Quarterly Report

Calendar Year 2024 – Fourth Quarter, October 1 – December 31, 2024

Prepared by:

Carlsbad Environmental Monitoring & Research Center
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Submitted to:

U.S. Department of Energy
Carlsbad Field Office

January 2025

Field Programs - Radiation Safety Group

WIPP Underground Effluent Monitoring (Station A and Station B)

From October 1st to December 31st, a total of 56 filters from the primary skid at Station A, of which 44 were sample filters, 6 were trip blanks and 6 were filter blanks, were collected. In addition, 34 filters were collected from the backup skid at Station A (24 sample filters, 5 trip blank filters and 5 filter blanks). One hundred and fourteen filters were collected from the primary skid at Station B, (91 sample filters, 11 trip blanks and 12 filter blanks). One hundred and fourteen filters were collected from Station B backup (91 sample filters, 11 trip blanks and 12 filter blanks), during the same time period.

All 56 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 34 of the Station A backup filters have been processed and transferred to the Environmental Chemistry group (EC). All 114 filters from the primary Station B skid have been processed and transferred to RC. All 114 of the Station B backup filters were transferred to EC.

Ambient Air Sampling

From October 1st to December 31st, 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

From October 1st to December 31st, 6 Whatman-41 filters and 3 trip blank filters were collected, 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.

Vegetation sampling

From October 1st to December 31st, 6 vegetation samples (5 samples and 1 duplicate) were collected from five of the six perimeter and regional continuous sampling stations (Near Field, Cactus Flats, WIPP East, Carlsbad, and Loving.) Vegetation was not collected from the on-site sampling station because the station is surrounded mostly by concrete and infertile soil. Vegetation samples are currently undergoing processing so that they can be transferred to the RC group.

Surface Water Monitoring

From October 1st to December 31st, 9 surface water samples were collected, out of those 1 is a trip blank. All samples were transferred to RC and EC.

Drinking Water Monitoring

No activity to report this quarter.

Sediment Monitoring

From October 1st to December 31st, 4 sediment samples were collected. Sediment samples are currently undergoing processing so they can be transferred to the RC group.

Nuclear Materials Management and Safeguards

From October 1st to December 31st, 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 December 18, 2024. Several survey instruments were sent to Ludlum Corporation for calibration. One flow meter was sent to Omega Engineering 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 until it was permanently secured on November 14, 2024, in preparation for decommissioning, and Station B through the second week of January 2025 has been completed. The complete results for gross alpha and gross beta counts on FAS filters from Station A and Station B through December 2024 were submitted to CBFO on January 14, 2025.

Between October 1st and December 31st, 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)
    - 36 Fixed Air Sampler (FAS) Station A samples from 2024
- Beta radiation emitting isotope (^{90}Sr)
    - 12 Fixed Air Sampler (FAS) Station A samples from 2024
- Gamma radiation emitting isotopes (^{60}Co, ^{137}Cs, and ^{40}K)
    - 36 Fixed Air Sampler (FAS) Station A samples from 2024

Characteristic results are included in the following pages.

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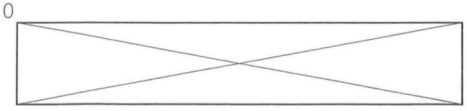

Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000061037.cnf
Batch Identification: STA01-03_Am
Sample Identification: 24A0101_Am
Procedure Description: Am - 5 Days

Detector Name: 2-02
Env. Background: System Bkgd 27843

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 11/6/2024 10:28:07 AM
Acquisition Date/Time: 11/6/2024 10:28:07 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 1322-Am-243-2
Tracer Quantity: 0.044 mL
Counting Efficiency: 0.1827 +/- 0.0037 on 7/21/2024 3:36:46 PM
Chem. Rec. Factor (%): 99.01 +/- 3.4217

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
AM-241		5.471	271.00	12.59	10.00	25.0
AM-243	T	5.259	1314.00	5.53	4.00	31.5

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
AM-241	5479.10*	3.470E-03 +/- 4.784E-04	3.009E-04 +/- 1.692E-05
AM-243	5270.00*	1.688E-02 +/- 9.491E-04	2.037E-04 +/- 1.146E-05

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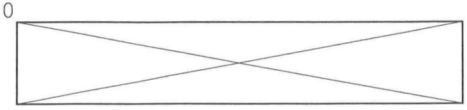

Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000061054.cnf
Batch Identification: STA01-03_Am
Sample Identification: 24A0102_Am
Procedure Description: Am - 5 Days

Detector Name: 2-03
Env. Background: System Bkgd 27844

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 11/6/2024 10:28:08 AM
Acquisition Date/Time: 11/6/2024 10:28:08 AM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 1322-Am-243-2
Tracer Quantity: 0.044 mL
Counting Efficiency: 0.2131 +/- 0.0042 on 7/21/2024 3:36:47 PM
Chem. Rec. Factor (%): 85.60 +/- 2.9175

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
AM-241		5.469	642.00	8.15	21.00	30.6
AM-243	T	5.257	1338.00	5.50	8.00	26.7

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
AM-241	5479.10*	8.152E-03 +/- 8.055E-04	4.171E-04 +/- 2.332E-05
AM-243	5270.00*	1.704E-02 +/- 9.529E-04	2.715E-04 +/- 1.518E-05

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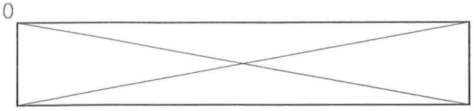

Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000061424.cnf
Batch Identification: STA07-09_Pu
Sample Identification: 24A0701_Pu
Procedure Description: Pu - 5 days

Detector Name: 5-07
Env. Background: System Bkgd 59129

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 11/20/2024 2:09:03 PM
Acquisition Date/Time: 11/20/2024 2:09:03 PM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 450-Pu-242
Tracer Quantity: 0.063 mL
Counting Efficiency: 0.1988 +/- 0.0039 on 7/19/2024 9:36:39 PM
Chem. Rec. Factor (%): 89.50 +/- 3.0475

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
PU-238		5.473	386.00	10.59	16.00	26.5
PU-239		5.130	64.00	26.88	5.00	4.3
PU-242	T	4.874	1315.00	5.52	2.00	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*	5.028E-03 +/- 6.018E-04	3.779E-04 +/- 2.105E-05
PU-239	5147.70*	8.336E-04 +/- 2.289E-04	2.268E-04 +/- 1.264E-05
PU-242	4890.70*	1.704E-02 +/- 9.494E-04	1.557E-04 +/- 8.671E-06

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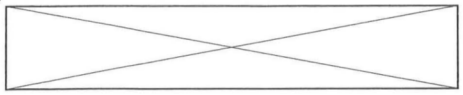

Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000061422.cnf
Batch Identification: STA07-09_Pu
Sample Identification: 24A0702_Pu
Procedure Description: Pu - 5 days

Detector Name: 5-08
Env. Background: System Bkgd 59130

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 11/20/2024 2:09:04 PM
Acquisition Date/Time: 11/20/2024 2:09:04 PM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 450-Pu-242
Tracer Quantity: 0.064 mL
Counting Efficiency: 0.2066 +/- 0.0041 on 7/19/2024 9:36:38 PM
Chem. Rec. Factor (%): 89.63 +/- 3.0082

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
PU-238		5.479	355.00	11.31	24.00	20.8
PU-239		5.139	65.00	31.83	21.00	14.3
PU-242	T	4.873	1389.00	5.38	3.00	28.5

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
PU-238	5487.10*	4.442E-03 +/- 5.573E-04	4.371E-04 +/- 2.371E-05
PU-239	5147.70*	8.134E-04 +/- 2.626E-04	4.110E-04 +/- 2.230E-05
PU-242	4890.70*	1.730E-02 +/- 9.384E-04	1.756E-04 +/- 9.526E-06

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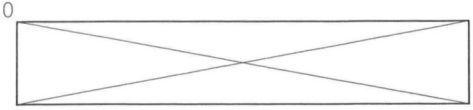

Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000061456.cnf
Batch Identification: STA07-09_U
Sample Identification: 24A0701_U
Procedure Description: Uranium

Detector Name: 2-01
Env. Background: System Bkgd 27842

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 11/22/2024 12:59:09 PM
Acquisition Date/Time: 11/22/2024 12:59:09 PM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 1320_U232
Tracer Quantity: 0.040 mL
Counting Efficiency: 0.2103 +/- 0.0041 on 7/21/2024 4:22:51 AM
Chem. Rec. Factor (%): 70.58 +/- 2.6213

----- PEAK AREA REPORT -----

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
U-232	T	5.287	1058.00	6.21	11.00	41.1
U-234		4.740	191.00	14.99	7.00	30.9
U-235		4.405	1.00	447.21	2.00	3.4
U-238		4.156	160.00	16.68	9.00	26.5

T = Tracer Peak used for Effective Efficiency

----- NUCLIDE ANALYSIS RESULTS -----

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
U-232	5302.50*	1.653E-02 +/- 1.040E-03	3.832E-04 +/- 2.411E-05
U-234	4761.50*	2.985E-03 +/- 4.853E-04	3.143E-04 +/- 1.977E-05
U-235	4385.50*	1.928E-05 +/- 8.623E-05	2.315E-04 +/- 1.457E-05
U-238	4184.40*	2.490E-03 +/- 4.438E-04	3.492E-04 +/- 2.197E-05

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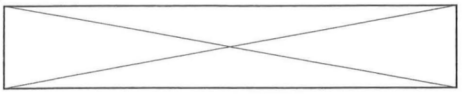

Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000061457.cnf
Batch Identification: STA07-09_U
Sample Identification: 24A0801_U
Procedure Description: Uranium

Detector Name: 2-05
Env. Background: System Bkgd 27846

Sample Size: 1.0000E+00 +/- 0.0000E+00 unit
Sample Date/Time: 11/22/2024 12:59:16 PM
Acquisition Date/Time: 11/22/2024 12:59:16 PM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 1320_U232
Tracer Quantity: 0.048 mL
Counting Efficiency: 0.1885 +/- 0.0038 on 7/21/2024 7:39:21 PM
Chem. Rec. Factor (%): 71.83 +/- 2.6037

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
U-232	T	5.289	1151.00	5.96	12.00	28.1
U-234		4.737	180.00	15.48	7.00	28.7
U-235		4.396	6.00	124.72	4.00	3.4
U-238		4.160	162.00	17.20	16.00	12.4

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
U-232	5302.50*	1.971E-02 +/- 1.191E-03	4.366E-04 +/- 2.637E-05
U-234	4761.50*	3.083E-03 +/- 5.122E-04	3.444E-04 +/- 2.080E-05
U-235	4385.50*	1.268E-04 +/- 1.583E-04	3.352E-04 +/- 2.024E-05
U-238	4184.40*	2.763E-03 +/- 5.035E-04	4.948E-04 +/- 2.989E-05

CEMRC Gross Alpha-Beta Analysis

Batch ID FASA_SR_JAN_MAR_24
Count Method FAS Gross Alpha Beta

Sample ID	Count Began	Addr	Count Time	Alpha counts	Beta counts
FASA_SR_FEB_24_1ST	11/12/2024 6:45:05 PM	7	1,200.0 **minutes**	81.0	930.0
FASA_SR_FEB_24_2ND	11/12/2024 6:45:29 PM	9	1,200.0 **minutes**	65.0	675.0
FASA_SR_FEB_24_3RD	11/12/2024 6:45:51 PM	10	1,200.0 **minutes**	76.0	592.0
FASA_SR_FEB_24_4TH	11/12/2024 6:46:10 PM	11	1,200.0 **minutes**	162.0	999.0
FASA_SR_JAN_24_1ST	11/12/2024 6:43:14 PM	2	1,200.0 **minutes**	105.0	818.0
FASA_SR_JAN_24_2ND	11/12/2024 6:43:43 PM	3	1,200.0 **minutes**	97.0	703.0
FASA_SR_JAN_24_3RD	11/12/2024 6:44:17 PM	4	1,200.0 **minutes**	77.0	996.0
FASA_SR_JAN_24_4TH	11/12/2024 6:44:42 PM	5	1,200.0 **minutes**	64.0	853.0
FASA_SR_JAN_MAR_24_BLANK	11/12/2024 6:42:36 PM	0	1,200.0 **minutes**	102.0	944.0
FASA_SR_JAN_MAR_24_LCS	11/12/2024 6:42:54 PM	1	1,200.0 **minutes**	108.0	3,510.0

CEMRC Gross Alpha-Beta Analysis

Batch ID FASA_SR_JAN_MAR_24
Count Method FAS Gross Alpha Beta

Sample ID	Count Began	Addr	Count Time	Alpha counts	Beta counts
FASA_SR_MAR_24_1ST	11/12/2024 6:46:32 PM	12	1,200.0 **minutes**	154.0	1,193.0
FASA_SR_MAR_24_2ND	11/12/2024 6:46:50 PM	13	1,200.0 **minutes**	119.0	1,183.0
FASA_SR_MAR_24_3RD	11/12/2024 6:47:07 PM	14	1,200.0 **minutes**	129.0	950.0
FASA_SR_MAR_24_4TH	11/12/2024 6:47:28 PM	15	1,200.0 **minutes**	145.0	1,033.0

Alpha/Beta Count Results

Air Filter Sample Activity Report

Batch ID FASA_SR_JAN_MAR_24

Count Method FAS Gross Alpha Beta

Sample ID FASA_SR_FEB_24_1ST **Addr:** 7

Flow Time		Flow Rate					
On	1/1/1900	0.00 LPM	Bkg Time	1,200.0 minutes	Count Time	1,200.0 minutes	
Off	1/1/1900	0.00 LPM	Total Flow Time	0.0 minutes	Count Began	11/12/2024 6:45:05 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	11/13/2024 2:46:17 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.066	0.068	0.007	2.5988 e-003	0.0000 e+000	1.1795 e-004 ± 7.4600 e-004	0.000	0.000
sd		0.007	0.008	0.045			7.4600 e-004		
Beta	1.000	0.665	0.775	0.280	4.7529 e-003	0.0000 e+000	4.6700 e-003 ± 1.4745 e-003	0.000	0.000
sd		0.024	0.025	0.088			1.4745 e-003		

Sample ID FASA_SR_FEB_24_2ND **Addr:** 9

Flow Time		Flow Rate					
On	1/1/1900	0.00 LPM	Bkg Time	1,200.0 minutes	Count Time	1,200.0 minutes	
Off	1/1/1900	0.00 LPM	Total Flow Time	0.0 minutes	Count Began	11/12/2024 6:45:29 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	11/13/2024 2:46:43 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.040	0.054	0.058	1.9786 e-003	0.0000 e+000	9.6254 e-004 ± 6.0217 e-004	0.000	0.000
sd		0.006	0.007	0.036			6.0217 e-004		
Beta	1.000	0.380	0.563	0.458	3.5761 e-003	0.0000 e+000	7.6269 e-003 ± 1.1820 e-003	0.000	0.000
sd		0.018	0.022	0.071			1.1820 e-003		

Sample ID FASA_SR_FEB_24_3RD **Addr:** 10

Flow Time		Flow Rate					
On	1/1/1900	0.00 LPM	Bkg Time	1,200.0 minutes	Count Time	1,200.0 minutes	
Off	1/1/1900	0.00 LPM	Total Flow Time	0.0 minutes	Count Began	11/12/2024 6:45:51 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	11/13/2024 2:47:03 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.043	0.063	0.083	2.0880 e-003	0.0000 e+000	1.3820 e-003 ± 6.5203 e-004	0.000	0.000
sd		0.006	0.007	0.039			6.5203 e-004		
Beta	1.000	0.350	0.493	0.356	3.4255 e-003	0.0000 e+000	5.9329 e-003 ± 1.1146 e-003	0.000	0.000
sd		0.017	0.020	0.067			1.1146 e-003		

Alpha/Beta Count Results

Air Filter Sample Activity Report

Batch ID FASA_SR_JAN_MAR_24

Count Method FAS Gross Alpha Beta

Sample ID FASA_SR_FEB_24_4TH **Addr:** 11

Flow Time		Flow Rate					
On	1/1/1900	0.00 LPM	Bkg Time	1,200.0 minutes	Count Time	1,200.0 minutes	
Off	1/1/1900	0.00 LPM	Total Flow Time	0.0 minutes	Count Began	11/12/2024 6:46:10 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	11/13/2024 2:47:27 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.126	0.135	0.037	3.3769 e-003	0.0000 e+000	6.2029 e-004 ± 9.9772 e-004	0.000	0.000
sd		0.010	0.011	0.060			9.9772 e-004		
Beta	1.000	0.610	0.833	0.550	4.4307 e-003	0.0000 e+000	9.1637 e-003 ± 1.4387 e-003	0.000	0.000
sd		0.023	0.026	0.086			1.4387 e-003		

Sample ID FASA_SR_JAN_24_1ST **Addr:** 2

Flow Time		Flow Rate					
On	1/1/1900	0.00 LPM	Bkg Time	1,200.0 minutes	Count Time	1,200.0 minutes	
Off	1/1/1900	0.00 LPM	Total Flow Time	0.0 minutes	Count Began	11/12/2024 6:43:14 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	11/13/2024 2:44:29 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.060	0.088	0.118	2.5117 e-003	0.0000 e+000	1.9646 e-003 ± 7.9295 e-004	0.000	0.000
sd		0.007	0.009	0.048			7.9295 e-004		
Beta	1.000	0.478	0.682	0.510	4.0124 e-003	0.0000 e+000	8.5007 e-003 ± 1.3163 e-003	0.000	0.000
sd		0.020	0.024	0.079			1.3163 e-003		

Sample ID FASA_SR_JAN_24_2ND **Addr:** 3

Flow Time		Flow Rate					
On	1/1/1900	0.00 LPM	Bkg Time	1,200.0 minutes	Count Time	1,200.0 minutes	
Off	1/1/1900	0.00 LPM	Total Flow Time	0.0 minutes	Count Began	11/12/2024 6:43:43 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	11/13/2024 2:44:57 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.061	0.081	0.083	2.4553 e-003	0.0000 e+000	1.3877 e-003 ± 7.5440 e-004	0.000	0.000
sd		0.007	0.008	0.045			7.5440 e-004		
Beta	1.000	0.485	0.586	0.253	4.0730 e-003	0.0000 e+000	4.2091 e-003 ± 1.2718 e-003	0.000	0.000
sd		0.020	0.022	0.076			1.2718 e-003		

Alpha/Beta Count Results

Air Filter Sample Activity Report

Batch ID FASA_SR_JAN_MAR_24

Count Method FAS Gross Alpha Beta

Sample ID FASA_SR_JAN_24_3RD **Addr:** 4

Flow Time		Flow Rate
On	1/1/1900	0.00 LPM
Off	1/1/1900	0.00 LPM

Bkg Time 1,200.0 minutes **Count Time** 1,200.0 minutes
Total Flow Time 0.0 minutes **Count Began** 11/12/2024 6:44:17 PM
Total Sampled Volume 1.0000 e+000 Sample **Count Ended** 11/13/2024 2:45:25 PM

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.052	0.064	0.052	2.2846 e-003	0.0000 e+000	8.7096 e-004 ± 6.8478 e-004	0.000	0.000
sd		0.007	0.007	0.041			6.8478 e-004		
Beta	1.000	0.750	0.830	0.195	4.8942 e-003	0.0000 e+000	3.2480 e-003 ± 1.4988 e-003	0.000	0.000
sd		0.025	0.026	0.090			1.4988 e-003		

Sample ID FASA_SR_JAN_24_4TH **Addr.** 5

Flow Time		Flow Rate
On	1/1/1900	0.00 LPM
Off	1/1/1900	0.00 LPM

Bkg Time 1,200.0 minutes **Count Time** 1,200.0 minutes
Total Flow Time 0.0 minutes **Count Began** 11/12/2024 6:44:42 PM
Total Sampled Volume 1.0000 e+000 Sample **Count Ended** 11/13/2024 2:45:51 PM

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.034	0.053	0.081	1.9169 e-003	0.0000 e+000	1.3565 e-003 ± 6.0491 e-004	0.000	0.000
sd		0.005	0.007	0.036			6.0491 e-004		
Beta	1.000	0.591	0.711	0.300	4.4605 e-003	0.0000 e+000	5.0027 e-003 ± 1.3941 e-003	0.000	0.000
sd		0.022	0.024	0.084			1.3941 e-003		

Sample ID FASA_SR_JAN_MAR_24_BLANK **Addr:** 0

Flow Time		Flow Rate
On	1/1/1900	0.00 LPM
Off	1/1/1900	0.00 LPM

Bkg Time 1,200.0 minutes **Count Time** 1,200.0 minutes
Total Flow Time 0.0 minutes **Count Began** 11/12/2024 6:42:36 PM
Total Sampled Volume 1.0000 e+000 Sample **Count Ended** 11/13/2024 2:43:48 PM

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.062	0.085	0.100	2.5441 e-003	0.0000 e+000	1.6669 e-003 ± 7.9045 e-004	0.000	0.000
sd		0.007	0.008	0.047			7.9045 e-004		
Beta	1.000	0.583	0.787	0.510	4.4361 e-003	0.0000 e+000	8.5046 e-003 ± 1.4339 e-003	0.000	0.000
sd		0.022	0.026	0.086			1.4339 e-003		

Alpha/Beta Count Results

Air Filter Sample Activity Report

Batch ID FASA_SR_JAN_MAR_24

Count Method FAS Gross Alpha Beta

Sample ID FASA_SR_JAN_MAR_24_LCS **Addr:** 1

Flow Time		Flow Rate
On	1/1/1900	0.00 LPM
Off	1/1/1900	0.00 LPM

Bkg Time 1,200.0 minutes **Count Time** 1,200.0 minutes
Total Flow Time 0.0 minutes **Count Began** 11/12/2024 6:42:54 PM
Total Sampled Volume 1.0000 e+000 Sample **Count Ended** 11/13/2024 2:44:12 PM

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.073	0.090	0.075	2.7461 e-003	0.0000 e+000	1.2507 e-003 ± 8.3205 e-004	0.000	0.000
sd		0.008	0.009	0.050			8.3205 e-004		
Beta	1.000	0.580	2.925	5.954	4.4270 e-003	0.0000 e+000	9.9231 e-002 ± 2.6378 e-003	0.000	0.000
sd		0.022	0.049	0.158			2.6378 e-003		

Sample ID FASA_SR_MAR_24_1ST **Addr:** 12

Flow Time		Flow Rate
On	1/1/1900	0.00 LPM
Off	1/1/1900	0.00 LPM

Bkg Time 1,200.0 minutes **Count Time** 1,200.0 minutes
Total Flow Time 0.0 minutes **Count Began** 11/12/2024 6:46:32 PM
Total Sampled Volume 1.0000 e+000 Sample **Count Ended** 11/13/2024 2:47:50 PM

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.098	0.128	0.131	3.1346 e-003	0.0000 e+000	2.1868 e-003 ± 9.7386 e-004	0.000	0.000
sd		0.009	0.010	0.058			9.7386 e-004		
Beta	1.000	0.689	0.994	0.769	4.8318 e-003	0.0000 e+000	1.2815 e-002 ± 1.5991 e-003	0.000	0.000
sd		0.024	0.029	0.096			1.5991 e-003		

Sample ID FASA_SR_MAR_24_2ND **Addr:** 13

Flow Time		Flow Rate
On	1/1/1900	0.00 LPM
Off	1/1/1900	0.00 LPM

Bkg Time 1,200.0 minutes **Count Time** 1,200.0 minutes
Total Flow Time 0.0 minutes **Count Began** 11/12/2024 6:46:50 PM
Total Sampled Volume 1.0000 e+000 Sample **Count Ended** 11/13/2024 2:48:08 PM

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.087	0.099	0.053	2.9569 e-003	0.0000 e+000	8.8427 e-004 ± 8.8050 e-004	0.000	0.000
sd		0.008	0.009	0.053			8.8050 e-004		
Beta	1.000	0.669	0.986	0.804	4.7626 e-003	0.0000 e+000	1.3393 e-002 ± 1.5862 e-003	0.000	0.000
sd		0.024	0.029	0.095			1.5862 e-003		

Alpha/Beta Count Results

Air Filter Sample Activity Report

Batch ID FASA_SR_JAN_MAR_24

Count Method FAS Gross Alpha Beta

Sample ID FASA_SR_MAR_24_3RD **Addr:** 14

Flow Time		Flow Rate					
On	1/1/1900	0.00 **LPM**	**Bkg Time**	1,200.0 **minutes**	**Count Time**	1,200.0 **minutes**	
Off	1/1/1900	0.00 **LPM**	**Total Flow Time**	0.0 **minutes**	**Count Began**	11/12/2024 6:47:07 PM	
			Total Sampled Volume	1.0000 e+000 **Sample**	**Count Ended**	11/13/2024 2:48:26 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.068	0.108	0.169	2.6139 e-003	0.0000 e+000	2.8141 e-003 ± 8.5135 e-004	0.000	0.000
sd		0.008	0.009	0.051			8.5135 e-004		
Beta	1.000	0.593	0.792	0.497	4.4929 e-003	0.0000 e+000	8.2874 e-003 ± 1.4487 e-003	0.000	0.000
sd		0.022	0.026	0.087			1.4487 e-003		

Sample ID FASA_SR_MAR_24_4TH **Addr:** 15

Flow Time		Flow Rate					
On	1/1/1900	0.00 **LPM**	**Bkg Time**	1,200.0 **minutes**	**Count Time**	1,200.0 **minutes**	
Off	1/1/1900	0.00 **LPM**	**Total Flow Time**	0.0 **minutes**	**Count Began**	11/12/2024 6:47:28 PM	
			Total Sampled Volume	1.0000 e+000 **Sample**	**Count Ended**	11/13/2024 2:48:43 PM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.080	0.121	0.172	2.8280 e-003	0.0000 e+000	2.8691 e-003 ± 9.1070 e-004	0.000	0.000
sd		0.008	0.010	0.055			9.1070 e-004		
Beta	1.000	0.681	0.861	0.447	4.7970 e-003	0.0000 e+000	7.4498 e-003 ± 1.5241 e-003	0.000	0.000
sd		0.024	0.027	0.091			1.5241 e-003		

Reviewed by: _____

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* NOTE: DAILY QUALITY CONTROL SAMPLES (QC) ARE GIVEN A USER DRIVEN          *
*  N-SIGMA TEST.  INVESTIGATE MEANS THE MEASUREMENT IS BETWEEN              *
*  10% AND 15% OF THE BASELINE.  ACTION MEANS THAT THE MEASUREMENT          *
*  IS ABOVE 15% OF THE BASELINE.                                            *
*  LABORATORY CONTROL SAMPLES ARE GIVEN A BOUNDARY TEST.  THE RESULT        *
*  IS ACCEPTABLE IF IT LIES BETWEEN +/- 25% OF THE TRUE SOURCE              *
*  ACTIVITY.                                                                *
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C E M R C G A M M A S P E C T R U M A N A L Y S I S

Sample ID : FASA240101
Sample Description : FASA240101
:
Calibration ID :
Background ID :

Sample Collection Date : 1/12/2024 12:00:00 PM
Count Start Date : 11/12/2024 10:00:05 AM

Sample Aliquot : 1.00000E+00
Aliquot Unc. : 0.00000E+00
Aliquot Unit : Unit

Live Time (sec) : 172800
Real Time (sec) : 172814

Energy Calibration Used Done On : 10/1/2024
Efficiency Calibration Used Done On : 11/16/2023
Efficiency ID : DET03_70mlEff_23

%Random Unc. : 0.0
%Systematic Unc. : 0.0

Nuclide	Energy	Eff%	UncEff%	Abun%	UncAbn%	HL(d)	UncHL(d)	Conc(Bq/unit)	Unc2sigma	MDC

K-40	1460.81	0.725	0.009	10.6700	0.1100	4.66412E+11	2.92192E+09	1.35253E-01	1.21904E-01	4.07340E-01
CO-60	1173.22	0.896	0.010	100.0000	0.0000	1.92518E+03	3.65240E-01	-1.87961E-03	1.23130E-02	4.26405E-02
CO-60	1332.49	0.794	0.009	100.0000	0.0000	1.92518E+03	3.65240E-01	1.51021E-02	1.39730E-02	4.66990E-02
CS-137	661.65	1.535	0.021	85.1200	0.2300	1.10193E+04	1.09572E+01	-9.17665E-04	1.82824E-02	6.14079E-02
AM-241	59.54	4.727	0.000	36.3000	0.0000	1.58153E+05	0.00000E+00	2.31859E-02	2.61062E-02	0.00000E+00

5 nuclide lines identified

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***** P E A K A N A L Y S I S R E P O R T *****
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Detector Name: DET03
Sample Title: FASA240101
Peak Analysis Performed on: 11/14/2024 10:00:23 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8190

	Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
M	1	66-	85	68.35	16.41	0.45	-1.076E-01	6.09	4.905E+00
m	2	66-	85	78.79	18.95	0.45	-1.019E+01	26.55	2.167E+01
	3	183-	204	191.95	46.54	0.24	-8.389E+01	166.62	2.710E+03
	4	235-	256	243.06	59.00	0.43	6.866E+01	154.60	2.293E+03
M	5	339-	395	345.01	83.85	0.43	2.743E+01	4.15	5.536E+02
m	6	339-	395	356.01	86.53	0.44	3.360E+01	4.42	5.424E+02
	7	428-	439	433.04	105.31	0.27	1.743E+01	87.44	1.016E+03
	8	541-	554	548.76	133.52	0.24	-9.666E+01	97.38	1.228E+03
	9	585-	609	597.66	145.44	0.24	-1.089E+02	154.38	2.176E+03
	10	664-	678	671.17	163.36	0.35	-1.486E+01	101.26	1.243E+03
	11	753-	773	764.90	186.21	0.24	-1.206E+01	125.53	1.704E+03
	12	834-	850	843.26	205.31	0.24	-3.682E+00	107.79	1.407E+03
	13	964-	993	979.94	238.63	0.24	1.903E+02	153.55	1.981E+03
M	14	1206-	1242	1210.09	294.73	0.50	1.641E+01	99.55	3.937E+02
m	15	1206-	1242	1230.77	299.77	0.50	1.112E+01	67.48	3.971E+02
M	16	1292-	1321	1295.06	315.45	0.50	-4.936E+01	138.57	4.294E+02

m 17	1292- 1321	1316.08	320.57	0.50	-3.996E+01	130.92	4.398E+02
M 18	1400- 1506	1408.15	343.01	0.68	-1.515E+01	164.23	6.997E+02
m 19	1400- 1506	1447.62	352.63	0.68	-1.056E+01	114.43	8.365E+02
m 20	1400- 1506	1463.16	356.42	0.69	-4.690E+00	50.86	8.778E+02
m 21	1400- 1506	1500.19	365.45	0.69	-7.706E+00	83.53	8.523E+02
22	1747- 1763	1756.25	427.87	0.24	2.023E+01	74.07	6.538E+02
23	1799- 1814	1807.89	440.46	0.26	-4.574E+00	69.11	5.976E+02
24	1952- 1967	1960.25	477.60	0.31	-5.342E+00	66.13	5.803E+02
25	2034- 2052	2040.16	497.08	0.24	5.561E+01	72.75	6.164E+02
26	2194- 2214	2204.99	537.26	0.38	3.957E+01	73.02	5.964E+02
27	2386- 2407	2393.40	583.19	0.44	6.873E+01	78.14	6.533E+02
28	2493- 2511	2500.55	609.31	0.24	7.613E+01	85.10	8.389E+02
29	2543- 2562	2552.36	621.94	0.24	-1.946E+01	72.93	6.375E+02
30	2708- 2727	2715.30	661.66	0.69	1.163E+02	68.99	5.057E+02
31	2977- 2992	2984.70	727.33	0.34	1.690E+01	54.32	3.781E+02
32	3096- 3113	3105.30	756.73	0.89	1.454E+01	52.08	3.305E+02
33	3258- 3278	3265.82	795.86	0.26	-3.898E+01	58.32	4.100E+02
34	3318- 3334	3326.95	810.76	0.24	6.847E+00	49.82	3.132E+02
35	3416- 3433	3425.77	834.85	0.25	-6.895E+00	55.89	3.859E+02
36	3676- 3697	3684.99	898.04	0.53	3.382E+01	57.35	3.522E+02
37	3731- 3749	3738.97	911.20	0.24	-7.715E-01	50.06	3.038E+02
38	3968- 3984	3975.96	968.97	0.24	-9.891E+00	42.89	2.489E+02
39	4100- 4115	4107.48	1001.03	0.24	8.800E+00	39.50	2.112E+02
40	4503- 4518	4510.27	1099.22	0.51	1.684E+00	37.90	1.983E+02
M 41	4570- 4605	4580.02	1116.22	3.36	5.341E+01	31.81	3.333E+02
m 42	4570- 4605	4599.57	1120.99	3.36	2.088E+01	29.93	3.781E+02

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
43	4806-	4821	4813.92	1173.24	0.24	-2.608E+00	34.17	1.626E+02
44	5221-	5238	5229.06	1274.44	0.24	-1.267E+01	33.85	1.557E+02
45	5459-	5476	5467.24	1332.50	0.24	1.856E+01	34.34	1.434E+02
46	5985-	6002	5993.67	1460.83	0.59	1.809E+01	32.60	1.289E+02
47	6640-	6657	6648.68	1620.50	0.24	-2.177E+00	27.26	1.032E+02

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Reviewed by: _____

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* NOTE: DAILY QUALITY CONTROL SAMPLES (QC) ARE GIVEN A USER DRIVEN          *
*  N-SIGMA TEST.  INVESTIGATE MEANS THE MEASUREMENT IS BETWEEN              *
*  10% AND 15% OF THE BASELINE.  ACTION MEANS THAT THE MEASUREMENT          *
*  IS ABOVE 15% OF THE BASELINE.                                            *
*  LABORATORY CONTROL SAMPLES ARE GIVEN A BOUNDARY TEST.  THE RESULT        *
*  IS ACCEPTABLE IF IT LIES BETWEEN +/- 25% OF THE TRUE SOURCE              *
*  ACTIVITY.                                                                *
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C E M R C G A M M A S P E C T R U M A N A L Y S I S

Sample ID : FASA240301
Sample Description : FASA240301
:
Calibration ID :
Background ID :

Sample Collection Date : 3/13/2024 12:00:00 PM
Count Start Date : 11/19/2024 8:37:30 AM

Sample Aliquot : 1.00000E+00
Aliquot Unc. : 0.00000E+00
Aliquot Unit : Unit

Live Time (sec) : 172800
Real Time (sec) : 172814

Energy Calibration Used Done On : 10/1/2024
Efficiency Calibration Used Done On : 11/16/2023
Efficiency ID : DET03_70mlEff_23

%Random Unc. : 0.0
%Systematic Unc. : 0.0

Nuclide	Energy	Eff%	UncEff%	Abun%	UncAbn%	HL(d)	UncHL(d)	Conc(Bq/unit)	Unc2sigma	MDC

K-40	1460.81	0.725	0.009	10.6700	0.1100	4.66412E+11	2.92192E+09	1.04269E-01	1.32841E-01	4.47481E-01
CO-60	1173.22	0.896	0.010	100.0000	0.0000	1.92518E+03	3.65240E-01	1.83984E-02	1.22835E-02	4.05389E-02
CO-60	1332.49	0.794	0.009	100.0000	0.0000	1.92518E+03	3.65240E-01	-2.72930E-02	1.35341E-02	4.92475E-02
CS-137	661.65	1.535	0.021	85.1200	0.2300	1.10193E+04	1.09572E+01	-8.89891E-04	2.15580E-02	7.21737E-02
AM-241	59.54	4.746	0.000	36.3000	0.0000	1.58153E+05	0.00000E+00	2.06898E-02	1.83180E-02	0.00000E+00

5 nuclide lines identified

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***** P E A K A N A L Y S I S R E P O R T *****
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Detector Name: DET03
Sample Title: FASA240301
Peak Analysis Performed on: 11/21/2024 8:37:49 AM
Peak Analysis From Channel: 50
Peak Analysis To Channel: 8190

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
1	66-	85	79.79	19.20	0.26	-1.326E+01	21.52	3.926E+01
2	181-	204	191.95	46.54	0.43	9.260E+01	176.87	2.827E+03
3	238-	251	245.28	59.54	0.33	6.153E+01	108.93	1.448E+03
4	342-	388	347.13	84.37	0.25	-2.197E+02	271.81	4.288E+03
5	421-	439	433.04	105.31	0.41	5.946E+01	120.97	1.523E+03
6	543-	555	548.76	133.52	0.24	-1.858E+01	91.42	1.090E+03
7	575-	604	597.66	145.44	0.24	-2.572E+02	190.80	2.956E+03
8	665-	679	671.17	163.36	0.39	-3.478E+01	99.93	1.218E+03
9	756-	771	764.90	186.21	0.24	-2.307E+01	102.50	1.321E+03
10	836-	856	843.26	205.31	0.29	-4.310E+01	124.33	1.687E+03
11	971-	995	979.94	238.63	0.33	9.384E+01	133.79	1.706E+03
M 12	1206-	1242	1214.56	295.82	0.49	-9.407E+00	87.26	4.128E+02
m 13	1206-	1242	1228.60	299.25	0.50	-8.758E+00	81.24	4.029E+02
14	1290-	1330	1314.07	320.08	0.24	-1.426E+02	182.56	2.377E+03
M 15	1406-	1503	1414.02	344.45	0.55	1.661E+01	28.01	3.780E+02
m 16	1406-	1503	1443.96	351.74	0.55	2.382E+01	28.96	3.818E+02

m 17	1406- 1503	1467.38	357.45	0.55	4.629E+01	33.53	3.847E+02
m 18	1406- 1503	1498.14	364.95	0.56	1.909E+01	29.20	3.884E+02
19	1750- 1763	1756.25	427.87	0.31	-2.760E+01	60.59	5.026E+02
20	1799- 1814	1807.89	440.46	0.24	1.172E+01	69.03	5.873E+02
21	1954- 1969	1960.25	477.60	0.35	2.250E+01	64.18	5.325E+02
22	2034- 2048	2040.16	497.08	0.34	-1.899E+01	59.54	4.930E+02
23	2197- 2212	2204.99	537.26	0.70	6.885E+01	61.01	4.531E+02
24	2386- 2406	2393.40	583.19	0.35	4.699E+01	74.06	6.090E+02
25	2493- 2509	2500.55	609.31	0.24	3.605E+01	77.60	7.499E+02
26	2544- 2560	2552.36	621.94	0.28	8.115E+00	65.31	5.429E+02
27	2697- 2724	2715.30	661.66	1.12	1.163E+02	85.92	6.767E+02
28	2975- 2992	2984.70	727.33	0.41	1.351E+01	58.21	4.155E+02
29	3095- 3113	3105.30	756.73	0.31	8.858E+00	55.37	3.671E+02
30	3258- 3273	3265.82	795.86	0.38	-9.525E+00	46.72	2.935E+02
31	3319- 3334	3326.95	810.76	0.24	-4.819E+00	46.12	2.828E+02
32	3418- 3441	3425.77	834.85	0.26	-5.685E+01	70.06	5.478E+02
33	3675- 3695	3684.99	898.04	0.47	7.253E+01	56.04	3.275E+02
34	3731- 3747	3738.97	911.20	0.26	3.263E+01	45.98	2.544E+02
35	3967- 3985	3975.96	968.97	0.29	7.898E+00	46.38	2.711E+02
36	4100- 4115	4107.48	1001.03	0.25	-2.611E+00	38.37	2.046E+02
37	4503- 4518	4510.27	1099.22	0.24	-6.494E-01	35.99	1.786E+02
M 38	4570- 4604	4579.11	1116.00	0.86	3.034E+01	22.72	1.481E+02
m 39	4570- 4604	4593.31	1119.46	0.86	9.781E+00	17.26	1.185E+02
40	4806- 4821	4813.92	1173.24	0.24	2.603E+01	34.75	1.500E+02
41	5221- 5238	5229.06	1274.44	0.24	1.244E+01	35.21	1.556E+02
42	5459- 5476	5467.24	1332.50	0.24	-3.420E+01	33.91	1.692E+02

Peak No.	ROI start	ROI end	Peak centroid	Energy (keV)	FWHM (keV)	Net Peak Area	Net Area Uncert.	Continuum Counts
43	5984-	6003	5993.67	1460.83	0.24	1.394E+01	35.53	1.491E+02
44	6640-	6657	6648.68	1620.50	0.24	-9.990E+00	27.61	1.090E+02

M = First peak in a multiplet region
m = Other peak in a multiplet region
F = Fitted singlet

Environmental Chemistry Group

From October 1st to December 31st, 2024, the Environmental Chemistry (EC) group processed the anion and cation analyses for the Fixed Air Sampler (FAS) filters and the ambient air (HiVol) filters and finished the complete analyses for surface water samples (including the anions, cations, pH, total organic carbon, conductivity, specific gravity, TDS/TSS, and metals analyses) collected in 2024.

The following Tables and Figures represent characteristic results.

FAS Filters – Station A

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

Week	Aluminum ng/m^3	Cadmium ng/m^3	Lead ng/m^3	Magnesium ng/m^3	Silicon ng/m^3	Thorium ng/m^3	Uranium ng/m^3
01/01/24							
01/08/24							
01/15/24							
01/22/24							
02/01/24							
02/08/24							
02/15/24							
02/22/24							
03/01/24							
03/08/24							
03/15/24							
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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							

NOTE: Filters were not received for the following time frames: N/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	#VALUE!	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	1.62E+05	3.39E+02	<MDL	1.53E+04
06/08/24	3.01E+05	<MDL	<MDL	2.20E+04
06/15/24	1.42E+05	2.27E+02	<MDL	1.58E+04
06/22/24	1.48E+05	2.88E+02	<MDL	1.95E+04
07/01/24	1.50E+05	1.22E+02	1.10E+02	1.84E+04
07/08/24	2.46E+05	5.65E+01	<MDL	2.00E+04
07/15/24	5.62E+04	5.11E+01	7.07E+01	1.18E+04
07/22/24	4.32E+04	<MDL	<MDL	1.05E+04
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				

NOTE: Filters were not received for the following time frames: N/A

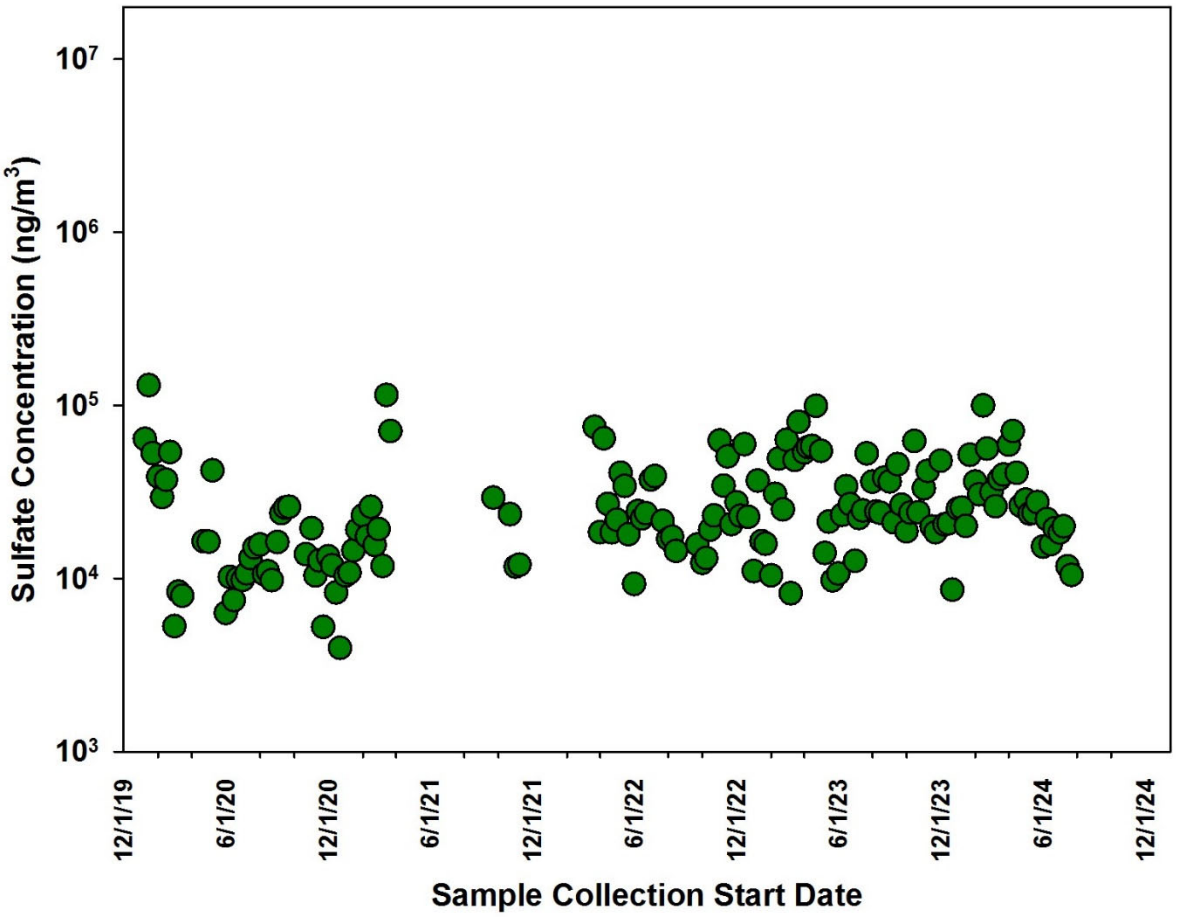

Figure 1: Historical Concentrations of Sulfate at Station A

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	1.11E+06	<MDL	5.38E+02	2.10E+03	4.96E+03
06/08/24	2.01E+06	<MDL	2.66E+02	2.49E+03	6.58E+03
06/15/24	9.45E+05	<MDL	1.46E+03	<MDL	6.26E+03
06/22/24	9.94E+05	<MDL	4.71E+02	<MDL	7.79E+03
07/01/24	9.91E+05	<MDL	1.37E+03	1.74E+03	7.83E+03
07/08/24	1.65E+06	<MDL	1.72E+03	3.10E+03	6.61E+03
07/15/24	3.61E+04	<MDL	9.82E+02	1.68E+03	4.93E+03
07/22/24	2.78E+04	<MDL	8.22E+02	1.75E+03	4.02E+03
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					

NOTE: Filters were not received for the following time frames: N/A

FAS Filters – Station B

Sample Type: FAS, Station B
Year: 2024
Analysis Performed: Metals in monthly composites

Month	Aluminum ng/m^3	Cadmium ng/m^3	Lead ng/m^3	Magnesium ng/m^3	Silicon ng/m^3	Thorium ng/m^3	Uranium ng/m^3
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							

Sample Type: FAS, Station B
Year: 2024
Analysis Performed: Anions in monthly composites

Month	Chloride ng/m^3	Nitrate ng/m^3	Phosphate ng/m^3	Sulfate ng/m^3
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Sample Type: FAS, Station B
Year: 2024
Analysis Performed: Cations in monthly composites

Month	Sodium ng/m^3	Ammonium ng/m^3	Magnesium ng/m^3	Potassium ng/m^3	Calcium ng/m^3
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

Whatman Filters

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

Start Date	Aluminum µg/m^3	Cadmium µg/m^3	Lead µg/m^3	Silica µg/m^3	Thorium µg/m^3	Uranium µg/m^3

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

Start Date	Aluminum µg/m^3	Cadmium µg/m^3	Lead µg/m^3	Silica µg/m^3	Thorium µg/m^3	Uranium µg/m^3

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
05/24/24	1.54E-01	1.76E+00	3.22E-03	2.59E+00
06/19/24	1.27E-01	1.92E+00	<MDL	1.87E+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
05/24/24	1.52E-01	1.87E+00	2.40E-03	2.76E+00
06/19/24	1.01E-01	1.58E+00	<MDL	1.46E+00

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
05/24/24	1.71E+00	1.96E-02	5.31E-02	4.12E-01
06/19/24	1.24E+00	2.33E-02	5.46E-02	3.04E-01

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
05/24/24	1.84E+00	9.65E-02	1.05E-01	3.79E-01
06/19/24	1.89E+00	2.61E-02	5.16E-02	3.43E-01

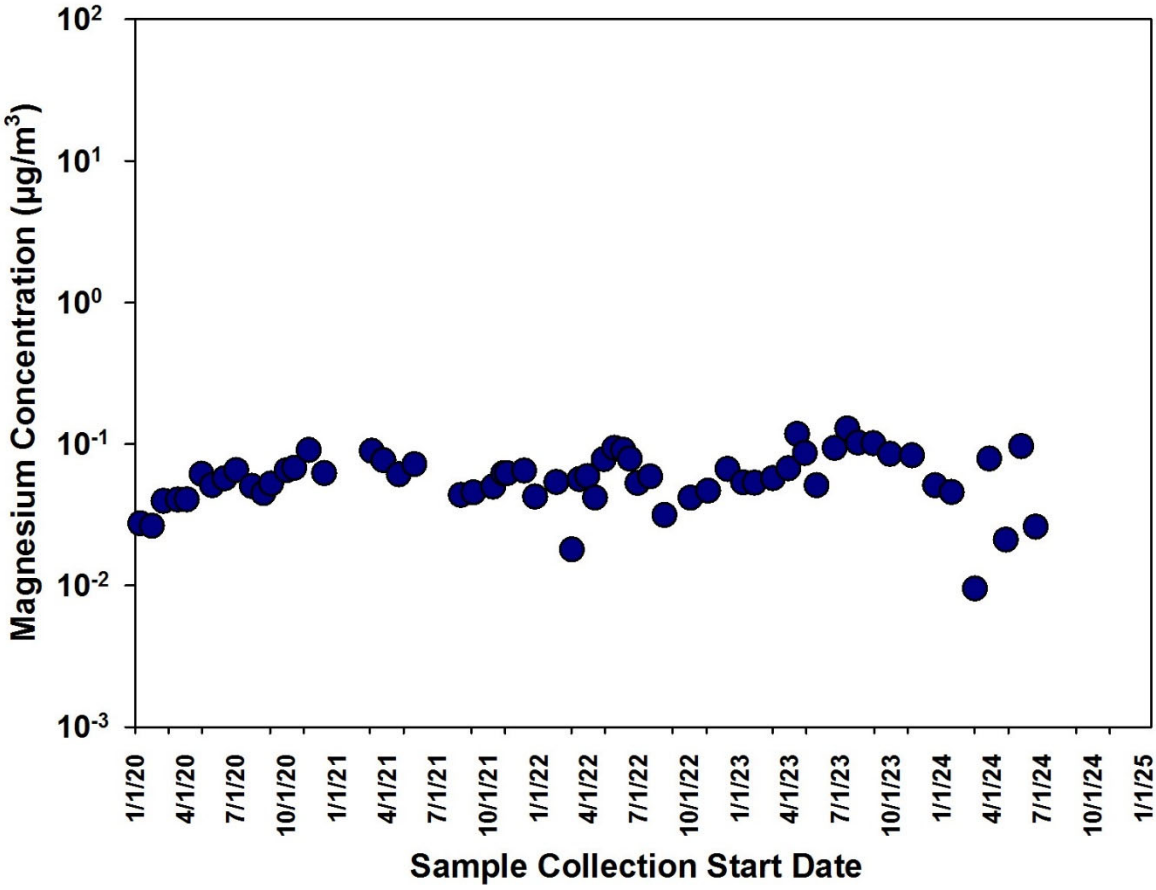

Figure 2: Historical Concentrations of Magnesium at Cactus Flats

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	4.02E+04	2.03E+04	<MDL	1.25E+05
Otis	2.31E+05	1.80E+04	<MDL	5.55E+05
Malaga	6.46E+05	1.57E+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)	7.42E+04	3.00E+04	<MDL	2.64E+04
Hobbs	1.11E+05	2.13E+04	<MDL	5.73E+04
Double Eagle PRV4	5.22E+04	9.85E+03	3.65E+03	3.51E+04

Loving	9.01E+04	3.43E+04	<MDL	2.62E+04
Otis	2.40E+05	6.22E+04	<MDL	8.79E+04
Malaga	4.58E+05	1.16E+05	<MDL	2.06E+05

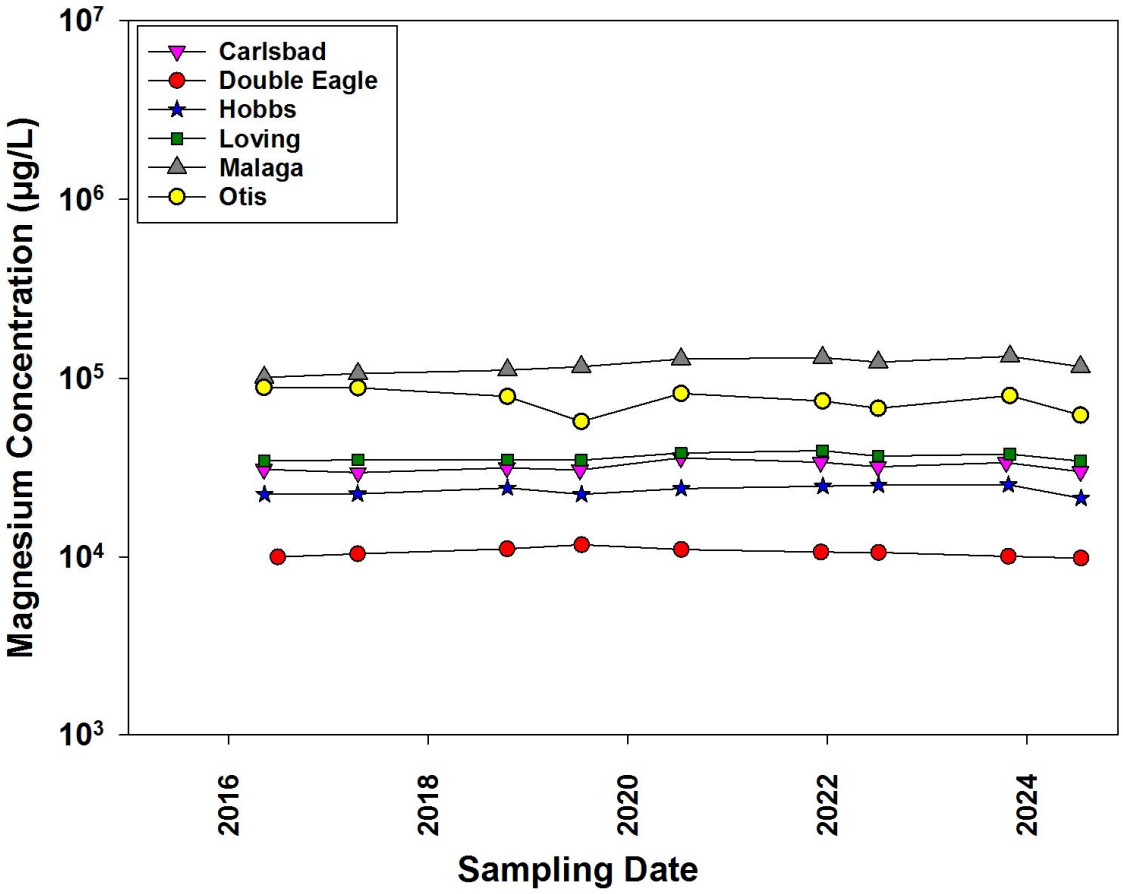

Figure 3: Historical Concentrations of Magnesium in Drinking Water

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	1.231
Hobbs	1.114
Double Eagle PRV-4	0.5095
Loving	0.7142
Otis	0.5344
Malaga	0.7121

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)	0.995
Loving	0.996
Otis	0.997
Malaga	0.997
Hobbs	0.996
PRV4 (Double Eagle)	0.996

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.		

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

Metal	Carlsbad Conc µg/L	Loving Conc µg/L	Otis Conc µg/L	Malaga Conc µg/L	Hobbs Conc µg/L	Double Eagle (PRV4) Conc µg/L
Ag	7.19E-02	<MDC	<MDC	<MDC	<MDC	2.00E-01
Al	3.43E+00	2.04E+00	4.18E+00	6.74E+00	2.11E+00	3.55E+00
As	7.69E-01	1.72E+00	1.87E+00	2.62E+00	8.42E+00	7.82E+00
Ba	7.25E+01	3.39E+01	1.66E+01	1.34E+01	5.64E+01	1.02E+02
Be	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Ca	7.44E+04	8.80E+04	2.34E+05	4.43E+05	1.13E+05	5.44E+04
Cd	5.42E-03	<MDC	<MDC	<MDC	1.31E-02	<MDC
Ce	3.10E-03	<MDC	<MDC	<MDC	<MDC	<MDC
Co	1.35E-01	1.64E-01	4.03E-01	7.01E-01	2.01E-01	9.89E-02
Cr	1.41E+00	2.40E+00	2.12E+00	1.81E+00	1.79E+00	1.31E+00
Cu	2.63E+00	3.10E+00	5.03E+00	3.57E+00	4.72E+00	1.64E+00
Dy	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Er	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Eu	1.86E-02	8.17E-03	<MDC	<MDC	<MDC	2.51E-02
Fe	2.80E+02	3.32E+02	1.02E+03	1.73E+03	1.05E+03	2.34E+02
Gd	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Hg	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
K	1.30E+03	1.90E+03	2.86E+03	3.99E+03	2.74E+03	2.96E+03
La	4.46E-03	<MDC	<MDC	<MDC	<MDC	<MDC
Li	7.43E+00	2.13E+01	4.32E+01	6.44E+01	3.72E+01	2.06E+01
Mg	3.47E+04	3.91E+04	7.69E+04	1.32E+05	2.71E+04	1.13E+04
Mn	4.99E-01	3.01E-02	6.79E-02	4.45E-01	1.24E+00	1.08E+00
Mo	1.36E+00	1.67E+00	3.47E+00	4.00E+00	2.72E+00	1.93E+00
Na	2.60E+04	2.58E+04	8.73E+04	1.94E+05	5.59E+04	3.48E+04
Nd	3.23E-03	<MDC	<MDC	<MDC	<MDC	<MDC
Ni	3.38E+00	3.88E+00	1.12E+01	1.85E+01	5.45E+00	2.43E+00
P	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Pb	3.14E-01	2.26E-01	<MDC	2.36E-01	1.24E+00	4.70E-01
Pr	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Sb	3.22E-02	3.41E-02	4.56E-02	4.34E-02	6.71E-02	3.43E-02
Sc	1.84E+00	2.92E+00	3.26E+00	3.17E+00	7.42E+00	4.82E+00
Se	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Si	6.29E+03	9.89E+03	1.04E+04	1.05E+04	2.60E+04	1.65E+04
Sr	3.49E+02	8.33E+02	2.91E+03	5.80E+03	1.28E+03	5.93E+02
Th	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Tl	1.09E-01	<MDC	<MDC	<MDC	2.13E-02	1.23E-02
U	8.22E-01	1.94E+00	3.83E+00	5.67E+00	3.77E+00	1.71E+00
V	3.79E+00	1.16E+01	1.04E+01	7.93E+00	3.16E+01	3.17E+01
Zn	8.28E+00	4.95E+00	2.66E+01	8.69E+00	3.81E+01	6.81E+00

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+03	5.60E+02	5.09E+02	1.38E+04
Noya Tank	4.46E+04	<MDL	<MDL	6.44E+03
Pierce Canyon	1.69E+06	4.06E+03	<MDL	1.77E+06
Lake Carlsbad (Shallow)	6.13E+05	4.11E+03	<MDL	1.04E+06
Lake Carlsbad (Deep)	6.39E+05	4.11E+03	<MDL	1.08E+06
Brantley Lake (Shallow)	5.33E+05	1.39E+03	<MDL	8.83E+05
Brantley (Deep)	7.15E+05	1.61E+03	<MDL	9.96E+05
Red Bluff (Shallow)	3.71E+06	<MDL	<MDL	3.70E+06
Red Bluff (Deep)	3.69E+06	<MDL	<MDL	3.68E+06

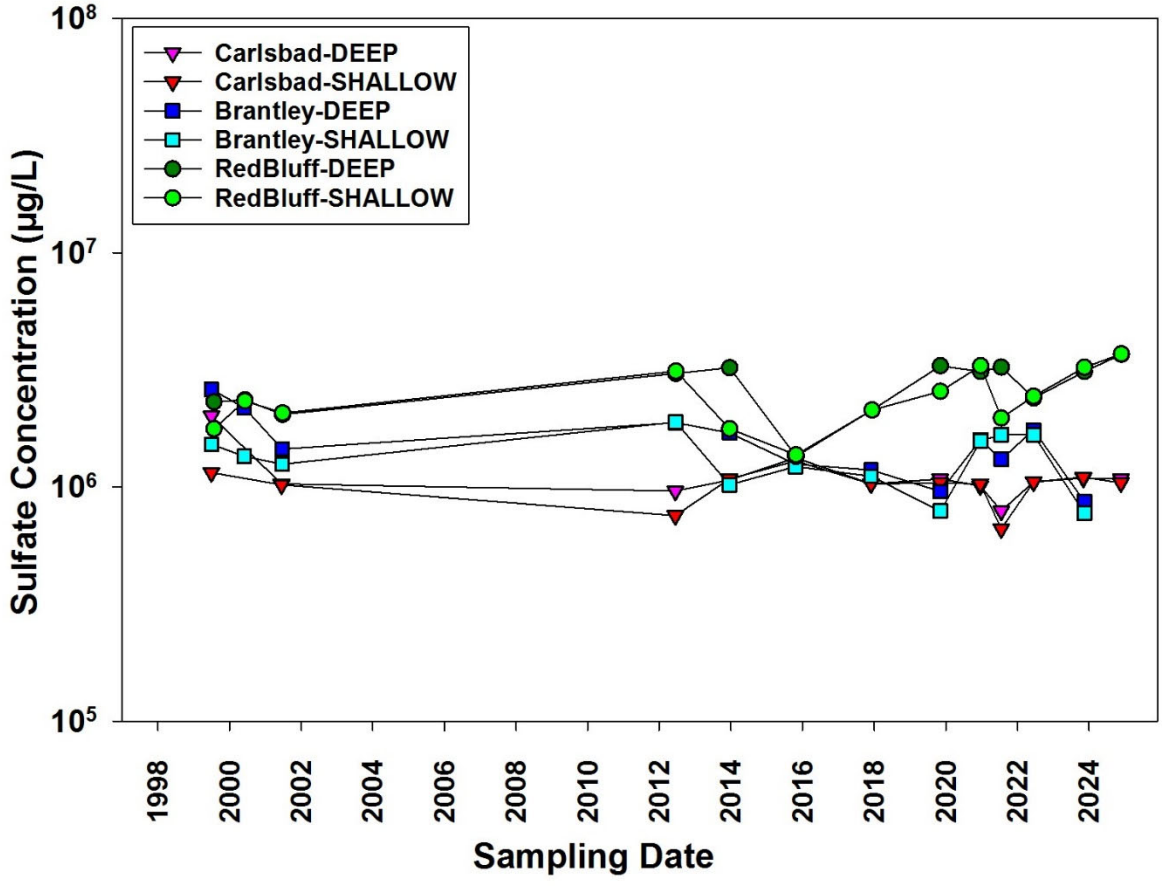

Figure 4: Historical Concentrations of Sulfate in Surface Water

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+04	8.91E+03	2.44E+04	2.41E+03
Noya Tank	2.13E+05	1.55E+04	4.25E+04	1.28E+04
Pierce Canyon	5.68E+05	2.12E+05	4.16E+04	9.76E+05
Lake Carlsbad (Shallow)	3.53E+05	1.18E+05	2.19E+04	3.94E+05
Lake Carlsbad (Deep)	3.54E+05	1.19E+05	2.14E+04	3.99E+05
Brantley Lake (Shallow)	3.26E+05	7.75E+04	2.26E+04	3.23E+05
Brantley Lake (Deep)	3.65E+05	9.44E+04	2.40E+04	4.35E+05
Red Bluff (Shallow)	9.56E+05	5.65E+05	1.71E+05	2.18E+06
Red Bluff (Deep)	9.95E+05	5.62E+05	1.85E+05	2.20E+06

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)	8.22
Lake Carlsbad (Deep)	8.32
Brantley Lake (Shallow)	8.43
Brantley Lake (Deep)	8.36
Red Bluff (Shallow)	8.25
Red Bluff (Deep)	8.24

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)	3.88	21.5
Lake Carlsbad (Deep)	3.94	21.5
Brantley Lake (Shallow)	3.15	19.3
Brantley Lake (Deep)	3.90	19.4
Red Bluff (Shallow)	14.55	20.3
Red Bluff (Deep)	14.70	19.9

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)	1.001
Lake Carlsbad (Deep)	0.999

Brantley Lake (Shallow)	1.001
Brantley (Deep)	0.998
Red Bluff (Shallow)	1.004
Red Bluff (Deep)	1.005

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)	1.875
Lake Carlsbad (Deep)	1.527
Brantley Lake (Shallow)	4.741
Brantley (Deep)	4.711
Red Bluff (Shallow)	10.43
Red Bluff (Deep)	10.33

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)	3040.00	80.00
Lake Carlsbad (Deep)	2240.00	N.D.
Brantley Lake (Shallow)	2080.00	320.00
Brantley (Deep)	2280.00	40.00
Red Bluff (Shallow)	11840.00	N.D.
Red Bluff (Deep)	10680.00	40.00

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

	Brantley Lake		Lake Carlsbad		Red Bluff	
Metal	Shallow Conc µg/L	Deep Conc µg/L	Shallow Conc µg/L	Deep Conc µg/L	Shallow Conc µg/L	Deep Conc µg/L
Ag	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Al	1.35E+02	1.62E+02	2.48E+01	2.94E+01	<MDC	<MDC
As	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Ba	1.20E+02	1.17E+02	1.62E+01	1.63E+01	8.18E+01	8.62E+01
Be	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Ca	3.03E+05	3.38E+05	3.42E+05	3.39E+05	9.81E+05	9.98E+05
Cd	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Ce	4.96E-01	2.17E-01	<MDC	<MDC	<MDC	<MDC
Co	<MDC	6.32E-01	<MDC	<MDC	<MDC	<MDC
Cr	6.90E+00	6.57E+00	7.72E+00	7.92E+00	3.31E+01	3.98E+01
Cu	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Dy	3.33E-01	<MDC	<MDC	<MDC	<MDC	<MDC
Er	3.13E-01	<MDC	3.30E-02	<MDC	<MDC	<MDC
Eu	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Fe	1.06E+03	1.24E+03	1.17E+03	1.34E+03	4.73E+03	4.11E+03
Gd	3.40E-01	<MDC	<MDC	<MDC	<MDC	<MDC
Hg	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL
K	8.48E+03	8.31E+03	4.92E+03	4.92E+03	4.15E+04	4.11E+04
La	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Li	2.50E+01	3.09E+01	3.88E+01	3.90E+01	1.71E+02	1.67E+02
Mg	6.75E+04	8.44E+04	1.08E+05	1.10E+05	4.40E+05	4.45E+05
Mn	8.31E+00	1.26E+01	<MDC	<MDC	4.24E+01	4.27E+01
Mo	3.33E+00	<MDC	3.18E+00	<MDC	<MDC	<MDC
Na	2.97E+05	4.05E+05	3.72E+05	3.73E+05	2.09E+06	2.17E+06
Nd	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Ni	1.28E+01	1.43E+01	1.36E+01	1.41E+01	<MDC	<MDC
P	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Pb	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Pr	3.51E-01	<MDC	<MDC	<MDC	<MDC	<MDC
Sb	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Sc	1.36E+00	1.34E+00	1.28E+00	1.67E+00	2.10E+00	2.18E+00
Se	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Si	5.33E+03	5.71E+03	6.60E+03	6.79E+03	5.98E+03	6.40E+03
Sr	3.78E+03	4.14E+03	4.65E+03	4.08E+03	1.36E+04	1.33E+04
Th	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
Tl	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC
U	2.92E+00	3.26E+00	3.22E+00	3.18E+00	9.39E+00	9.61E+00
V	6.17E+00	5.78E+00	6.10E+00	6.24E+00	9.95E+00	1.26E+01
Zn	<MDC	<MDC	<MDC	<MDC	<MDC	<MDC

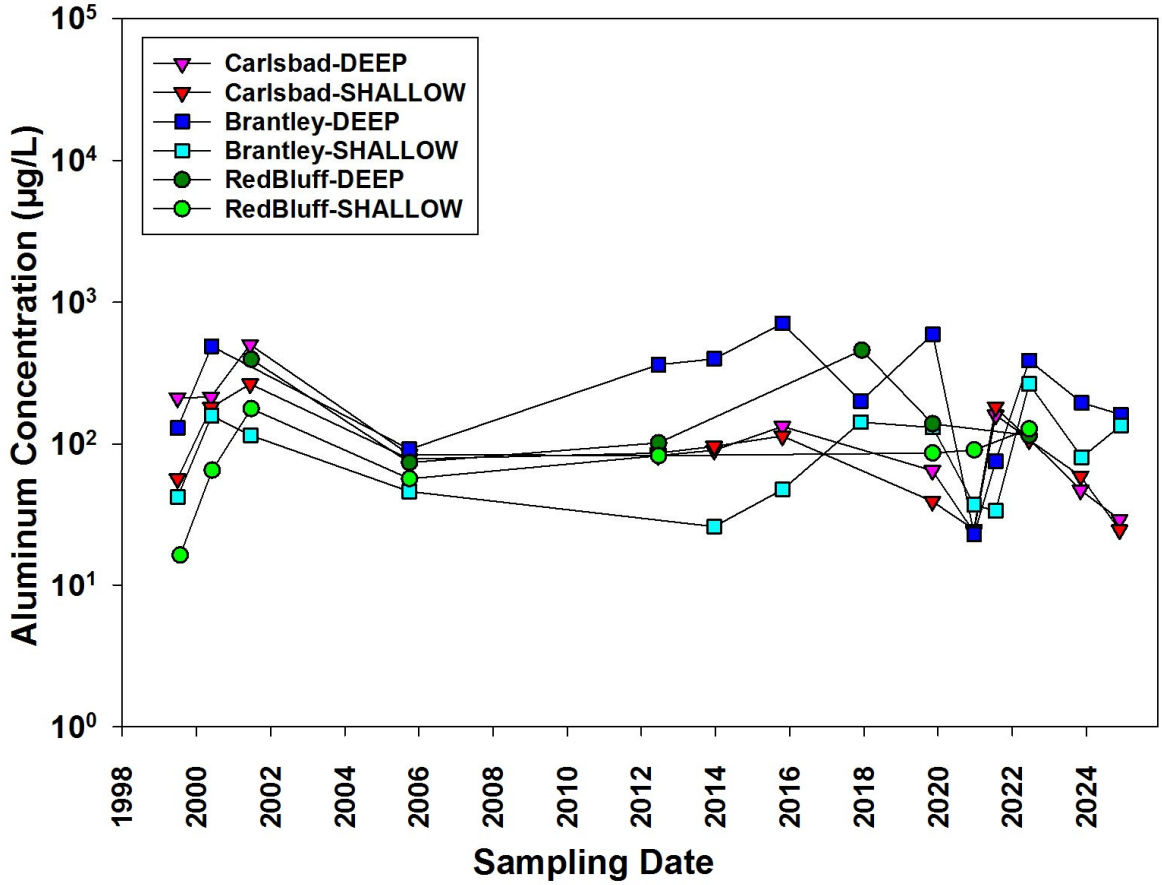

Figure 5: Historical Concentrations of Aluminum in Surface Water

Internal Dosimetry Group

No existing contract radiobioassay measurements were scheduled to be performed during October mainly due to software technical issues in generating only the personnel radiobioassay reports, due to conflict between the Lynx and PC operating systems. There was no WIPP contract to be scheduled. During October and November, performed for 2025-2026 annual calibration cycle: 1) annual energy calibration of lung and Whole-Body detectors, 2) annual efficiency calibration BOMAB phantom counts of Whole-Body detector system in 4D and 3D configurations, 3) annual efficiency calibration of Whole-Body detector system in 4D and 3D configurations, 4) annual efficiency calibration phantom counts of Lung detector system for chest wall thicknesses 1.6 cm, 2.2 cm, 3.01 cm, 3.3 cm, (4.6 cm to be completed) using phantom lung sets and 5) completed performing DOELAP performance testing of unknown BOMAB phantom radiobioassay measurements for Whole-Body detectors in 3D configuration.

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 October 1st to December 31st, 2024:

10/21/2024:

Carlsbad Collaborative Corporation visit

Explained the history and importance of WIPP development, the Lung and Whole-Body radiobioassay need and importance in the context of WIPP as a radioactive waste repository. Lecture presentation and Lung and Whole-Body radiobioassay facility tour. Handed out the flyers about Lie down and Be Counted program.
Attendees: 5 students, 1 visitor, 1 instructor. Location: CEMRC. Duration: 10:00 AM – 12:00 PM.

10/29/2024

Southeast New Mexico College (SENMC) students Field Trip to CEMRC

The purpose of the visit was to provide students with the concepts of radioactive decay by alpha, beta and gamma radiation emission, how these types of radiation can be monitored and measured experimentally, and concepts of instrumentation. Brief explanations were provided by CEMRC scientists about instrumentation for radiochemistry, environmental chemistry, and internal dosimetry monitoring and sample collecting methods. Gave a Lung and Whole-Body radiobioassay facility tour. Handed out the flyers about Lie Down and Be Counted program.
Attendees: 7 students, 1 instructor. Location: CEMRC. Duration: 8:30 AM to 9:30 AM

Low Background Radiation Experiment (LBRE)

One of the current LBRE project goals is to identify Permian-age biosignatures in WIPP halite inclusion fluid. We have developed procedures to disinfect halite crystals (Owen, MS Thesis, 2023) and extract PCR-amplifiable DNA from the "Generic Weep Brine" that is used by Swanson (LANL-CO) to represent WIPP halite brine (CEMRC 2023 annular report). We report here recent progress made in developing our clean room and the microscopy methods we intend to use to identify biomarkers.

We completed our move of our Ancient DNA Laboratory to a clean room in which we have constructed and installed a 2-compartment glove box. There are two compartments in the glove box, the first a staging area where reagents and supplies are introduced, and the second compartment housing the drill, magnifying cameras, and lights (Figure 1A). During drilling, two camera angles can be projected onto the screen at once to allow for precision drilling and sampling of halite fluid (Figure 1B). Inclusion samples are tested for cell growth, DNA and Energy-Dispersive X-ray Spectroscopy (EDS) to complement Transmission Electron Microscopy (TEM) data.

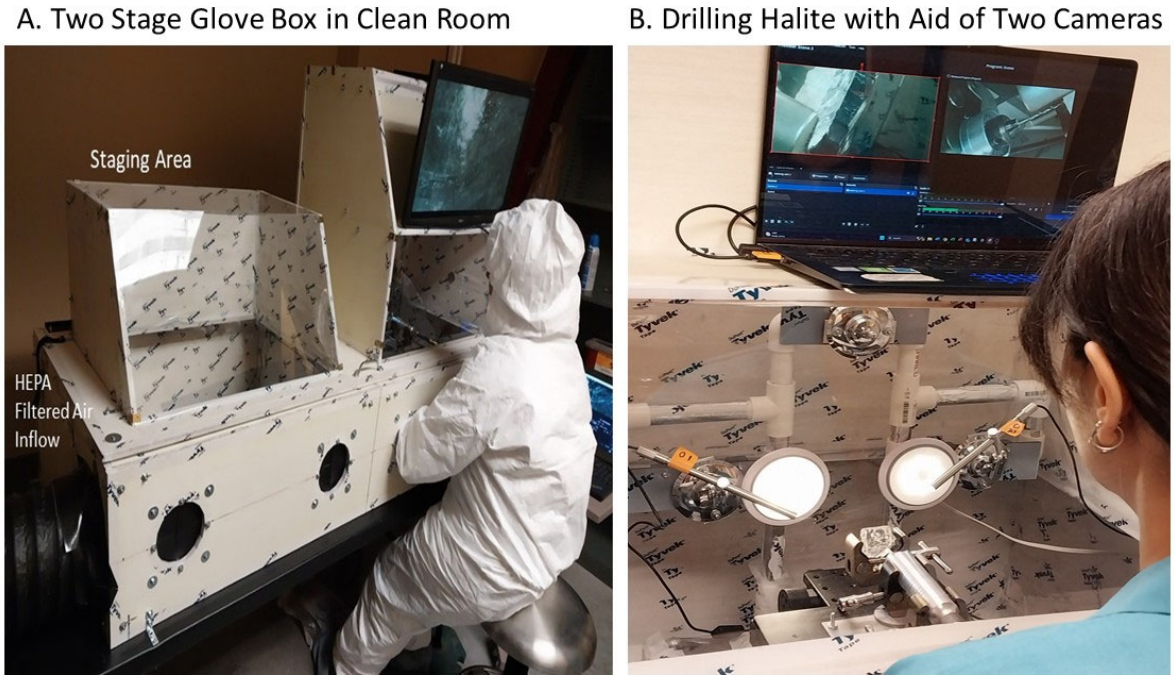

Figure 1. A. HEPA-filtered glove box in new cleanroom location in NMSU Biology department. **B.** Using two magnifying cameras, Emma Soto drills into WIPP halite in pilot study.

Following the WIPP halite disinfection procedure developed by a former graduate student funded by the LBRE project, we are finalizing the inclusion fluid extraction method under sterile conditions. Two tests have been run on extracted WIPP inclusion fluid, 1. Culture microbes 2. PCR-amplification of nucleic acids (CEMRC 2023 Annual Report). We are in the process of adding Energy-dispersive X-ray Spectroscopy (EDS) analysis to aid in distinguishing biotic signatures from the abiotic background in WIPP inclusion fluid. A test of the EDS system at NMSU is shown below in Figure 2.

A. WIPP halite salt deposit

B. EDS analysis of the salt

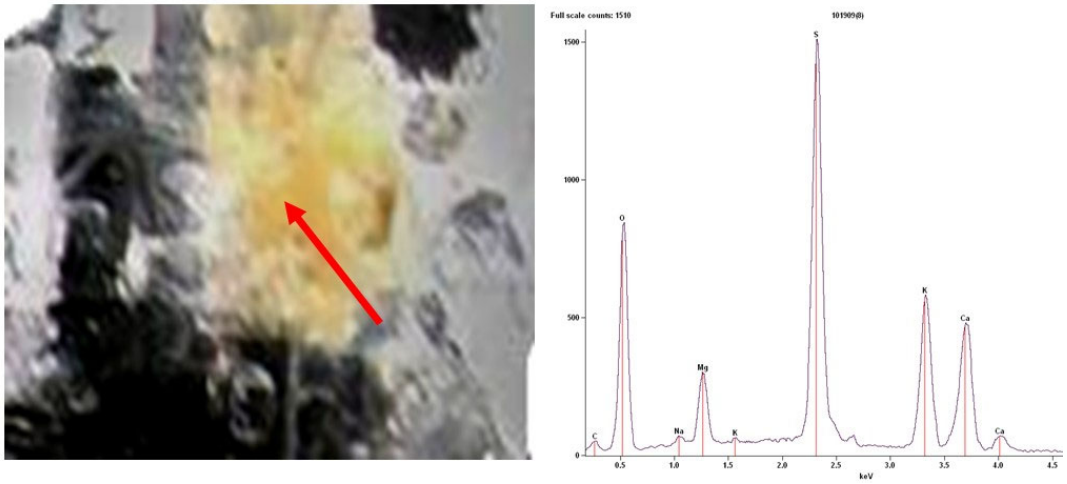

Figure 2. WIPP halite inclusion cavity with pigmented material **(A)**, was analyzed by Energy-dispersive X-ray Spectroscopy (EDS) at the NMSU Imaging Center **(B)**.