Quarterly Report

Calendar Year 2025 – Second Quarter, April 1 – June 30, 2025

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 2025

Field Programs - Radiation Safety Group

WIPP Underground Effluent Monitoring (Station B)

From April1st to June 30th, a total of 116 filters were collected from the primary skid at Station B, (92 sample filters, 12 trip blanks and 12 filter blanks). Twenty-four filters were collected from Station B backup (18 sample filters, 3 trip blanks and 3 filter blanks), during the same time period.

All 116 filters from the primary skid at Station B 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 24 of the Station B backup filters were transferred to Environmental Chemistry group (EC).

Ambient Air Sampling

From April1st to June 30th, 25 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 April1st to June 30th, 8 Whatman-41 filters and 4 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.

Soils sampling

From April1st to June 30th, 30 soil samples were collected and are currently being processed.

Vegetation sampling

From April1st to June 30th, 3 vegetation samples were collected and are currently being processed.

Surface Water Monitoring

From April 1st to June 30th, 8 surface water samples were collected. All samples were processed and transferred to both the EC and RC groups.

Drinking Water Monitoring

No activity to report this quarter.

Sediment Monitoring

No activity to report this quarter.

Groundwater Monitoring

From April1st to June 30th, 5 groundwater samples were collected. All samples were transferred to RC and EC.

Nuclear Materials Management and Safeguards

From April1st 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 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 June 11, 2025.

Radiochemistry Group

WIPP Underground Effluent Monitoring (Station B)

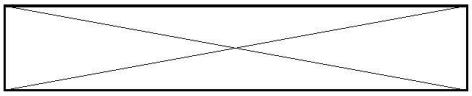
Gross alpha and beta activities on individual filters collected from Station B, taken after the high-efficiency particulate air (HEPA) filtration, were counted using a low-background gas proportional counter (Protean Instruments) for 1200 minutes (20 hours). The analysis of all filters from Station B through the first week of July 2025 has been completed. The complete results for gross alpha and gross beta counts on FAS filters from Station B through June 2025 were submitted to CBFO on July 14, 2025.

As of June 30, 2025, all 2024 samples have been analyzed. However, several samples with low recovery rates are currently being re-prepared and will be reanalyzed. Data processing is ongoing, and the 2024 annual report is in preparation. In addition:

- MAPEP evaluation - Passed all analytes except for Sr-90 on vegetation and soil, which only half of all MAPEP participating labs passed this year. This means we passed 34/36 analytes for the recent MAPEP.
- Performed method development for radium analysis
- Received 12 EM water samples and gamma counted
- Performed method development for FAS, Soil, and Sediments to improve safety and efficiency
- 2023 annual report corrections and re-analysis for Am on soils and sediments
- 2024 annual report - data processing and analysis

Characteristic results are included in the following pages.

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000065698.cnf
Batch Identification: 24FASB_Pu
Sample Identification: PuB1
Procedure Description: Pu - 5 days

Detector Name: 5-06
Env. Background: System Bkgd 70981

Sample Size: 2.5000E-01 +/- 0.0000E+00 unit
Sample Date/Time: 1/1/2024 10:00:00 AM
Acquisition Date/Time: 6/13/2025 1:12:36 PM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 450_Pu-242_T
Tracer Quantity: 0.068 mL
Counting Efficiency: 0.1825 +/- 0.0037 on 7/19/2024 9:36:38 PM
Chem. Rec. Factor (%): 81.38 +/- 2.8638

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

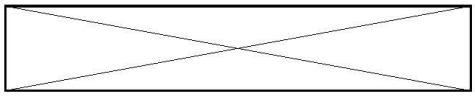
Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
PU-238		5.463	2.00	400.00	7.00	3.4
PU-239		5.127	6.00	105.41	2.00	5.1
PU-242	T	4.863	1219.00	5.73	1.00	40.5

T = Tracer Peak used for Effective Efficiency

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

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
PU-238	5487.10*	1.262E-04 +/- 5.050E-04	1.269E-03 +/- 7.334E-05
PU-239	5147.70*	3.744E-04 +/- 3.953E-04	7.495E-04 +/- 4.330E-05
PU-242	4890.70*	7.569E-02 +/- 4.373E-03	5.766E-04 +/- 3.331E-05

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000065119.cnf
Batch Identification: 24FASB_U
Sample Identification: BU1
Procedure Description: Uranium

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

Sample Size: 2.5000E-01 +/- 0.0000E+00 unit
Sample Date/Time: 1/1/2024 10:00:00 AM
Acquisition Date/Time: 2/5/2025 4:43:27 PM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 8444.3 minutes

Tracer Certificate: 1320_U232_T
Tracer Quantity: 0.049 mL
Counting Efficiency: 0.1866 +/- 0.0037 on 7/22/2024 12:44:53 PM
Chem. Rec. Factor (%): 81.38 +/- 4.9607

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
U-232	T	5.274	1247.00	5.70	9.00	41.9
U-234		4.725	186.00	15.28	8.00	12.5
U-235		4.401	5.00	144.22	4.00	3.4
U-238		4.139	139.00	18.48	13.00	5.5

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /unit)	MDA (Bq /unit)
U-232	5302.50*	7.704E-02 +/- 8.870E-03	1.386E-03 +/- 1.596E-04
U-234	4761.50*	1.137E-02 +/- 2.175E-03	1.302E-03 +/- 1.499E-04
U-235	4385.50*	3.769E-04 +/- 5.453E-04	1.196E-03 +/- 1.377E-04
U-238	4184.40*	8.457E-03 +/- 1.841E-03	1.607E-03 +/- 1.851E-04

UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: _____

```
**************************************************************************
* 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.                                                             *
**************************************************************************
```

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	:	Sed54724
Sample Description	:	Sed54724
	:	
Calibration ID	:	
Background ID	:	
Sample Collection Date	:	12/4/2024 1:00:00 PM
Count Start Date	:	5/5/2025 4:01:49 PM
Sample Aliquot	:	4.02600E-01
Aliquot Unc.	:	0.00000E+00
Aliquot Unit	:	kg
Live Time (sec)	:	172800
Real Time (sec)	:	172988
Energy Calibration Used Done On	:	7/16/2024
Efficiency Calibration Used Done On	:	7/16/2024
Efficiency ID	:	DET01_SoilEff_24
%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	0.993	0.037	10.6700	0.1100	4.66412E+11	2.92192E+09	4.31216E+02	1.69101E+01	3.60741E+00
CO-60	1173.22	1.181	0.024	100.0000	0.0000	1.92518E+03	3.65240E-01	4.79829E-02	7.43667E-02	2.46757E-01
CO-60	1332.49	1.069	0.031	100.0000	0.0000	1.92518E+03	3.65240E-01	-1.15013E-01	9.05401E-02	3.04475E-01
CS-137	661.65	1.807	0.030	85.1200	0.2300	1.10193E+04	1.09572E+01	4.76411E-01	8.14762E-02	2.60049E-01
AM-241	59.54	1.132	0.000	36.3000	0.0000	1.58153E+05	0.00000E+00	2.57943E-01	5.74653E-01	0.00000E+00

5 nuclide lines identified

****
***** P E A K A N A L Y S I S R E P O R T *****
****

Detector Name: DET01
Sample Title: Sed54724
Peak Analysis Performed on: 5/7/2025 4:05:01 PM
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	182-	196	189.76	46.50	1.03	4.062E+02	294.04	7.360E+03
2	235-	250	243.03	59.50	0.31	7.371E+01	328.37	8.931E+03
3	965-	984	977.07	238.63	1.62	1.677E+04	458.53	1.330E+04
4	1427-	1454	1441.35	351.93	1.95	1.701E+04	370.46	5.764E+03
5	1950-	1963	1956.32	477.60	0.26	-3.387E+01	122.48	2.014E+03
6	2372-	2404	2389.00	583.19	2.39	7.238E+03	275.77	3.837E+03
7	2466-	2493	2477.14	604.70	0.95	-9.836E+02	346.91	1.076E+04
8	2696-	2720	2710.55	661.66	0.80	5.048E+02	171.84	2.866E+03
9	2961-	2990	2979.66	727.33	2.95	1.787E+03	191.03	2.751E+03
10	3242-	3270	3260.64	795.90	2.20	8.288E+02	163.89	2.247E+03

11	3713- 3751	3733.11	911.20	3.18	5.139E+03	231.57	2.800E+03
12	4793- 4815	4806.90	1173.24	0.33	3.732E+01	115.66	1.616E+03
13	5209- 5230	5221.96	1274.53	0.24	-1.285E+01	97.20	1.187E+03
14	5436- 5472	5459.51	1332.50	0.24	-8.101E+01	127.46	1.538E+03
15	5961- 6008	5985.38	1460.83	4.83	3.183E+04	388.17	1.991E+03

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

Alpha/Beta Count Results

Air Filter Sample Activity Report

Batch ID 2024 Soil WIPP Sediments

Count Method FAS Gross Alpha Beta

Sample ID 54662 **Addr:** 4

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	4/16/2025 3:45:08 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	4/17/2025 11:46:19 AM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.052	0.071	0.080	2.2846 e-003	0.0000 e+000	1.3355 e-003 ± 7.0449 e-004	0.000	0.000
sd		0.007	0.008	0.042			7.0449 e-004		
Beta	1.000	0.750	0.836	0.208	4.8942 e-003	0.0000 e+000	3.4600 e-003 ± 1.5016 e-003	0.000	0.000
sd		0.025	0.026	0.090			1.5016 e-003		

Sample ID 54662blank **Addr:** 1

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	4/16/2025 3:46:07 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	4/17/2025 11:47:21 AM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.073	0.071	-0.007	2.7461 e-003	0.0000 e+000	-1.1912 e-004 ± 7.9013 e-004	0.000	0.000
sd		0.008	0.008	0.047			7.9013 e-004		
Beta	1.000	0.580	0.732	0.385	4.4270 e-003	0.0000 e+000	6.4222 e-003 ± 1.4031 e-003	0.000	0.000
sd		0.022	0.025	0.084			1.4031 e-003		

Sample ID 54662LCS **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	4/16/2025 3:46:13 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	4/17/2025 11:47:27 AM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.060	0.065	0.021	2.5117 e-003	0.0000 e+000	3.5719 e-004 ± 7.2915 e-004	0.000	0.000
sd		0.007	0.007	0.044			7.2915 e-004		
Beta	1.000	0.478	5.218	12.002	4.0124 e-003	0.0000 e+000	2.0003 e-001 ± 3.7294 e-003	0.000	0.000
sd		0.020	0.066	0.224			3.7294 e-003		

Alpha/Beta Count Results

Air Filter Sample Activity Report

Batch ID 2024 Soil WIPP Sediments

Count Method FAS Gross Alpha Beta

Sample ID 54663 **Addr:** 5

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	4/16/2025 3:45:15 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	4/17/2025 11:46:25 AM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.034	0.055	0.088	1.9169 e-003	0.0000 e+000	1.4744 e-003 ± 6.1073 e-004	0.000	0.000
sd		0.005	0.007	0.037			6.1073 e-004		
Beta	1.000	0.591	0.731	0.351	4.4605 e-003	0.0000 e+000	5.8421 e-003 ± 1.4052 e-003	0.000	0.000
sd		0.022	0.025	0.084			1.4052 e-003		

Sample ID 54664 **Addr:** 6

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	4/16/2025 3:45:22 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	4/17/2025 11:46:40 AM	

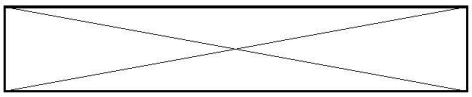
	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.034	0.055	0.087	1.8927 e-003	0.0000 e+000	1.4559 e-003 ± 6.0303 e-004	0.000	0.000
sd		0.005	0.007	0.036			6.0303 e-004		
Beta	1.000	0.535	0.578	0.105	4.2578 e-003	0.0000 e+000	1.7563 e-003 ± 1.2910 e-003	0.000	0.000
sd		0.021	0.022	0.077			1.2910 e-003		

Sample ID 54718 **Addr:** 8

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	4/16/2025 3:45:31 PM	
			Total Sampled Volume	1.0000 e+000 Sample	Count Ended	4/17/2025 11:46:46 AM	

	Factor	Bkg cpm	Gross cpm	Net dpm	MDC Bq	DAC Bq	Net Concentration Bq	% of DAC	DAC-Hrs
Alpha	1.000	0.037	0.060	0.098	1.9510 e-003	0.0000 e+000	1.6272 e-003 ± 6.2671 e-004	0.000	0.000
sd		0.006	0.007	0.038			6.2671 e-004		
Beta	1.000	0.367	0.604	0.608	3.5897 e-003	0.0000 e+000	1.0129 e-002 ± 1.2275 e-003	0.000	0.000
sd		0.017	0.022	0.074			1.2275 e-003		

[PS 0



Sample Description:
Spectrum File: C:\Canberra\ApexAlpha\Root\Data\0000064587.cnf
Batch Identification: 2024_Vegetation_
Sample Identification: Am54730
Procedure Description: Am - 5 Days

Detector Name: 1-04
Env. Background: System Bkgd 71009

Sample Size: 1.0000E-02 +/- 0.0000E+00 kg
Sample Date/Time: 5/7/2025 2:36:26 PM
Acquisition Date/Time: 5/7/2025 2:36:26 PM
Acquisition Live Time: 7200.0 minutes
Acquisition Real Time: 7200.0 minutes

Tracer Certificate: 1322_Am-243-4_T
Tracer Quantity: 0.106 mL
Counting Efficiency: 0.2074 +/- 0.0041 on 2/8/2025 12:46:47 PM
Chem. Rec. Factor (%): 85.86 +/- 2.3645

PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	FWHM (keV)
AM-241		5.427	0.00	2000.0	11.00	5.2
AM-243	T	5.204	2914.00	3.71	0.00	112.0

T = Tracer Peak used for Effective Efficiency

NUCLIDE ANALYSIS RESULTS

Nuclide	Energy (keV)	Activity (Bq /kg)	MDA (Bq /kg)
AM-241	5479.10*	0.000E+00 +/- 1.220E-02	3.189E-02 +/- 1.224E-03
AM-243	5270.00*	3.802E+00 +/- 1.459E-01	9.602E-03 +/- 3.685E-04

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 : Veg54729
Sample Description : Veg54729
:
Calibration ID :
Background ID :

Sample Collection Date : 12/12/2024 8:30:00 AM
Count Start Date : 4/4/2025 8:38:37 AM

Sample Aliquot : 5.00000E-02
Aliquot Unc. : 0.00000E+00
Aliquot Unit : kg

Live Time (sec) : 172800
Real Time (sec) : 172970

Energy Calibration Used Done On : 7/16/2024
Efficiency Calibration Used Done On : 7/17/2024
Efficiency ID : DET01_WMarEff_24

%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	0.819	0.036	10.6700	0.1100	4.66412E+11	2.92192E+09	3.00541E+02	1.64035E+01	2.33506E+01
CO-60	1173.22	0.989	0.025	100.0000	0.0000	1.92518E+03	3.65240E-01	1.32343E-01	3.22911E-01	1.08706E+00
CO-60	1332.49	0.889	0.029	100.0000	0.0000	1.92518E+03	3.65240E-01	1.32191E-01	3.48699E-01	1.17535E+00
CS-137	661.65	1.504	0.060	85.1200	0.2300	1.10193E+04	1.09572E+01	2.93131E-01	3.25906E-01	1.08260E+00
AM-241	59.54	0.523	0.000	36.3000	0.0000	1.58153E+05	0.00000E+00	2.13573E+00	3.37029E+00	

0.00000E+00

5 nuclide lines identified

****
***** P E A K A N A L Y S I S R E P O R T *****
****

Detector Name: DET01
Sample Title: Veg54729
Peak Analysis Performed on: 4/30/2025 2:04:24 PM
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	182-	196	189.76	46.50	0.77	2.342E+02	156.48	2.045E+03
2	240-	248	243.03	59.50	1.10	3.500E+01	110.43	1.413E+03
3	972-	983	977.07	238.63	0.61	2.965E+02	116.77	1.552E+03
4	1434-	1452	1441.35	351.93	0.38	1.201E+02	124.94	1.603E+03
5	1947-	1968	1956.32	477.60	2.06	6.758E+02	122.94	1.305E+03
6	2382-	2405	2389.00	583.19	0.47	1.517E+02	109.47	1.134E+03
7	2469-	2493	2477.14	604.70	0.24	-2.261E+02	132.27	1.771E+03
8	2704-	2719	2710.55	661.66	0.28	3.220E+01	71.56	6.578E+02
9	2972-	2989	2979.66	727.33	0.24	1.507E+01	71.43	6.299E+02
10	3253-	3269	3260.64	795.90	0.24	-1.422E+01	64.77	5.462E+02
11	3726-	3742	3733.11	911.20	0.75	5.888E+01	62.07	4.881E+02
12	4798-	4815	4806.90	1173.24	0.24	1.085E+01	52.96	3.771E+02
13	5213-	5230	5221.96	1274.53	0.34	7.966E+00	47.39	3.030E+02
14	5450-	5469	5459.51	1332.50	0.37	9.745E+00	51.41	3.383E+02
15	5963-	6008	5985.38	1460.83	3.36	2.304E+03	134.55	7.568E+02

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

Environmental Chemistry Group

From April 1st to June 30th, 2025, the Environmental Chemistry (EC) group processed the anions and cations analyses for the Whatman-41 filters (3rd and 4th Quarters of 2024), Fixed Air Sampler (FAS) filters station B monthly composite, and the metal analysis for FAS station A weekly composite and FAS station B monthly composite collected in 2024. In addition, the EC group conducted analyses for samples collected in 2025. The anions, cations, pH, conductivity, specific gravity, and TDS/TSS analyses were completed for ground water (sets 3, 4, 5, and 6) and surface water (sets 1 and 2) samples. The surface water (sets 1 and 2) also had the mercury and metals analyses processed.

The following tables and figures represent characteristics results.

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

Week	Aluminum ng/m³	Cadmium ng/m³	Lead ng/m³	Magnesium ng/m³	Silicon ng/m³	Thorium ng/m³	Uranium ng/m³
01/01/24	3.541E+02	7.771E-01	1.734E+00	2.872E+03	1.555E+03	3.915E-02	4.171E-02
01/08/24	6.487E+02	5.299E-01	3.190E+00	2.736E+03	2.072E+03	9.054E-02	5.364E-02
01/15/24	4.620E+02	5.456E-01	2.409E+00	2.053E+03	1.609E+03	5.537E-02	4.556E-02
01/22/24	4.158E+02	6.172E-01	5.892E+00	2.511E+03	1.588E+03	4.713E-02	5.793E-02
02/01/24	6.351E+02	8.106E-01	5.713E+00	3.627E+03	2.158E+03	7.739E-02	6.772E-02
02/08/24	4.292E+02	7.309E-01	1.183E+01	3.240E+03	1.502E+03	5.033E-02	4.989E-02
02/15/24	8.788E+02	5.618E-01	1.043E+01	5.282E+03	2.541E+03	1.368E-01	1.152E-01
02/22/24	6.300E+02	6.838E-01	1.791E+01	3.394E+03	2.061E+03	9.390E-02	7.676E-02
03/01/24	4.911E+02	5.307E-01	1.263E+01	2.637E+03	1.631E+03	6.812E-02	5.148E-02
03/08/24	6.495E+02	5.516E-01	8.971E+00	4.285E+03	2.212E+03	8.853E-02	7.748E-02
03/15/24	4.502E+02	5.334E-01	3.785E+00	3.632E+03	1.625E+03	5.826E-02	7.277E-02
03/22/24	6.182E+02	5.604E-01	9.250E+00	2.362E+03	2.046E+03	1.026E-01	6.682E-02
04/01/24	6.791E+02	7.853E-01	7.430E+00	3.647E+03	2.234E+03	9.813E-02	7.241E-02
04/08/24	6.778E+02	6.987E-01	1.087E+01	4.150E+03	2.227E+03	9.454E-02	8.553E-02
04/15/24	5.603E+02	5.565E-01	1.187E+01	2.874E+03	1.825E+03	8.021E-02	5.916E-02
04/22/24	5.142E+02	5.874E-01	4.997E+00	2.704E+03	1.763E+03	7.748E-02	4.822E-02
05/01/24	5.117E+02	5.208E-01	1.210E+01	2.514E+03	1.621E+03	6.229E-02	3.815E-02
05/08/24	4.334E+02	5.742E-01	9.238E+00	2.307E+03	1.500E+03	5.420E-02	3.375E-02
05/15/24	5.090E+02	4.701E-01	1.282E+01	2.428E+03	1.717E+03	6.618E-02	4.018E-02
05/22/24	5.284E+02	4.942E-01	6.109E+00	2.521E+03	1.738E+03	7.442E-02	3.861E-02
06/01/24	3.139E+02	5.935E-01	6.843E+00	1.659E+03	1.065E+03	3.676E-02	2.895E-02
06/08/24	2.258E+02	6.707E-01	5.133E+00	1.440E+03	9.632E+02	2.715E-02	2.097E-02
06/15/24	2.370E+02	5.775E-01	6.594E+00	1.495E+03	9.498E+02	3.127E-02	2.445E-02
06/22/24	1.638E+02	7.371E-01	7.160E+00	1.522E+03	8.948E+02	2.150E-02	2.361E-02
07/01/24	3.206E+02	4.341E-01	1.118E+00	1.075E+03	9.859E+02	4.241E-02	2.528E-02
07/08/24	3.219E+02	6.244E-01	2.546E+00	1.586E+03	1.160E+03	3.827E-02	2.791E-02
07/15/24	3.411E+02	4.473E-01	2.757E+00	1.003E+03	1.068E+03	4.412E-02	2.425E-02
07/22/24	1.832E+02	5.486E-01	7.338E+00	8.801E+02	8.351E+02	2.538E-02	1.753E-02
08/01/24	4.589E+02	5.226E-01	7.291E+00	9.930E+02	1.549E+03	5.367E-02	2.887E-02
08/08/24	2.394E+02	7.449E-01	8.626E+00	9.246E+02	1.554E+03	2.903E-02	2.188E-02
08/15/24	2.026E+02	5.152E-01	4.268E+00	8.952E+02	1.048E+03	2.489E-02	2.612E-02
08/22/24	2.027E+02	5.797E-01	2.482E+00	8.906E+02	1.098E+03	2.602E-02	2.082E-02
09/01/24	7.966E+01	4.626E-01	8.993E+00	7.731E+02	4.818E+02	<MDL	1.240E-02
09/08/24	2.437E+02	6.601E-01	5.731E+00	1.454E+03	1.037E+03	2.741E-02	3.066E-02
09/15/24	1.089E+02	5.464E-01	7.662E+00	6.476E+02	5.802E+02	<MDL	1.430E-02
09/22/24	1.773E+02	4.899E-01	4.191E+00	8.626E+02	7.677E+02	2.219E-02	2.157E-02
10/01/24	3.234E+02	4.510E-01	3.283E+00	1.283E+03	1.222E+03	3.990E-02	3.641E-02
10/08/24							
10/21/24	<MDL	1.232E+00	1.926E+00	7.822E+02	2.294E+03	<MDL	1.578E-02
10/22/24	3.366E+02	3.605E-01	2.918E+00	1.602E+03	1.198E+03	4.268E-02	4.864E-02

11/01/24	3.041E+02	3.517E-01	2.860E+00	1.928E+03	1.075E+03	3.785E-02	3.989E-02
11/08/24	3.651E+02	4.125E-01	2.858E+00	3.750E+03	1.226E+03	4.513E-02	1.021E-01
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: 10/08/24-10/20/24, 11/15/24-12/31/24

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	9.13E+04	2.22E+02	<MDL	1.27E+04
01/08/24	1.30E+05	1.73E+02	<MDL	1.28E+04
01/15/24	1.39E+05	2.38E+02	<MDL	1.01E+04
01/22/24	1.87E+05	1.51E+02	<MDL	2.59E+04
02/01/24	1.06E+05	<MDL	<MDL	1.81E+04
02/08/24	1.72E+05	<MDL	<MDL	1.53E+04
02/15/24	4.47E+05	4.32E+01	<MDL	5.02E+04
02/22/24	2.32E+05	9.49E+01	<MDL	2.81E+04
03/01/24	1.32E+05	1.23E+02	<MDL	1.57E+04
03/08/24	2.08E+05	1.64E+02	<MDL	1.31E+04
03/15/24	1.14E+05	1.04E+02	<MDL	1.87E+04
03/22/24	9.28E+04	1.90E+02	<MDL	1.99E+04
04/01/24	2.57E+05	1.15E+02	<MDL	2.96E+04
04/08/24	2.52E+05	1.24E+02	<MDL	3.56E+04
04/15/24	2.24E+05	1.17E+02	<MDL	2.04E+04
04/22/24	2.27E+05	1.32E+02	<MDL	1.31E+04
05/01/24	2.30E+05	1.62E+02	<MDL	1.42E+04
05/08/24	2.06E+05	1.95E+02	<MDL	1.18E+04
05/15/24	1.97E+05	1.07E+02	<MDL	1.20E+04
05/22/24	2.90E+05	1.32E+02	<MDL	1.38E+04
06/01/24	8.09E+04	1.69E+02	<MDL	7.63E+03
06/08/24	1.50E+05	<MDL	<MDL	1.10E+04
06/15/24	7.11E+04	1.13E+02	<MDL	7.89E+03
06/22/24	7.39E+04	1.44E+02	<MDL	9.74E+03
07/01/24	7.48E+04	6.09E+01	5.50E+01	9.19E+03
07/08/24	1.23E+05	<MDL	<MDL	9.99E+03
07/15/24	2.81E+04	2.55E+01	3.53E+01	5.88E+03
07/22/24	2.16E+04	<MDL	<MDL	5.24E+03
08/01/24	4.44E+04	1.24E+02	<MDL	9.68E+03
08/08/24	3.64E+04	<MDL	<MDL	8.98E+03
08/15/24	3.92E+04	1.00E+02	<MDL	1.15E+04
08/22/24	3.08E+04	1.10E+02	<MDL	7.15E+03
09/01/24	2.10E+04	<MDL	<MDL	5.05E+03
09/08/24	4.58E+04	<MDL	<MDL	1.25E+04
09/15/24	2.28E+04	<MDL	<MDL	6.18E+03
09/22/24	3.58E+04	<MDL	<MDL	8.58E+03
10/01/24	2.32E+04	1.56E+02	<MDL	5.28E+03
10/08/24				
10/21/24	2.23E+04	<MDL	<MDL	7.78E+03
10/22/24	5.16E+04	1.33E+02	<MDL	1.54E+04
11/01/24	1.18E+05	8.83E+01	<MDL	1.33E+04
11/08/24	6.48E+04	1.14E+02	<MDL	4.03E+04
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: 10/08/24-10/20/24, 11/15/2024-12/31/2024

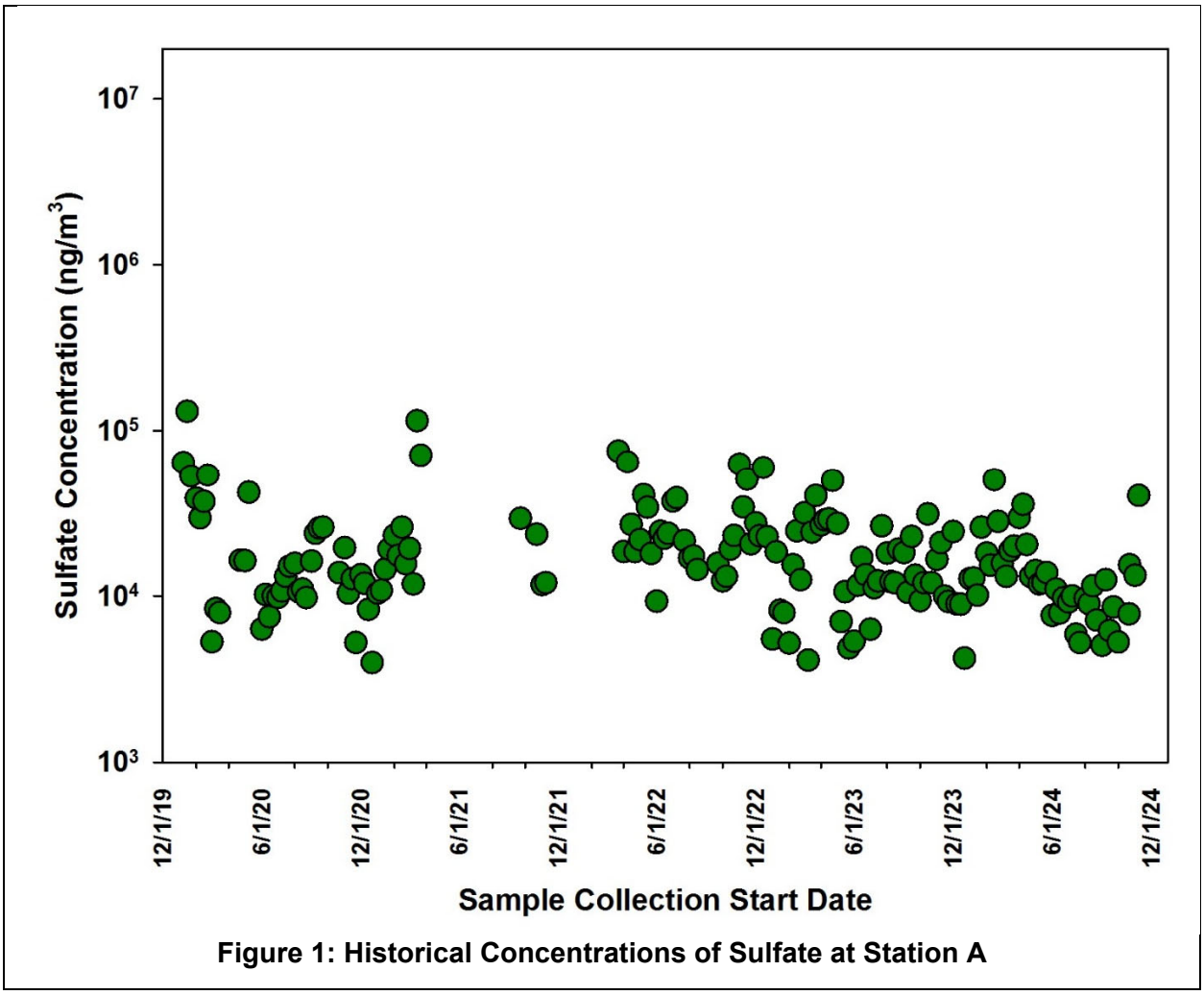


Figure 1: Historical Concentrations of Sulfate at Station A

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	6.28E+04	<MDL	1.22E+03	1.21E+03	5.68E+03
01/08/24	8.56E+04	<MDL	2.97E+02	1.10E+03	5.34E+03
01/15/24	9.25E+04	<MDL	9.08E+02	9.40E+02	4.37E+03
01/22/24	1.25E+05	<MDL	2.68E+02	1.20E+03	1.10E+04
02/01/24	6.88E+04	<MDL	4.50E+02	1.56E+03	7.43E+03
02/08/24	1.13E+05	<MDL	3.60E+02	1.81E+03	5.70E+03
02/15/24	3.21E+05	<MDL	2.92E+03	5.07E+03	1.82E+04
02/22/24	1.56E+05	<MDL	2.06E+03	3.22E+03	1.07E+04
03/01/24	8.76E+04	<MDL	2.76E+02	1.19E+03	6.19E+03
03/08/24	1.40E+05	<MDL	5.00E+02	1.40E+03	5.40E+03
03/15/24	7.45E+04	<MDL	1.76E+03	2.03E+03	8.40E+03
03/22/24	6.06E+04	<MDL	2.48E+02	1.07E+03	8.98E+03
04/01/24	1.70E+05	<MDL	4.91E+02	1.99E+03	1.16E+04
04/08/24	1.68E+05	<MDL	5.08E+02	2.03E+03	1.32E+04
04/15/24	1.52E+05	<MDL	4.15E+02	1.49E+03	7.59E+03
04/22/24	1.54E+05	<MDL	3.94E+02	1.43E+03	4.23E+03
05/01/24	1.55E+05	<MDL	9.34E+02	1.59E+03	4.49E+03
05/08/24	1.38E+05	<MDL	8.76E+02	1.53E+03	3.87E+03
05/15/24	1.31E+05	<MDL	2.01E+03	<MDL	4.16E+03
05/22/24	1.91E+05	<MDL	9.97E+02	1.71E+03	4.25E+03

06/01/24	5.54E+04	<MDL	2.69E+02	1.05E+03	2.48E+03
06/08/24	1.00E+05	<MDL	1.33E+02	1.24E+03	3.29E+03
06/15/24	4.73E+04	<MDL	7.30E+02	<MDL	3.13E+03
06/22/24	4.97E+04	<MDL	2.36E+02	<MDL	3.90E+03
07/01/24	4.96E+04	<MDL	6.87E+02	8.70E+02	3.91E+03
07/08/24	8.23E+04	<MDL	8.61E+02	1.55E+03	3.30E+03
07/15/24	1.80E+04	<MDL	4.91E+02	8.38E+02	2.47E+03
07/22/24	1.39E+04	<MDL	4.11E+02	8.74E+02	2.01E+03
08/01/24	2.94E+04	<MDL	3.12E+02	3.16E+02	4.09E+03
08/08/24	5.03E+04	<MDL	1.73E+02	3.40E+02	7.10E+03
08/15/24	2.58E+04	<MDL	3.10E+02	4.16E+02	5.19E+03
08/22/24	2.11E+04	<MDL	3.33E+02	5.19E+02	3.08E+03
09/01/24	1.42E+04	<MDL	2.97E+02	2.55E+02	2.18E+03
09/08/24	3.09E+04	<MDL	4.56E+02	9.31E+02	4.94E+03
09/15/24	1.61E+04	<MDL	1.50E+02	1.05E+02	2.50E+03
09/22/24	2.35E+04	<MDL	2.75E+02	4.70E+02	4.00E+03
10/01/24	1.55E+04	<MDL	6.41E+02	6.82E+02	2.88E+03
10/08/24					
10/21/24	1.44E+04	<MDL	<MDL	8.65E+02	3.00E+03
10/22/24	3.41E+04	<MDL	5.91E+02	1.23E+03	6.57E+03
11/01/24	7.97E+04	<MDL	9.17E+02	1.59E+03	4.47E+03
11/08/24	4.20E+04	<MDL	1.99E+03	3.86E+03	1.46E+04
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: 10/08/24-10/20/24, 11/15/2024-12/31/2024

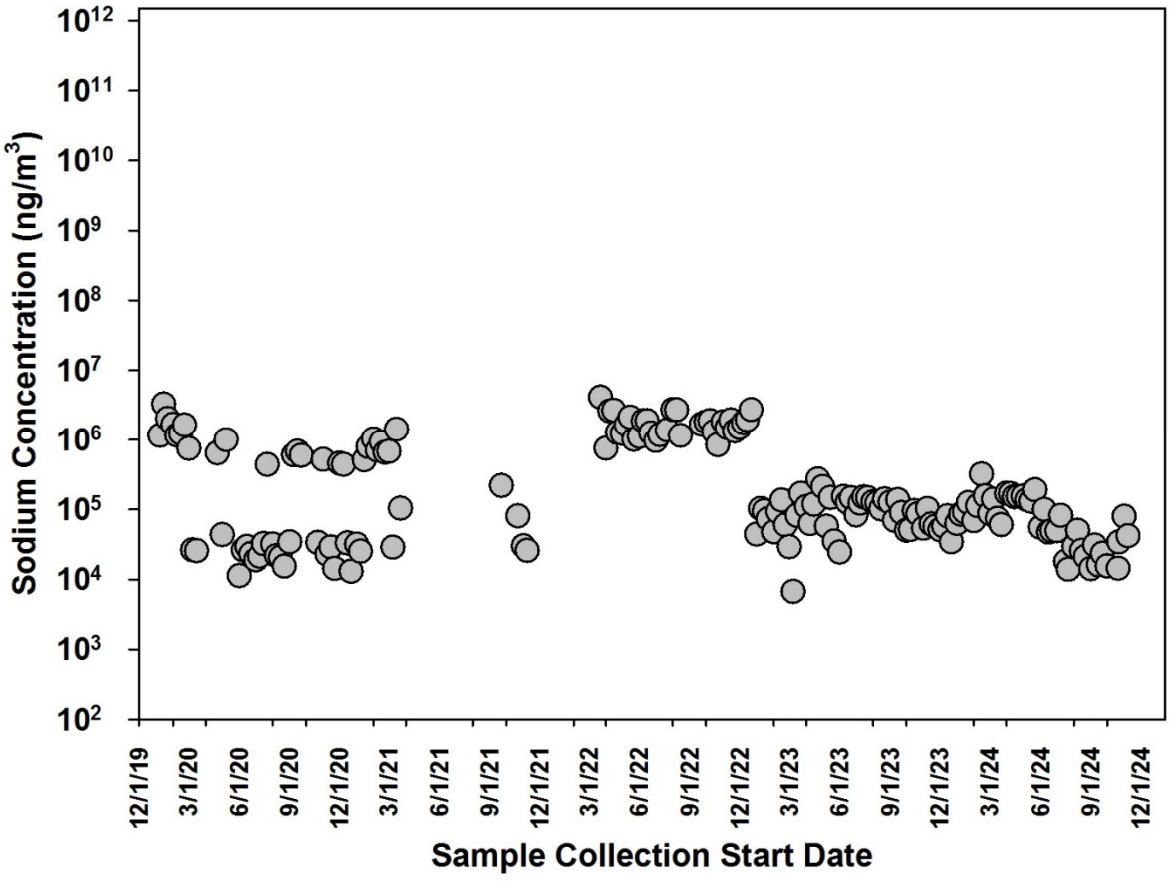


Figure 2: Historical Concentrations of Sodium at Station A

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	63.97	0.40	0.11	46.32	532.7	<MDC	<MDC
February	<MDC	0.38	0.15	45.55	434.2	<MDC	<MDC
March	<MDC	0.39	0.12	<MDC	376.5	<MDC	<MDC
April	69.80	0.42	0.14	44.81	420.4	0.01	0.005
May	73.60	0.43	0.12	48.93	490.5	<MDC	<MDC
June	63.89	0.44	0.14	45.94	388.1	<MDC	<MDC
July	<MDC	0.41	0.23	41.98	348.2	<MDC	<MDC
August	<MDC	0.40	0.15	48.33	360.2	<MDC	<MDC
September	<MDC	0.44	0.18	42.32	334.5	<MDC	<MDC
October	<MDC	0.38	0.16	46.71	386.8	<MDC	0.005
November	<MDC	0.38	0.12	<MDC	304.3	<MDC	<MDC
December	<MDC	0.38	0.11	<MDC	315.4	<MDC	<MDC

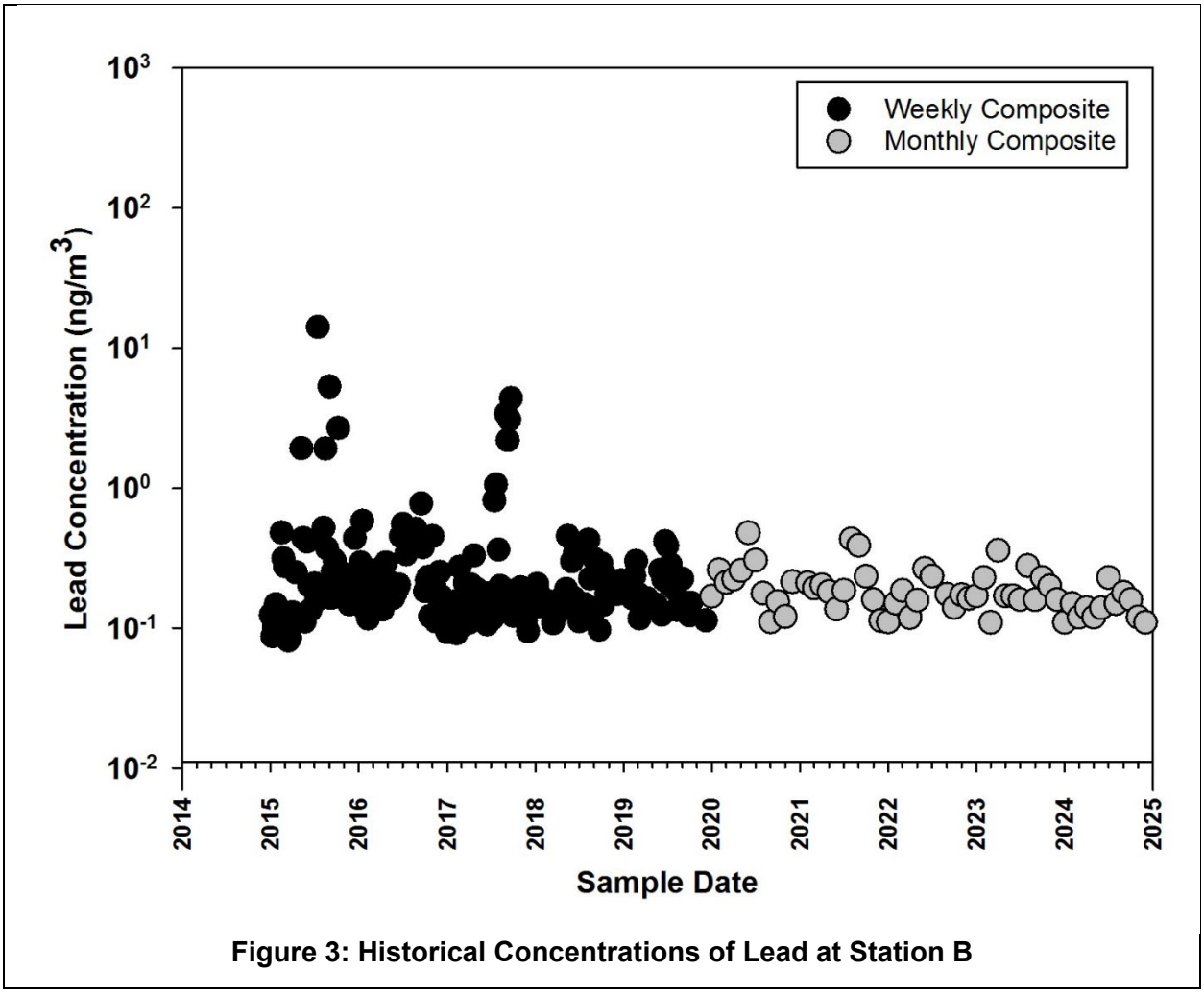


Figure 3: Historical Concentrations of Lead at Station B

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

Month	Chloride ng/m³	Nitrate ng/m³	Phosphate ng/m³	Sulfate ng/m³
January	7.18E+02	<MDL	<MDL	2.02E+02
February	6.69E+02	<MDL	<MDL	1.87E+02
March	6.05E+02	<MDL	<MDL	1.70E+02
April	6.02E+02	<MDL	<MDL	1.89E+02
May	7.62E+02	<MDL	<MDL	2.10E+02
June	7.05E+02	<MDL	<MDL	2.09E+02
July	6.80E+02	<MDL	<MDL	2.06E+02
August	6.55E+02	<MDL	<MDL	2.02E+02
September	9.05E+02	<MDL	<MDL	2.15E+02
October	6.42E+02	<MDL	<MDL	1.99E+02
November	7.26E+02	<MDL	<MDL	1.79E+02
December	6.40E+02	<MDL	<MDL	1.87E+02

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

Month	Sodium ng/m³	Ammonium ng/m³	Magnesium ng/m³	Potassium ng/m³	Calcium ng/m³
January	3.03E+01	<MDL	<MDL	7.28E+01	2.13E+02
February	2.95E+00	<MDL	<MDL	9.23E+01	2.63E+02
March	<MDL	<MDL	4.59E+01	<MDL	1.22E+02
April	<MDL	<MDL	<MDL	<MDL	2.53E+02
May	<MDL	<MDL	<MDL	6.77E+01	3.21E+02
June	4.06E+00	<MDL	<MDL	1.08E+02	3.05E+02
July	1.90E+01	<MDL	<MDL	1.15E+02	3.23E+02
August	1.28E+01	<MDL	<MDL	1.26E+02	3.10E+02
September	1.87E+02	<MDL	<MDL	1.85E+02	2.90E+02
October	<MDL	<MDL	<MDL	1.39E+02	3.02E+02
November	7.46E+01	<MDL	<MDL	2.31E+02	2.48E+02
December	<MDL	<MDL	<MDL	1.06E+02	2.33E+02

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
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
07/17/24	1.51E-01	2.11E+00	<MDL	2.07E+00
08/08/24	1.66E-01	1.60E+00	3.63E-03	1.99E-03
08/30/24	2.90E-01	3.10E+00	1.71E-02	3.04E+00
10/04/24	6.18E-01	2.70E+00	6.30E-03	2.21E+00
10/25/24	9.20E-01	2.41E+00	4.37E-03	2.09E+00
11/20/24	5.51E-01	2.79E+00	2.67E-03	1.82E+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
07/17/24	7.09E-02	2.08E+00	<MDL	2.04E+00
08/08/24	6.79E-02	1.36E+00	2.86E-03	1.65E+00
08/30/24	1.15E-01	2.74E+00	1.45E-02	2.80E+00
10/04/24	4.54E-01	2.32E+00	<MDL	2.17E+00
10/25/24	1.15E-01	8.41E-01	<MDL	8.05E-01
11/20/24	2.72E-01	2.56E+00	1.34E-03	1.70E+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	1.24E+00	2.33E-02	5.45E-02	3.04E-01
05/24/24	1.71E+00	1.96E-02	5.31E-02	4.12E-01
06/19/24	1.01E+00	6.04E-02	5.04E-02	3.35E-01
07/17/24	1.52E+00	5.90E-02	8.83E-02	2.79E-01
08/08/24	1.42E+00	6.51E-02	7.71E-02	3.64E-01
08/30/24	1.40E+00	5.07E-02	8.61E-02	2.24E-01
10/04/24	1.60E+00	9.50E-02	1.23E-01	5.26E-01
10/25/24	1.35E+00	6.82E-02	9.73E-02	5.27E-01
11/20/24	1.47E+00	8.71E-02	1.49E-01	5.19E-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	1.53E+00	2.11E-02	4.18E-02	2.78E-01
05/24/24	1.84E+00	9.65E-02	1.05E-01	3.79E-01
06/19/24	1.34E+00	5.85E-02	5.40E-02	2.53E-01
07/17/24	1.84E+00	5.41E-02	8.34E-02	2.15E-01
08/08/24	1.12E+00	4.40E-02	5.75E-02	1.89E-01
08/30/24	1.38E+00	4.19E-02	6.69E-02	1.16E-01
10/04/24	1.72E+00	8.40E-02	9.48E-02	4.03E-01
10/25/24	1.36E+00	5.81E-02	7.55E-02	2.39E-01
11/20/24	1.49E+00	5.75E-02	7.98E-02	2.26E-01

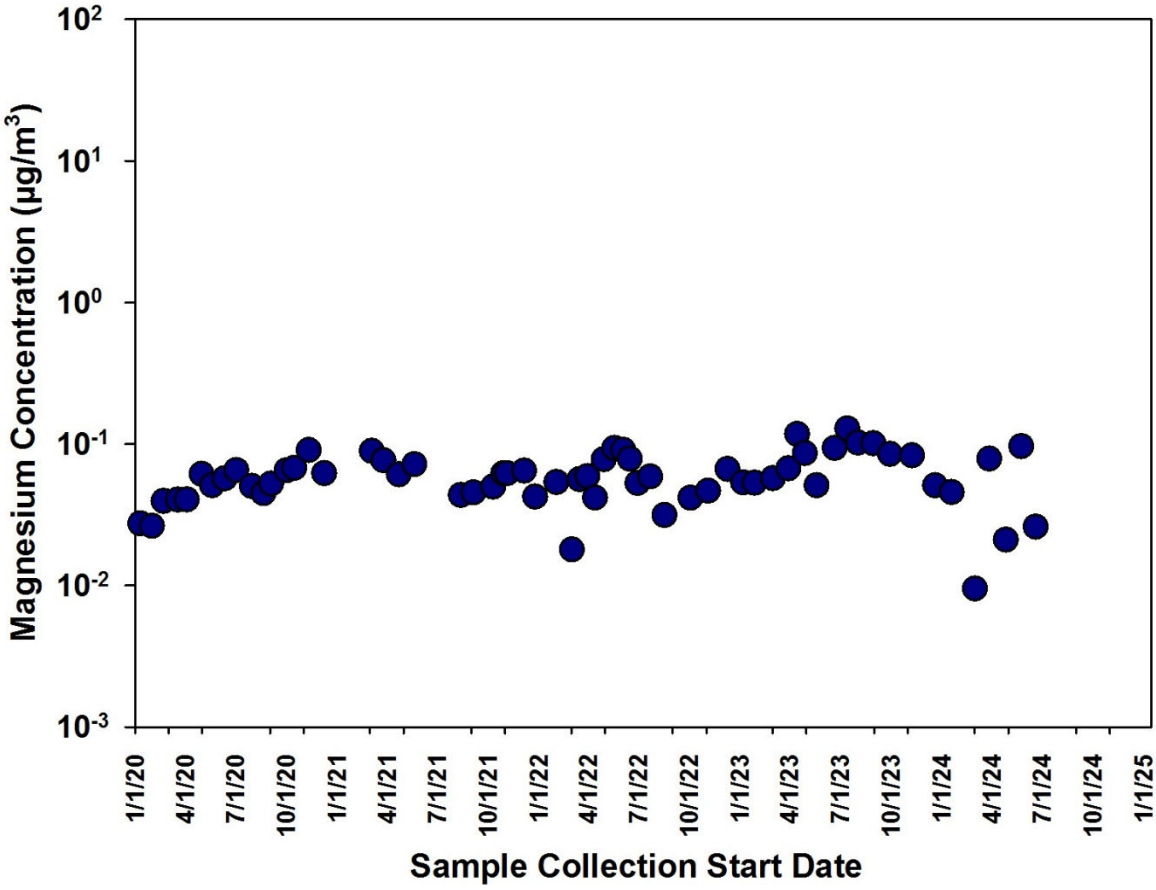


Figure 4: Historical Concentrations of Magnesium at Cactus Flats

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

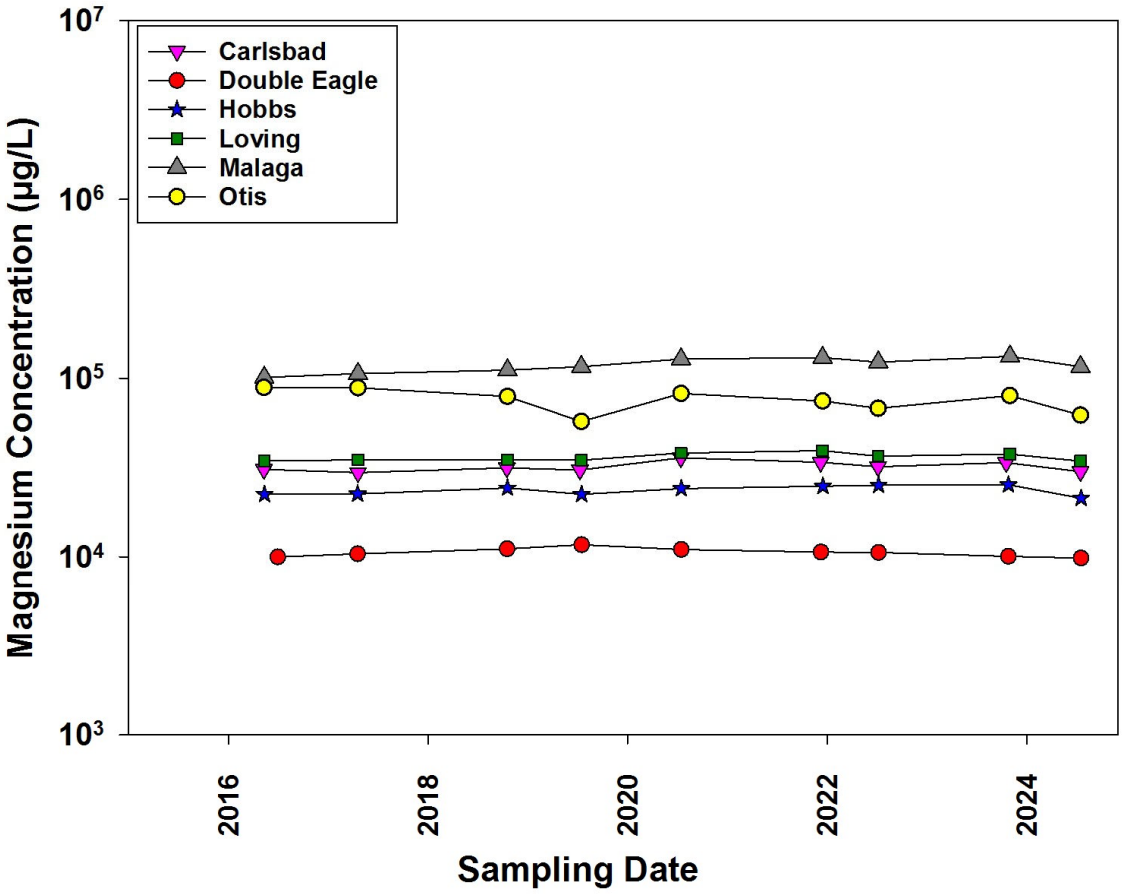


Figure 5: Historical Concentrations of Magnesium in Drinking Water

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

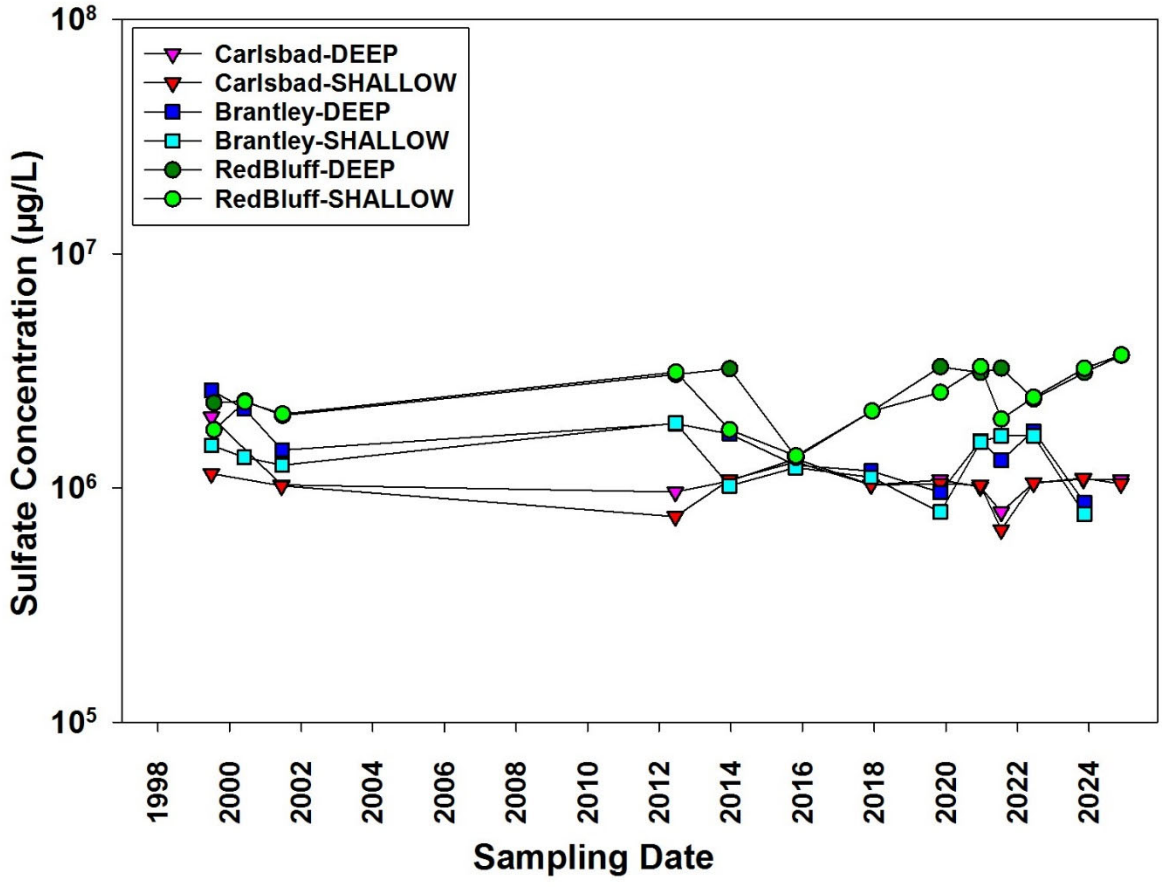


Figure 6: Historical Concentrations of Sulfate in Surface Water

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	
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

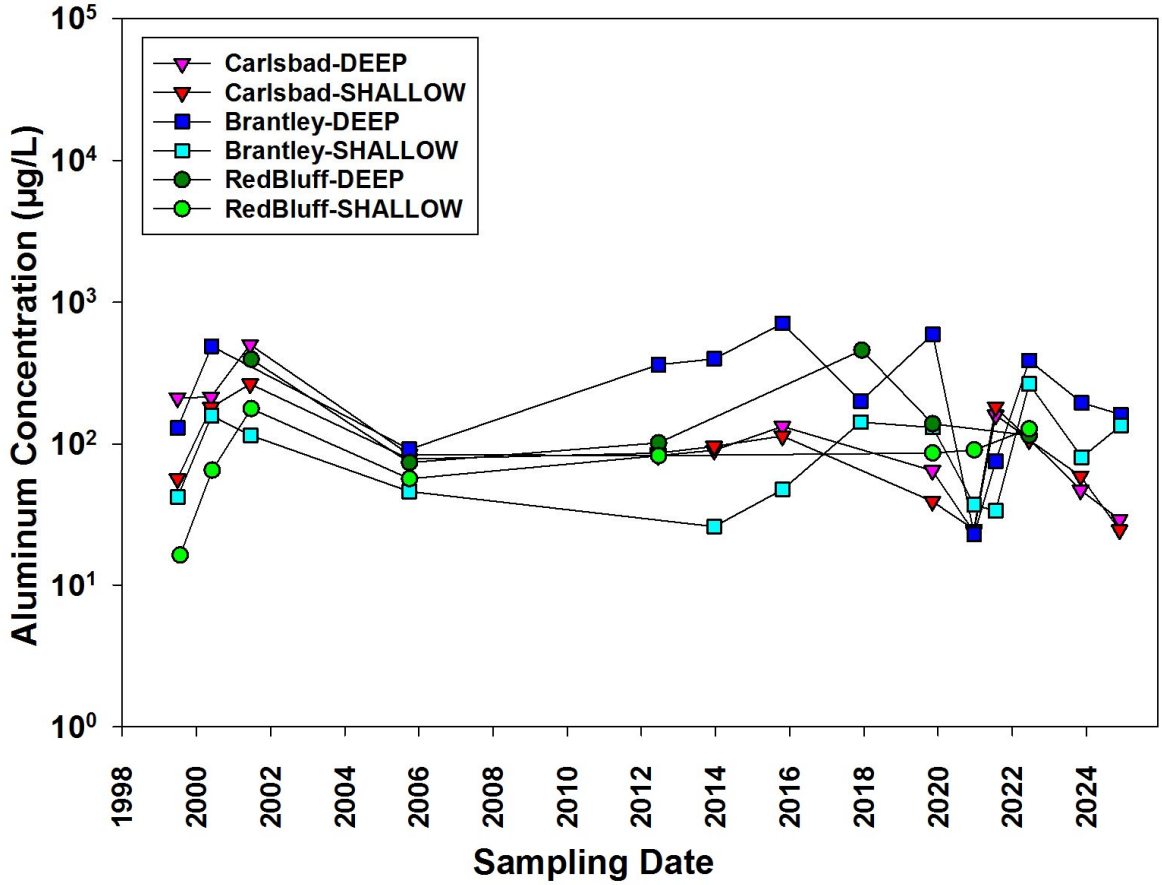


Figure 7: Historical Concentrations of Aluminum in Surface Water

Surface Water

Sample Type: Surface Water
Year: 2025
Analysis Performed: Anions

Sample Location	Chloride µg/L	Nitrate µg/L	Phosphate µg/L	Sulfate µg/L
Hill Tank	2.73E+03	1.03E+03	4.66E+02	7.63E+03
Noya Tank	1.09E+03	1.71E+03	6.77E+02	1.82E+03
Pierce Canyon	1.41E+06	3.14E+03	<MDL	1.47E+06
Lake Carlsbad (Shore)	7.04E+05	1.48E+03	<MDL	1.16E+06
Brantley Lake (Shore)	1.33E+06	<MDL	<MDL	1.42E+06
Pecos River (Shore)	4.94E+05	2.33E+03	<MDL	1.11E+06

Sample Type: Surface Water
Year: 2025
Analysis Performed: Cations

Sample Location	Sodium µg/L	Magnesium µg/L	Potassium µg/L	Calcium µg/L
Hill Tank	1.38E+03	3.61E+03	7.59E+03	4.93E+04
Noya Tank	3.40E+02	2.05E+03	5.38E+03	4.26E+04
Pierce Canyon	8.30E+05	1.86E+05	3.91E+04	4.98E+05
Lake Carlsbad (Shore)	4.47E+05	1.19E+05	9.52E+03	3.88E+05
Brantley Lake (Shore)	8.42E+05	1.47E+05	1.50E+04	4.96E+05
Pecos River (Shore)	4.07E+05	9.58E+04	8.08E+03	4.95E+05

Sample Type: Surface Water
Year: 2025
Analysis Performed: pH

Sample Location	pH @ 25°C
Hill Tank	8.33
Noya Tank	8.41
Pierce Canyon	8.07
Lake Carlsbad (Shore)	8.21
Brantley Lake (Shore)	8.29
Pecos River (Shore)	7.58

Sample Type: Surface Water
Year: 2025
Analysis Performed: Conductivity

Sample Location	Conductivity mS/cm	Temperature °C
Hill Tank	0.1764	19.8
Noya Tank	0.1537	19.8
Pierce Canyon	6.49	19.6
Lake Carlsbad (Shore)	4.26	19.6

Brantley Lake (Shore)	6.44	19.4
Pecos River (Shore)	3.91	19.9

Sample Type: Surface Water
Year: 2025
Analysis Performed: Specific gravity

Sample Location	SG T/4°C
Hill Tank	0.995
Noya Tank	0.996
Pierce Canyon	1.001
Lake Carlsbad (Shore)	0.999
Brantley Lake (Shore)	1.000
Pecos River (Shore)	1.000

Sample Type: Surface Water
Year: 2025
Analysis Performed: TOC

Sample Location	TOC mg/L
Hill Tank	16.01
Noya Tank	16.10
Pierce Canyon	17.91
Lake Carlsbad (Shore)	17.73
Brantley Lake (Shore)	18.33
Pecos River (Shore)	12.11

Sample Type: Surface Water
Year: 2025
Analysis Performed: TDS/TSS

Sample Location	TDS mg/L	TSS mg/L
Hill Tank	160.00	N.D.
Noya Tank	200.00	N.D.
Pierce Canyon	4760.00	N.D.
Lake Carlsbad (Shore)	2960.00	N.D.
Brantley Lake (Shore)	4680.00	N.D.
Pecos River (Shore)	2720.00	2120.00

Sample Type: Surface Water

Year: 2025
Analysis Performed: Metals

Metal	Hill Tank Conc µg/L	Noya Tank Conc µg/L	Pierce Canyon Conc µg/L
Ag	<MDC	<MDC	<MDC
Al	6.54E+03	7.12E+03	1.78E+03
As	2.68E+00	2.60E+00	<MDC
Ba	2.60E+02	2.55E+02	1.37E+02
Be	4.83E-01	5.26E-01	<MDC
Ca	4.51E+04	3.96E+04	4.16E+05
Cd	1.14E-01	1.16E-01	<MDC
Ce	1.27E+01	1.37E+01	2.58E+00
Co	4.22E+00	4.59E+00	2.17E+00
Cr	4.51E+00	4.23E+00	<MDC
Cu	<MDC	1.89E+01	<MDC
Dy	9.61E-01	1.08E+00	2.22E-01
Er	4.42E-01	4.95E-01	1.01E-01
Eu	3.70E-01	4.21E-01	9.55E-02
Fe	3.28E+03	3.49E+03	2.33E+03
Gd	1.50E+00	1.69E+00	3.28E-01
Hg	<MDL	<MDL	<MDC
K	7.03E+03	6.94E+03	1.53E+04
La	5.53E+00	5.96E+00	1.07E+00
Li	7.55E+00	9.43E+00	7.70E+01
Mg	7.34E+03	7.60E+03	1.80E+05
Mn	1.71E+02	1.93E+02	1.69E+02
Mo	1.39E-01	3.00E-01	2.91E+00
Na	1.56E+03	7.99E+02	7.10E+05
Nd	6.68E+00	7.06E+00	1.40E+00
Ni	8.94E+00	8.94E+00	1.81E+01
P	4.48E+02	5.71E+02	1.15E+02
Pb	6.48E+00	8.88E+00	<MDC
Pr	1.55E+00	1.64E+00	3.20E-01
Sb	1.11E-01	1.30E-01	2.07E-01
Sc	2.94E+00	3.30E+00	2.12E+00
Se	<MDC	<MDC	<MDC
Si	1.56E+04	1.74E+04	7.44E+03
Sr	1.39E+02	1.16E+02	6.87E+03
Th	1.60E-01	2.10E-01	<MDC
Tl	3.34E-02	4.14E-02	<MDC
U	2.33E-01	2.06E-01	6.07E+00
V	1.64E+01	1.92E+01	8.11E+00
Zn	<MDC	<MDC	<MDC

	Brantley Lake		Lake Carlsbad		Red Bluff		Brantley Lake	Lake Carlsbad	Pecos River
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	Shore Conc µg/L	Shore Conc µg/L	Shore Conc µg/L
Ag							<MDC	<MDC	<MDC
Al							1.95E+02	1.71E+02	1.88E+04
As							<MDC	<MDC	7.17E+00
Ba							9.10E+01	2.14E+01	1.53E+02
Be							<MDC	<MDC	1.93E+00
Ca							4.60E+05	3.48E+05	4.73E+05
Cd							<MDC	<MDC	4.16E-01
Ce							3.09E-01	3.09E-01	4.13E+01
Co							9.79E-01	7.04E-01	1.18E+01
Cr							<MDC	<MDC	1.19E+01
Cu							<MDC	<MDC	<MDC
Dy							<MDC	<MDC	4.05E+00
Er							<MDC	<MDC	1.80E+00
Eu							<MDC	<MDC	1.39E+00
Fe							1.39E+03	1.40E+03	1.38E+04
Gd							<MDC	<MDC	6.03E+00
Hg							<MDC	<MDC	<MDC
K							9.44E+03	5.21E+03	8.08E+03
La							1.42E-01	1.55E-01	1.77E+01
Li							5.53E+01	4.60E+01	6.58E+01
Mg							1.42E+05	1.16E+05	1.06E+05
Mn							3.71E+01	9.89E+00	1.76E+03
Mo							3.82E+00	2.91E+00	2.20E+00
Na							7.81E+05	4.12E+05	3.72E+05
Nd							<MDC	<MDC	2.42E+01
Ni							1.56E+01	1.31E+01	3.71E+01
P							<MDC	<MDC	8.84E+02
Pb							<MDC	<MDC	<MDC
Pr							3.76E-02	3.68E-02	5.41E+00
Sb							2.06E-01	9.32E-02	1.80E-01
Sc							1.19E+00	1.63E+00	8.19E+00
Se							<MDC	<MDC	<MDC
Si							4.53E+03	5.79E+03	4.07E+04
Sr							7.34E+03	5.10E+03	6.32E+03
Th							<MDC	<MDC	2.54E+00
Tl							<MDC	<MDC	7.39E-02
U							4.51E+00	3.42E+00	6.12E+00
V							4.01E+00	5.86E+00	4.44E+01
Zn							<MDC	<MDC	<MDC

Groundwater

Sample Type: Ground Water
Year: 2025
Analysis Performed: Anions

Sample Location	Chloride µg/L	Nitrate µg/L	Phosphate µg/L	Sulfate µg/L
WQSP-1	3.56E+07	<MDL	<MDL	4.85E+06
WQSP-2	3.59E+07	<MDL	<MDL	5.28E+06
WQSP-3	1.36E+08	<MDL	<MDL	7.95E+06
WQSP-4	5.94E+07	<MDL	<MDL	6.75E+06
WQSP-5	1.66E+07	<MDL	<MDL	4.88E+06
WQSP-6	5.32E+06	<MDL	<MDL	4.51E+06

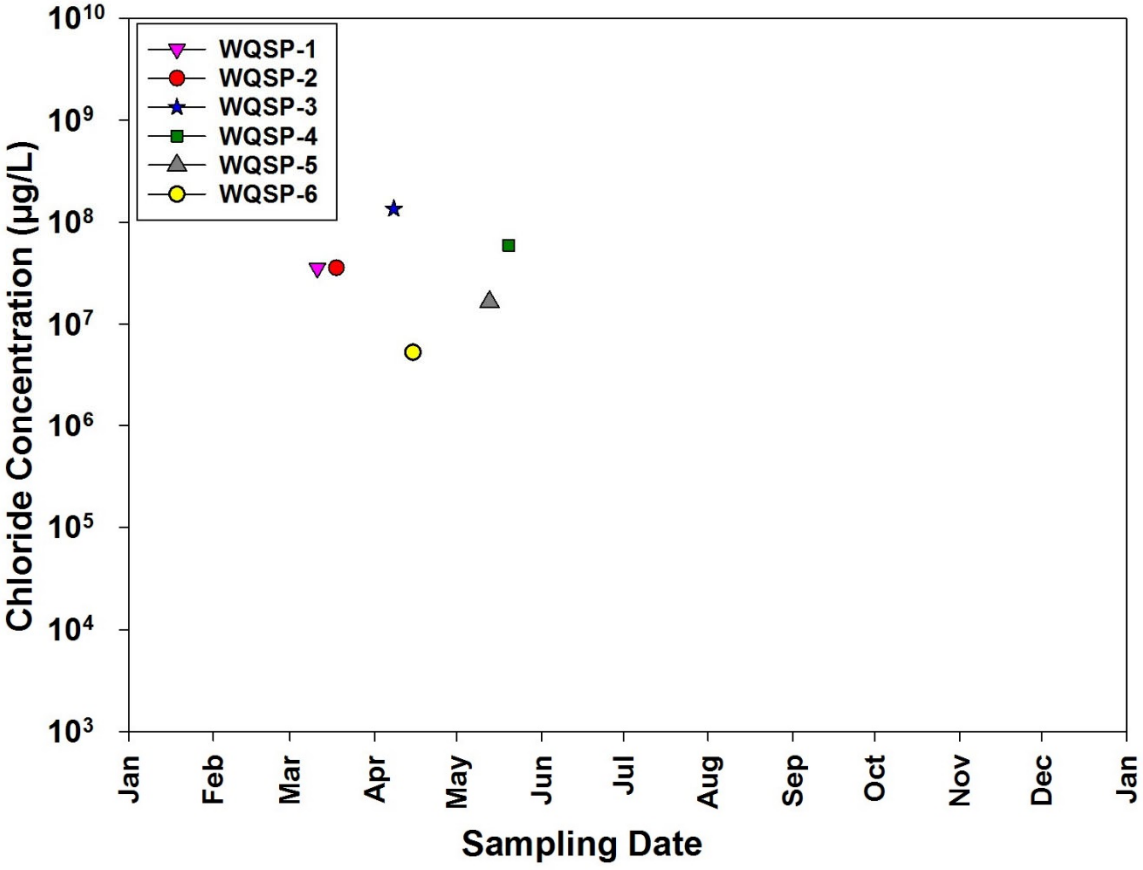


Figure 8: Concentrations of Chloride in Groundwater Samples Collected in 2025

Sample Type: Ground Water
Year: 2025
Analysis Performed: Cations

Sample Location	Sodium µg/L	Magnesium µg/L	Potassium µg/L	Calcium µg/L
WQSP-1	2.31E+07	1.01E+06	4.12E+05	1.79E+06
WQSP-2	2.16E+07	9.74E+05	4.36E+05	1.58E+06
WQSP-3	8.39E+07	2.29E+06	1.47E+06	1.44E+06
WQSP-4	4.02E+07	1.24E+06	9.81E+05	1.80E+06
WQSP-5	1.13E+07	5.95E+05	3.76E+05	1.12E+06

WQSP-6	4.69E+06	2.01E+05	1.63E+05	7.14E+05

Sample Type: Ground Water
Year: 2025
Analysis Performed: pH

Sample Location	pH @ 23°C
WQSP-1	6.86
WQSP-2	7.05
WQSP-3	7.32
WQSP-4	7.42
WQSP-5	7.62
WQSP-6	8.02

Sample Type: Ground Water
Year: 2025
Analysis Performed: Conductivity

Sample Location	Conductivity mS/cm	Temperature °C
WQSP-1	85.4	21.7
WQSP-2	83.6	21.7
WQSP-3	198.8	18.6
WQSP-4	128.9	20.4
WQSP-5	46.8	22.6
WQSP-6	21.0	18.6

Sample Type: Ground Water
Year: 2025
Analysis Performed: Specific gravity

Sample Location	SG $_{T/4°C}$
WQSP-1	1.041
WQSP-2	1.044
WQSP-3	1.129
WQSP-4	1.069
WQSP-5	1.024
WQSP-6	1.007

Sample Type: Ground Water
Year: 2025
Analysis Performed: TOC

Sample Location	TOC mg/L
WQSP-1	1.440
WQSP-2	1.322
WQSP-3	0.969
WQSP-4	3.497
WQSP-5	4.130
WQSP-6	1.384

Sample Type: Ground Water
Year: 2025
Analysis Performed: TDS/TSS

Sample Location	TDS mg/L	TSS mg/L
WQSP-1	66480.00	N.D.
WQSP-2	66440.00	N.D.
WQSP-3	229580.00	60.00
WQSP-4	111260.00	20.00
WQSP-5	35020.00	40.00
WQSP-6	15440.00	180.00

Internal Dosimetry Group and Public Outreach

***In vivo* radiobioassay measurements performed during the reporting period**:

None for WIPP (no current contract), 51 for the contract radiological personnel and those working in the laboratories located at CEMRC, 9 for the public participants.

Outreach activities:

CEMRC and the Internal Dosimetry group continue to interact with the public to explain CEMRC's function and to encourage 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 are outreach activities during the reporting period:

4/9/2025: Provided a quick tour including explanation of the principles behind the ID laboratory, demonstration of the lung and whole-body radiobioassay measurement, and handing out LDBC brochures to a LATA informal group of 4 people.

6/3/2025: *Inspired by Science* Summer Camp students visit to CEMRC (9:00 am – 12:00 pm)
Explained CEMRC's role, mission, and laboratory activities, provided a tour of the facility and laboratoriess, demonstration of the lung and whole-body radiobioassay measurement, and handed out LDBC brochures to two groups of 20 (total 40) students aged 10 to 12 years and their teachers.

6/6/2025: Provided a detailed tour including explanation of the principles behind the ID laboratory, handing out LDBC brochure, and performing a whole-body count to a public visitor from Las Cruces.

6/21/2025: STEM Passport to Adventure at Riverwalk Recreation Center, Carlsbad NM (10:00 am – 2:00 pm)
Explained CEMRC's role, mission, and laboratory activities, handed out LDBC brochures, and demonstrated simple science experiments to local families with young children; the number of families visited estimated to be between 70 to 80 (2 to 5 people per family).

Low Background Radiation Experiment (LBRE)

Key milestones and accomplishments: 1. On April 7, 2025, Jakob Plante, an NMSU Biology graduate student supported on this grant, successfully defended his MS thesis on the effect of depriving *Drosophila* of natural radiation. 2. With former graduate student Liam Goodale and postdoctoral researcher Cung Thawng, completed writing a manuscript on radiation effects on *Aedes aegypti* based on Goodale's NMSU thesis. Submitted the manuscript on May 28 to *Nature Scientific Reports* for preliminary review. Editors required that we submit our RNA Sequences and we did so and formal review began on June 20th.

In our Q1 2025 report, we presented data showing that *Drosophila* growth and development was inhibited when grown underground at WIPP deprived of surface levels of radiation. During Plante's MS Thesis oral exam, he presented an illuminating graph showing that the developmental inhibition was likely between the egg hatching stage and the production of pupae (Figure 1). The Y axis of the graph shows the extent of inhibition by growth underground compared to the surface control, and pupae production was more than 35% inhibited (red line in Figure 1). And, as discussed in the Q1 2025 report, rescuing the flies form the underground abrogated the inhibition (green line). What was illuminating about Plante's graph was the slope of the line showed that most of the inhibition occurred between the eggs and the pupae stage – that is during the larval stage. These results indicate that normal *Drosophila* development *requires* natural background radiation. We plan to confirm and expand these results in the summer of 2025.

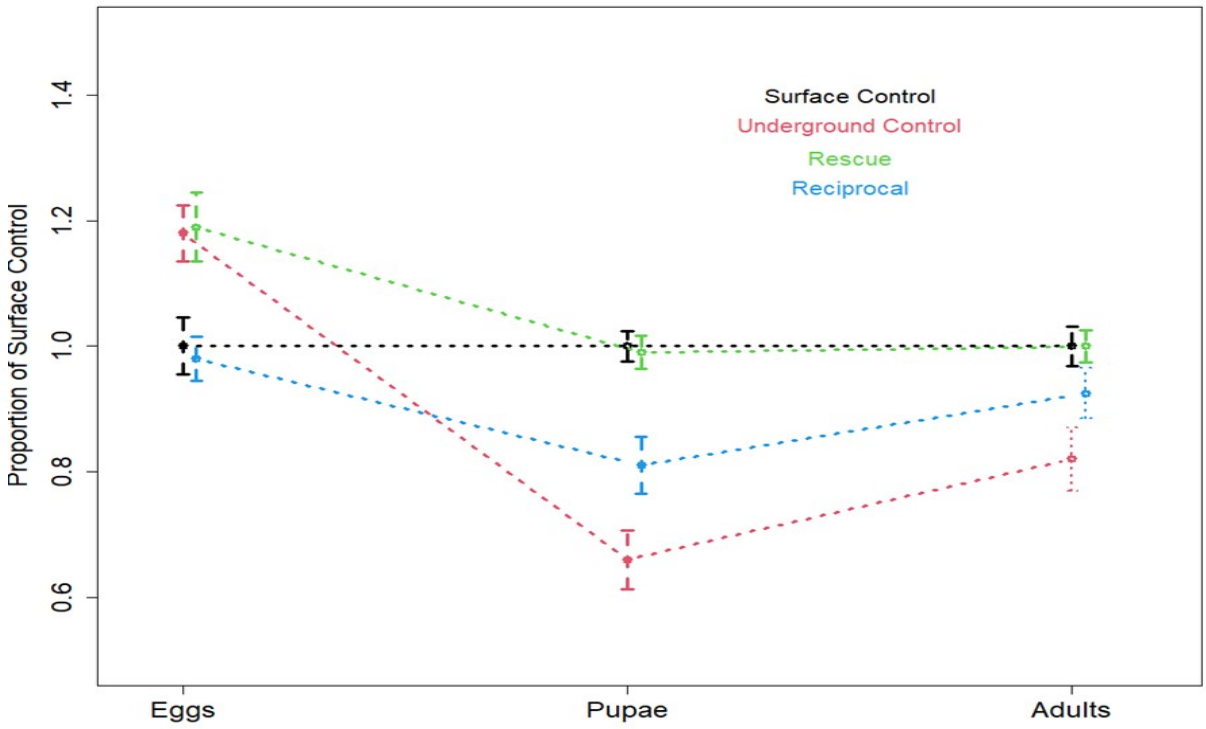


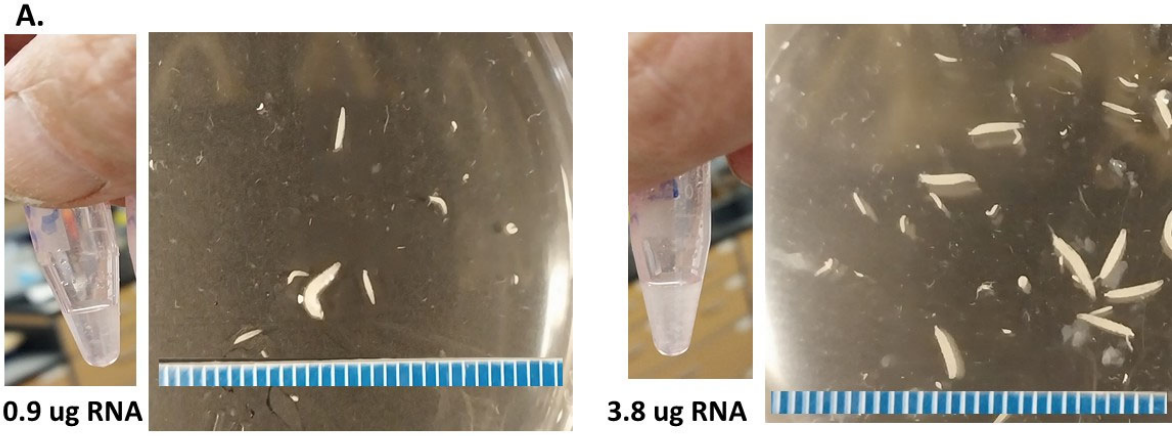
Figure 1. The extent of inhibition by the deprivation of radiation in the underground at WIPP. Surface control development is shown as 1.0 and the underground inhibition is shown as less than 1.0.

Drosophila Larval Development Pilot Studies.

We therefore are developing techniques to test if the larval stage is the critical stage during which the lack of radiation influences development. Towards the end of carrying out an experiment at WIPP this summer on the influence of larval development, we have undertaken pilot studies to work out the methods to make this a successful experiment.

To test larval development in the second pilot study (1st pilot not shown), we demonstrated we could distinguish Larval instar stages 1, 2, and 3 based on larval size (2nd instar= 1-2 mm, 3rd instar = 3-4 mm, see **Figure 2 A** for identification of both these stages of larval development). Another critical question requiring this study was to find out if we could harvest enough RNA to perform RNA Seq Transcriptome analysis (0.5-2 µg is needed). RNA was extracted from 2, 3, and 4 days post mating, and it was found that day 3 yielded enough RNA to do transcriptome sequencing.

A.



B. RNA Yields from Drosophila (ug)

2 days post mating	3 days	4 days
Rep a 0.23	0.9	6.7
b 0.20	3.8	22.3

Figure 2. **A.** Larval developmental and **B.** RNA extraction monitored for up to 4 days post-mating. Ruler markings represent 1 mm.

The other project goal in the 2025 LBRE proposed work is to document biosignatures for life in WIPP's 250 million-year-old halite deposit. Emma Soto, who had been hired on the LBRE project to work on this sub-project, was let go in February due to the ending of the previous five-year grant. She has been volunteering in the laboratory, setting up our new Clean Room for halite extraction work in the NMSU Biology Department. **Figure 3** shows Emma in the laboratory on June 12, 2025, with the WIPP inclusion fluid she extracted. When we are doing these extractions under sterile conditions, we will use quantitative PCR to amplify any nucleic acids present, document life-forms by Electron Dispersive Spectroscopy (EDS) and Scanning Electron Microscopy (SEM), and grow inclusion fluid under both aerobic and anaerobic conditions.

Figure 3. A. NMSU undergraduate Emma Soto with a sample of WIPP inclusion fluid she extracted. **B.** A closer view of the approximate 75 μL of extracted inclusion fluid.