, April 1 – June 30, 2024

Prepared by:

Carlsbad Environmental Monitoring & Research Center
under a financial assistance grant from
U.S. Department of Energy
Carlsbad Field Office (CBFO)
Award No. DE-EM0005195

Submitted to:

U.S. Department of Energy
Carlsbad Field Office

July 2024

Field Programs - Radiation Safety Group

WIPP Underground Effluent Monitoring (Station A and Station B)

From April 1st to June 30th, a total of 119 filters from the primary skid at Station A, of which 95 were sample filters, 12 were trip blanks and 12 were filter blanks, were collected. In addition, 144 filters were collected from the backup skid at Station A (120 sample filters, 12 trip blank filters and 12 filter blanks). One hundred and fifteen filters were collected from the primary skid at Station B, (91 sample filters, 12 trip blanks and 12 filter blanks). One hundred and eighteen filters were collected from Station B backup (94 sample filters, 12 trip blanks and 12 filter blanks), during the same time period.

All 119 filters from the primary skid at Station A have been processed (gravimetrics, sample flow volume, and mass concentration have been calculated in the Field Programs (FP) data package) and transferred to the Radiochemistry group (RC). All of the Station A backup filters have been processed and transferred to the Environmental Chemistry group (EC). All 115 filters from the primary Station B skid have been processed and transferred to RC. All of the Station B backup filters have been transferred to EC.

Ambient Air Sampling

From April 1st to June 30th, 18 ambient air particulate filters were collected from the six perimeter and regional continuous sampling stations (On-Site, Near Field, Cactus Flats, WIPP East, Carlsbad, and Loving) using a high-volume sampler (HiVol). All filters have been processed (gravimetrics, total air flow values, and notes of any irregularities) by FP and transferred to RC.

Subtask - Non-Radiological analyses

Six Whatman-41 filters and 3 trip blank filters were collected from April 1st to June 30th, from the 2 sampling sites (Near Field and Cactus Flats) using a high-volume sampler. All filters have been processed (total air flow values and notes of any irregularities) by FP and transferred to EC.

Soil sampling

Twenty-nine soil samples were collected during the second quarter of 2024.

Surface Water Monitoring

No activity to report this quarter.

Drinking Water Monitoring

Drinking water samples are scheduled for collection during the month of July.

Sediment Monitoring

No activity to report this quarter.

Nuclear Materials Management and Safeguards

From April 1st to June 30th the Radiation Safety group (RS) has collected and bulked radioactive waste from NMSU, LANL, and the WIPP Labs groups working in the CEMRC facility. Radiation Safety (RS) has performed monthly surveys of all laboratories where radioactive materials are present, including smears and dose rate measurements. All fume hoods are face-velocity checked quarterly. The date of the last inspection was March 21, 2024. Several survey instruments have been sent to Ludlum Corporation for calibration.

Radiochemistry Group

WIPP Underground Effluent Monitoring (Station A and Station B)

Gross alpha and beta activities on individual filters collected from station A, taken immediately before, and Station B, taken after the high-efficiency particulate air (HEPA) filtration, were counted using a low-background gas proportional counter (Protean Instruments) for 1200 minutes (20 hours). The analysis of all filters from Station A and Station B has been completed through the second week of July 2024. The complete results for gross alpha and gross beta counts on FAS filters from Station A and Station B through June 2024 were submitted to CBFO on July 12, 2024.

Between April 1st and June 30th, 2024, the following types of environmental samples were processed and analyzed:

- Alpha radiation emitting isotopes (^{241}Am, ^{238}Pu, $^{239+240}$Pu, ^{234}U, ^{235}U, and ^{238}U)
    - Airborne particulate (HiVol) – 50 samples
    - Fixed Air Sampler (FAS) from Station A – 44 samples
    - Fixed Air Sampler (FAS) from Station B – 11 samples
- Beta radiation emitting isotope (^{90}Sr)
    - All ^{90}Sr samples for all environmental samples collected in 2023 have been analyzed
- Gamma radiation emitting isotopes (^{60}Co, ^{137}Cs, and ^{40}K)
    - All environmental samples collected in 2023, except for 24 soil samples, have been analyzed for gamma-radiation-emitting isotopes

Characteristic results for Sr, U, Pu, and Am in HiVol samples are included in the following pages.

Mirion personnel will visit CEMRC in July 2024 to conduct preventive maintenance and work on the alpha radiation detectors.

2023 Hi-Vol Batch 3/22/2024

Assay Definition

Assay Description:

Assay Type: Direct DPM
Report Name: Report1
Output Data Path: C:\Packard\Tricarb\Results\JS\Sr90_d DPM\20240509_1008
Raw Results Path: C:\Packard\Tricarb\Results\JS\Sr90_d DPM\20240509_1008\20240509_1008.results
Comma-Delimited File Name: C:\Packard\Tricarb\Results\JS\Sr90_d DPM\20240509_1008\Report1.txt
Assay File Name: C:\Packard\TriCarb\Assays\Sr90_d DPM.lsa

Count Conditions

Nuclide: Direct DPM 3H
Quench Indicator: tSIE/AEC
External Std Terminator (sec): 0.5 2s%
Pre-Count Delay (min): 0.00
Quench Set:
Low Energy: 3H
Count Time (min): 16.00
Count Mode: Normal Normalization Std DPM: 129900
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract

Background Subtract: Off
Low CPM Threshold: Off
2 Sigma % Terminator: Off

Regions	LL	UL
A	0.0	2000.0

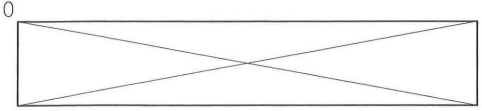
Count Corrections

Static Controller: On Luminescence Correction: Off
Colored Samples: n/a Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Cycle 1 Results

S#	Count Time	CPMA	DPM1	tSIE	MESSAGES	A:2S%	A:%Ref
1	CMP+B 16.00	28	34	8.27		9.41	0.00
2	BLANK 16.00	31	47	256.58		8.93	0.00
3	MBLANK 16.00	35	51	249.98		8.44	0.00
4	LCS 16.00	46	64	244.29		7.35	0.00
5	50971 16.00	33	49	243.88		8.70	0.00
6	50973 16.00	34	51	241.84		8.56	0.00
7	50975 16.00	36	54	241.28		8.36	0.00
8	50976 16.00	33	51	244.03		8.73	0.00
9	50977 16.00	30	45	245.34		9.15	0.00
10	50978 16.00	34	47	245.47		8.61	0.00

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000056960.cnf
Batch Identification: HIVol_U50992
Sample Identification: U50994
Procedure Description: Uranium

Detector Name: 2-11
Env. Background: System Bkgd 27852

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 4/23/2024 10:34:24 AM
Acquisition Date/Time: 4/23/2024 10:34:24 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 410-U232
Tracer Quantity: 0.620 mL
Counting Efficiency: 0.1891 +/- 0.0046 on 12/17/2018 9:24:46 AM
Chem. Rec. Factor (%): 35.25 +/- 2.0562

PEAK AREA REPORT

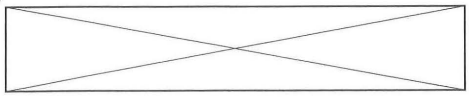
Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
U-232	T	5.264	3115.00	3.59	9.00	71.4
U-234		4.716	1297.00	5.59	8.00	43.6
U-235		4.384	65.00	26.29	4.00	5.0
U-238		4.140	1184.00	5.88	13.00	70.5

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
U-232	5302.50*	1.084E-01 +/- 1.152E-02	7.809E-04 +/- 8.299E-05
U-234	4761.50*	4.514E-02 +/- 5.420E-03	7.416E-04 +/- 7.882E-05
U-235	4385.50*	2.791E-03 +/- 7.913E-04	6.810E-04 +/- 7.238E-05
U-238	4184.40*	4.103E-02 +/- 4.983E-03	9.155E-04 +/- 9.730E-05

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000056954.cnf
Batch Identification: HIVol_U50992
Sample Identification: U50995
Procedure Description: Uranium

Detector Name: 2-12
Env. Background: System Bkgd 59237

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 4/23/2024 10:34:26 AM
Acquisition Date/Time: 4/23/2024 10:34:26 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 410-U232
Tracer Quantity: 0.650 mL
Counting Efficiency: 0.1935 +/- 0.0039 on 4/16/2023 4:54:49 PM
Chem. Rec. Factor (%): 31.06 +/- 1.7685

PEAK AREA REPORT

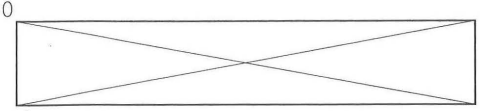
Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
U-232	T	5.268	2944.00	3.69	6.00	47.5
U-234		4.720	1920.00	4.59	10.00	57.8
U-235		4.377	70.00	24.24	1.00	5.0
U-238		4.141	1712.00	4.88	17.00	62.4

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
U-232	5302.50*	1.137E-01 +/- 1.212E-02	7.265E-04 +/- 7.746E-05
U-234	4761.50*	7.412E-02 +/- 8.604E-03	9.074E-04 +/- 9.675E-05
U-235	4385.50*	3.334E-03 +/- 8.829E-04	4.422E-04 +/- 4.715E-05
U-238	4184.40*	6.581E-02 +/- 7.717E-03	1.146E-03 +/- 1.222E-04

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000057354.cnf
Batch Identification: HiVol_Pu51035
Sample Identification: Pu51035
Procedure Description: Pu - 5 days

Detector Name: 2-07
Env. Background: System Bkgd 27848

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 5/14/2024 10:37:52 AM
Acquisition Date/Time: 5/14/2024 10:37:52 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 162-Pu-242-1
Tracer Quantity: 0.270 mL
Counting Efficiency: 0.1909 +/- 0.0038 on 4/11/2023 10:58:46 PM
Chem. Rec. Factor (%): 42.29 +/- 2.4121

PEAK AREA REPORT

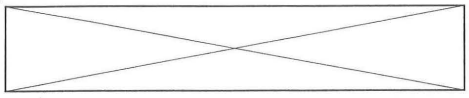
Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
PU-238		5.466	4.00	264.58	12.00	5.1
PU-239		5.127	13.00	67.06	3.00	3.4
PU-242	T	4.871	2847.00	3.75	1.00	28.7

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
PU-238	5487.10*	1.148E-04 +/- 3.039E-04	7.315E-04 +/- 7.812E-05
PU-239	5147.70*	3.731E-04 +/- 2.533E-04	4.046E-04 +/- 4.321E-05
PU-242	4890.70*	8.129E-02 +/- 8.682E-03	2.651E-04 +/- 2.832E-05

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000057355.cnf
Batch Identification: HiVol_Pu51035
Sample Identification: Pu51036
Procedure Description: Pu - 5 days

Detector Name: 2-08
Env. Background: System Bkgd 27849

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 5/14/2024 10:37:54 AM
Acquisition Date/Time: 5/14/2024 10:37:54 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 162-Pu-242-1
Tracer Quantity: 0.290 mL
Counting Efficiency: 0.1918 +/- 0.0046 on 12/16/2018 1:18:36 PM
Chem. Rec. Factor (%): 41.69 +/- 2.4334

PEAK AREA REPORT

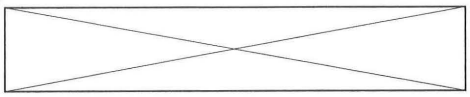
Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
PU-238		5.454	4.00	264.58	12.00	3.4
PU-239		5.129	22.00	53.01	6.00	3.4
PU-242	T	4.868	3028.00	3.64	3.00	34.7

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
PU-238	5487.10*	1.159E-04 +/- 3.069E-04	7.387E-04 +/- 7.861E-05
PU-239	5147.70*	6.375E-04 +/- 3.447E-04	5.453E-04 +/- 5.803E-05
PU-242	4890.70*	8.731E-02 +/- 9.291E-03	4.066E-04 +/- 4.327E-05

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000057358.cnf
Batch Identification: HiVol_Am51035
Sample Identification: Am51035
Procedure Description: Am - 5 Days

Detector Name: 1-11
Env. Background: System Bkgd 27840

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 5/14/2024 10:37:35 AM
Acquisition Date/Time: 5/14/2024 10:37:35 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.1 minutes

Tracer Certificate: 302-Am-243-4
Tracer Quantity: 0.400 mL
Counting Efficiency: 0.1947 +/- 0.0047 on 12/14/2018 7:58:24 AM
Chem. Rec. Factor (%): 92.35 +/- 5.2106

PEAK AREA REPORT

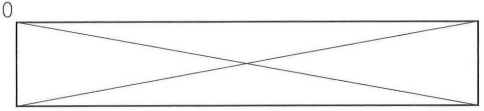
Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
AM-241		5.466	15.00	53.33	0.00	3.4
AM-243	T	5.233	9043.00	2.10	2.00	149.7

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
AM-241	5479.10*	1.932E-04 +/- 1.049E-04	9.478E-05 +/- 9.686E-06
AM-243	5270.00*	1.168E-01 +/- 1.194E-02	1.552E-04 +/- 1.586E-05

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000057359.cnf
Batch Identification: HiVol_Am51035
Sample Identification: Am51036
Procedure Description: Am - 5 Days

Detector Name: 1-12
Env. Background: System Bkgd 27841

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 5/14/2024 10:37:37 AM
Acquisition Date/Time: 5/14/2024 10:37:37 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.1 minutes

Tracer Certificate: 302-Am-243-4
Tracer Quantity: 0.410 mL
Counting Efficiency: 0.1863 +/- 0.0045 on 12/14/2018 9:23:40 AM
Chem. Rec. Factor (%): 44.22 +/- 2.5479

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
AM-241		5.451	5.00	144.22	4.00	5.1
AM-243	T	5.242	4245.00	3.07	6.00	96.9

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
AM-241	5479.10*	1.406E-04 +/- 2.033E-04	4.460E-04 +/- 4.666E-05
AM-243	5270.00*	1.198E-01 +/- 1.253E-02	5.309E-04 +/- 5.554E-05

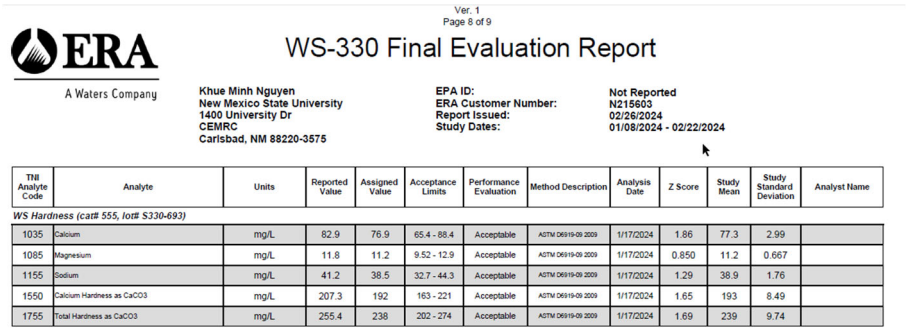
Environmental Chemistry Group

From April 1st to June 30th, 2024, the Environmental Chemistry group (EC) worked on Proficiency Testing and processing Fixed Air Sampler (FAS) filters, ambient air (HiVol) filters, surface water samples, and drinking water samples collected in 2024.

The following Tables and Figures represent characteristic results.

Proficiency Test Results

Sample Type: Proficiency Test
Year: 2024
Analysis Performed: Cations (Hardness)



Ver. 1
Page 8 of 9

ERA
A Waters Company

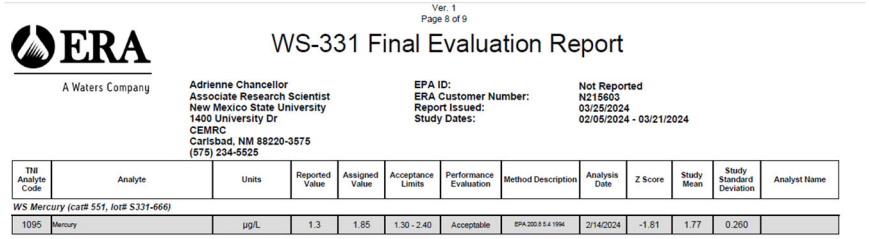
WS-330 Final Evaluation Report

Khue Minh Nguyen
New Mexico State University
1400 University Dr
CEMRC
Carlsbad, NM 88220-3575

EPA ID: Not Reported
ERA Customer Number: N215603
Report Issued: 02/26/2024
Study Dates: 01/08/2024 - 02/22/2024

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Z Score	Study Mean	Study Standard Deviation	Analyst Name
WS Hardness (cat# 555, lot# S330-693)												
1035	Calcium	mg/L	82.9	76.9	65.4 - 88.4	Acceptable	ASTM D6919-09 2009	1/17/2024	1.86	77.3	2.99	
1085	Magnesium	mg/L	11.8	11.2	9.52 - 12.9	Acceptable	ASTM D6919-09 2009	1/17/2024	0.850	11.2	0.667	
1155	Sodium	mg/L	41.2	38.5	32.7 - 44.3	Acceptable	ASTM D6919-09 2009	1/17/2024	1.29	38.9	1.76	
1550	Calcium Hardness as CaCO3	mg/L	207.3	192	163 - 221	Acceptable	ASTM D6919-09 2009	1/17/2024	1.65	193	8.49	
1755	Total Hardness as CaCO3	mg/L	255.4	238	202 - 274	Acceptable	ASTM D6919-09 2009	1/17/2024	1.69	239	9.74	

Sample Type: Proficiency Test
Year: 2024
Analysis Performed: Mercury



Ver. 1
Page 8 of 9

ERA
A Waters Company

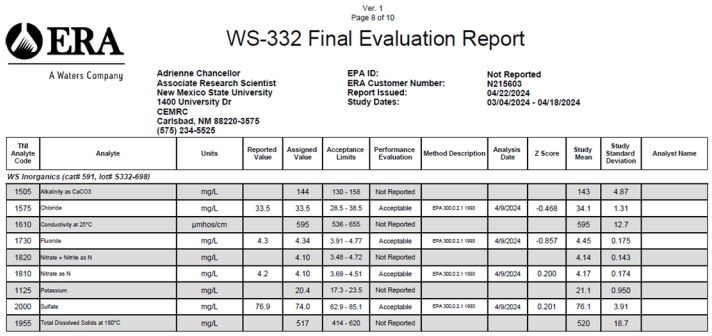
WS-331 Final Evaluation Report

Adrienne Chancellor
Associate Research Scientist
New Mexico State University
1400 University Dr
CEMRC
Carlsbad, NM 88220-3575
(575) 234-5525

EPA ID: Not Reported
ERA Customer Number: N215603
Report Issued: 03/25/2024
Study Dates: 02/05/2024 - 03/21/2024

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Z Score	Study Mean	Study Standard Deviation	Analyst Name
WS Mercury (cat# 551, lot# S331-666)												
1095	Mercury	µg/L	1.3	1.85	1.30 - 2.40	Acceptable	EPA 200.8 5.4 1994	2/14/2024	-1.81	1.77	0.260	

Sample Type: Proficiency Test
Year: 2024
Analysis Performed: Anions (Inorganic)



Ver. 1
Page 8 of 10

ERA
A Waters Company

WS-332 Final Evaluation Report

Adrienne Chancellor
Associate Research Scientist
New Mexico State University
1400 University Dr
CEMRC
Carlsbad, NM 88220-3575
(575) 234-5525

EPA ID: Not Reported
ERA Customer Number: N215603
Report Issued: 04/22/2024
Study Dates: 03/04/2024 - 04/18/2024

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Z Score	Study Mean	Study Standard Deviation	Analyst Name
WS Inorganics (cat# 591, lot# S332-698)												
1505	Alkalinity as CaCO3	mg/L		144	130 - 158	Not Reported				143	4.87	
1575	Chloride	mg/L	33.5	33.5	28.5 - 38.5	Acceptable	EPA 300.0 2.1 1993	4/9/2024	-0.468	34.1	1.31	
1610	Conductivity at 25°C	µmhos/cm		595	536 - 655	Not Reported				595	12.7	
1730	Fluoride	mg/L	4.3	4.34	3.91 - 4.77	Acceptable	EPA 300.0 2.1 1993	4/9/2024	-0.857	4.45	0.175	
1820	Nitrate + Nitrite as N	mg/L		4.10	3.48 - 4.72	Not Reported				4.14	0.143	
1810	Nitrate as N	mg/L	4.2	4.10	3.69 - 4.51	Acceptable	EPA 300.0 2.1 1993	4/9/2024	0.200	4.17	0.174	
1125	Potassium	mg/L		20.4	17.3 - 23.5	Not Reported				21.1	0.950	
2000	Sulfate	mg/L	76.9	74.0	62.9 - 85.1	Acceptable	EPA 300.0 2.1 1993	4/9/2024	0.201	76.1	3.91	
1955	Total Dissolved Solids at 180°C	mg/L		517	414 - 620	Not Reported				520	18.7	

Sample Type: Proficiency Test
Year: 2024
Analysis Performed: Metals

WS-332 Final Evaluation Report

A Waters Company

Adrienne Chancellor
Associate Research Scientist
New Mexico State University
1400 University Dr
CEMRC
Carlsbad, NM 88220-3575
(575) 234-5525

EPA ID: Not Reported
ERA Customer Number: N215603
Report Issued: 04/22/2024
Study Dates: 03/04/2024 - 04/18/2024

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Z Score	Study Mean	Study Standard Deviation	Analyst Name
WS Metals (cat# 590, lot# S332-697)												
1000	Aluminum	µg/L	334.6	306	245 - 367	Acceptable	EPA 200.8 5.4 1994	3/26/2024	1.00	315	19.3	
1005	Antimony	µg/L	27.1	28.0	19.6 - 36.4	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.655	28.0	1.39	
1010	Arsenic	µg/L	31.1	32.7	22.9 - 42.5	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.764	33.2	2.69	
1015	Barium	µg/L	624.8	623	530 - 716	Acceptable	EPA 200.8 5.4 1994	3/26/2024	0.0454	624	26.9	
1020	Beryllium	µg/L	11.2	10.8	9.18 - 12.4	Acceptable	EPA 200.8 5.4 1994	3/26/2024	0.817	10.7	0.626	
1025	Boron	µg/L		1430	1220 - 1640	Not Reported				1420	58.3	
1030	Cadmium	µg/L	44.5	48.1	38.5 - 57.7	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.953	46.4	1.99	
1040	Chromium	µg/L	67.9	72.5	61.6 - 83.4	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-1.53	72.4	2.98	
1055	Copper	µg/L	1457.9	1490	1340 - 1640	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.614	1500	62.9	
1070	Iron	µg/L	984.6	1040	884 - 1200	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-1.21	1050	54.0	
1075	Lead	µg/L	31.6	32.3	22.6 - 42.0	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.414	32.2	1.53	
1090	Manganese	µg/L	595.8	628	534 - 722	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-1.69	633	21.9	
1100	Molybdenum	µg/L	106.6	117	99.4 - 135	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.981	114	7.54	
1105	Nickel	µg/L	349.9	354	301 - 407	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.687	359	13.9	
1140	Selenium	µg/L	80.6	88.5	70.8 - 106	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-1.39	88.7	5.78	
1150	Silver	µg/L	20.68	22.5	15.8 - 29.2	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-1.23	22.8	1.71	
1165	Thallium	µg/L	3.3	3.46	2.42 - 4.50	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.547	3.40	0.187	
1185	Vanadium	µg/L	183.2	190	162 - 218	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.685	189	8.16	
1190	Zinc	µg/L	910.9	929	790 - 1070	Acceptable	EPA 200.8 5.4 1994	3/26/2024	-0.778	940	37.9	

FAS Filters – Station A

Sample Type: FAS, Station A
Year: 2024
Analysis Performed: Anions in weekly composites

Week	Chloride ng/m^3	Nitrate ng/m^3	Phosphate ng/m^3	Sulfate ng/m^3
01/01/24	1.83E+05	4.44E+02	<MDL	2.53E+04
01/08/24	2.60E+05	3.47E+02	<MDL	2.56E+04
01/15/24	2.78E+05	4.75E+02	<MDL	2.01E+04
01/22/24	3.74E+05	3.01E+02	<MDL	5.18E+04
02/01/24	2.13E+05	<MDL	<MDL	3.62E+04
02/08/24	3.43E+05	4.03E+01	<MDL	3.06E+04
02/15/24		8.64E+01	<MDL	1.00E+05
02/22/24	1.16E+06	1.90E+02	<MDL	5.62E+04
03/01/24	2.63E+05	2.47E+02	<MDL	3.15E+04
03/08/24	4.15E+05	3.29E+02	<MDL	2.61E+04
03/15/24	2.27E+05	2.08E+02	<MDL	3.75E+04
03/22/24	1.86E+05	3.80E+02	<MDL	3.98E+04
04/01/24	5.13E+05	2.30E+02	<MDL	5.93E+04
04/08/24	5.03E+05	2.47E+02	<MDL	7.11E+04
04/15/24	4.48E+05	2.33E+02	<MDL	4.07E+04
04/22/24	4.54E+05	2.64E+02	<MDL	2.63E+04
05/01/24	4.59E+05	3.24E+02	<MDL	2.85E+04
05/08/24	4.12E+05	3.90E+02	<MDL	2.37E+04
05/15/24	3.93E+05	2.13E+02	<MDL	2.40E+04
05/22/24	1.45E+06	2.64E+02	<MDL	2.76E+04
06/01/24				
06/08/24				
06/15/24				
06/22/24				
07/01/24				
07/08/24				
07/15/24				
07/22/24				
08/01/24				
08/08/24				
08/15/24				
08/22/24				
09/01/24				
09/08/24				
09/15/24				
09/22/24				
10/01/24				
10/08/24				
10/15/24				
10/22/24				
11/01/24				
11/08/24				
11/15/24				
11/22/24				
12/01/24				
12/08/24				
12/15/24				
12/22/24				

Sample Type: FAS, Station A
Year: 2024
Analysis Performed: Cations in weekly composites

Week	Sodium ng/m³	Ammonium ng/m³	Magnesium ng/m³	Potassium ng/m³	Calcium ng/m³
01/01/24	1.26E+06	<MDL	2.44E+03	2.42E+03	1.14E+04
01/08/24	1.71E+06	<MDL	5.94E+02	2.21E+03	1.07E+04
01/15/24	1.85E+06	<MDL	1.82E+03	1.88E+03	8.75E+03
01/22/24	2.49E+06	<MDL	5.36E+02	2.40E+03	2.20E+04
02/01/24	1.38E+06	<MDL	9.01E+02	3.12E+03	1.49E+04
02/08/24	2.27E+06	<MDL	7.21E+02	3.63E+03	1.14E+04
02/15/24	#VALUE!	<MDL	5.85E+03	1.01E+04	3.64E+04
02/22/24	3.12E+06	<MDL	4.12E+03	6.45E+03	2.14E+04
03/01/24	1.75E+06	<MDL	5.51E+02	2.38E+03	1.24E+04
03/08/24	2.81E+06	<MDL	9.99E+02	2.80E+03	1.08E+04
03/15/24	1.49E+06	<MDL	3.52E+03	4.07E+03	1.68E+04
03/22/24	1.21E+06	<MDL	4.96E+02	2.13E+03	1.80E+04
04/01/24	3.40E+06	<MDL	9.82E+02	3.99E+03	2.33E+04
04/08/24	3.35E+06	<MDL	1.02E+03	4.07E+03	2.63E+04
04/15/24	3.04E+06	<MDL	8.30E+02	2.99E+03	1.52E+04
04/22/24	3.09E+06	<MDL	7.87E+02	2.87E+03	8.45E+03
05/01/24	3.11E+06	<MDL	1.87E+03	3.17E+03	8.98E+03
05/08/24	2.76E+06	<MDL	1.75E+03	3.07E+03	7.73E+03
05/15/24	2.62E+06	<MDL	4.01E+03	<MDL	8.32E+03
05/22/24	3.82E+06	<MDL	1.99E+03	3.42E+03	8.50E+03
06/01/24					
06/08/24					
06/15/24					
06/22/24					
07/01/24					
07/08/24					
07/15/24					
07/22/24					
08/01/24					
08/08/24					
08/15/24					
08/22/24					
09/01/24					
09/08/24					
09/15/24					
09/22/24					
10/01/24					
10/08/24					
10/15/24					
10/22/24					
11/01/24					
11/08/24					
11/15/24					
11/22/24					
12/01/24					
12/08/24					
12/15/24					
12/22/24					

Whatman Filters

Sample Type: Near Field (107), ambient air
Year: 2024
Analysis Performed: Anions

Start Date	Chloride µg/m³	Nitrate µg/m³	Phosphate µg/m³	Sulfate µg/m³
01/19/24	4.17E-01	1.45E+00	9.63E-04	1.02E+00
03/01/24	3.01E-01	1.78E+00	2.77E-03	1.31E+00
03/27/24	3.12E-01	1.90E+00	2.72E-03	1.78E+00
04/26/24	3.14E-01	1.98E+00	3.94E-03	1.92E+00

Sample Type: Cactus Flats (108), ambient air
Year: 2024
Analysis Performed: Anions

Start Date	Chloride µg/m³	Nitrate µg/m³	Phosphate µg/m³	Sulfate µg/m³
01/19/24	2.97E-01	1.58E+00	<MDL	1.20E+00
03/01/24	2.16E-01	1.45E+00	1.49E-03	1.31E+00
03/27/24	3.11E-01	1.77E+00	1.33E-03	1.75E+00
04/26/24	2.74E-01	2.09E-03	2.07E+00	2.63E-03

Sample Type: Near Field (107), ambient air
Year: 2024
Analysis Performed: Cations

Start Date	Calcium µg/m³	Magnesium µg/m³	Potassium µg/m³	Sodium µg/m³
01/19/24	7.24E-01	6.65E-02	9.17E-02	2.84E-01
03/01/24	9.90E-01	6.54E-02	8.23E-02	2.43E-01
03/27/24	1.12E+00	9.49E-02	1.10E-01	3.08E-01
04/26/24	3.04E-01	2.48E-01	2.33E-02	5.45E-02

Sample Type: Cactus Flats (108), ambient air
Year: 2024
Analysis Performed: Cations

Start Date	Calcium µg/m³	Magnesium µg/m³	Potassium µg/m³	Sodium µg/m³
01/19/24	8.96E-01	4.57E-02	5.38E-02	2.24E-01
03/01/24	1.01E+00	9.52E-03	2.55E-02	1.90E-01
03/27/24	1.24E+00	7.87E-02	8.55E-02	2.83E-01
04/26/24	2.78E-01	1.93E-01	2.11E-02	4.18E-02

Drinking Water

Sample Type: Drinking Water
Year: 2024
Analysis Performed: Anions

Sample Location	Chloride µg/L	Nitrate µg/L	Phosphate µg/L	Sulfate µg/L
Carlsbad (Sheep draw)	3.73E+04	4.60E+03	<MDL	9.26E+04
Hobbs	1.19E+05	2.17E+04	<MDL	1.47E+05
Double Eagle PRV4	3.39E+04	1.35E+04	<MDL	3.94E+04
Loving	3.63E+04	1.99E+04	<MDL	1.25E+05
Otis	2.22E+05	1.83E+04	<MDL	5.55E+05
Malaga	6.46E+05	1.58E+04	<MDL	9.92E+05

Sample Type: Drinking Water
Year: 2024
Analysis Performed: Cations

Sample Location	Calcium µg/L	Magnesium µg/L	Potassium µg/L	Sodium µg/L
Carlsbad (Sheep draw)				
Hobbs				
Double Eagle PRV4				
Loving				
Otis				
Malaga				

Sample Type: Drinking Water
Year: 2024
Analysis Performed: pH

Sample Location	pH @ 20.6°C
Carlsbad (Sheep draw)	7.99
Hobbs	7.95
Double Eagle PRV4	8.47
Loving	8.19
Otis	8.26
Malaga	8.01

Sample Type: Drinking Water
Year: 2024
Analysis Performed: Total Organic Carbon

Sample Location	TOC mg/L
Sheep Draw	
Hobbs	
Double Eagle PRV-4	
Loving	
Otis	
Malaga	

Sample Type: Drinking Water
Year: 2024
Analysis Performed: Conductivity

Sample Location	Conductivity mS/cm	Temperature °C
Sheep Draw (Carlsbad)	0.697	21.0
Loving	0.807	21.0
Otis	1.93	21.0
Malaga	3.81	21.0
Hobbs	0.995	21.0
PRV4 (Double Eagle)	0.496	21.0

Sample Type: Drinking Water
Year: 2024
Analysis Performed: Specific gravity

Sample Location	Specific Gravity
Sheep Draw (Carlsbad)	
Loving	
Otis	
Malaga	
Hobbs	
PRV4 (Double Eagle)	

Sample Type: Drinking Water
Year: 2024
Analysis Performed: TDS/TSS

Sample Location	TDS mg/L	TSS mg/L
Sheep Draw (Carlsbad)	220.0	N.D.
Loving	400.0	N.D.
Otis	1440.0	N.D.
Malaga	3020.0	N.D.
Hobbs	620.0	N.D.
PRV4 (Double Eagle)	120.0	N.D.
N.D. = non-detect.		

Surface Water

Sample Type: Surface Water
Year: 2024
Analysis Performed: Anions

Sample Location	Chloride µg/L	Nitrate µg/L	Phosphate µg/L	Sulfate µg/L
Hill Tank	4.54E+00	5.60E-01	5.09E-01	1.38E+01
Noya Tank	4.46E+01	<MDL	<MDL	6.44E+00
Pierce Canyon	1.69E+03	4.06E+00	<MDL	1.77E+03
Lake Carlsbad (Shallow)				
Lake Carlsbad (Deep)				
Brantley Lake (Shallow)				
Brantley (Deep)				
Red Bluff (Shallow)				
Red Bluff (Deep)				

Sample Type: Surface Water
Year: 2024
Analysis Performed: Cations

Sample Location	Calcium µg/L	Magnesium µg/L	Potassium µg/L	Sodium µg/L
Hill Tank	6.75E+01	8.91E+00	2.44E+01	2.41E+00
Noya Tank	2.13E+02	1.55E+01	4.25E+01	1.28E+01
Pierce Canyon	5.68E+02	2.12E+02	4.16E+01	9.76E+02
Lake Carlsbad (Shallow)				
Lake Carlsbad (Deep)				
Brantley Lake (Shallow)				
Brantley Lake (Deep)				
Red Bluff (Shallow)				
Red Bluff (Deep)				

Sample Type: Surface Water
Year: 2024
Analysis Performed: pH

Sample Location	pH @ 24°C
Hill Tank	8.782
Noya Tank	8.180
Pierce Canyon	8.338
Lake Carlsbad (Shallow)	
Lake Carlsbad (Deep)	
Brantley Lake (Shallow)	
Brantley Lake (Deep)	
Red Bluff (Shallow)	
Red Bluff (Deep)	

Sample Type: Surface Water
Year: 2024
Analysis Performed: Conductivity

Sample Location	Conductivity mS/cm	Temperature °C
Hill Tank	0.456	20.0
Noya Tank	0.533	20.3
Pierce Canyon	9.83	19.9
Lake Carlsbad (Shallow)		
Lake Carlsbad (Deep)		
Brantley Lake (Shallow)		
Brantley Lake (Deep)		

Red Bluff (Shallow)		
Red Bluff (Deep)		

Sample Type: Surface Water
Year: 2024
Analysis Performed: Specific gravity

Sample Location	SG $_{T/4°C}$
Hill Tank	0.987
Noya Tank	0.980
Pierce Canyon	0.983
Lake Carlsbad (Shallow)	
Lake Carlsbad (Deep)	
Brantley Lake (Shallow)	
Brantley (Deep)	
Red Bluff (Shallow)	
Red Bluff (Deep)	

Sample Type: Surface Water
Year: 2024
Analysis Performed: TOC

Sample Location	TOC mg/L
Hill Tank	14.66
Noya Tank	115.0
Pierce Canyon	5.665
Lake Carlsbad (Shallow)	
Lake Carlsbad (Deep)	
Brantley Lake (Shallow)	
Brantley (Deep)	
Red Bluff (Shallow)	
Red Bluff (Deep)	

Sample Type: Surface Water
Year: 2024
Analysis Performed: TDS/TSS

Sample Location	TDS mg/L	TSS mg/L
Hill Tank	160.00	140.00
Noya Tank	460.00	520.00
Pierce Canyon	5620.00	220.00
Lake Carlsbad (Shallow)		
Lake Carlsbad (Deep)		
Brantley Lake (Shallow)		
Brantley (Deep)		
Red Bluff (Shallow)		
Red Bluff (Deep)		

Sample Type: Surface Water
Year: 2024
Analysis Performed: Metals

Metal	Hill Tank Conc µg/L	Noya Tank Conc µg/L	Pierce Canyon Conc µg/L
Ag	<MDC	4.32E-01	<MDC
Al	4.56E+02	1.68E+04	1.14E+02
As	7.34E+00	2.86E+01	<MDC
Ba	2.11E+02	3.04E+03	4.09E+01
Be	<MDC	3.21E+00	<MDC
Ca	6.39E+04	4.46E+05	5.39E+05
Cd	<MDC	1.45E+00	<MDC
Ce	1.93E+00	1.13E+02	5.51E-01
Co	1.17E+00	3.08E+01	1.54E+00
Cr	1.58E+00	1.35E+01	<MDC
Cu	1.18E+01	4.30E+01	3.05E+00
Dy	1.67E-01	1.04E+01	<MDC
Er	7.77E-02	4.72E+00	3.78E-02
Eu	<MDC	4.26E+00	<MDC
Fe	4.32E+02	1.19E+04	1.78E+03
Gd	2.47E-01	1.63E+01	<MDC
Hg	<MDL	<MDL	<MDL
K	2.15E+04	4.58E+04	1.66E+04
La	8.98E-01	4.98E+01	<MDC
Li	4.43E+00	2.40E+01	8.34E+01
Mg	9.69E+03	3.77E+04	2.15E+05
Mn	9.24E+01	4.88E+03	2.14E+01
Mo	9.23E-01	1.43E+00	4.02E+00
Na	2.26E+03	1.24E+04	9.31E+05
Nd	1.03E+00	6.30E+01	<MDC
Ni	4.79E+00	5.48E+01	2.44E+01
P	2.76E+02	5.85E+03	<MDC
Pb	<MDC	7.41E+01	<MDC
Pr	2.39E-01	1.38E+01	<MDC
Sb	6.35E-01	8.23E-01	<MDC
Sc	1.73E+00	9.05E+00	1.08E+00
Se	<MDC	<MDC	<MDC
Si	6.56E+03	2.91E+04	4.67E+03
Sr	3.13E+02	9.98E+02	8.50E+03
~~Th~~			
Tl	<MDC	<MDC	<MDC
U	7.27E-01	1.49E+00	8.19E+00
V	1.77E+01	1.16E+02	5.13E+00
Zn	<MDC	<MDC	<MDC

Internal Dosimetry Group

Number of *in vivo* radiobioassay measurements performed during the reporting period: None for WIPP, 52 for the contract radiological personnel and those working in the laboratories located at CEMRC, and 4 for the public participants.

Outreach activities:
The Internal Dosimetry group continues to interact with the public to encourage citizens to participate in the Lie Down and Be Counted (LDBC) project's lung and whole body in-vivo radiobioassay measurements at CEMRC. CEMRC also promotes awareness of environmental monitoring and research to the public.

The following activities took place during the reporting period of April 1st to June 30th, 2024:

4/18/2024: Science Technology Engineering Arts Mathematics (STEAM) Expo, 4 PM – 6 PM, SENMC gymnasium, Carlsbad NM. Explained and handed out the flyers about Lie down and Be Counted program to around 150 students of all ages, interacted with community members to encourage participating in the LDBC program.

5/8/2024: Explained and handed out the flyers about Lie down and Be Counted program to Carlsbad Medical Center Oncology Director who is very much interested in CEMRC's Internal dosimetry and radiobioassay measurement program. CEMRC will follow up for a possible interactive program.

6/5/2024: Explained and handed out the flyers about Lie down and Be Counted program and demonstrated the lung and whole-body radiobioassay measurement to Covenant Health radiology clinic, Lubbock. CEMRC will follow up for a possible interactive program.

6/6/2024: Inspired By Science 2024 Summer Camp STEM Night, 6 PM – 7:30 PM, SENMC gymnasium, Carlsbad NM. About 250 students, kids and community members of all ages visited. Explained and handed out, about150 flyers about Lie down and Be Counted program to around 150 visitors who showed interest in getting to know about the LDBC program.