

via email

8 June 2023



Stephen Lee, Director
Louisiana Department of Natural Resources
Office of Conservation - Injection & Mining Division
617 North Third Street, LaSalle Building
Baton Rouge, Louisiana 70802-5431

Reference: 0688077

Subject: 2nd Analytical Data Submittal
Westlake US 2, LLC
Sulphur Dome
Calcasieu Parish, Louisiana

Dear Mr. Lee:

On behalf of Westlake US 2, LLC (Westlake), Environmental Resources Management Southwest, Inc. (ERM) is pleased to provide the Louisiana Department of Natural Resources (LDNR) Injection & Mining Division with the final laboratory analytical data for groundwater, surface water, and oil samples collected at the Sulphur Dome in Calcasieu Parish. The samples were collected by ERM during March through May 2023 sampling events.

Enclosed are the following:

- Table 1 – Ground Water Data
- Table 2 – Surface Water Data
- Table 3 – Central Lake Water Column Profile
- Table 4 – Dissolved Gasses Data
- Table 5 – Oil Data
- Figure 1-3 – Sample Location Maps
- Figure 4 – Piper Diagram
- Figure 5 – Dissolved Gas Isotopes
- Attachment 1 – Laboratory Reports

Only final laboratory reports received since the previous data submittal are provided in Attachment 1. Supplemental submittals will be made as additional final laboratory analytical data are received.

1. WATER SAMPLING RESULTS

Between March and May 2023, additional samples of groundwater, surface water, and oil were collected at the site. The sampling locations are shown on Figures 1-3. The water samples were analyzed by ALS Global laboratory based in Houston, Texas, a Louisiana Environmental Laboratory Accreditation Program (LELAP) accredited laboratory. Dissolved gases were submitted to and analyzed by Isotech, a Stratum Reservoir Company, located in Champaign, Illinois. Oil samples were submitted to SPL, a hydrocarbon analytical laboratory in Houston, Texas. All

samples were submitted under proper Chain-of-Custody in laboratory supplied containers with appropriate preservative and handling requirements.

1.1 Groundwater Sampling Results

On April 27, 2023, 5 groundwater samples were collected from the industrial water wells operated by Westlake, as well as the Cottages Well located west of Cavern 7 (see Figure 1). Well 019-1603 was not operational at the time of sampling and no sample could be obtained from this well. At each well, water was allowed to flow from each well for several minutes prior to sampling and field parameters, i.e., pH, specific conductivity (SC), oxidation-reduction potential (ORP), and temperature, were recorded with a hand-held meter at the time of sampling. The groundwater analytical data to date are summarized in Table 1. Nickel and vanadium were added to the analyte list during this sampling event.

Reported constituent concentrations were below their respective RECAP screening standards (GWSS) or EPA Secondary Maximum Contaminant Limits (SMCL), with the exception of iron and manganese. Alluvial aquifers throughout South Louisiana are known to exhibit elevated concentrations of naturally occurring iron, manganese, and other metals. Industrial processes utilizing steel piping can also influence the metal concentrations reported in the water. SMCLs are non-enforceable guidelines established by the EPA based on aesthetic qualities (e.g., odor, taste, etc.).

The brine samples, previously collected, were included on Table 1 for comparison but were not evaluated with respect to the RECAP GWSS or the SMCL because the brine is a manufactured product.

The piper diagram (Figure 4) illustrates the overall consistency of the groundwater quality. At this time, there is no indication that the groundwater at these locations has been influenced by or mixed with brine.

1.2 Surface Water Sampling Results

No additional surface water quality data have been received since the last data submittal. For completeness, the surface water sampling locations are provided on Figure 2, and the surface water quality data received to date are summarized on Table 2.

1.2.1 Central Lake Water Column Profile

The deepest portion of the Central Lake currently measured is in the area surrounding bubble site LDNR # 5, which is approximately 5-6 feet deep. On May 22, 2023, a profile of the water column was conducted at 1-foot depth intervals using a hand-held water quality meter. The water depth was measured at 5.0 feet. Tubing was set at discrete depth intervals and purged using a peristaltic pump prior to recording the water quality parameters. Previously water quality parameters were recorded at the top and bottom at bubble site LDNR # 4. The profile data are shown on Table 3. Generally, the water quality is consistent throughout the water column, and consistent with parameters recorded in January 2023. There is a slight change in water quality at the bottom of the lake where the pH and temperature are slightly lower, change to reducing conditions (ORP is negative), and conductivity slightly increases. The reducing conditions at the bottom are most likely attributed to decaying vegetation accumulating on the bottom.

1.3 Dissolved Gas Results

Dissolved gas data for bubble sites LDNR #21, 22, and 23, and the 5 industrial water wells sampled on March 30, 2023 are included in this submittal. A water sample was unable to be collected from the Cottages Well during this event. Dissolved gas data are summarized in Table 4. Several samples did not contain enough methane to perform the full isotopic analysis, including LDNR #23, and water well samples 019-580, 019-582, 019-995, and 019-1055.

The methane stable isotopic results were plotted on a linear chart (Figure 5) for comparison with known genetic classifications (Coleman, et al., 1995). Data previously collected by Lonquist of gas samples from the caverns and/or well annulus were also plotted for comparison.

The methane isotopic gas data indicate that the gas from the bubble sites has thermogenic origins, is likely deep gas, and is similar in isotopic composition to the cavern gas samples collected previously. The concentration of methane in the water wells was too low for complete isotopic evaluation, however, the carbon 13 isotopic data indicate the origin of gas in the Chicot aquifer is different than that observed in the caverns and at the bubble sites.

1.4 Gas Sampling Update

Following the Second Amendment to Compliance Order No. IMD 2022-027, several methods have been attempted to isolate and collect the gas from the bubble sites. On May 22, 2023, a method using a large, inverted funnel and standpipe sunk over the bubble site was successful in isolating the gas from submerged bubble sites within the Central Lake. Gas samples were collected from LDNR #3, 4, and 24 bubble sites within the Central Lake, which have relatively high bubble rates. Going forward, this method will be used to isolate and collect gas from submerged bubble sites if possible. Locations with low bubble rates are still being evaluated for sampling best methodology.

The results from attempts to isolate the gas from non-submerged bubble sites are still pending.

Additionally, attempts to isolate the bubbles located along the casing of and within the vault of the Cavern 7 brine well 7B have not been successful at this time. Efforts will continue to isolate the gas at that bubble location.

2. OIL SAMPLE RESULTS

On May 2, 2023 two oil samples were collected from oil wells SN 185997 and SN 209459 per the Second Amendment to Compliance Order No. IMD 2022-027. The samples were submitted to SPL for bulk/whole oil properties. The oil and gas sample locations are shown on Figure 3. The results from this sampling, along with data from previous sampling conducted by Intertek, are provided in Table 5. Based on the data comparison, the oil from Cavern 7B appears to be similar to the previous 7B oil samples and different from the Yellow Rock crude oil sample collected.

Gas was sampled from the annulus of SN 209459 on May 2, 2023. The results of this sampling are still pending.

3. SCHEDULE

Water wells will continue to be sampled on a monthly basis. The next water well sampling event is planned for June 26, 2023. The bubble sites will be sampled as discovered. All bubble sites were

sampled May 17-22, 2023. The results of that sampling effort will be provided to LDNR when available. The next full round of bubble site sampling is planned for the 3rd Quarter 2023.

We will continue to report additional sampling results to LDNR as they are received. Should you have any questions or need addition information, please contact us at scott.himes@erm.com and david.upthegrove@erm.com.

Sincerely,

Environmental Resources Management Southwest, Inc.



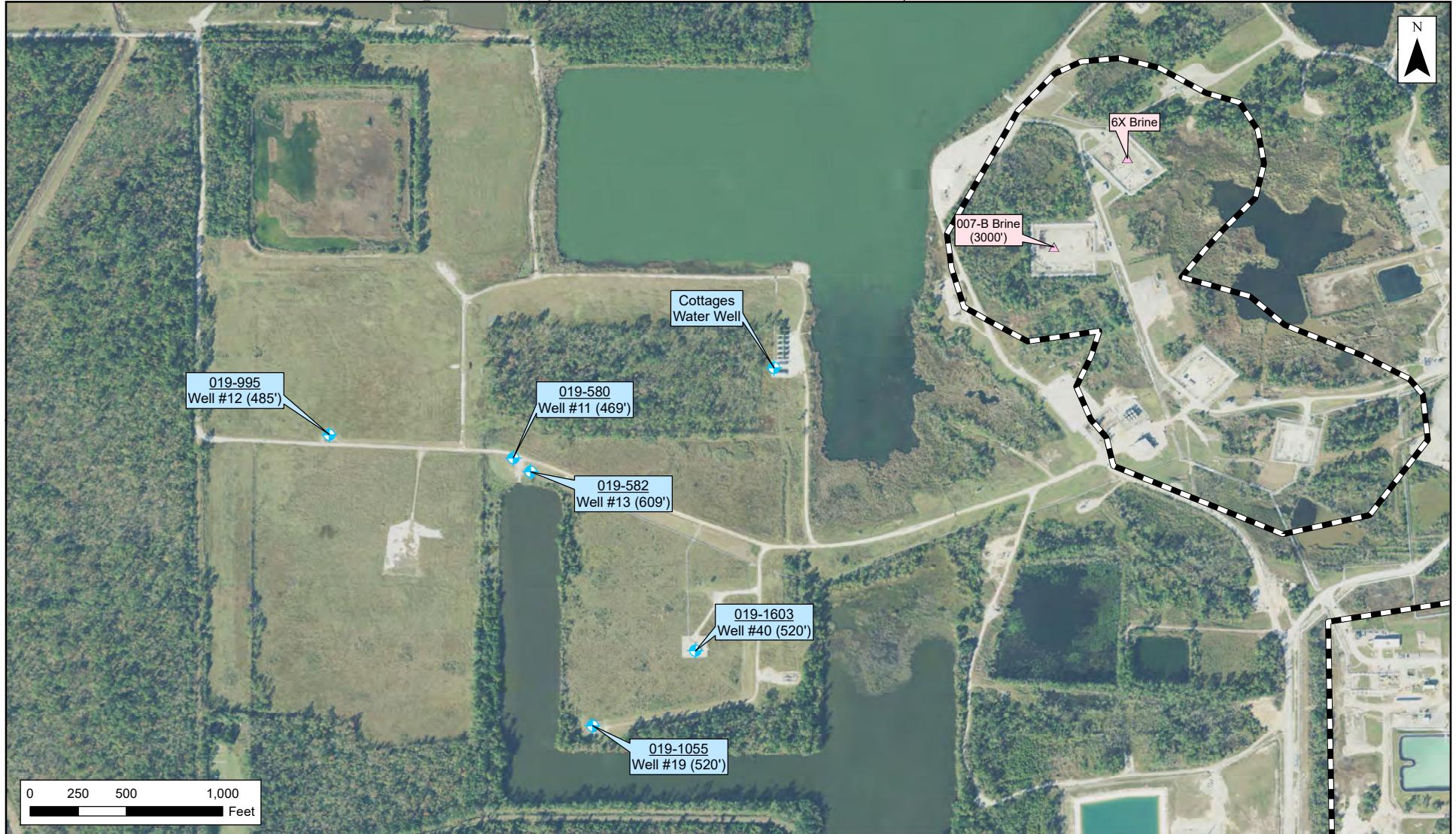
Scott A. Himes, P.G.
Senior Hydrogeologist



David C. Upthegrove, P.G.
Partner



FIGURES



Legend

- Water Well Sample Location
- Brine Sample Location
- Westlake Property

Figure 1
Groundwater Sampling Locations
 Sulphur Dome
 Westlake US 2, LLC
 Calcasieu Parish, Louisiana

Notes:
 2021 Aerial imagery via USGS Earth Explorer (NAIP).

**Legend**

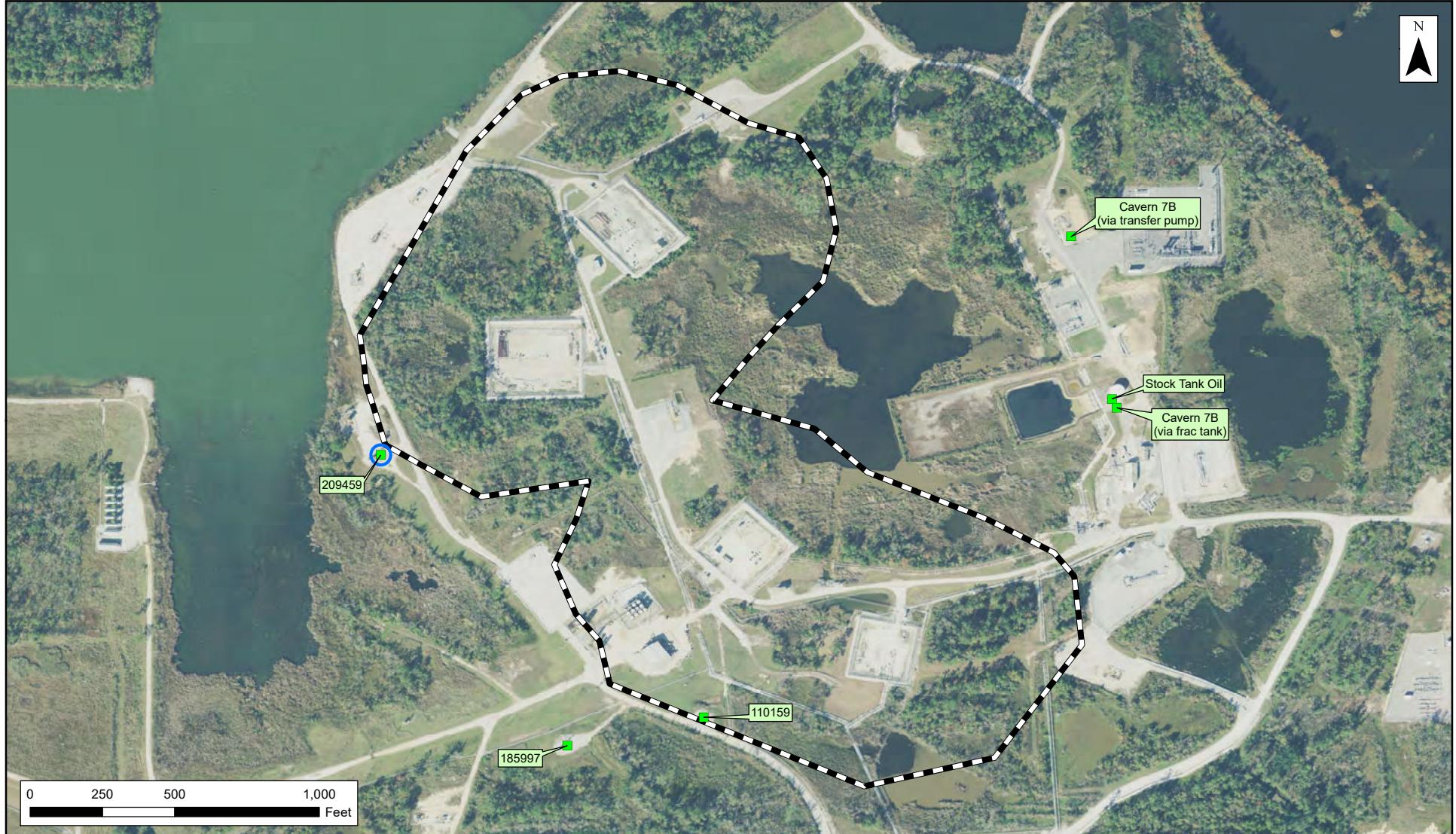
- Surface Water Sample Location (non-bubble site)
- Bubble Site Water/Gas Sample Location
- Sheen Sample Location

Westlake Property

Notes:

2021 Aerial imagery via USGS Earth Explorer (NAIP).

Figure 2
Surface Water Sampling Locations
Sulphur Dome
Westlake US 2, LLC
Calcasieu Parish, Louisiana

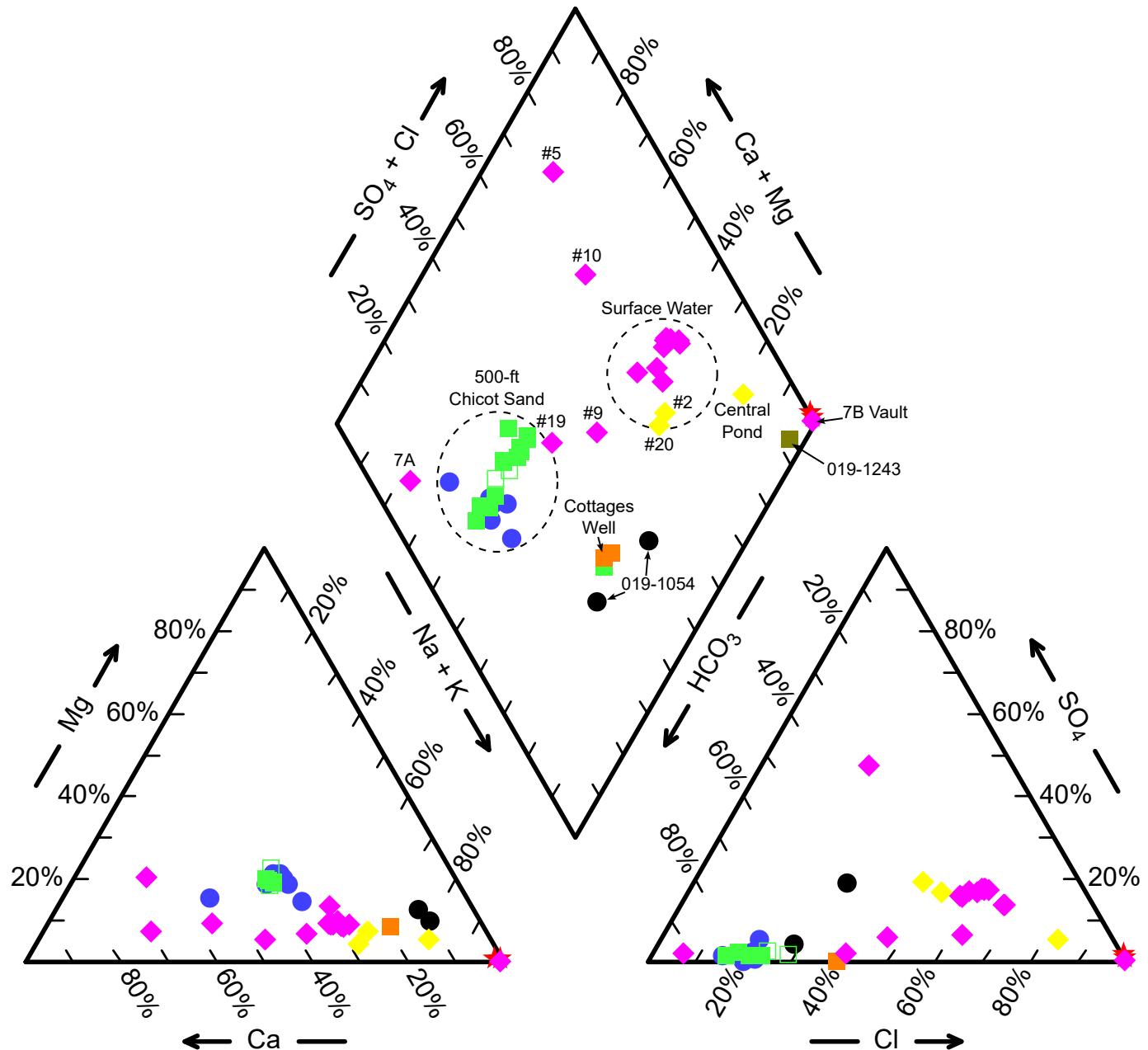


Legend

- Oil Sample Location
- Gas Sample Location
- Westlake Property

Notes:
2021 Aerial imagery via USGS Earth Explorer (NAIP).

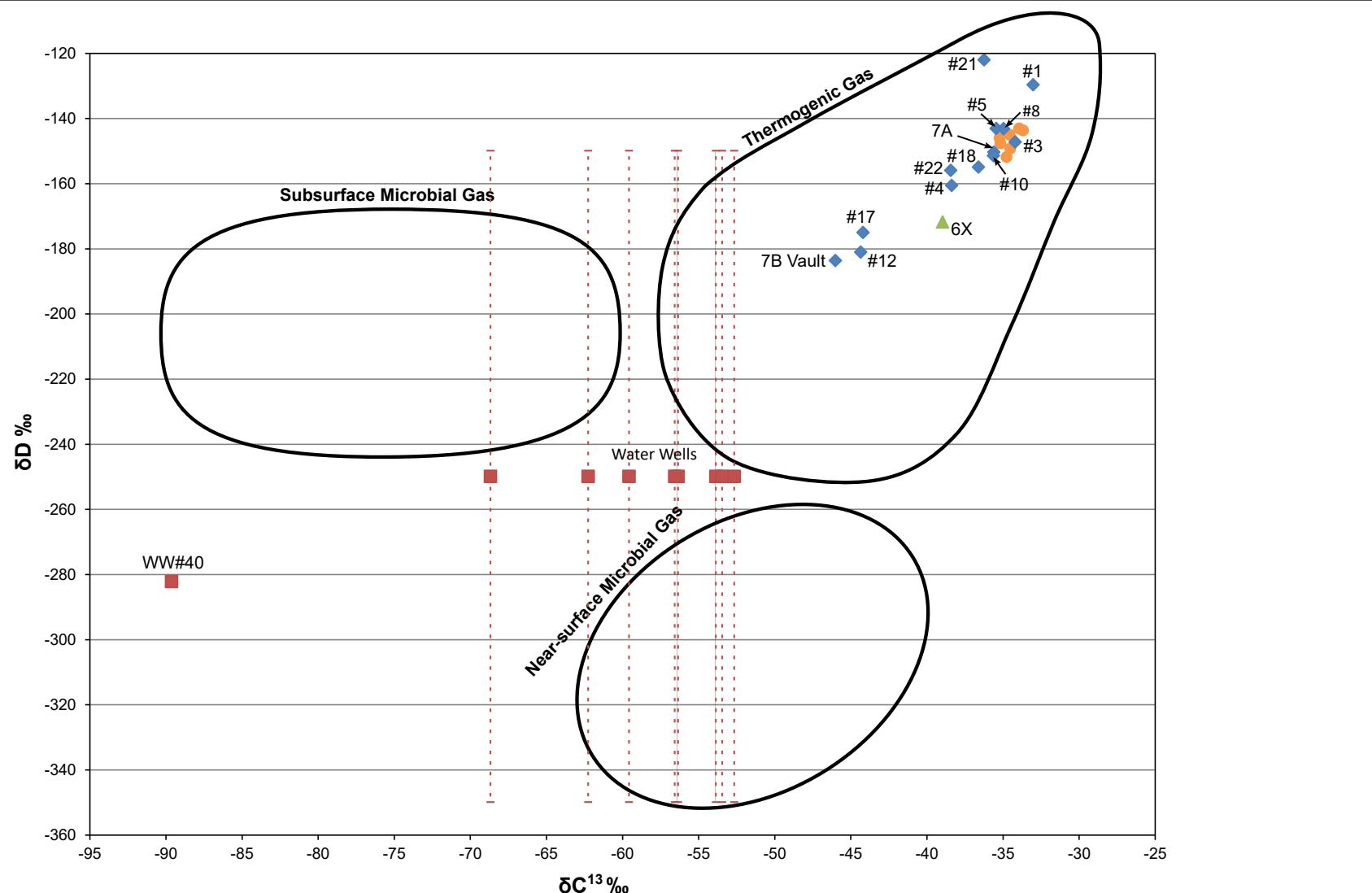
Figure 3
Oil and Gas Sampling Locations
Sulphur Dome
Westlake US 2, LLC
Calcasieu Parish, Louisiana

**Legend**

- ◆ Bubble Site & Surface Water
- ◆ Other Surface Water
- ◆ Industrial Water Well (Current)
- ◆ Industrial Water Well (Historic)
- ◆ Cottages Well
- ◆ Other Water Well

- 019-1054 (Historic)
- Evangeline Aquifer Water Well (Historic)
- ★ Brine

Figure 4
Piper Diagram
Sulphur Dome
Westlake US 2, LLC
Calcasieu Parish, Louisiana

**Legend**

- Cavern Gas (Lonquist)
- Bubble Site
- Groundwater
- Brine

Figure 5
Dissolved Gas Isotopes
Sulphur Dome
Westlake US 2, LLC
Calcasieu Parish, Louisiana

TABLES

Table 1
Groundwater Data Summary
Sulphur Dome
Calcasieu Parish, Louisiana

Notes

J - Estimated Value reported below the detection limit.

H - pH is received at the lab outside of hold time (15 min from sampling).

< - Not Detected at the reporting limit shown.

Bolded values detected in the sample.

NA - Not Analyzed

NS - No Standard

(a) - No RECAP standard, limit listed is EPA Secondary MCL

Shaded values exceed standard

Table 1
Groundwater Data Summary
 Sulphur Dome
 Calcasieu Parish, Louisiana

Constituent	Units	007-B Brine	
		Sample	SN 67270
		Sample	3,000' 2/16/23 ERM
Total Metals			
Arsenic	mg/L	<0.04	
Barium	mg/L	<0.19	
Cadmium	mg/L	<0.02	
Calcium	mg/L	1,320	
Chromium	mg/L	0.722	
Iron ^(a)	mg/L	9.65 J	
Lead	mg/L	<0.06	
Magnesium	mg/L	8.64 J	
Manganese ^(a)	mg/L	0.487 J	
Mercury	mg/L	<0.00003	
Nickel	mg/L	NA	
Potassium	mg/L	13.8 J	
Selenium	mg/L	<0.11	
Silver	mg/L	<0.02	
Sodium	mg/L	82,600	
Strontium	mg/L	11	
Vanadium	mg/L	NA	
Zinc	mg/L	1.7	
Anions/Water Quality Parameters			
Bicarbonate Alkalinity	mg/L	140	
Bromide	mg/L	<7.5	
Carbonate Alkalinity	mg/L	<5	
Chloride ^(a)	mg/L	201,000	
Sulfate ^(a)	mg/L	3,060	
Total Dissolved Solids (TDS) ^(a)	mg/L	300,000	
pH ^(a)	SI	NA	
pH (field)	SI	NA	
Sulfides			
Hydrogen Sulfide	mg/L	<0.5	
Sulfide	mg/L	<1	
Volatile Organic Compounds			
Benzene	mg/L	0.092	
Ethylbenzene	mg/L	<0.0003	
Toluene	mg/L	0.025	
m,p-Xylene	mg/L	<0.0005	
o-Xylene	mg/L	<0.0003	
Xylenes, Total	mg/L	<0.0003	
TPH Fractions			
Aliphatics >C6-C8	mg/L	0.0803	
Aliphatics >C8-C10	mg/L	0.107	
Aliphatics >C10-C12	mg/L	NA	
Aliphatics >C12-C16	mg/L	NA	
Aliphatics >C16-C35	mg/L	NA	
Aromatics >C8-C10	mg/L	0.422	
Aromatics >C10-C12	mg/L	NA	
Aromatics >C12-C16	mg/L	NA	
Aromatics >C16-C21	mg/L	NA	
Aromatics >C21-C35	mg/L	NA	

Notes

J - Estimated Value reported below the de

H - pH is received at the lab outside of hol

< - Not Detected at the reporting limit show

Bolded values detected in the sample.

NA - Not Analyzed

NS - No Standard

^(a) - No RECAP standard, limit listed is EP/

Shaded values exceed standard

Table 2
Surface Water Data Summary
Sulphur Dome
Calcasieu Parish, Louisiana

Notes

J - Estimated Value reported below the detection limit.

H - pH is received at the lab outside of hold time (15 min from sampling).

< - Not Detected at the reporting limit shown.

Bolded values detected in the sample.

Table 2
Surface Water Data Summary
 Sulphur Dome
 Calcasieu Parish, Louisiana

LDNR Sample No. Sample ID Sample Date Sample Interval (ft) Constituent	Units	#2	#20			
		Culvert	Central Pond	No. 20		
		1/25/23 Surface	1/25/23 Surface	3/9/23 Surface		
		Sampler ERM	ERM	ERM		
Constituent		Surface Water				
Total Metals						
Arsenic	mg/L	0.00141 J	0.00192 J	0.00109 J		
Barium	mg/L	0.0832	0.146	0.43		
Cadmium	mg/L	<0.0002	<0.0004	<0.0002		
Calcium	mg/L	58.2	149	8.98		
Chromium	mg/L	0.00101 J	0.00458 J	<0.0004		
Iron	mg/L	0.207	2.07	0.148 J		
Lead	mg/L	<0.0006	<0.00120	<0.0006		
Magnesium	mg/L	5.44	37.8	1.6		
Manganese	mg/L	0.00934	0.847	0.0163		
Mercury	mg/L	<0.00003	<0.00003	<0.00003		
Potassium	mg/L	2.86	3.22	1.2		
Selenium	mg/L	<0.0011	<0.0022	<0.0011		
Silver	mg/L	<0.0002	<0.0004	<0.0002		
Sodium	mg/L	158	1080	27.5		
Strontium	mg/L	0.341	0.941	0.134		
Zinc	mg/L	0.0153	0.0258	<0.002		
Anions/Water Quality Parameters						
Bicarbonate Alkalinity	mg/L	210	495	37.4		
Bromide	mg/L	<0.03	<0.06	<0.03		
Carbonate Alkalinity	mg/L	<5	<5	<5		
Chloride	mg/L	215	2090	32		
Sulfate	mg/L	92.1	183	17.2		
Total Dissolved Solids (TDS)	mg/L	498	3600	148		
pH	SI	NA	NA	NA		
Sulfides						
Hydrogen Sulfide	mg/L	<0.5	<0.5	<0.5		
Sulfide	mg/L	<1	<1	<1.7		
Volatile Organic Compounds						
Benzene	mg/L	<0.0002	<0.0002	<0.2		
Ethylbenzene	mg/L	<0.0003	<0.0003	<0.3		
Toluene	mg/L	<0.0002	<0.0002	<0.2		
m,p-Xylene	mg/L	<0.0005	<0.0005	<0.5		
o-Xylene	mg/L	<0.0003	<0.0003	<0.3		
Xylenes, Total	mg/L	<0.0003	<0.0003	<0.3		
TPH Fractions						
Aliphatics >C6-C8	mg/L	<0.01	<0.01	<0.01		
Aliphatics >C8-C10	mg/L	<0.01	<0.01	<0.01		
Aliphatics >C10-C12	mg/L	<0.001	<0.001	<0.001		
Aliphatics >C12-C16	mg/L	<0.002	<0.002	<0.002		
Aliphatics >C16-C35	mg/L	<0.008	<0.008	<0.008		
Aromatics >C8-C10	mg/L	<0.01	<0.01	0.012		
Aromatics >C10-C12	mg/L	<0.001	<0.001	<0.001		
Aromatics >C12-C16	mg/L	<0.004	<0.004	<0.004		
Aromatics >C16-C21	mg/L	<0.003	<0.003	<0.003		
Aromatics >C21-C35	mg/L	<0.009	<0.009	<0.009		

Notes

J - Estimated Value reported below the d

H - pH is received at the lab outside of hc

< - Not Detected at the reporting limit shc

Bolded values detected in the sample.

Table 3
Central Lake Water Column Profile
 Sulphur Dome
 Calcasieu Parish, Louisiana

1/30/2023 LDNR #4 (water depth 2.55 ft)					
Depth (ft)	pH	SC (uS/cm)	ORP (mV)	Temp (°C)	TDS (ppm)
0.5	6.14	1317	31	17.5	NM
2.55	6.3	1321	-4	17.1	NM

5/22/2023 LDNR #5 (water depth 5.0 ft)					
Depth (ft)	pH	SC (uS/cm)	ORP (mV)	Temp (°C)	TDS (ppm)
0	6.95	1509	59	30.1	1058
1	6.95	1513	69	30.1	1058
2	6.96	1515	77	30	1057
3	6.94	1513	83	29.7	1059
4	6.96	1513	84	29.6	1057
5	6.77	1522	-64	28.7	1065

Notes:

Readings were recorded with an Ultrameter II, hand-held meter

Table 4
Dissolved Gas Data Summary
 Sulphur Dome
 Calcasieu Parish, Louisiana

Component	Units	LDNR #1	LDNR #3	LDNR #4	LDNR #5	LDNR #6	LDNR #7	LDNR #8	LDNR #9	LDNR #10
		Brine Well 22 BS	CP BS 1	CP BS 2	CP BS 3	BS 06	BS 07	BS 08	Brine Pond 4	1101529-BS
		1/25/23	1/30/23	1/30/23	1/30/23	2/28/23	2/28/23	2/28/23	2/10/23	2/10/23
		ERM	ERM	ERM	ERM	ERM	ERM	ERM	ERM	ERM
Surface Water (Bubble Site)										
Carbon Monoxide	mol%	ND	ND	ND	ND	ND	ND	ND	0.034	ND
Helium	mol%	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrogen	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND
Argon	mol%	1.35	1.04	0.905	1.54	1.68	1.66	1.31	1.14	0.837
Oxygen	mol%	0.47	8.91	15.5	21.68	21.86	22.94	16.43	22.32	14.68
Nitrogen	mol%	61.78	45.65	65.33	69.85	72.96	71.73	57.26	75.05	59.75
Carbon Dioxide	mol%	7.47	3.58	1.29	2.47	3.22	3.27	2.88	0.61	1.04
Methane	mol%	28.45	40.41	16.69	4.39	0.278	0.398	21.89	0.845	23.55
Ethane	mol%	0.287	0.261	0.209	0.0472	0.0042	0.0050	0.146	0.0022	0.12
Ethylene	mol%	ND	0.0097	0.0067	0.0022	ND	ND	0.0044	ND	ND
Propane	mol%	0.0926	0.0702	0.0445	0.0128	ND	0.0006	0.0482	0.0004	0.0084
Propylene	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iso-butane	mol%	0.0216	0.0259	0.0115	0.0033	ND	ND	0.0158	ND	0.0112
N-butane	mol%	0.0216	0.0189	0.0091	0.0028	ND	ND	0.0108	ND	ND
Iso-pentane	mol%	0.0083	0.0083	0.0032	0.0006	ND	ND	0.0034	ND	0.0019
N-pentane	mol%	0.0055	0.0051	0.0019	ND	ND	ND	0.0015	ND	ND
Hexanes +	mol%	0.0449	0.0083	0.0029	0.0039	0.0012	0.0013	0.0030	0.0007	0.0012
Methane Stable Isotopes										
$\delta^{13}\text{C}$	‰	-33.03	-34.2	-38.37	-35.45	NA	-36.7	-34.96	-33.1	-35.63
δD	‰	-129.6	-147.2	-160.5	-143	NA	NA	-143.1	-81	-151.4

Notes

Bolded values detected in the sample.

ND - Not Detected

NA - Not Analyzed (insufficient volume)

Table 4
Dissolved Gas Data Summary
 Sulphur Dome
 Calcasieu Parish, Louisiana

Component	Sample Location	LDNR #12	LDNR #17	LDNR #18	LDNR #19	LDNR #21	LDNR #22	LDNR #23	WPB PGG No.7A	WPB PPB No.7B	
		Sample ID	BS 12	BS 17	BS 18	BS 19	No. 21	No. 22	Brine Well 7A BS	Brine Well 7B-BS	
		Sample Date	2/28/23	2/28/23	2/28/23	2/28/23	3/30/23	3/30/23	1/25/23	2/16/23	
Component	Units	Surface Water (Bubble Site)									
Carbon Monoxide	mol%	ND	ND	ND	ND	0.11	0.098	0.040	ND	ND	
Helium	mol%	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Hydrogen	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Argon	mol%	1.62	1.69	1.21	0.976	1.29	1.43	1.09	0.744	0.955	
Oxygen	mol%	19.99	16.22	14.38	29.18	20.65	20.90	21.18	16.39	19.64	
Nitrogen	mol%	70.00	74.92	52.67	43.27	75.31	71.96	76.89	41.21	76.59	
Carbon Dioxide	mol%	3.51	5.42	3.08	2.83	1.77	2.40	0.69	0.29	0.51	
Methane	mol%	4.72	1.73	28.32	23.62	0.860	3.16	0.105	40.83	2.26	
Ethane	mol%	0.138	0.0148	0.240	0.106	0.0080	0.410	0.0013	0.397	0.0333	
Ethylene	mol%	ND	ND	ND	ND	ND	0.0005	ND	0.0013	0.0011	
Propane	mol%	0.0108	0.0021	0.0616	0.093	0.0011	0.0064	0.0002	0.099	0.0085	
Propylene	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Iso-butane	mol%	0.0025	ND	0.176	0.0034	0.0004	0.0015	ND	0.0286	0.0011	
N-butane	mol%	0.0019	ND	0.132	ND	ND	0.0010	ND	0.0106	0.0024	
Iso-pentane	mol%	ND	ND	0.0044	0.0004	ND	ND	ND	0.013	0.0005	
N-pentane	mol%	ND	ND	0.0024	ND	ND	ND	ND	ND	0.0004	
Hexanes +	mol%	0.0038	0.0028	0.0044	0.0021	0.0018	0.0020	0.0007	0.003	0.001	
Methane Stable Isotopes											
δ ¹³ C	‰	-44.36	-44.2	-36.62	-32.77	-36.2	-38.40	-34.0	-35.6	-46.02	
δD	‰	-181	-175	-154.9	-109.4	-122	-156	NA	-150.3	-183.6	

Notes

Bolded values detected in the sample.

ND - Not Detected

NA - Not Analyzed (insufficient volume)

Table 4
Dissolved Gas Data Summary
 Sulphur Dome
 Calcasieu Parish, Louisiana

Sample Location	Sulphur Dome	LDNR #20	WW #11			WW #13			WW #12		
	Central Pond	No. 20	019-580			019-582			019-995		
	Sample Date	1/25/23	3/9/23	1/26/23	3/30/23	4/27/23	1/26/23	3/30/23	4/27/23	1/26/23	3/30/23
	Sampler	ERM	ERM	ERM	ERM	ERM	ERM	ERM	ERM	ERM	ERM
Component	Units	Surface Water					Water Well				
Carbon Monoxide	mol%	0.26	0.023	ND	ND	ND	ND	ND	ND	ND	ND
Helium	mol%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrogen	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Argon	mol%	1.98	1.01	1.64	1.17	1.66	1.76	1.27	1.61	1.75	1.29
Oxygen	mol%	0.41	22.40	5.59	14.38	9.66	5.03	13.10	8.07	6.3	11.66
Nitrogen	mol%	84.79	76.38	79.08	80.66	76.17	82.36	80.92	80.13	80.84	81.99
Carbon Dioxide	mol%	12.25	0.16	13.23	3.75	11.99	10.83	4.66	9.64	10.81	4.83
Methane	mol%	0.302	0.0245	0.456	0.0421	0.517	0.0186	0.0516	0.547	0.294	0.231
Ethane	mol%	0.0015	ND	ND	ND	0.0007	ND	ND	0.0022	ND	0.0005
Ethylene	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Propane	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Propylene	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iso-butane	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-butane	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iso-pentane	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-pentane	mol%	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexanes +	mol%	0.0037	0.005	0.0042	0.0008	0.0039	0.0018	0.0007	0.0027	0.0019	0.0018
Methane Stable Isotopes											
$\delta^{13}\text{C}$	%	NA	NA	-56.4	NA	-59.6	NA	NA	-62.3	NA	-56.6
δD	%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes

Bolded values detected in the sample.

ND - Not Detected

NA - Not Analyzed (insufficient volume)

Table 4
Dissolved Gas Data Summary
 Sulphur Dome
 Calcasieu Parish, Louisiana

Component	Sample Location Sample ID	WW #19		WW #40		Cottages Well	SN 57788 6X Brine 1/25/23 Brine
		019-1055		019-1603			
		Sample Date Sampler	1/26/23 ERM	3/30/23 ERM	4/27/23 ERM	3/30/23 ERM	
Component	Units			Water Well			
Carbon Monoxide	mol%	ND	ND	ND	ND	ND	ND
Helium	mol%	NA	NA	NA	NA	NA	NA
Hydrogen	mol%	ND	ND	ND	ND	ND	ND
Argon	mol%	1.39	1.23	1.68	1.26	1.43	1.91
Oxygen	mol%	9.78	13.74	9.15	11.67	20.30	0.74
Nitrogen	mol%	82	80.18	78.32	82.50	70.51	79.17
Carbon Dioxide	mol%	6.53	4.67	10.43	3.77	7.28	5.31
Methane	mol%	0.3	0.180	0.411	0.802	0.476	11.72
Ethane	mol%	0.0013	0.0007	0.0017	0.0009	ND	0.462
Ethylene	mol%	ND	ND	ND	ND	ND	0.0193
Propane	mol%	ND	ND	ND	ND	ND	0.389
Propylene	mol%	ND	ND	ND	ND	ND	0.0006
Iso-butane	mol%	ND	ND	ND	ND	ND	0.0312
N-butane	mol%	ND	ND	ND	ND	ND	0.0893
Iso-pentane	mol%	ND	ND	ND	ND	ND	0.0162
N-pentane	mol%	ND	ND	ND	ND	ND	0.0193
Hexanes +	mol%	0.002	0.0015	0.0034	0.0013	0.0015	0.12
Methane Stable Isotopes							
$\delta^{13}\text{C}$	‰	-53.9	-53.5	-52.7	-89.5	-76.1	-38.98
δD	‰	NA	NA	NA	-282	NA	-171.7

Notes

Bolded values detected in the sample.

ND - Not Detected

NA - Not Analyzed (insufficient volume)

Table 4
Oil Data Summary
 Sulphur Dome
 Calcasieu Parish, Louisiana

Lab Sample ID: 2022-NEDR-000656-001 2022-NEDR-000TBN 2022-NEDR-001041-019 2022-NEDR-001562-001 2023-NEDR-000085-002 1030-23040178-001A 2022-NEDR-001562-002 2023-NEDR-000085-003

Sample ID	Westlake 7B	Westlake 7B	Westlake 7B	Westlake 7B	Westlake 7B	7B Oil	Yellowrock 969	Pad Oil
Sample Date	5/11/22	6/14/22	8/16/22	11/2/22	1/18/23	3/30/23	11/2/22	1/18/23
Location	Shore Tank @	Shore Tank @	7B Well	7B Well	7B Brine Well	7B Oil frac tank	Yellowrock 969	Pad Oil
Constituent	Boardwalk Composite	Boardwalk Composite					Well Sample	Pump Oil
Units	Intertek	Intertek	Intertek	Intertek	Intertek	ERM	Intertek	Intertek
Average API Gravity °	30.3	32.8	34.1	32.8	34	33.6	26.0	29.1
Sulfur Wt %	1.48	1.3788	1.36	1.38	1.4	1.37	0.302	1.17
Vanadium mg/kg	20.6	4.035	2.85	22.8	22.8	100	1.23	19
Nickel mg/kg	26.2	1.401	0.986	6.11	5.88	26	7.04	4.94
Iron mg/kg	<0.1	2.304	0.014	0.002	0	12	6.57	24.5
Salt lb/1000 bbl	<1.0	0.57	5	<1.0	2.1	18	363.36	46.7
Organic Chloride mg/kg	5.1	4.5	6.9	4.8	2.5	<1.0	89.0	63.7
Total Chloride mg/kg	5.5	5.19	10.5	5.5	9.7	NA	146.1	202.9
Inorganic Chloride mg/kg	0.4	0.69	3.7	0.7	7.2	NA	57.1	139.2

Notes:

< Not detected at the reporting limit shown.

Bolded values detected in sample

NA - Not Analyzed

ATTACHMENT 1: LABORATORY REPORTS



Certificate of Analysis

Number: 1030-23050143-001A

Houston Laboratories

8820 Interchange Drive

Houston, TX 77054

Phone 713-660-0901

Scott Himes
ERM
840 W. Sam Houston Parkway North
Houston, TX 77024-4613

May 19, 2023

Station Name: 209459
Method: ASTM D-86
Analyzed: 05/15/2023 00:00:00 by FSN

Sampled By:
Sample Of: Liquid Spot
Sample Date: 05/02/2023 10:45
Sample Conditions:

ASTM D-86 Distillation

% Recovery	°F @ 770 mm Hg
Initial Boiling Point	306
5	446
10	NR
20	NR
30	NR
40	NR
50	NR
60	NR
70	NR
80	NR
85	NR
90	NR
95	NR
Final Boiling Point	500
Volume % Recovery	9.0
Volume % Residue	91.0
Volume % Loss	0.0

Comments: Visual color is crude.
IBP to 400°F Naphtha Cut Mass Fraction = 0.0902

Data reviewed by: Michael Staley, ASTM Manager

Quality Assurance:

The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.



Certificate of Analysis

Number: 1030-23050143-001A

Houston Laboratories

8820 Interchange Drive

Houston, TX 77054

Phone 713-660-0901

Scott Himes
ERM
840 W. Sam Houston Parkway North
Houston, TX 77024-4613

May 19, 2023

Station Name: 209459
Sample Conditions:

Sampled By:
Sample Of: Liquid Spot
Sample Date: 05/02/2023 10:45

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Salt in Crude Oil	ASTM D-3230	1290.0	lbs/1000 bbls		ES	05/18/2023
Sulfur Content by X-ray	ASTM D-4294	0.435	wt%		CMN	05/16/2023
Organic Chloride	ASTM D-4929	<1.0	ppmw		FSN	05/17/2023
API Gravity @ 60.01 °F	ASTM D-5002	22.81	°		DKK	05/18/2023
Specific Gravity @ 60.01/60.01 °F	ASTM D-5002	0.9170			DKK	05/18/2023
Density @ 60.01 °F	ASTM D-5002	0.9161	g/ml		DKK	05/18/2023
Nickel	ASTM D-5708A	8	ppmw		CMN	05/09/2023
Vanadium	ASTM D-5708A	2	ppmw		CMN	05/09/2023
Iron	ASTM D-5708A	13	ppmw		CMN	05/09/2023

Comments:

AS-D-4929: Sample analyzed by ASTM D-4929 procedure B.
Mass Fraction = 0.0902

Data reviewed by: Michael Staley, ASTM Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.



Certificate of Analysis

Number: 1030-23050143-002A

Houston Laboratories

8820 Interchange Drive

Houston, TX 77054

Phone 713-660-0901

Scott Himes
ERM
840 W. Sam Houston Parkway North
Houston, TX 77024-4613

May 19, 2023

Station Name: 185997
Method: ASTM D-86
Analyzed: 05/15/2023 00:00:00 by FSN

Sampled By:
Sample Of: Liquid Spot
Sample Date: 05/02/2023 11:30
Sample Conditions:

ASTM D-86 Distillation

% Recovery	°F @ 767 mm Hg
Initial Boiling Point	202
5	474
10	NR
20	NR
30	NR
40	NR
50	NR
60	NR
70	NR
80	NR
85	NR
90	NR
95	NR
Final Boiling Point	500
Volume % Recovery	7.0
Volume % Residue	93.0
Volume % Loss	0.0

Comments: IBP to 400°F Naphtha Cut Mass Fraction = 0.0663
Visual color is crude.

Data reviewed by: Michael Staley, ASTM Manager

Quality Assurance:

The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.



Certificate of Analysis

Number: 1030-23050143-002A

Houston Laboratories

8820 Interchange Drive

Houston, TX 77054

Phone 713-660-0901

Scott Himes
ERM
840 W. Sam Houston Parkway North
Houston, TX 77024-4613

May 19, 2023

Station Name: 185997

Sample Conditions:

Sampled By:

Sample Of: Liquid Spot

Sample Date: 05/02/2023 11:30

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Salt in Crude Oil	ASTM D-3230	1015.0	lbs/1000 bbls		ES	05/18/2023
Sulfur Content by X-ray	ASTM D-4294	0.407	wt%	CMN	05/16/2023	
Organic Chloride	ASTM D-4929	<1.0	ppmw	FSN	05/17/2023	
API Gravity @ 60.01 °F	ASTM D-5002	21.53	°	DKK	05/18/2023	
Specific Gravity @ 60.01/60.01 °F	ASTM D-5002	0.9246		DKK	05/18/2023	
Density @ 60.01 °F	ASTM D-5002	0.9237	g/ml	DKK	05/18/2023	
Nickel	ASTM D-5708A	9	ppmw	CMN	05/09/2023	
Vanadium	ASTM D-5708A	2	ppmw	CMN	05/09/2023	
Iron	ASTM D-5708A	6	ppmw	CMN	05/09/2023	

Comments:

AS-D-4929: Sample analyzed by ASTM D-4929 procedure B.
Mass Fraction = 0.0663

Data reviewed by: Michael Staley, ASTM Manager

Quality Assurance:

The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

SPL, Inc.
Analysis Request Chain of Custody Record

In-Person

						SPL Work Order No.:	Acct. Mgr. Code:	Dept. Code:	Page:	Pages:			
									1	1			
Report To: (Company Name):		ERM		Project/Station Name:		Project/Station Number:		Project/Station Location:		Requested TAT*			
Address:		840 W. Sam Houston Parkway North Suite 600		Special Instructions:									
City/State/Zip:		Houston	TX	77024-4613						10 business days			
Contact:		Scott Himes	Scott.Himes@erm.com		Indicate Billing Type: (Place "X", where appropriate)		Net 30 day Acct.	Check #					
Phone:		832-209-8811	Fax:			Credit Card		<<<Contact SPL, Inc for CC payment arrangements.		* Surcharges May Apply (See quote for details)			
Invoice To: (Company Name):		ERM						Requested Analysis (Place an "X" next to Sample ID below)					
Address:		840 W. Sam Houston Parkway North Suite 600		<small>† Terms: Cylinders will be rented for \$10/cyl. All cylinders checked out are to be returned within 21 days, whether they contain sample or not. Cylinders not returned after 30 days will be considered lost and will be billed at current replacement cost.</small>		AS-D-5002	AS-D-4294	ASTM D-5708	AS-D-3230	ASTM D-86-IBP-400°F	AS-D-4929		
City/State/Zip:		Houston	TX			77024-4613							
Contact:		Scott Himes	Scott.Himes@erm.com										
Phone:		832-209-8811	Fax:										
Client PO# or Ref. No.:													
Contract/Proposal #: (i.e. SPLQ####)		SPLQ10978											
Sample ID (used to log/track sample)	Sample Date	Sample Time	Sample Type (Gas/Liq./Solid)	Duplicate	Composite	Spot	Cylinder Tracking Info'					Comments	
							Cylinder #	Date Out	Date In	X	X		X
209459	5/2/23	1045	Liq		X								
185997	5/2/23	1130	Liq		X								
Sampled By-Print Name:						Received By-Company:							
Signature:													
Relinquished By-Print Name:				Date:	Time:	Received By-Print Name:				<i>D. Guinn</i>			
Signature:						Signature:				Date: 05/03/23			
Relinquished By-Print Name:				Date:	Time:	Received By-Print Name:							
Signature:						Signature:							
Relinquished By-Print Name:				Date:	Time:	Received By-Print Name:							
Signature:						Signature:							
Choose SPL Facility>>>		Corporate HQ - Houston, TX		Ship to Address:		8820 Interchange Dr., Houston, TX 77054				Phone: 713.660.0901			
Note - As a convenience to our clients, this form is available in an electronic format. Please contact one of our offices above for the form to be e-mailed to you.													



right solutions.
right partner.

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

May 11, 2023

Scott Himes
Environmental Resources Mgmt.
CityCentre Four
840 W. Sam Houston Pkwy., Suite 600
Houston, TX 77024

Work Order: **HS23041840**

Laboratory Results for: **Sulphur Dome**

Dear Scott Himes,

ALS Environmental received 5 sample(s) on Apr 28, 2023 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

A handwritten signature in black ink that reads "Bernadette Fini".

Generated By: JUMOKE.LAWAL

Bernadette A. Fini
Project Manager

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
Work Order: HS23041840

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS23041840-01	019-1055	Water		27-Apr-2023 10:25	28-Apr-2023 09:47	<input type="checkbox"/>
HS23041840-02	019-995	Water		27-Apr-2023 11:15	28-Apr-2023 09:47	<input type="checkbox"/>
HS23041840-03	Cottages Well	Water		27-Apr-2023 12:30	28-Apr-2023 09:47	<input type="checkbox"/>
HS23041840-04	019-580	Water		27-Apr-2023 13:00	28-Apr-2023 09:47	<input type="checkbox"/>
HS23041840-05	019-582	Water		27-Apr-2023 13:20	28-Apr-2023 09:47	<input type="checkbox"/>

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
Work Order: HS23041840

CASE NARRATIVE**GC Semivolatiles by Method MA EPH****Batch ID: 193335**

Sample ID: HS23041809-01MS

- MS was performed on an unrelated sample

GC Volatiles by Method MA VPH**Batch ID: R434182,R434186,R434592,R434597**

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Volatiles by Method SW8260**Batch ID: R434166**

Sample ID: HS23041854-02MS

- MS and MSD are for an unrelated sample

Metals by Method SW7470A**Batch ID: 193593**

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Metals by Method SW6020A**Batch ID: 193582**

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM2320B**Batch ID: R434821**

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method E376.1**Batch ID: R434891**

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method M2540C**Batch ID: R434366**

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SM4500 S2-F**Batch ID: R434339**

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
Work Order: HS23041840

CASE NARRATIVE**WetChemistry by Method SW9056****Batch ID: R434176****Sample ID: 019-1055 (HS23041840-01MS)**

- The recovery of the Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) associated with this analyte was outside of the established control limits. However, the LCS was within control limits. The recovery of the MS/MSD may be due to sample matrix interference. (Bromide)

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-1055
 Collection Date: 27-Apr-2023 10:25

ANALYTICAL REPORT
 WorkOrder:HS23041840
 Lab ID:HS23041840-01
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C							
				Method:SW8260			Analyst: PC
Benzene	U		0.20	1.0	ug/L	1	02-May-2023 16:24
Ethylbenzene	U		0.30	1.0	ug/L	1	02-May-2023 16:24
m,p-Xylene	U		0.50	2.0	ug/L	1	02-May-2023 16:24
o-Xylene	U		0.30	1.0	ug/L	1	02-May-2023 16:24
Toluene	U		0.20	1.0	ug/L	1	02-May-2023 16:24
Xylenes, Total	U		0.30	1.0	ug/L	1	02-May-2023 16:24
<i>Surr: 1,2-Dichloroethane-d4</i>	71.6			70-126	%REC	1	02-May-2023 16:24
<i>Surr: 4-Bromofluorobenzene</i>	89.4			77-113	%REC	1	02-May-2023 16:24
<i>Surr: Dibromofluoromethane</i>	80.8			77-123	%REC	1	02-May-2023 16:24
<i>Surr: Toluene-d8</i>	101			82-127	%REC	1	02-May-2023 16:24
MASSACHUSETTS VPH, FEB 2018, REV 2.1							
				Method:MA VPH			Analyst: PJM
Aliphatics >C6 - C8	U		0.0100	0.0100	mg/L	1	03-May-2023 02:20
Aliphatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 02:20
Aromatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 02:20
<i>Surr: 2,5-Dibromotoluene (Aliphatic)</i>	111			70-130	%REC	1	03-May-2023 02:20
<i>Surr: 2,5-Dibromotoluene (Aromatic)</i>	117			70-130	%REC	1	03-May-2023 02:20
MASSACHUSETTS EPH R2.1, DEC 2019							
				Method:MA EPH	Prep:SW3510 / 04-May-2023		Analyst: PPM
Aliphatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 01:41
Aliphatics >C12 - C16	U		0.00200	0.00200	mg/L	1	11-May-2023 01:41
Aliphatics >C16 - C35	U		0.00800	0.00800	mg/L	1	11-May-2023 01:41
Aromatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 02:13
Aromatics >C12 - C16	U		0.00400	0.00400	mg/L	1	11-May-2023 02:13
Aromatics >C16 - C21	U		0.00300	0.00300	mg/L	1	11-May-2023 02:13
Aromatics >C21 - C35	U		0.00900	0.00900	mg/L	1	11-May-2023 02:13
<i>Surr: 1-Chlorooctadecane</i>	81.6			40-140	%REC	1	11-May-2023 01:41
<i>Surr: 2-Bromonaphthalene</i>	119			40-140	%REC	1	11-May-2023 02:13
<i>Surr: 2-Fluorobiphenyl</i>	79.7			40-140	%REC	1	11-May-2023 02:13
<i>Surr: o-Terphenyl</i>	108			40-140	%REC	1	11-May-2023 02:13

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-1055
 Collection Date: 27-Apr-2023 10:25

ANALYTICAL REPORT

WorkOrder:HS23041840
 Lab ID:HS23041840-01
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A Method:SW6020A				Prep:SW3010A / 09-May-2023		Analyst: JC	
Arsenic	0.000461	J	0.000400	0.00200	mg/L	1	10-May-2023 14:34
Barium	0.242		0.00190	0.00400	mg/L	1	10-May-2023 14:34
Cadmium	U		0.000200	0.00200	mg/L	1	10-May-2023 14:34
Calcium	24.7		0.0340	0.500	mg/L	1	10-May-2023 14:34
Chromium	U		0.000400	0.00400	mg/L	1	10-May-2023 14:34
Iron	3.48		0.0120	0.200	mg/L	1	10-May-2023 14:34
Lead	U		0.000600	0.00200	mg/L	1	10-May-2023 14:34
Magnesium	7.32		0.0100	0.200	mg/L	1	10-May-2023 14:34
Manganese	0.353		0.000700	0.00500	mg/L	1	10-May-2023 14:34
Nickel	U		0.000600	0.00200	mg/L	1	10-May-2023 14:34
Potassium	2.54		0.0180	0.200	mg/L	1	10-May-2023 14:34
Selenium	U		0.00110	0.00200	mg/L	1	10-May-2023 14:34
Silver	U		0.000200	0.00200	mg/L	1	10-May-2023 14:34
Sodium	28.5		0.0140	0.200	mg/L	1	10-May-2023 14:34
Strontium	0.225		0.000200	0.00500	mg/L	1	10-May-2023 14:34
Vanadium	0.00320	J	0.000600	0.00500	mg/L	1	10-May-2023 14:34
Zinc	0.0163		0.00200	0.00400	mg/L	1	10-May-2023 14:34
MERCURY BY SW7470A Method:SW7470A				Prep:SW7470A / 09-May-2023		Analyst: JS	
Mercury	U		0.0000300	0.000200	mg/L	1	09-May-2023 17:39
HYDROGEN SULFIDE BY E376.1 Method:E376.1				Analyst: CD			
Hydrogen Sulfide	U		0.500	1.00	mg/L	1	04-May-2023 07:49
TOTAL DISSOLVED SOLIDS BY SM2540C -2011 Method:M2540C				Analyst: DC			
Total Dissolved Solids (Residue, Filterable)	220		5.00	10.0	mg/L	1	03-May-2023 12:30
ALKALINITY BY SM 2320B-2011 Method:SM2320B				Analyst: JAC			
Alkalinity, Bicarbonate (As CaCO ₃)	119		5.00	5.00	mg/L	1	09-May-2023 17:38
Alkalinity, Carbonate (As CaCO ₃)	U		5.00	5.00	mg/L	1	09-May-2023 17:38
SULFIDE BY SM4500 S2-F-2011 Method:SM4500 S2-F				Analyst: CD			
Sulfide	U		1.70	2.00	mg/L	1	04-May-2023 12:45
ANIONS BY SW9056A Method:SW9056				Analyst: TH			
Bromide	U		0.0300	0.100	mg/L	1	02-May-2023 18:24
Chloride	40.6		0.200	0.500	mg/L	1	02-May-2023 18:24
Sulfate	3.55		0.200	0.500	mg/L	1	02-May-2023 18:24

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-995
 Collection Date: 27-Apr-2023 11:15

ANALYTICAL REPORT

WorkOrder:HS23041840
 Lab ID:HS23041840-02
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		Method:SW8260					
Benzene	U		0.20	1.0	ug/L	1	02-May-2023 16:45
Ethylbenzene	U		0.30	1.0	ug/L	1	02-May-2023 16:45
m,p-Xylene	U		0.50	2.0	ug/L	1	02-May-2023 16:45
o-Xylene	U		0.30	1.0	ug/L	1	02-May-2023 16:45
Toluene	U		0.20	1.0	ug/L	1	02-May-2023 16:45
Xylenes, Total	U		0.30	1.0	ug/L	1	02-May-2023 16:45
<i>Surr: 1,2-Dichloroethane-d4</i>	72.3			70-126	%REC	1	02-May-2023 16:45
<i>Surr: 4-Bromofluorobenzene</i>	88.1			77-113	%REC	1	02-May-2023 16:45
<i>Surr: Dibromofluoromethane</i>	82.7			77-123	%REC	1	02-May-2023 16:45
<i>Surr: Toluene-d8</i>	99.8			82-127	%REC	1	02-May-2023 16:45
MASSACHUSETTS VPH, FEB 2018, REV 2.1		Method:MA VPH					
Aliphatics >C6 - C8	U		0.0100	0.0100	mg/L	1	03-May-2023 04:14
Aliphatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 04:14
Aromatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 04:14
<i>Surr: 2,5-Dibromotoluene (Aliphatic)</i>	116			70-130	%REC	1	03-May-2023 04:14
<i>Surr: 2,5-Dibromotoluene (Aromatic)</i>	118			70-130	%REC	1	03-May-2023 04:14
MASSACHUSETTS EPH R2.1, DEC 2019		Method:MA EPH					
Aliphatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 02:13
Aliphatics >C12 - C16	U		0.00200	0.00200	mg/L	1	11-May-2023 02:13
Aliphatics >C16 - C35	U		0.00800	0.00800	mg/L	1	11-May-2023 02:13
Aromatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 02:44
Aromatics >C12 - C16	U		0.00400	0.00400	mg/L	1	11-May-2023 02:44
Aromatics >C16 - C21	U		0.00300	0.00300	mg/L	1	11-May-2023 02:44
Aromatics >C21 - C35	U		0.00900	0.00900	mg/L	1	11-May-2023 02:44
<i>Surr: 1-Chlorooctadecane</i>	79.4			40-140	%REC	1	11-May-2023 02:13
<i>Surr: 2-Bromonaphthalene</i>	101			40-140	%REC	1	11-May-2023 02:44
<i>Surr: 2-Fluorobiphenyl</i>	84.4			40-140	%REC	1	11-May-2023 02:44
<i>Surr: o-Terphenyl</i>	87.3			40-140	%REC	1	11-May-2023 02:44

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-995
 Collection Date: 27-Apr-2023 11:15

ANALYTICAL REPORT
 WorkOrder:HS23041840
 Lab ID:HS23041840-02
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A				Method:SW6020A		Prep:SW3010A / 09-May-2023	
Arsenic	0.000739	J	0.000400	0.00200	mg/L	1	10-May-2023 14:36
Barium	0.242		0.00190	0.00400	mg/L	1	10-May-2023 14:36
Cadmium	U		0.000200	0.00200	mg/L	1	10-May-2023 14:36
Calcium	27.7		0.0340	0.500	mg/L	1	10-May-2023 14:36
Chromium	U		0.000400	0.00400	mg/L	1	10-May-2023 14:36
Iron	3.42		0.0120	0.200	mg/L	1	10-May-2023 14:36
Lead	U		0.000600	0.00200	mg/L	1	10-May-2023 14:36
Magnesium	8.14		0.0100	0.200	mg/L	1	10-May-2023 14:36
Manganese	0.416		0.000700	0.00500	mg/L	1	10-May-2023 14:36
Nickel	0.00531		0.000600	0.00200	mg/L	1	10-May-2023 14:36
Potassium	2.79		0.0180	0.200	mg/L	1	10-May-2023 14:36
Selenium	U		0.00110	0.00200	mg/L	1	10-May-2023 14:36
Silver	U		0.000200	0.00200	mg/L	1	10-May-2023 14:36
Sodium	32.2		0.0140	0.200	mg/L	1	10-May-2023 14:36
Strontium	0.244		0.000200	0.00500	mg/L	1	10-May-2023 14:36
Vanadium	0.00299	J	0.000600	0.00500	mg/L	1	10-May-2023 14:36
Zinc	0.00276	J	0.00200	0.00400	mg/L	1	10-May-2023 14:36
MERCURY BY SW7470A				Method:SW7470A		Prep:SW7470A / 09-May-2023	
Mercury	U		0.0000300	0.000200	mg/L	1	09-May-2023 17:41
HYDROGEN SULFIDE BY E376.1				Method:E376.1		Analyst: CD	
Hydrogen Sulfide	U		0.500	1.00	mg/L	1	04-May-2023 07:49
TOTAL DISSOLVED SOLIDS BY SM2540C -2011				Method:M2540C		Analyst: DC	
Total Dissolved Solids (Residue, Filterable)	202		5.00	10.0	mg/L	1	03-May-2023 12:30
ALKALINITY BY SM 2320B-2011				Method:SM2320B		Analyst: JAC	
Alkalinity, Bicarbonate (As CaCO ₃)	124		5.00	5.00	mg/L	1	09-May-2023 17:43
Alkalinity, Carbonate (As CaCO ₃)	U		5.00	5.00	mg/L	1	09-May-2023 17:43
SULFIDE BY SM4500 S2-F-2011				Method:SM4500 S2-F		Analyst: CD	
Sulfide	U		1.70	2.00	mg/L	1	04-May-2023 12:45
ANIONS BY SW9056A				Method:SW9056		Analyst: TH	
Bromide	U		0.0300	0.100	mg/L	1	02-May-2023 18:42
Chloride	37.5		0.200	0.500	mg/L	1	02-May-2023 18:42
Sulfate	2.12		0.200	0.500	mg/L	1	02-May-2023 18:42

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: Cottages Well
 Collection Date: 27-Apr-2023 12:30

ANALYTICAL REPORT
 WorkOrder:HS23041840
 Lab ID:HS23041840-03
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		Method:SW8260					
Benzene	U		0.20	1.0	ug/L	1	02-May-2023 17:06
Ethylbenzene	U		0.30	1.0	ug/L	1	02-May-2023 17:06
m,p-Xylene	U		0.50	2.0	ug/L	1	02-May-2023 17:06
o-Xylene	U		0.30	1.0	ug/L	1	02-May-2023 17:06
Toluene	U		0.20	1.0	ug/L	1	02-May-2023 17:06
Xylenes, Total	U		0.30	1.0	ug/L	1	02-May-2023 17:06
<i>Surr: 1,2-Dichloroethane-d4</i>	72.2			70-126	%REC	1	02-May-2023 17:06
<i>Surr: 4-Bromofluorobenzene</i>	87.8			77-113	%REC	1	02-May-2023 17:06
<i>Surr: Dibromofluoromethane</i>	80.6			77-123	%REC	1	02-May-2023 17:06
<i>Surr: Toluene-d8</i>	101			82-127	%REC	1	02-May-2023 17:06
MASSACHUSETTS VPH, FEB 2018, REV 2.1		Method:MA VPH					
Aliphatics >C6 - C8	U		0.0100	0.0100	mg/L	1	03-May-2023 04:53
Aliphatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 04:53
Aromatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 04:53
<i>Surr: 2,5-Dibromotoluene (Aliphatic)</i>	117			70-130	%REC	1	03-May-2023 04:53
<i>Surr: 2,5-Dibromotoluene (Aromatic)</i>	118			70-130	%REC	1	03-May-2023 04:53
MASSACHUSETTS EPH R2.1, DEC 2019		Method:MA EPH					
Aliphatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 02:44
Aliphatics >C12 - C16	U		0.00200	0.00200	mg/L	1	11-May-2023 02:44
Aliphatics >C16 - C35	U		0.00800	0.00800	mg/L	1	11-May-2023 02:44
Aromatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 03:16
Aromatics >C12 - C16	U		0.00400	0.00400	mg/L	1	11-May-2023 03:16
Aromatics >C16 - C21	U		0.00300	0.00300	mg/L	1	11-May-2023 03:16
Aromatics >C21 - C35	U		0.00900	0.00900	mg/L	1	11-May-2023 03:16
<i>Surr: 1-Chlorooctadecane</i>	85.6			40-140	%REC	1	11-May-2023 02:44
<i>Surr: 2-Bromonaphthalene</i>	86.1			40-140	%REC	1	11-May-2023 03:16
<i>Surr: 2-Fluorobiphenyl</i>	64.5			40-140	%REC	1	11-May-2023 03:16
<i>Surr: o-Terphenyl</i>	76.0			40-140	%REC	1	11-May-2023 03:16

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: Cottages Well
 Collection Date: 27-Apr-2023 12:30

ANALYTICAL REPORT

WorkOrder:HS23041840
 Lab ID:HS23041840-03
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A Method:SW6020A				Prep:SW3010A / 09-May-2023		Analyst: JC	
Arsenic	0.000464	J	0.000400	0.00200	mg/L	1	10-May-2023 14:38
Barium	0.187		0.00190	0.00400	mg/L	1	10-May-2023 14:38
Cadmium	U		0.000200	0.00200	mg/L	1	10-May-2023 14:38
Calcium	14.5		0.0340	0.500	mg/L	1	10-May-2023 14:38
Chromium	U		0.000400	0.00400	mg/L	1	10-May-2023 14:38
Iron	2.48		0.0120	0.200	mg/L	1	10-May-2023 14:38
Lead	U		0.000600	0.00200	mg/L	1	10-May-2023 14:38
Magnesium	3.97		0.0100	0.200	mg/L	1	10-May-2023 14:38
Manganese	0.192		0.000700	0.00500	mg/L	1	10-May-2023 14:38
Nickel	0.00330		0.000600	0.00200	mg/L	1	10-May-2023 14:38
Potassium	2.24		0.0180	0.200	mg/L	1	10-May-2023 14:38
Selenium	U		0.00110	0.00200	mg/L	1	10-May-2023 14:38
Silver	U		0.000200	0.00200	mg/L	1	10-May-2023 14:38
Sodium	65.2		0.0140	0.200	mg/L	1	10-May-2023 14:38
Strontium	0.167		0.000200	0.00500	mg/L	1	10-May-2023 14:38
Vanadium	0.00270	J	0.000600	0.00500	mg/L	1	10-May-2023 14:38
Zinc	0.320		0.00200	0.00400	mg/L	1	10-May-2023 14:38
MERCURY BY SW7470A Method:SW7470A				Prep:SW7470A / 09-May-2023		Analyst: JS	
Mercury	U		0.0000300	0.000200	mg/L	1	09-May-2023 17:42
HYDROGEN SULFIDE BY E376.1 Method:E376.1				Analyst: CD			
Hydrogen Sulfide	U		0.500	1.00	mg/L	1	04-May-2023 07:49
TOTAL DISSOLVED SOLIDS BY SM2540C -2011 Method:M2540C				Analyst: DC			
Total Dissolved Solids (Residue, Filterable)	250		5.00	10.0	mg/L	1	03-May-2023 12:30
ALKALINITY BY SM 2320B-2011 Method:SM2320B				Analyst: JAC			
Alkalinity, Bicarbonate (As CaCO ₃)	134		5.00	5.00	mg/L	1	09-May-2023 17:48
Alkalinity, Carbonate (As CaCO ₃)	U		5.00	5.00	mg/L	1	09-May-2023 17:48
SULFIDE BY SM4500 S2-F-2011 Method:SM4500 S2-F				Analyst: CD			
Sulfide	U		1.70	2.00	mg/L	1	04-May-2023 12:45
ANIONS BY SW9056A Method:SW9056				Analyst: TH			
Bromide	0.105		0.0300	0.100	mg/L	1	02-May-2023 18:48
Chloride	55.6		0.200	0.500	mg/L	1	02-May-2023 18:48
Sulfate	0.286	J	0.200	0.500	mg/L	1	02-May-2023 18:48

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-580
 Collection Date: 27-Apr-2023 13:00

ANALYTICAL REPORT

WorkOrder:HS23041840
 Lab ID:HS23041840-04
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C		Method:SW8260					
Benzene	U		0.20	1.0	ug/L	1	02-May-2023 17:27
Ethylbenzene	U		0.30	1.0	ug/L	1	02-May-2023 17:27
m,p-Xylene	U		0.50	2.0	ug/L	1	02-May-2023 17:27
o-Xylene	U		0.30	1.0	ug/L	1	02-May-2023 17:27
Toluene	U		0.20	1.0	ug/L	1	02-May-2023 17:27
Xylenes, Total	U		0.30	1.0	ug/L	1	02-May-2023 17:27
<i>Surr: 1,2-Dichloroethane-d4</i>	71.7			70-126	%REC	1	02-May-2023 17:27
<i>Surr: 4-Bromofluorobenzene</i>	89.2			77-113	%REC	1	02-May-2023 17:27
<i>Surr: Dibromofluoromethane</i>	82.1			77-123	%REC	1	02-May-2023 17:27
<i>Surr: Toluene-d8</i>	99.7			82-127	%REC	1	02-May-2023 17:27
MASSACHUSETTS VPH, FEB 2018, REV 2.1		Method:MA VPH					
Aliphatics >C6 - C8	U		0.0100	0.0100	mg/L	1	03-May-2023 05:31
Aliphatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 05:31
Aromatics >C8 - C10	U		0.0100	0.0100	mg/L	1	03-May-2023 05:31
<i>Surr: 2,5-Dibromotoluene (Aliphatic)</i>	120			70-130	%REC	1	03-May-2023 05:31
<i>Surr: 2,5-Dibromotoluene (Aromatic)</i>	119			70-130	%REC	1	03-May-2023 05:31
MASSACHUSETTS EPH R2.1, DEC 2019		Method:MA EPH					
Aliphatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 04:19
Aliphatics >C12 - C16	U		0.00200	0.00200	mg/L	1	11-May-2023 04:19
Aliphatics >C16 - C35	U		0.00800	0.00800	mg/L	1	11-May-2023 04:19
Aromatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 04:51
Aromatics >C12 - C16	U		0.00400	0.00400	mg/L	1	11-May-2023 04:51
Aromatics >C16 - C21	U		0.00300	0.00300	mg/L	1	11-May-2023 04:51
Aromatics >C21 - C35	U		0.00900	0.00900	mg/L	1	11-May-2023 04:51
<i>Surr: 1-Chlorooctadecane</i>	61.4			40-140	%REC	1	11-May-2023 04:19
<i>Surr: 2-Bromonaphthalene</i>	97.6			40-140	%REC	1	11-May-2023 04:51
<i>Surr: 2-Fluorobiphenyl</i>	95.7			40-140	%REC	1	11-May-2023 04:51
<i>Surr: o-Terphenyl</i>	87.8			40-140	%REC	1	11-May-2023 04:51

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-580
 Collection Date: 27-Apr-2023 13:00

ANALYTICAL REPORT
 WorkOrder:HS23041840
 Lab ID:HS23041840-04
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A				Method:SW6020A		Prep:SW3010A / 09-May-2023	
Arsenic	0.000615	J	0.000400	0.00200	mg/L	1	10-May-2023 14:45
Barium	0.205		0.00190	0.00400	mg/L	1	10-May-2023 14:45
Cadmium	U		0.000200	0.00200	mg/L	1	10-May-2023 14:45
Calcium	15.8		0.0340	0.500	mg/L	1	10-May-2023 14:45
Chromium	0.000559	J	0.000400	0.00400	mg/L	1	10-May-2023 14:45
Iron	2.72		0.0120	0.200	mg/L	1	10-May-2023 14:45
Lead	U		0.000600	0.00200	mg/L	1	10-May-2023 14:45
Magnesium	4.32		0.0100	0.200	mg/L	1	10-May-2023 14:45
Manganese	0.215		0.000700	0.00500	mg/L	1	10-May-2023 14:45
Nickel	0.00368		0.000600	0.00200	mg/L	1	10-May-2023 14:45
Potassium	2.42		0.0180	0.200	mg/L	1	10-May-2023 14:45
Selenium	U		0.00110	0.00200	mg/L	1	10-May-2023 14:45
Silver	U		0.000200	0.00200	mg/L	1	10-May-2023 14:45
Sodium	71.5		0.0140	0.200	mg/L	1	10-May-2023 14:45
Strontium	0.183		0.000200	0.00500	mg/L	1	10-May-2023 14:45
Vanadium	0.00434	J	0.000600	0.00500	mg/L	1	10-May-2023 14:45
Zinc	0.350		0.00200	0.00400	mg/L	1	10-May-2023 14:45
MERCURY BY SW7470A				Method:SW7470A		Prep:SW7470A / 09-May-2023	
Mercury	U		0.0000300	0.000200	mg/L	1	09-May-2023 17:44
HYDROGEN SULFIDE BY E376.1				Method:E376.1		Analyst: CD	
Hydrogen Sulfide	U		0.500	1.00	mg/L	1	04-May-2023 07:49
TOTAL DISSOLVED SOLIDS BY SM2540C -2011				Method:M2540C		Analyst: DC	
Total Dissolved Solids (Residue, Filterable)	210		5.00	10.0	mg/L	1	03-May-2023 12:30
ALKALINITY BY SM 2320B-2011				Method:SM2320B		Analyst: JAC	
Alkalinity, Bicarbonate (As CaCO ₃)	116		5.00	5.00	mg/L	1	09-May-2023 17:54
Alkalinity, Carbonate (As CaCO ₃)	U		5.00	5.00	mg/L	1	09-May-2023 17:54
SULFIDE BY SM4500 S2-F-2011				Method:SM4500 S2-F		Analyst: CD	
Sulfide	U		1.70	2.00	mg/L	1	04-May-2023 12:45
ANIONS BY SW9056A				Method:SW9056		Analyst: TH	
Bromide	U		0.0300	0.100	mg/L	1	02-May-2023 18:54
Chloride	40.7		0.200	0.500	mg/L	1	02-May-2023 18:54
Sulfate	2.21		0.200	0.500	mg/L	1	02-May-2023 18:54

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-582
 Collection Date: 27-Apr-2023 13:20

ANALYTICAL REPORT

WorkOrder:HS23041840
 Lab ID:HS23041840-05
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
LOW LEVEL VOLATILES BY SW8260C							
Benzene	U		0.20	1.0	ug/L	1	02-May-2023 17:48
Ethylbenzene	U		0.30	1.0	ug/L	1	02-May-2023 17:48
m,p-Xylene	U		0.50	2.0	ug/L	1	02-May-2023 17:48
o-Xylene	U		0.30	1.0	ug/L	1	02-May-2023 17:48
Toluene	U		0.20	1.0	ug/L	1	02-May-2023 17:48
Xylenes, Total	U		0.30	1.0	ug/L	1	02-May-2023 17:48
<i>Surr: 1,2-Dichloroethane-d4</i>	71.0			70-126	%REC	1	02-May-2023 17:48
<i>Surr: 4-Bromofluorobenzene</i>	88.8			77-113	%REC	1	02-May-2023 17:48
<i>Surr: Dibromofluoromethane</i>	81.1			77-123	%REC	1	02-May-2023 17:48
<i>Surr: Toluene-d8</i>	100			82-127	%REC	1	02-May-2023 17:48
MASSACHUSETTS VPH, FEB 2018, REV 2.1							
Aliphatics >C6 - C8	U		0.0100	0.0100	mg/L	1	05-May-2023 13:39
Aliphatics >C8 - C10	U		0.0100	0.0100	mg/L	1	05-May-2023 13:39
Aromatics >C8 - C10	U		0.0100	0.0100	mg/L	1	05-May-2023 13:39
<i>Surr: 2,5-Dibromotoluene (Aliphatic)</i>	114			70-130	%REC	1	05-May-2023 13:39
<i>Surr: 2,5-Dibromotoluene (Aromatic)</i>	123			70-130	%REC	1	05-May-2023 13:39
MASSACHUSETTS EPH R2.1, DEC 2019							
Aliphatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 04:51
Aliphatics >C12 - C16	U		0.00200	0.00200	mg/L	1	11-May-2023 04:51
Aliphatics >C16 - C35	U		0.00800	0.00800	mg/L	1	11-May-2023 04:51
Aromatics >C10 - C12	U		0.00100	0.00100	mg/L	1	11-May-2023 05:22
Aromatics >C12 - C16	U		0.00400	0.00400	mg/L	1	11-May-2023 05:22
Aromatics >C16 - C21	U		0.00300	0.00300	mg/L	1	11-May-2023 05:22
Aromatics >C21 - C35	U		0.00900	0.00900	mg/L	1	11-May-2023 05:22
<i>Surr: 1-Chlorooctadecane</i>	61.7			40-140	%REC	1	11-May-2023 04:51
<i>Surr: 2-Bromonaphthalene</i>	91.6			40-140	%REC	1	11-May-2023 05:22
<i>Surr: 2-Fluorobiphenyl</i>	90.4			40-140	%REC	1	11-May-2023 05:22
<i>Surr: o-Terphenyl</i>	80.7			40-140	%REC	1	11-May-2023 05:22

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Environmental Resources Mgmt.
 Project: Sulphur Dome
 Sample ID: 019-582
 Collection Date: 27-Apr-2023 13:20

ANALYTICAL REPORT
 WorkOrder:HS23041840
 Lab ID:HS23041840-05
 Matrix:Water

ANALYSES	RESULT	QUAL	MDL	REPORT LIMIT	UNITS	DILUTION FACTOR	DATE ANALYZED
ICP-MS METALS BY SW6020A				Method:SW6020A		Prep:SW3010A / 09-May-2023	
Arsenic	0.000451	J	0.000400	0.00200	mg/L	1	10-May-2023 14:47
Barium	0.243		0.00190	0.00400	mg/L	1	10-May-2023 14:47
Cadmium	U		0.000200	0.00200	mg/L	1	10-May-2023 14:47
Calcium	25.8		0.0340	0.500	mg/L	1	10-May-2023 14:47
Chromium	U		0.000400	0.00400	mg/L	1	10-May-2023 14:47
Iron	6.09		0.0120	0.200	mg/L	1	10-May-2023 14:47
Lead	U		0.000600	0.00200	mg/L	1	10-May-2023 14:47
Magnesium	7.58		0.0100	0.200	mg/L	1	10-May-2023 14:47
Manganese	0.388		0.000700	0.00500	mg/L	1	10-May-2023 14:47
Nickel	U		0.000600	0.00200	mg/L	1	10-May-2023 14:47
Potassium	2.70		0.0180	0.200	mg/L	1	10-May-2023 14:47
Selenium	U		0.00110	0.00200	mg/L	1	10-May-2023 14:47
Silver	U		0.000200	0.00200	mg/L	1	10-May-2023 14:47
Sodium	30.2		0.0140	0.200	mg/L	1	10-May-2023 14:47
Strontium	0.231		0.000200	0.00500	mg/L	1	10-May-2023 14:47
Vanadium	0.00352	J	0.000600	0.00500	mg/L	1	10-May-2023 14:47
Zinc	0.0474		0.00200	0.00400	mg/L	1	10-May-2023 14:47
MERCURY BY SW7470A				Method:SW7470A		Prep:SW7470A / 09-May-2023	
Mercury	U		0.0000300	0.000200	mg/L	1	09-May-2023 17:46
HYDROGEN SULFIDE BY E376.1				Method:E376.1		Analyst: CD	
Hydrogen Sulfide	U		0.500	1.00	mg/L	1	04-May-2023 07:49
TOTAL DISSOLVED SOLIDS BY SM2540C -2011				Method:M2540C		Analyst: DC	
Total Dissolved Solids (Residue, Filterable)	236		5.00	10.0	mg/L	1	03-May-2023 12:30
ALKALINITY BY SM 2320B-2011				Method:SM2320B		Analyst: JAC	
Alkalinity, Bicarbonate (As CaCO ₃)	119		5.00	5.00	mg/L	1	09-May-2023 17:59
Alkalinity, Carbonate (As CaCO ₃)	U		5.00	5.00	mg/L	1	09-May-2023 17:59
SULFIDE BY SM4500 S2-F-2011				Method:SM4500 S2-F		Analyst: CD	
Sulfide	U		1.70	2.00	mg/L	1	04-May-2023 12:45
ANIONS BY SW9056A				Method:SW9056		Analyst: TH	
Bromide	U		0.0300	0.100	mg/L	1	02-May-2023 18:59
Chloride	40.4		0.200	0.500	mg/L	1	02-May-2023 18:59
Sulfate	2.69		0.200	0.500	mg/L	1	02-May-2023 18:59

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Weight / Prep Log**Client:** Environmental Resources Mgmt.**Project:** Sulphur Dome**WorkOrder:** HS23041840**Batch ID:** 193335**Start Date:** 04 May 2023 08:30**End Date:** 04 May 2023 12:00**Method:** MA EPH EXTRACTION-FRACTIONATION**Prep Code:** MA EPH_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS23041840-01	1	1000 (mL)	2 (mL)	0.002	1-litre amber glass, HCL to pH <2
HS23041840-02	1	1000 (mL)	2 (mL)	0.002	1-litre amber glass, HCL to pH <2
HS23041840-03	1	1000 (mL)	2 (mL)	0.002	1-litre amber glass, HCL to pH <2
HS23041840-04	1	1000 (mL)	2 (mL)	0.002	1-litre amber glass, HCL to pH <2
HS23041840-05	1	1000 (mL)	2 (mL)	0.002	1-litre amber glass, HCL to pH <2

Batch ID: 193582**Start Date:** 09 May 2023 12:30**End Date:** 09 May 2023 16:30**Method:** WATER - SW3010A**Prep Code:** 3010A

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS23041840-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-05		10 (mL)	10 (mL)	1	120 plastic HNO3

Batch ID: 193593**Start Date:** 09 May 2023 10:00**End Date:** 09 May 2023 13:00**Method:** MERCURY PREP BY 7470A- WATER**Prep Code:** HG_WPR

Sample ID	Container	Sample Wt/Vol	Final Volume	Prep Factor	
HS23041840-01		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-02		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-03		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-04		10 (mL)	10 (mL)	1	120 plastic HNO3
HS23041840-05		10 (mL)	10 (mL)	1	120 plastic HNO3

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: 193335 (0)		Test Name : MASSACHUSETTS EPH R2.1, DEC 2019			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25		04 May 2023 09:47	11 May 2023 02:13	1
HS23041840-01	019-1055	27 Apr 2023 10:25		04 May 2023 09:47	11 May 2023 01:41	1
HS23041840-02	019-995	27 Apr 2023 11:15		04 May 2023 09:47	11 May 2023 02:44	1
HS23041840-02	019-995	27 Apr 2023 11:15		04 May 2023 09:47	11 May 2023 02:13	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30		04 May 2023 09:47	11 May 2023 03:16	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30		04 May 2023 09:47	11 May 2023 02:44	1
HS23041840-04	019-580	27 Apr 2023 13:00		04 May 2023 09:47	11 May 2023 04:51	1
HS23041840-04	019-580	27 Apr 2023 13:00		04 May 2023 09:47	11 May 2023 04:19	1
HS23041840-05	019-582	27 Apr 2023 13:20		04 May 2023 09:47	11 May 2023 05:22	1
HS23041840-05	019-582	27 Apr 2023 13:20		04 May 2023 09:47	11 May 2023 04:51	1
Batch ID: 193582 (0)		Test Name : ICP-MS METALS BY SW6020A			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25		09 May 2023 12:30	10 May 2023 14:34	1
HS23041840-02	019-995	27 Apr 2023 11:15		09 May 2023 12:30	10 May 2023 14:36	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30		09 May 2023 12:30	10 May 2023 14:38	1
HS23041840-04	019-580	27 Apr 2023 13:00		09 May 2023 12:30	10 May 2023 14:45	1
HS23041840-05	019-582	27 Apr 2023 13:20		09 May 2023 12:30	10 May 2023 14:47	1
Batch ID: 193593 (0)		Test Name : MERCURY BY SW7470A			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25		09 May 2023 10:00	09 May 2023 17:39	1
HS23041840-02	019-995	27 Apr 2023 11:15		09 May 2023 10:00	09 May 2023 17:41	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30		09 May 2023 10:00	09 May 2023 17:42	1
HS23041840-04	019-580	27 Apr 2023 13:00		09 May 2023 10:00	09 May 2023 17:44	1
HS23041840-05	019-582	27 Apr 2023 13:20		09 May 2023 10:00	09 May 2023 17:46	1
Batch ID: R434166 (0)		Test Name : LOW LEVEL VOLATILES BY SW8260C			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			02 May 2023 16:24	1
HS23041840-02	019-995	27 Apr 2023 11:15			02 May 2023 16:45	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			02 May 2023 17:06	1
HS23041840-04	019-580	27 Apr 2023 13:00			02 May 2023 17:27	1
HS23041840-05	019-582	27 Apr 2023 13:20			02 May 2023 17:48	1
Batch ID: R434176 (0)		Test Name : ANIONS BY SW9056A			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			02 May 2023 18:24	1
HS23041840-02	019-995	27 Apr 2023 11:15			02 May 2023 18:42	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			02 May 2023 18:48	1
HS23041840-04	019-580	27 Apr 2023 13:00			02 May 2023 18:54	1
HS23041840-05	019-582	27 Apr 2023 13:20			02 May 2023 18:59	1

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R434182 (0)		Test Name : MASSACHUSETTS VPH, FEB 2018, REV 2.1			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			03 May 2023 02:20	1
HS23041840-02	019-995	27 Apr 2023 11:15			03 May 2023 04:14	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			03 May 2023 04:53	1
HS23041840-04	019-580	27 Apr 2023 13:00			03 May 2023 05:31	1
Batch ID: R434186 (0)		Test Name : MASSACHUSETTS VPH, FEB 2018, REV 2.1			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			03 May 2023 02:20	1
HS23041840-02	019-995	27 Apr 2023 11:15			03 May 2023 04:14	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			03 May 2023 04:53	1
HS23041840-04	019-580	27 Apr 2023 13:00			03 May 2023 05:31	1
Batch ID: R434339 (0)		Test Name : SULFIDE BY SM4500 S2-F-2011			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			04 May 2023 12:45	1
HS23041840-02	019-995	27 Apr 2023 11:15			04 May 2023 12:45	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			04 May 2023 12:45	1
HS23041840-04	019-580	27 Apr 2023 13:00			04 May 2023 12:45	1
HS23041840-05	019-582	27 Apr 2023 13:20			04 May 2023 12:45	1
Batch ID: R434366 (0)		Test Name : TOTAL DISSOLVED SOLIDS BY SM2540C-2011			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			03 May 2023 12:30	1
HS23041840-02	019-995	27 Apr 2023 11:15			03 May 2023 12:30	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			03 May 2023 12:30	1
HS23041840-04	019-580	27 Apr 2023 13:00			03 May 2023 12:30	1
HS23041840-05	019-582	27 Apr 2023 13:20			03 May 2023 12:30	1
Batch ID: R434592 (0)		Test Name : MASSACHUSETTS VPH, FEB 2018, REV 2.1			Matrix: Water	
HS23041840-05	019-582	27 Apr 2023 13:20			05 May 2023 13:39	1
Batch ID: R434597 (0)		Test Name : MASSACHUSETTS VPH, FEB 2018, REV 2.1			Matrix: Water	
HS23041840-05	019-582	27 Apr 2023 13:20			05 May 2023 13:39	1
Batch ID: R434821 (0)		Test Name : ALKALINITY BY SM 2320B-2011			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			09 May 2023 17:38	1
HS23041840-02	019-995	27 Apr 2023 11:15			09 May 2023 17:43	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			09 May 2023 17:48	1
HS23041840-04	019-580	27 Apr 2023 13:00			09 May 2023 17:54	1
HS23041840-05	019-582	27 Apr 2023 13:20			09 May 2023 17:59	1
Batch ID: R434891 (0)		Test Name : HYDROGEN SULFIDE BY E376.1			Matrix: Water	
HS23041840-01	019-1055	27 Apr 2023 10:25			04 May 2023 07:49	1
HS23041840-02	019-995	27 Apr 2023 11:15			04 May 2023 07:49	1
HS23041840-03	Cottages Well	27 Apr 2023 12:30			04 May 2023 07:49	1
HS23041840-04	019-580	27 Apr 2023 13:00			04 May 2023 07:49	1
HS23041840-05	019-582	27 Apr 2023 13:20			04 May 2023 07:49	1

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193335 (0) **Instrument:** FID-7 **Method:** MASSACHUSETTS EPH R2.1, DEC 2019

MLBK	Sample ID:	MLBK-193335	Units:	mg/L	Analysis Date: 10-May-2023 21:28			
Client ID:		Run ID:	FID-7_434945	SeqNo:	7293194	PrepDate:	04-May-2023	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual

Aliphatics >C10 - C12	U	0.00100						
Aliphatics >C12 - C16	U	0.00200						
Aliphatics >C16 - C35	U	0.00800						
Surr: 1-Chlorooctadecane	0.02525	0	0.04	0	63.1	40 - 140		

MLBK	Sample ID:	MLBK-193335	Units:	mg/L	Analysis Date: 10-May-2023 21:59			
Client ID:		Run ID:	FID-8_434909	SeqNo:	7293242	PrepDate:	04-May-2023	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual

Al aromatics >C10 - C12	U	0.00100						
Aromatics >C12 - C16	U	0.00400						
Aromatics >C16 - C21	U	0.00300						
Aromatics >C21 - C35	U	0.00900						
Surr: 2-Bromonaphthalene	0.03207	0	0.04	0	80.2	40 - 140		
Surr: 2-Fluorobiphenyl	0.02861	0	0.04	0	71.5	40 - 140		
Surr: o-Terphenyl	0.02981	0	0.04	0	74.5	40 - 140		

LCS	Sample ID:	LCS-193335	Units:	mg/L	Analysis Date: 10-May-2023 21:59			
Client ID:		Run ID:	FID-7_434945	SeqNo:	7293195	PrepDate:	04-May-2023	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual

Aliphatics >C10 - C12	0.05158	0.00100	0.05	0	103	40 - 140		
Aliphatics >C12 - C16	0.1058	0.00200	0.1	0	106	40 - 140		
Aliphatics >C16 - C35	0.3569	0.00800	0.4	0	89.2	40 - 140		
Surr: 1-Chlorooctadecane	0.02663	0	0.04	0	66.6	40 - 140		

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193335 (0)		Instrument: FID-7		Method: MASSACHUSETTS EPH R2.1, DEC 2019					
LCS	Sample ID: LCS-193335			Units: mg/L		Analysis Date: 10-May-2023 22:31			
Client ID:		Run ID: FID-8_434909		SeqNo: 7293243		PrepDate: 04-May-2023	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aromatics >C10 - C12	0.06514	0.00100	0.05	0	130	40 - 140			
Aromatics >C12 - C16	0.2518	0.00400	0.2	0	126	40 - 140			
Aromatics >C16 - C21	0.1906	0.00300	0.15	0	127	40 - 140			
Aromatics >C21 - C35	0.5094	0.00900	0.45	0	113	40 - 140			
Surr: 2-Bromonaphthalene	0.04238	0	0.04	0	106	40 - 140			
Surr: 2-Fluorobiphenyl	0.03203	0	0.04	0	80.1	40 - 140			
Surr: o-Terphenyl	0.0341	0	0.04	0	85.3	40 - 140			
MS	Sample ID: HS23041809-01MS			Units: mg/L		Analysis Date: 10-May-2023 23:34			
Client ID:		Run ID: FID-7_434945		SeqNo: 7293197		PrepDate: 04-May-2023	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C10 - C12	0.0625	0.00100	0.05	0	125	40 - 140			
Aliphatics >C12 - C16	0.1367	0.00200	0.1	0	137	40 - 140			
Aliphatics >C16 - C35	0.4729	0.00800	0.4	0	118	40 - 140			
Surr: 1-Chlorooctadecane	0.03545	0	0.04	0	88.6	40 - 140			
MS	Sample ID: HS23041809-01MS			Units: mg/L		Analysis Date: 11-May-2023 00:06			
Client ID:		Run ID: FID-8_434909		SeqNo: 7293245		PrepDate: 04-May-2023	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aromatics >C10 - C12	0.07335	0.00100	0.05	0	147	40 - 140			S
Aromatics >C12 - C16	0.2843	0.00400	0.2	0	142	40 - 140			S
Aromatics >C16 - C21	0.227	0.00300	0.15	0	151	40 - 140			S
Aromatics >C21 - C35	0.5881	0.00900	0.45	0	131	40 - 140			
Surr: 2-Bromonaphthalene	0.04365	0	0.04	0	109	40 - 140			
Surr: 2-Fluorobiphenyl	0.03947	0	0.04	0	98.7	40 - 140			
Surr: o-Terphenyl	0.04164	0	0.04	0	104	40 - 140			

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193335 (0) **Instrument:** FID-7 **Method:** MASSACHUSETTS EPH R2.1, DEC 2019

MSD	Sample ID:	HS23041809-01MSD		Units: mg/L		Analysis Date: 11-May-2023 00:06			
Client ID:		Run ID: FID-7_434945		SeqNo: 7293198		PrepDate: 04-May-2023	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C10 - C12		0.04569	0.00100	0.05	0	91.4	40 - 140	0.0625	31.1 50
Aliphatics >C12 - C16		0.09628	0.00200	0.1	0	96.3	40 - 140	0.1367	34.7 50
Aliphatics >C16 - C35		0.3197	0.00800	0.4	0	79.9	40 - 140	0.4729	38.7 50
Surr: 1-Chlorooctadecane		0.02388	0	0.04	0	59.7	40 - 140	0.03545	39 50

MSD	Sample ID:	HS23041809-01MSD		Units: mg/L		Analysis Date: 11-May-2023 00:38			
Client ID:		Run ID: FID-8_434909		SeqNo: 7293246		PrepDate: 04-May-2023	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aromatics >C10 - C12		0.06328	0.00100	0.05	0	127	40 - 140	0.07335	14.7 50
Aromatics >C12 - C16		0.2371	0.00400	0.2	0	119	40 - 140	0.2843	18.1 50
Aromatics >C16 - C21		0.1867	0.00300	0.15	0	124	40 - 140	0.227	19.4 50
Aromatics >C21 - C35		0.4936	0.00900	0.45	0	110	40 - 140	0.5881	17.5 50
Surr: 2-Bromonaphthalene		0.03647	0	0.04	0	91.2	40 - 140	0.04365	17.9 50
Surr: 2-Fluorobiphenyl		0.0299	0	0.04	0	74.8	40 - 140	0.03947	27.6 50
Surr: o-Terphenyl		0.03407	0	0.04	0	85.2	40 - 140	0.04164	20 50

The following samples were analyzed in this batch:	HS23041840-01	HS23041840-02	HS23041840-03	HS23041840-04
	HS23041840-05			

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434182 (0)		Instrument: FID-14		Method: MASSACHUSETTS VPH, FEB 2018, REV 2.1				
MLBK	Sample ID: MBLK-230502			Units: mg/L		Analysis Date: 02-May-2023 14:12		
Client ID:		Run ID: FID-14_434182		SeqNo: 7275618	PrepDate:	DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C6 - C8	U	0.0100						
Aliphatics >C8 - C10	U	0.0100						
Surr: 2,5-Dibromotoluene (Aliphatic)	0.2905	0.0100	0.25	0	116	70 - 130		
LCS	Sample ID: LCS-230502			Units: mg/L		Analysis Date: 02-May-2023 12:17		
Client ID:		Run ID: FID-14_434182		SeqNo: 7275616	PrepDate:	DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C6 - C8	0.02143	0.0100	0.025	0	85.7	70 - 130		
Aliphatics >C8 - C10	0.02018	0.0100	0.025	0	80.7	70 - 130		
Surr: 2,5-Dibromotoluene (Aliphatic)	0.299	0.0100	0.25	0	120	70 - 130		
LCSD	Sample ID: LCSD-230502			Units: mg/L		Analysis Date: 02-May-2023 12:55		
Client ID:		Run ID: FID-14_434182		SeqNo: 7275617	PrepDate:	DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C6 - C8	0.02323	0.0100	0.025	0	92.9	70 - 130	0.02143	8.05 25
Aliphatics >C8 - C10	0.02138	0.0100	0.025	0	85.5	70 - 130	0.02018	5.76 25
Surr: 2,5-Dibromotoluene (Aliphatic)	0.299	0.0100	0.25	0	120	70 - 130	0.299	0.0211 25
The following samples were analyzed in this batch: HS23041840-01 HS23041840-02 HS23041840-03 HS23041840-04								

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434186 (0)		Instrument: FID-15		Method: MASSACHUSETTS VPH, FEB 2018, REV 2.1					
MLBK	Sample ID: MBLK-230502	Units: mg/L		Analysis Date: 02-May-2023 14:12					
Client ID:		Run ID: FID-15_434186	SeqNo: 7275683	PrepDate:	DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD				
Aromatics >C8 - C10	U	0.0100			RPD Limit Qual				
Surr: 2,5-Dibromotoluene (Aromatic)	0.2957	0.0100	0.25	0 118	70 - 130				
LCS	Sample ID: LCS-230502	Units: mg/L		Analysis Date: 02-May-2023 12:17					
Client ID:		Run ID: FID-15_434186	SeqNo: 7275681	PrepDate:	DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD				
Aromatics >C8 - C10	0.07586	0.0100	0.1	0 75.9	70 - 130				
Surr: 2,5-Dibromotoluene (Aromatic)	0.2972	0.0100	0.25	0 119	70 - 130				
LCSD	Sample ID: LCSD-230502	Units: mg/L		Analysis Date: 02-May-2023 12:55					
Client ID:		Run ID: FID-15_434186	SeqNo: 7275682	PrepDate:	DF: 1				
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD				
Aromatics >C8 - C10	0.08051	0.0100	0.1	0 80.5	70 - 130 0.07586 5.94 25				
Surr: 2,5-Dibromotoluene (Aromatic)	0.2944	0.0100	0.25	0 118	70 - 130 0.2972 0.951 25				
The following samples were analyzed in this batch:									
HS23041840-01		HS23041840-02		HS23041840-03					

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434592 (0)		Instrument: FID-14		Method: MASSACHUSETTS VPH, FEB 2018, REV 2.1					
MLBK	Sample ID: MBLK-230505			Units: mg/L		Analysis Date: 05-May-2023 13:01			
Client ID:		Run ID: FID-14_434592		SeqNo: 7284890	PrepDate:	DF: 1			
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C6 - C8		U	0.0100						
Aliphatics >C8 - C10		U	0.0100						
Surr: 2,5-Dibromotoluene (Aliphatic)	0.2715	0.0100	0.25	0	109	70 - 130			
LCS	Sample ID: LCS-230505			Units: mg/L		Analysis Date: 05-May-2023 11:06			
Client ID:		Run ID: FID-14_434592		SeqNo: 7284904	PrepDate:	DF: 1			
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C6 - C8	0.02279	0.0100	0.025	0	91.2	70 - 130			
Aliphatics >C8 - C10	0.02145	0.0100	0.025	0	85.8	70 - 130			
Surr: 2,5-Dibromotoluene (Aliphatic)	0.3028	0.0100	0.25	0	121	70 - 130			
LCSD	Sample ID: LCSD-230505			Units: mg/L		Analysis Date: 05-May-2023 11:44			
Client ID:		Run ID: FID-14_434592		SeqNo: 7284905	PrepDate:	DF: 1			
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C6 - C8	0.02413	0.0100	0.025	0	96.5	70 - 130	0.02279	5.68	25
Aliphatics >C8 - C10	0.02216	0.0100	0.025	0	88.6	70 - 130	0.02145	3.26	25
Surr: 2,5-Dibromotoluene (Aliphatic)	0.3051	0.0100	0.25	0	122	70 - 130	0.3028	0.755	25
MS	Sample ID: HS23050271-01MS			Units: mg/L		Analysis Date: 05-May-2023 21:19			
Client ID:		Run ID: FID-14_434592		SeqNo: 7284895	PrepDate:	DF: 1			
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Aliphatics >C6 - C8	0.02372	0.0100	0.025	0	94.9	70 - 130			
Aliphatics >C8 - C10	0.02051	0.0100	0.025	0	82.0	70 - 130			
Surr: 2,5-Dibromotoluene (Aliphatic)	0.2922	0.0100	0.25	0	117	70 - 130			

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434592 (0) **Instrument:** FID-14 **Method:** MASSACHUSETTS VPH, FEB 2018, REV 2.1

MSD	Sample ID:	HS23050271-01MSD		Units:	mg/L		Analysis Date: 05-May-2023 21:57			
Client ID:		Run ID: FID-14_434592		SeqNo:	7284896	PrepDate:	DF: 1			
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Aliphatics >C6 - C8		0.02267	0.0100	0.025	0	90.7	70 - 130	0.02372	4.52 25	
Aliphatics >C8 - C10		0.02004	0.0100	0.025	0	80.1	70 - 130	0.02051	2.34 25	
<i>Surr: 2,5-Dibromotoluene</i> <i>(Aliphatic)</i>		0.2919	0.0100	0.25	0	117	70 - 130	0.2922	0.121 25	

The following samples were analyzed in this batch: HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434597 (0)		Instrument: FID-15		Method: MASSACHUSETTS VPH, FEB 2018, REV 2.1	
MLBK Sample ID: MLBK-230505		Units: mg/L			Analysis Date: 05-May-2023 13:01
Client ID:		Run ID: FID-15_434597	SeqNo: 7284987	PrepDate:	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD
Aromatics >C8 - C10	U	0.0100			RPD Limit Qual
Surr: 2,5-Dibromotoluene (Aromatic)	0.2933	0.0100	0.25	0 117	70 - 130
LCS Sample ID: LCS-230505		Units: mg/L			Analysis Date: 05-May-2023 11:06
Client ID:		Run ID: FID-15_434597	SeqNo: 7284985	PrepDate:	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD
Aromatics >C8 - C10	0.08349	0.0100	0.1	0 83.5	70 - 130
Surr: 2,5-Dibromotoluene (Aromatic)	0.2996	0.0100	0.25	0 120	70 - 130
LCSD Sample ID: LCSD-230505		Units: mg/L			Analysis Date: 05-May-2023 11:44
Client ID:		Run ID: FID-15_434597	SeqNo: 7284986	PrepDate:	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD
Aromatics >C8 - C10	0.08909	0.0100	0.1	0 89.1	70 - 130 0.08349 6.49 25
Surr: 2,5-Dibromotoluene (Aromatic)	0.2966	0.0100	0.25	0 119	70 - 130 0.2996 1.02 25
MS Sample ID: HS23050271-01MS		Units: mg/L			Analysis Date: 05-May-2023 21:19
Client ID:		Run ID: FID-15_434597	SeqNo: 7284992	PrepDate:	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD
Aromatics >C8 - C10	0.0852	0.0100	0.1	0 85.2	70 - 130
Surr: 2,5-Dibromotoluene (Aromatic)	0.3078	0.0100	0.25	0 123	70 - 130
MSD Sample ID: HS23050271-01MSD		Units: mg/L			Analysis Date: 05-May-2023 21:57
Client ID:		Run ID: FID-15_434597	SeqNo: 7284993	PrepDate:	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value %REC	Control Limit RPD Ref Value %RPD
Aromatics >C8 - C10	0.08317	0.0100	0.1	0 83.2	70 - 130 0.0852 2.41 25
Surr: 2,5-Dibromotoluene (Aromatic)	0.3029	0.0100	0.25	0 121	70 - 130 0.3078 1.58 25

The following samples were analyzed in this batch: HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193582 (0) **Instrument:** ICPMS06 **Method:** ICP-MS METALS BY SW6020A

MLBK	Sample ID:	MLBK-193582	Units:	mg/L	Analysis Date: 10-May-2023 14:20				
Client ID:		Run ID:	ICPMS06_434830	SeqNo:	7291186	PrepDate:	09-May-2023	DF:	1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit Qual
Arsenic	U	0.00200							
Barium	U	0.00400							
Cadmium	U	0.00200							
Calcium	U	0.500							
Chromium	U	0.00400							
Iron	U	0.200							
Lead	U	0.00200							
Magnesium	0.01114	0.200							J
Manganese	U	0.00500							
Nickel	U	0.00200							
Potassium	U	0.200							
Selenium	U	0.00200							
Silver	U	0.00200							
Sodium	0.05179	0.200							J
Strontium	U	0.00500							
Vanadium	U	0.00500							
Zinc	U	0.00400							

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193582 (0)		Instrument: ICPMS06		Method: ICP-MS METALS BY SW6020A				
LCS	Sample ID: LCS-193582	Units: mg/L			Analysis Date: 10-May-2023 14:22			
Client ID:		Run ID: ICPMS06_434830		SeqNo: 7291187	PrepDate: 09-May-2023	DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Arsenic	0.04839	0.00200	0.05	0	96.8	80 - 120		
Barium	0.0472	0.00400	0.05	0	94.4	80 - 120		
Cadmium	0.04807	0.00200	0.05	0	96.1	80 - 120		
Calcium	4.876	0.500	5	0	97.5	80 - 120		
Chromium	0.04492	0.00400	0.05	0	89.8	80 - 120		
Iron	4.841	0.200	5	0	96.8	80 - 120		
Lead	0.04739	0.00200	0.05	0	94.8	80 - 120		
Magnesium	4.912	0.200	5	0	98.2	80 - 120		
Manganese	0.04644	0.00500	0.05	0	92.9	80 - 120		
Nickel	0.04831	0.00200	0.05	0	96.6	80 - 120		
Potassium	4.816	0.200	5	0	96.3	80 - 120		
Selenium	0.04978	0.00200	0.05	0	99.6	80 - 120		
Silver	0.0464	0.00200	0.05	0	92.8	80 - 120		
Sodium	4.844	0.200	5	0	96.9	80 - 120		
Strontium	0.09603	0.00500	0.1	0	96.0	80 - 120		
Vanadium	0.04539	0.00500	0.05	0	90.8	80 - 120		
Zinc	0.04927	0.00400	0.05	0	98.5	80 - 120		

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193582 (0) **Instrument:** ICPMS06 **Method:** ICP-MS METALS BY SW6020A

MS	Sample ID:	HS23050275-05MS		Units:	mg/L	Analysis Date: 10-May-2023 14:28			
Client ID:		Run ID: ICPMS06_434830		SeqNo:	7291190	PrepDate:	09-May-2023	DF:	1
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Arsenic		0.05516	0.00200	0.05	0.005669	99.0	80 - 120		
Barium		0.09976	0.00400	0.05	0.05288	93.8	80 - 120		
Cadmium		0.04857	0.00200	0.05	0.000015	97.1	80 - 120		
Calcium		21.7	0.500	5	16.24	109	80 - 120		
Chromium		0.04516	0.00400	0.05	-0.000334	91.0	80 - 120		
Iron		5.158	0.200	5	0.3816	95.5	80 - 120		
Lead		0.04852	0.00200	0.05	0.000103	96.8	80 - 120		
Magnesium		9.983	0.200	5	5.237	94.9	80 - 120		
Manganese		0.1161	0.00500	0.05	0.06982	92.5	80 - 120		
Nickel		0.04915	0.00200	0.05	0.000554	97.2	80 - 120		
Potassium		6.669	0.200	5	1.968	94.0	80 - 120		
Selenium		0.05108	0.00200	0.05	0.000054	102	80 - 120		
Silver		0.04546	0.00200	0.05	0.000006	90.9	80 - 120		
Sodium		100.5	0.200	5	95.39	102	80 - 120	O	
Strontium		0.4882	0.00500	0.1	0.3929	95.3	80 - 120		
Vanadium		0.04698	0.00500	0.05	0.000025	93.9	80 - 120		
Zinc		0.05143	0.00400	0.05	0.001351	100	80 - 120		

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193582 (0) **Instrument:** ICPMS06 **Method:** ICP-MS METALS BY SW6020A

MSD	Sample ID:	HS23050275-05MSD		Units:	mg/L		Analysis Date: 10-May-2023 14:30			
Client ID:		Run ID: ICPMS06_434830		SeqNo:	7291191	PrepDate:	09-May-2023	DF:	1	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual	
Arsenic		0.05539	0.00200	0.05	0.005669	99.4	80 - 120	0.05516	0.422 20	
Barium		0.1	0.00400	0.05	0.05288	94.3	80 - 120	0.09976	0.249 20	
Cadmium		0.04868	0.00200	0.05	0.000015	97.3	80 - 120	0.04857	0.234 20	
Calcium		21.19	0.500	5	16.24	98.9	80 - 120	21.7	2.39 20	
Chromium		0.04558	0.00400	0.05	-0.000334	91.8	80 - 120	0.04516	0.937 20	
Iron		5.168	0.200	5	0.3816	95.7	80 - 120	5.158	0.194 20	
Lead		0.04818	0.00200	0.05	0.000103	96.2	80 - 120	0.04852	0.709 20	
Magnesium		9.824	0.200	5	5.237	91.7	80 - 120	9.983	1.6 20	
Manganese		0.1168	0.00500	0.05	0.06982	94.0	80 - 120	0.1161	0.636 20	
Nickel		0.04877	0.00200	0.05	0.000554	96.4	80 - 120	0.04915	0.776 20	
Potassium		6.653	0.200	5	1.968	93.7	80 - 120	6.669	0.235 20	
Selenium		0.04908	0.00200	0.05	0.000054	98.0	80 - 120	0.05108	4 20	
Silver		0.04562	0.00200	0.05	0.000006	91.2	80 - 120	0.04546	0.367 20	
Sodium		100.4	0.200	5	95.39	100	80 - 120	100.5	0.0655 20 O	
Strontium		0.4876	0.00500	0.1	0.3929	94.7	80 - 120	0.4882	0.131 20	
Vanadium		0.04666	0.00500	0.05	0.000025	93.3	80 - 120	0.04698	0.668 20	
Zinc		0.05124	0.00400	0.05	0.001351	99.8	80 - 120	0.05143	0.37 20	

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193582 (0)		Instrument: ICPMS06		Method: ICP-MS METALS BY SW6020A					
PDS	Sample ID:	HS23050275-05PDS		Units: mg/L		Analysis Date: 10-May-2023 14:32			
Client ID:		Run ID: ICPMS06_434830		SeqNo: 7291192	PrepDate: 09-May-2023	DF: 1			
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD	RPD Limit Qual
Arsenic		0.1127	0.00200	0.1	0.005669	107	75 - 125		
Barium		0.1559	0.00400	0.1	0.05288	103	75 - 125		
Cadmium		0.1058	0.00200	0.1	0.000015	106	75 - 125		
Calcium		26.27	0.500	10	16.24	100	75 - 125		
Chromium		0.09916	0.00400	0.1	-0.000334	99.5	75 - 125		
Iron		10.74	0.200	10	0.3816	104	75 - 125		
Lead		0.1035	0.00200	0.1	0.000103	103	75 - 125		
Magnesium		15.45	0.200	10	5.237	102	75 - 125		
Manganese		0.1668	0.00500	0.1	0.06982	96.9	75 - 125		
Nickel		0.1035	0.00200	0.1	0.000554	103	75 - 125		
Potassium		12.13	0.200	10	1.968	102	75 - 125		
Selenium		0.1068	0.00200	0.1	0.000054	107	75 - 125		
Silver		0.1036	0.00200	0.1	0.000006	104	75 - 125		
Sodium		103	0.200	10	95.39	76.3	75 - 125	O	
Strontium		0.5043	0.00500	0.1	0.3929	111	75 - 125		
Vanadium		0.1009	0.00500	0.1	0.000025	101	75 - 125		
Zinc		0.1092	0.00400	0.1	0.001351	108	75 - 125		

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193582 (0) **Instrument:** ICPMS06 **Method:** ICP-MS METALS BY SW6020A

SD	Sample ID:	HS23050275-05SD		Units:	mg/L	Analysis Date: 10-May-2023 14:26				
Client ID:		Run ID: ICPMS06_434830		SeqNo:	7291189	PrepDate:	09-May-2023	DF:	5	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit Qual
Arsenic		0.006259	0.0100					0.005669	0	10
Barium		0.05164	0.0200					0.05288	2.35	10
Cadmium		U	0.0100					0.000015	0	10
Calcium		16.32	2.50					16.24	0.5	10
Chromium		U	0.0200					-0.000334	0	10
Iron		0.374	1.00					0.3816	0	10
Lead		U	0.0100					0.000103	0	10
Magnesium		5.474	1.00					5.237	4.53	10
Manganese		0.07137	0.0250					0.06982	2.21	10
Nickel		U	0.0100					0.000554	0	10
Potassium		1.926	1.00					1.968	2.12	10
Selenium		U	0.0100					0.000054	0	10
Silver		U	0.0100					0.000006	0	10
Sodium		97.96	1.00					95.39	2.69	10
Strontium		0.3973	0.0250					0.3929	1.11	10
Vanadium		U	0.0250					0.000025	0	10
Zinc		U	0.0200					0.001351	0	10

The following samples were analyzed in this batch: HS23041840-01 HS23041840-02 HS23041840-03 HS23041840-04
HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: 193593 (0) **Instrument:** HG04 **Method:** MERCURY BY SW7470A

MLBK	Sample ID:	MLBK-193593	Units:	mg/L	Analysis Date: 09-May-2023 17:32			
Client ID:		Run ID:	HG04_434741	SeqNo:	7289405	PrepDate:	09-May-2023	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual

Mercury U 0.000200

LCS	Sample ID:	LCS-193593	Units:	mg/L	Analysis Date: 09-May-2023 17:34			
Client ID:		Run ID:	HG04_434741	SeqNo:	7289406	PrepDate:	09-May-2023	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual

Mercury 0.00511 0.000200 0.005 0 102 80 - 120

MS	Sample ID:	HS23050275-01MS	Units:	mg/L	Analysis Date: 09-May-2023 18:06			
Client ID:		Run ID:	HG04_434741	SeqNo:	7289422	PrepDate:	09-May-2023	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual

Mercury 0.00513 0.000200 0.005 -0.000008 103 75 - 125

MSD	Sample ID:	HS23050275-01MSD	Units:	mg/L	Analysis Date: 09-May-2023 18:08			
Client ID:		Run ID:	HG04_434741	SeqNo:	7289423	PrepDate:	09-May-2023	DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual

Mercury 0.005 0.000200 0.005 -0.000008 100 75 - 125 0.00513 2.57 20

The following samples were analyzed in this batch: HS23041840-01 HS23041840-02 HS23041840-03 HS23041840-04
HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434166 (0)		Instrument: VOA6		Method: LOW LEVEL VOLATILES BY SW8260C					
MLBK	Sample ID: VBLKW-230502			Units: ug/L		Analysis Date: 02-May-2023 12:11			
Client ID:		Run ID: VOA6_434166		SeqNo: 7274964		PrepDate:		DF: 1	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Benzene		U	1.0						
Ethylbenzene		U	1.0						
m,p-Xylene		U	2.0						
o-Xylene		U	1.0						
Toluene		U	1.0						
Xylenes, Total		U	1.0						
Surr: 1,2-Dichloroethane-d4	35.89	1.0	50	0	71.8	70 - 123			
Surr: 4-Bromofluorobenzene	44.25	1.0	50	0	88.5	77 - 113			
Surr: Dibromofluoromethane	40.86	1.0	50	0	81.7	73 - 126			
Surr: Toluene-d8	50.57	1.0	50	0	101	81 - 120			
LCS	Sample ID: VLCSW-230502			Units: ug/L		Analysis Date: 02-May-2023 11:29			
Client ID:		Run ID: VOA6_434166		SeqNo: 7274963		PrepDate:		DF: 1	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Benzene	18.96	1.0	20	0	94.8	74 - 120			
Ethylbenzene	19.7	1.0	20	0	98.5	77 - 117			
m,p-Xylene	39.13	2.0	40	0	97.8	77 - 122			
o-Xylene	18.94	1.0	20	0	94.7	75 - 119			
Toluene	19.49	1.0	20	0	97.5	77 - 118			
Xylenes, Total	58.07	1.0	60	0	96.8	75 - 122			
Surr: 1,2-Dichloroethane-d4	40.81	1.0	50	0	81.6	70 - 123			
Surr: 4-Bromofluorobenzene	47.9	1.0	50	0	95.8	77 - 113			
Surr: Dibromofluoromethane	46.26	1.0	50	0	92.5	73 - 126			
Surr: Toluene-d8	49.17	1.0	50	0	98.3	81 - 120			

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434166 (0)		Instrument: VOA6		Method: LOW LEVEL VOLATILES BY SW8260C				
MS	Sample ID: HS23041854-02MS			Units: ug/L		Analysis Date: 02-May-2023 15:21		
Client ID:		Run ID: VOA6_434166		SeqNo: 7274966	PrepDate:	DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Benzene	20.37	1.0	20	0	102	70 - 127		
Ethylbenzene	142.2	1.0	20	124.4	89.2	70 - 124		O
m,p-Xylene	109.5	2.0	40	63.22	116	70 - 130		
o-Xylene	22.57	1.0	20	0.6748	109	70 - 124		
Toluene	22.12	1.0	20	0	111	70 - 123		
Xylenes, Total	132	1.0	60	63.9	114	70 - 130		
Surr: 1,2-Dichloroethane-d4	35.61	1.0	50	0	71.2	70 - 126		
Surr: 4-Bromofluorobenzene	47.97	1.0	50	0	95.9	77 - 113		
Surr: Dibromofluoromethane	40.99	1.0	50	0	82.0	77 - 123		
Surr: Toluene-d8	49.09	1.0	50	0	98.2	82 - 127		
MSD	Sample ID: HS23041854-02MSD			Units: ug/L		Analysis Date: 02-May-2023 15:42		
Client ID:		Run ID: VOA6_434166		SeqNo: 7274967	PrepDate:	DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Benzene	19.5	1.0	20	0	97.5	70 - 127	20.37	4.33 20
Ethylbenzene	135.9	1.0	20	124.4	57.9	70 - 124	142.2	4.5 20 SO
m,p-Xylene	104	2.0	40	63.22	102	70 - 130	109.5	5.06 20
o-Xylene	21.83	1.0	20	0.6748	106	70 - 124	22.57	3.37 20
Toluene	21.11	1.0	20	0	106	70 - 123	22.12	4.69 20
Xylenes, Total	125.9	1.0	60	63.9	103	70 - 130	132	4.77 20
Surr: 1,2-Dichloroethane-d4	35.26	1.0	50	0	70.5	70 - 126	35.61	0.972 20
Surr: 4-Bromofluorobenzene	47.7	1.0	50	0	95.4	77 - 113	47.97	0.558 20
Surr: Dibromofluoromethane	40.98	1.0	50	0	82.0	77 - 123	40.99	0.0376 20
Surr: Toluene-d8	49.05	1.0	50	0	98.1	82 - 127	49.09	0.0907 20
The following samples were analyzed in this batch:		HS23041840-01		HS23041840-02		HS23041840-03		HS23041840-04
		HS23041840-05						

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434176 (0) **Instrument:** ICS-Integriion **Method:** ANIONS BY SW9056A

MLBK		Sample ID: MBLK		Units: mg/L		Analysis Date: 02-May-2023 18:06			
Client ID:		Run ID: ICS-Integriion_434176		SeqNo: 7275354		PrepDate:		DF: 1	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Bromide		U		0.100					
Chloride		U		0.500					
Sulfate		U		0.500					

LCS		Sample ID: LCS		Units: mg/L		Analysis Date: 02-May-2023 18:12			
Client ID:		Run ID: ICS-Integriion_434176		SeqNo: 7275355		PrepDate:		DF: 1	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Bromide		3.628	0.100	4	0	90.7	80 - 120		
Chloride		20.99	0.500	20	0	105	80 - 120		
Sulfate		18.86	0.500	20	0	94.3	80 - 120		

MS		Sample ID: HS23041840-01MS		Units: mg/L		Analysis Date: 02-May-2023 18:30			
Client ID: 019-1055		Run ID: ICS-Integriion_434176		SeqNo: 7275357		PrepDate:		DF: 1	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Bromide		1.484	0.100	2	0	74.2	80 - 120		S
Chloride		48.99	0.500	10	40.62	83.7	80 - 120		O
Sulfate		12.92	0.500	10	3.554	93.7	80 - 120		

MSD		Sample ID: HS23041840-01MSD		Units: mg/L		Analysis Date: 02-May-2023 18:36			
Client ID: 019-1055		Run ID: ICS-Integriion_434176		SeqNo: 7275358		PrepDate:		DF: 1	
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Bromide		1.508	0.100	2	0	75.4	80 - 120	1.484	1.64 20 S
Chloride		49.11	0.500	10	40.62	84.9	80 - 120	48.99	0.255 20 O
Sulfate		12.96	0.500	10	3.554	94.1	80 - 120	12.92	0.35 20

The following samples were analyzed in this batch: HS23041840-01 HS23041840-02 HS23041840-03 HS23041840-04 HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434339 (0) **Instrument:** WetChem_HS **Method:** SULFIDE BY SM4500 S2-F-2011

MBLK	Sample ID:	MBLK-R434339	Units:	mg/L	Analysis Date: 04-May-2023 12:45		
Client ID:		Run ID: WetChem_HS_434339 SeqNo: 7278975	PrepDate:		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Sulfide U 2.00

LCS	Sample ID:	LCS-R434339	Units:	mg/L	Analysis Date: 04-May-2023 12:45		
Client ID:		Run ID: WetChem_HS_434339 SeqNo: 7278974	PrepDate:		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Sulfide 22.56 2.00 25 0 90.2 85 - 115

LCSD	Sample ID:	LCSD-R434339	Units:	mg/L	Analysis Date: 04-May-2023 12:45		
Client ID:		Run ID: WetChem_HS_434339 SeqNo: 7278973	PrepDate:		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Sulfide 22.36 2.00 25 0 89.4 85 - 115 22.56 0.89 20

MS	Sample ID:	HS23041690-01MS	Units:	mg/L	Analysis Date: 04-May-2023 12:45		
Client ID:		Run ID: WetChem_HS_434339 SeqNo: 7278976	PrepDate:		DF: 1		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Sulfide 22.36 2.00 25 -1.64 96.0 80 - 120

The following samples were analyzed in this batch:	HS23041840-01	HS23041840-02	HS23041840-03	HS23041840-04
	HS23041840-05			

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434366 (0) **Instrument:** Balance1 **Method:** TOTAL DISSOLVED SOLIDS BY SM2540C-2011

MBLK	Sample ID:	WBLK-05032023	Units:	mg/L	Analysis Date: 03-May-2023 12:30		
Client ID:		Run ID:	Balance1_434366	SeqNo: 7279611	PrepDate:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Total Dissolved Solids (Residue, Filterable) U 10.0

LCS	Sample ID:	LCS-05032023	Units:	mg/L	Analysis Date: 03-May-2023 12:30		
Client ID:		Run ID:	Balance1_434366	SeqNo: 7279610	PrepDate:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Total Dissolved Solids (Residue, Filterable) 1062 10.0 1000 0 106 85 - 115

DUP	Sample ID:	HS23041850-01DUP	Units:	mg/L	Analysis Date: 03-May-2023 12:30		
Client ID:		Run ID:	Balance1_434366	SeqNo: 7279597	PrepDate:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Total Dissolved Solids (Residue, Filterable) 586 10.0 588 0.341 20

DUP	Sample ID:	HS23041840-02DUP	Units:	mg/L	Analysis Date: 03-May-2023 12:30		
Client ID:	019-995	Run ID:	Balance1_434366	SeqNo: 7279592	PrepDate:		DF: 1
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD Limit Qual

Total Dissolved Solids (Residue, Filterable) 200 10.0 202 0.995 20

The following samples were analyzed in this batch: HS23041840-01 HS23041840-02 HS23041840-03 HS23041840-04
HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434821 (0) **Instrument:** Skalar 03 **Method:** ALKALINITY BY SM 2320B-2011

MLBK		Sample ID: MBLK-05092023		Units: mg/L		Analysis Date: 09-May-2023 16:20			
Client ID:		Run ID:	Skalar 03_434821	SeqNo:	7290415	PrepDate:	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Alkalinity, Bicarbonate (As CaCO3)		U	5.00						
Alkalinity, Carbonate (As CaCO3)		U	5.00						

LCS		Sample ID: LCS-05092023		Units: mg/L		Analysis Date: 09-May-2023 16:26			
Client ID:		Run ID:	Skalar 03_434821	SeqNo:	7290416	PrepDate:	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Alkalinity, Carbonate (As CaCO3)		950.4	5.00	1000	0	95.0	85 - 115		

LCSD		Sample ID: LCSD-05092023		Units: mg/L		Analysis Date: 09-May-2023 16:32			
Client ID:		Run ID:	Skalar 03_434821	SeqNo:	7290417	PrepDate:	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Alkalinity, Carbonate (As CaCO3)		920.4	5.00	1000	0	92.0	85 - 115	950.4	3.21 20

DUP		Sample ID: HS23041690-01DUP		Units: mg/L		Analysis Date: 09-May-2023 16:43			
Client ID:		Run ID:	Skalar 03_434821	SeqNo:	7290419	PrepDate:	DF: 1		
Analyte		Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD Limit Qual
Alkalinity, Bicarbonate (As CaCO3)		45.6	5.00					45.9	0.656 20
Alkalinity, Carbonate (As CaCO3)		U	5.00					0	0 20

The following samples were analyzed in this batch: HS23041840-01 HS23041840-02 HS23041840-03 HS23041840-04
HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

QC BATCH REPORT

Batch ID: R434891 (0) **Instrument:** WetChem_HS **Method:** HYDROGEN SULFIDE BY E376.1

MBLK	Sample ID:	MBLK-R434891	Units:	mg/L	Analysis Date: 04-May-2023 07:49			
Client ID:		Run ID: WetChem_HS_434891 SeqNo: 7291913	PrepDate:		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD	RPD Limit Qual

Hydrogen Sulfide U 1.00

LCS	Sample ID:	LCS-R434891	Units:	mg/L	Analysis Date: 04-May-2023 07:49			
Client ID:		Run ID: WetChem_HS_434891 SeqNo: 7291912	PrepDate:		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD	RPD Limit Qual

Hydrogen Sulfide 23.97 1.00 25 0 95.9 80 - 120

LCSD	Sample ID:	LCSD-R434891	Units:	mg/L	Analysis Date: 04-May-2023 07:49			
Client ID:		Run ID: WetChem_HS_434891 SeqNo: 7291911	PrepDate:		DF: 1			
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value %RPD	RPD Limit Qual

Hydrogen Sulfide 23.76 1.00 25 0 95.0 80 - 120 23.97 0.89 20

The following samples were analyzed in this batch: HS23041840-01 HS23041840-02 HS23041840-03 HS23041840-04
HS23041840-05

Client: Environmental Resources Mgmt.
Project: Sulphur Dome
WorkOrder: HS23041840

**QUALIFIERS,
ACRONYMS, UNITS**

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-00356	27-Mar-2024
Dept of Defense	L21-682	31-Dec-2023
Florida	E87611-36	30-Jun-2023
Kansas	E-10352; 2022-2023	31-Jul-2023
Louisiana	03087, 2022-2023	30-Jun-2023
Maryland	343, 2022-2023	30-Jun-2023
North Carolina	624-2023	31-Dec-2023
Oklahoma	2022-141	31-Aug-2023
Texas	T104704231-23-30	30-Apr-2024
Utah	TX026932022-13	31-Jul-2023

Sample Receipt Checklist

Work Order ID: HS23041840

Date/Time Received:

28-Apr-2023 09:47

Client Name: ERMSW-HOU

Received by:

Si MaCompleted By: /S/ Nelson D. Dusara

eSignature

29-Apr-2023 09:55

Date/Time

Reviewed by: /S/ Bernadette A. Fini

eSignature

01-May-2023 08:47

Date/Time

Matrices:

Water

Carrier name:

Client

Shipping container/cooler in good condition?

Yes No Not Present

Custody seals intact on shipping container/cooler?

Yes No Not Present

Custody seals intact on sample bottles?

Yes No Not Present

VOA/TX1005/TX1006 Solids in hermetically sealed vials?

Yes No Not Present

Chain of custody present?

Yes No

Chain of custody signed when relinquished and received?

Yes No

Samplers name present on COC?

Yes No

Chain of custody agrees with sample labels?

Yes No

Samples in proper container/bottle?

Yes No

Sample containers intact?

Yes No

Sufficient sample volume for indicated test?

Yes No

All samples received within holding time?

Yes No

Container/Temp Blank temperature in compliance?

Yes No

Temperature(s)/Thermometer(s):

2.1/1.6,3.9/3.4 C UC/C

IR 31

Cooler(s)/Kit(s):

50646/50458

Date/Time sample(s) sent to storage:

04/28/2023 18:00

Water - VOA vials have zero headspace?

Yes No No VOA vials submitted

Water - pH acceptable upon receipt?

Yes No N/A

pH adjusted?

Yes No N/A

pH adjusted by:

Login Notes:

Client Contacted:

Date Contacted:

Person Contacted:

Contacted By:

Regarding:

Comments:

Comments:

Corrective Action:

Corrective Action:

Cincinnati, OH
+1 513 733 5336Everett, WA
+1 425 356 2600Fort Collins, CO
+1 970 490 1511Holland, MI
+1 616 399 6070

Chain of Custody Fo

Page 1 of 1

COC ID: 29033!

HS23041840

Environmental Resources Mgmt.
Sulphur Dome

ALS Project Manager:

Customer Information		Project Information											
Purchase Order	0688077	Project Name	Sulphur Dome	A	8260 LL W (Low Level VOC (8260) BTEX)								
Work Order		Project Number		B	MA EPH W La (MA EPH)								
Company Name	Environmental Resources Mgmt.	Bill To Company	Environmental Resources Mgmt.	C	MA VPH LA W (MA VPH)								
Send Report To	Scott Himes	Invoice Attn	Accounts Payable	D	9056 anions W (Cl, SO ₄ , Br)								
Address	CityCentre Four 840 W. Sam Houston Pkwy., Suite 6	Address	CityCentre Four 840 W. Sam Houston Pkwy., Suite 6	E	ALK_W 2320B (carb, bicarb), pH								
				F	H ₂ S_W (H ₂ S)								
City/State/Zip	Houston, TX 77024	City/State/Zip	Houston TX 77024	G	HG_W (Mercury)								
Phone	(281) 600-1000	Phone	(281) 600-1000	H	ICP_TW (As,Ba,Cd,Ca,Cr,Fe,Pb,Mg,Mn,K,Se,Ag,Na,Sr,Zn) N; V								
Fax	(281) 600-1001	Fax	(281) 600-1001	I	SULFD_4500S F (Sulfide)								
e-Mail Address	scott.himes@erm.com	e-Mail Address	ERMNAAccountsPayable@erm.com	J	TDS_W 2540C (TDS)								

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	019-1055	4/27/23	1025	W		12	X	X	X	X	X	X	X	X	X	X	
2	019-995		1115				X	X	X	X	X	X	X	X	X	X	
3	Cottages Well		1230				X	X	X	X	X	X	X	X	X	X	
4	019-580		1300				X	X	X	X	X	X	X	X	X	X	
5	019-582		1320				X	X	X	X	X	X	X	X	X	X	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign	<i>Scott Himes</i>	Shipment Method	Required Turnaround Time: (Check Box)	<input type="checkbox"/> Other _____	Results Due Date:
--------------------------------	--------------------	-----------------	---------------------------------------	--------------------------------------	-------------------

Relinquished by:	Date: 4/28/23	Time: 0947	Received by:	Notes: ERM Sulphur Dome		
------------------	---------------	------------	--------------	-------------------------	--	--

Relinquished by:	Date:	Time:	Received by (Laboratory): <i>GM 04128123 09:47</i>	Cooler ID	Cooler Temp. <i>V1</i>	QC Package: (Check One Box Below)
------------------	-------	-------	--	-----------	------------------------	-----------------------------------

Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	<input checked="" type="checkbox"/> Level II Std QC	<input type="checkbox"/> TRRP Checklist
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Preservative Key:	1-HCl	2-HNO ₃	3-H ₂ SO ₄	4-NaOH	5-Na ₂ S ₂ O ₃	6-NaHSO ₄	7-Other	8-4°C	9-5035	<input type="checkbox"/> Level III Std QC/Raw Date	<input type="checkbox"/> Level IV SW846/CLP	<input type="checkbox"/> Other
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Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
 2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
 3. The Chain of Custody is a legal document. All information must be completed accurately.

IRP-31

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IRP-25



Lab #: 869216 Job #: 54433 IS-102884 Co. Job#:
 Sample Name: 019-1055 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 4/27/2023 10:25 Date Received: 5/02/2023 Date Reported: 5/31/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.68					
Oxygen -----	9.15					
Nitrogen -----	78.32					
Carbon Dioxide -----	10.43					
Methane -----	0.411	-52.7			0.10	0.070
Ethane -----	0.0017				0.00047	0.00059
Ethylene -----	nd					
Propane -----	nd				< 0.0001	< 0.0003
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0034					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.82

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

Insufficient methane concentration for dD analysis.

Methane isotope data obtained online via GC-C-IRMS.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 869217 Job #: 54433 IS-102884 Co. Job#:
 Sample Name: 019-995 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 4/27/2023 11:15 Date Received: 5/02/2023 Date Reported: 5/31/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.61					
Oxygen -----	11.53					
Nitrogen -----	77.35					
Carbon Dioxide -----	9.19					
Methane -----	0.313	-68.7			0.084	0.056
Ethane -----	nd				< 0.0002	< 0.0002
Ethylene -----	nd					
Propane -----	nd				< 0.0002	< 0.0003
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0034					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.82

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

Insufficient methane concentration for dD analysis.

Methane isotope data obtained online via GC-C-IRMS.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 869218 Job #: 54433 IS-102884 Co. Job#:
 Sample Name: Cottages Well Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled:	4/27/2023	12:30	Date Received:	5/02/2023	Date Reported:	5/31/2023	
Component	Chemical mol. %		$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd						
Helium -----	na						
Hydrogen -----	nd						
Argon -----	1.43						
Oxygen -----	20.30						
Nitrogen -----	70.51						
Carbon Dioxide -----	7.28						
Methane -----	0.476	-76.1			0.15	0.099	
Ethane -----	nd				< 0.0002	< 0.0002	
Ethylene -----	nd						
Propane -----	nd				< 0.0002	< 0.0003	
Propylene -----	nd						
Iso-butane -----	nd						
N-butane -----	nd						
Iso-pentane -----	nd						
N-pentane -----	nd						
Hexanes + -----	0.0015						

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.80

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

Insufficient methane concentration for dD analysis.

Methane isotope data obtained online via GC-C-IRMS.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 869219 Job #: 54433 IS-102884 Co. Job#:
 Sample Name: 019-580 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled:	4/27/2023 13:00	Date Received:	5/02/2023	Date Reported:	5/31/2023	
Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.66					
Oxygen -----	9.66					
Nitrogen -----	76.17					
Carbon Dioxide -----	11.99					
Methane -----	0.517	-59.6			0.12	0.079
Ethane -----	0.0007				0.0002	0.0002
Ethylene -----	nd					
Propane -----	nd				< 0.0002	< 0.0003
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0039					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.85

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

Insufficient methane concentration for dD analysis.

Methane isotope data obtained online via GC-C-IRMS.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 869220 Job #: 54433 IS-102884 Co. Job#:
 Sample Name: 019-582 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled:	4/27/2023 13:20	Date Received:	5/02/2023	Date Reported:	5/31/2023	
Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.61					
Oxygen -----	8.07					
Nitrogen -----	80.13					
Carbon Dioxide -----	9.64					
Methane -----	0.547	-62.3		0.15	0.100	
Ethane -----	0.0022			0.00064	0.00080	
Ethylene -----	nd					
Propane -----	nd			< 0.0002	< 0.0003	
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0027					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.82

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

Insufficient methane concentration for dD analysis.

Methane isotope data obtained online via GC-C-IRMS.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865459 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: No. 21 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled:	3/30/2023 10:45	Date Received:	4/03/2023	Date Reported:	5/06/2023	
Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	0.11					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.29					
Oxygen -----	20.65					
Nitrogen -----	75.31					
Carbon Dioxide -----	1.77					
Methane -----	0.860	-36.2	-122		0.36	0.24
Ethane -----	0.0080				0.0036	0.0045
Ethylene -----	nd					
Propane -----	0.0011				0.00046	0.00085
Propylene -----	nd					
Iso-butane -----	0.0004					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0018					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.72

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.
Hydrogen of methane obtained online via GC-P-IRMS.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865460 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: No. 22 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled:	3/30/2023 11:00	Date Received:	4/03/2023	Date Reported:	5/06/2023	
Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	0.098					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.43					
Oxygen -----	20.90					
Nitrogen -----	71.96					
Carbon Dioxide -----	2.40					
Methane -----	3.16	-38.40	-156		0.96	0.64
Ethane -----	0.0410				0.013	0.017
Ethylene -----	0.0005					
Propane -----	0.0064				0.0020	0.0037
Propylene -----	nd					
Iso-butane -----	0.0015					
N-butane -----	0.0010					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0020					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.80

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

Carbon of methane obtained online via GC-C-IRMS.

Insufficient methane concentration for hydrogen isotope analysis.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865461 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: No. 23 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 3/30/2023 11:15 Date Received: 4/03/2023 Date Reported: 5/06/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	0.040					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.09					
Oxygen -----	21.18					
Nitrogen -----	76.89					
Carbon Dioxide -----	0.69					
Methane -----	0.105	-34.0			0.080	0.054
Ethane -----	0.0013				0.0011	0.0013
Ethylene -----	nd					
Propane -----	0.0002				0.0001	0.0003
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0007					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.45

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.
Insufficient concentration for hydrocarbon analysis.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865462 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: 19-580 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 3/30/2023 13:45 Date Received: 4/03/2023 Date Reported: 5/06/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.17					
Oxygen -----	14.38					
Nitrogen -----	80.66					
Carbon Dioxide -----	3.75					
Methane -----	0.0421			0.030	0.020	
Ethane -----	nd			< 0.0002	< 0.0002	
Ethylene -----	nd					
Propane -----	nd			< 0.0001	< 0.0003	
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0008					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.50

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.
Insufficient concentration for hydrocarbon analysis.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865463 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: 19-582 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 3/30/2023 14:00 Date Received: 4/03/2023 Date Reported: 5/06/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.27					
Oxygen -----	13.10					
Nitrogen -----	80.92					
Carbon Dioxide -----	4.66					
Methane -----	0.0516			0.029	0.020	
Ethane -----	nd			< 0.0002	< 0.0002	
Ethylene -----	nd					
Propane -----	nd			< 0.0001	< 0.0003	
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0007					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.60

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.
Methane isotopes obtained online via GC-C-IRMS and GC-P-IRMS.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865464 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: 19-1603 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 3/30/2023 15:00 Date Received: 4/03/2023 Date Reported: 5/06/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.26					
Oxygen -----	11.67					
Nitrogen -----	82.50					
Carbon Dioxide -----	3.77					
Methane -----	0.802	-89.5	-282		0.47	0.31
Ethane -----	0.0009				0.00056	0.00071
Ethylene -----	nd					
Propane -----	nd				< 0.0001	< 0.0002
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0013					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.54

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.
Carbon of methane obtained online via GC-C-IRMS.

Insufficient methane concentration for hydrogen isotope analysis.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865465 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: 19-1055 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 3/30/2023 15:15 Date Received: 4/03/2023 Date Reported: 5/06/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.23					
Oxygen -----	13.74					
Nitrogen -----	80.18					
Carbon Dioxide -----	4.67					
Methane -----	0.180	-53.5			0.10	0.068
Ethane -----	0.0007				0.00045	0.00057
Ethylene -----	nd					
Propane -----	nd				< 0.0001	< 0.0003
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0015					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.59

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

Carbon of methane obtained online via GC-C-IRMS.

Insufficient methane concentration for hydrogen isotope analysis.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.



Lab #: 865466 Job #: 54097 IS-102884 Co. Job#:
 Sample Name: 19-995 Co. Lab#:
 Company: Environmental Resources Management (ERM)
 API/Well:
 Container: IsoFlask
 Field/Site Name: Sulphur Dome
 Location: Sulphur, Louisiana
 Formation/Depth:
 Sampling Point:

Date Sampled: 3/30/2023 13:10 Date Received: 4/03/2023 Date Reported: 5/06/2023

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide -----	nd					
Helium -----	na					
Hydrogen -----	nd					
Argon -----	1.29					
Oxygen -----	11.66					
Nitrogen -----	81.99					
Carbon Dioxide -----	4.83					
Methane -----	0.231	-56.6			0.12	0.078
Ethane -----	0.0005				0.00028	0.00035
Ethylene -----	nd					
Propane -----	nd				< 0.0001	< 0.0002
Propylene -----	nd					
Iso-butane -----	nd					
N-butane -----	nd					
Iso-pentane -----	nd					
N-pentane -----	nd					
Hexanes + -----	0.0018					

Remarks:

Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.60

*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.