Bristol ISWMF Semi-Monthly Status Update (1/16/23 - 1/31/23)

Bernier, Quinn <QBernier@scsengineers.com>

Mon 3/6/2023 9:07 AM

To: Blalock, Susan (DEQ) <Susan.Blalock@deq.virginia.gov>;hall.kristen@epa.gov <hall.kristen@epa.gov>

Cc: Randall Eads <citymanager@bristolva.org>;Jon Hayes <jon.hayes@bristolva.org>;Hurst, Jeffrey (DEQ) <Jeffrey.Hurst@deq.virginia.gov>;David Cochran <dcochran@bristolva.org>;Erin Willard (willard.erinm@epa.gov) <willard.erinm@epa.gov>;Bowers, Stacy (DEQ) <Stacy.Bowers@deq.virginia.gov>;Lock, Tom <TLock@scsengineers.com>;Dick, Bob <BDick@scsengineers.com>;King, Brandon <BKing@scsengineers.com>

Ms. Hall and Ms. Blalock,

In accordance with EPA's letter, "Approval of Higher Operating Temperature Values of Landfill Gas Wells and Submission of Gas Treatment Alternatives at the Bristol Virginia Integrated Solid Waste Facility" from August 2021, please see the attached status report on existing wells, expansion of the gas collection system, and continuing operating and monitoring results, covering the period from January 16-31, 2023.

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March 6, 2023
File No. 02218208.04

MEMORANDUM

TO: Kristin Hall, EPA Region III
Tracy Blalock, VDEQ-SWRO

FROM: D. Brandon King, SCS Engineers
Quinn Bernier, SCS Engineers

SUBJECT: Semi-Monthly Status Update – January 16th through January 31st , 2023
Bristol Integrated Waste Management Facility, Bristol, Virginia

SCS is submitting this semi-monthly status update to satisfy the conditions of compliance provision #2 of the Environmental Protection Agency (EPA) Region III letter, *Approval of Higher Operating Temperature Values for Landfill Gas Wells and Submission of Gas Treatment Alternatives at the Bristol Virginia Integrated Solid Waste Management Facility*, dated 8/23/21. Accordingly, this memo is a summary of temperature monitoring activities as well as work accomplished during the semi-monthly monitoring period of 1/16/23 through 1/31/23.

TEMPERATURE MONITORING

Automated Wellhead Temperature Measurements

Twenty-five (25) individual landfill gas (LFG) wellheads in the Permit #588 Landfill have automated temperature sensors installed. Two wells (GW-51 and GW-68) are equipped with 2-inch automated temperature sensor tips and the remaining 23 wells have the shorter 1-inch tips. VDEQ and USEPA have receiving Daily Gas Well Temperature Reports with data from these automated temperature sensors since 12/1/22.

SCS is verifying the validity and accuracy of the temperatures recorded by the automated sensors and making modifications to improve the precision of temperature measurements in the LFG wellheads. Because the 2-inch sensors have yielded temperatures that align more closely with manually collected temperature data than the 1-inch sensors, SCS is in the process of obtaining more 2-inch automated temperature sensors for the 23 remaining wells. Manual daily temperature measurements discussed in the following section, using a handheld digital thermometer inserted into the wellhead monitoring port, are considered the more accurate representation of LFG temperatures within the wellheads.

Manual Daily Temperature Monitoring

Manual temperature measurements are being made daily by field staff with a GEM5000 or equivalent LFG analyzer. The manual measurements are used to verify the automated wellhead temperature sensors and to provide temperature data for the 13 wellheads without automated sensors. Some of the wells were not monitored on 1/17/23 and 1/24/23 due to high level alarms from a photoionization detector (PID) used by the City to monitor ambient air quality. Daily

temperature monitoring was not performed at any wellhead on 1/23/23 based on high level alarms from the PID throughout the site.

As shown in Table 1, temperatures measured manually during this monitoring period were greater than temperatures recorded by the automated temperature sensors in LFG wellheads, likely because the temperature probes on the GEM5000 extend further into the well than the automated sensors, and are less influenced by ambient temperatures. As mentioned, the wellheads with 1-inch automated temperature sensors are scheduled to be replaced with longer sensors by the end of February.

All manually recorded temperature measurements are provided in **Attachment A**.

Table 1.January 16th - 31st Temperature Exceedance Summary

Well ID	Average Automated Temperature Measurements (°F)	Average Manual Temperature Measurements (°F)	Manual Temperature minus Automated Temperature (°F)
32R	110.99	123.31	12.32
35	40.54	48.77	8.23
39	39.48	46.69	7.21
40	93.61	115.23	21.62
46	115.11	143.00	27.89
47	61.97	93.54	31.56
49	119.53	133.69	14.16
50	101.77	125.31	23.54
51	80.94	91.31	10.37
52	100.57	132.00	31.43
53	118.95	143.62	24.66
54	98.88	133.00	34.12
55	49.64	59.86	10.22
56	98.34	126.92	28.58
57	129.70	162.33	32.64
58	96.54	105.75	9.21
59	93.79	123.67	29.88
60	85.93	112.62	26.69
62	39.89	50.31	10.42
63	104.91	123.54	18.63
64	107.00	138.62	31.62
65	80.66	132.85	52.18
66	67.06	107.75	40.69
67	83.96	127.92	43.96

Monthly Regulatory Wellhead Temperature Measurements

Routine monthly temperature monitoring for purposes of complying with 40 CFR 60.36f(a)(5) was conducted on 1/5/23. During this monitoring period, wells that exhibited temperatures greater than 145°F on 1/5/23 were retested after corrective actions. Temperatures greater than 145°F continue to be recorded in GW-37 and GW-57. See Table 2 for a list of the status of all exceedances recorded in January 2023.

Table 2. January Temperature Exceedance Summary

Well ID	Initial Exceedance Date	Status as of 1/31/23
GW-37	4/6/22	HOV request submitted 3/8/22
GW-57	1/5/23	Ongoing, past 15-day timeline but less than 60 days
GW-64	1/5/23	Corrected 1/12/23

Work Accomplished During Monitoring Period

LFG Sampling

SCS collected LFG samples from wells GW-37, GW-57, and GW-64 using 1.5-L Summa canisters on 1/6/23, 1/13/23, and 1/20/23 to fulfill the requirement in 40 CFR 63.1961(a)(5) for temperature exceedances lasting more than 7 days. The samples were sent to Enthalpy Analytical for lab analysis of carbon monoxide (CO) and hydrogen (H_2) content. Data from the lab as of 1/31/23 are listed in Table 3. The laboratory analytical data is included in **Attachment B** for further detail.

Table 3. LFG Wellhead Sampling Summary

Sample Date	GW-37		GW-57		GW-64	
	CO (ppmv)	H2 (Vol. %)	CO (ppmv)	H2 (Vol. %)	CO (ppmv)	H2 (Vol. %)
1/6/23	151	2.22	259	3.84	ND	0.28
1/12/23	150	2.46	NM	NM	Exceedance corrected	
1/18/23	144	2.50	NM	NM		
1/25/23	148	2.39	300	6.78		

Weekly required samples of CO were not collected for two weeks in January at GW-57 (noted as "NM" in Table 2) because a lack of LFG System vacuum caused condensate to infiltrate the sampling train during sampling activities. CO testing was conducted at GW-64 only on 1/6/23 because the temperature exceedance was corrected after this date.

The presence of hydrogen in samples from all three wells indicates that combustion reactions are unlikely. The carbon monoxide measurements were all greater than 100 ppmv, indicating that continued weekly CO sampling should continue per 40 CFR 63.1961(a)(5)(viii) until the temperature exceedance is corrected or CO is less than 100 ppmv for four consecutive weekly samples.

Construction Activities

SCS Field Services (SCS-FS) continued construction of the Sidewall Odor Mitigation System (SOMS) in January. The initial phase of construction is a pilot-study on the western sidewall (referred to as Phase I). SCS-FS installed the upper and lower horizontal collector for Phase I and connected these collectors to a 2-HP Ametek Rotron regenerative blower and a CF-10 Solar Spark flare. The new blower/flare were operated starting on 1/31/23 to test LFG quality and quantity (see Figure 1).

Figure 1. Sidewall Odor Mitigation System Pilot-Study Phase I flare initial startup

Initial LFG monitoring data at the new blower inlet yielded methane concentrations between 36-40% and oxygen concentrations less than 3%, an acceptable quality for LFG. SCS and the City will continue to use the SOMS Phase I blower/flare system in early February to confirm that the LFG collected by the SOMS is of consistently acceptable quality, and if so, will connect the SOMS to the primary LFG Collection System.

The City has issued a notice of award to a Contractor for the current LFG System expansion project, which entails installation of additional vertical extraction wells near the sidewall and deeper vertical extraction wells in the interior of the waste mass. All of the LFG vertical wells will be fitted with dedicated dewatering pumps and tied into the existing LFG System and dewatering system designed to increase the efficiency of LFG and landfill liquids extraction.

Weekly SEM

SCS is continuing weekly surface emissions monitoring (SEM) per the Plan of Action Report dated 7/6/22. No exceedances of the 500 ppmv threshold were recorded during the weekly SEM event held on 1/19/23. One exceedance was recorded during the 1/26/23 monitoring event at GW-53, This well was revisited for corrective action, and found not to be under vacuum at the time of monitoring. Vacuum was restored to well GW-53, and no SEM exceedances were recorded during a follow up SEM monitoring on 1/30/23.

The City has placed intermediate cover throughout the Permit No. 588 Landfill and installed well bore skirts at 19 select LFG wells exhibiting methane exceedances at pipe penetrations during past weekly SEM events. The actions appear to be working based on the results of weekly SEM events during this monitoring period.

LFG System O&M

During this monitoring period, SCS investigated condensate sump CPS-2. Liquids were found to be moving through the check valve and into the discharge piping. Excess forcemain pressure was counteracting the sump pump through the discharge piping assembly. Similar issues were observed at LFG wells equipped with pumps in conjunction with CPS-2.

SCS coordinated with the City's O&M contractor to replace the check valve at CPS-2 the week of 1/30/23. This resolved the matter of forcemain pressure counteracting the pump through the discharge hose, restoring proper operation of the pump in CPS-2 as well as approximately a dozen wellhead-dewatering pumps located in the south end of the Permit #588 Landfill.

Additionally, SCS continued to monitor, balance, and tune the leachate cleanouts on the southern border of the Permit #588 Landfill to increase LFG extraction. SCS believes that the ongoing maintenance of these leachate cleanouts is contributing to improvements in LFG quality observed by field staff at the main blower/flare station. Field staff will continue to balance and tune the LFG wellheads on the southern leachate cleanouts in February, as well as other LFG collection system wells.

Please contact SCS or City personnel if you have any questions or require additional information.

cc: Randall Eads, City of Bristol
Jon Hayes, City of Bristol
Jeff Hurst, VDEQ-SWRO
Tom Lock, SCS Field Services
David Cochran, City of Bristol
Erin Willard, EPA Region III
Stacy Bowers, VDEQ-SWRO
Robert E. Dick, P.E., SCS Engineers

Attachment A

City of Bristol Daily LFG Well Temperature Readings

Note	Well Depth	Date Drill	Phase	Month	January	January	January	January	January	January	January	January	January	January	January	January	January	January	January
				Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday
				Date	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
				Well Number																
1	102	10/16/2016	Old Well	**35**	58	NM	65	65	66	60	64		34	42	45	32	35	34	40	52
2	70	9/6/2017	Old Well	**39**	60	NM	58	54	52	50	57		28	59	58	30	40	38	39	44
3	100	9/7/2017	Old Well	**40**	123	NM	115	118	120	118	120		45	122	124	117	123	124	124	128
4	110	10/4/2016	Old Well	**46**	143	46	144	142	145	142	142		NM	144	140	143	144	145	144	141
5	120	10/4/2016	Old Well	**47**	95	NM	97	94	98	99	95		32	97	99	96	100	101	106	102
6	120	9/17/2013	Old Well	**29**	108	NM	98	96	98	95	100		75	103	106	71	30	32	38	44
7	100	8/23/2017	Old Well	**30R**	128	NM	128	130	128	126	128		122	130	128	126	84	81	86	92
8	120	8/30/2017	Old Well	**31R**	134	135	136	134	135	135	137		136	134	138	130	133	130	136	133
9	70	7/29/2016	Old Well	**32**	72	NM	70	82	80	76	88		75	80	80	68	63	60	65	66
10	100	7/28/2016	Old Well	**33**	126	NM	124	127	125	123	126		124	126	120	124	24	30	38	41
11	100	7/30/2016	Old Well	**34**	120	NM	134	130	130	128	126		114	112	118	124	129	130	133	128
12	100	8/1/2016	Old Well	**36**	59	NM	66	65	67	66	70		72	84	89	68	64	66	66	68
13	100	8/24/2017	Old Well	**37**	151	150	150	152	150	150	148		149	150	150	149	150	146	149	150
14	50	8/25/2017	Old Well	**38**	101	NM	100	100	98	99	96		83	100	98	98	100	99	101	103
15	75	9/8/2017	Old Well	**41**	102	NM	79	80	78	80	77		NM	93	101	84	88	84	91	98
16	57	9/8/2017	Old Well	**42**	114	NM	113	110	110	108	108		107	104	110	104	103	102	105	102
17	110	10/7/2016	Old Well	**48**	61	NM	65	62	66	65	70		23	57	54	26	30	31	34	37
1	120	10/1/2021	New Well	**32R**	127	NM	125	122	127	120	118		122	126	127	121	123	120	127	125
2	110	10/1/2021	New Well	**49**	135	135	136	138	132	130	128		136	135	132	134	136	135	134	132
3	96	10/1/2021	New Well	**50**	119	NM	127	125	127	126	132		125	125	126	123	124	125	122	122
4	114	10/1/2021	New Well	**51**	114	NM	108	110	111	112	114		78	88	83	73	77	74	79	80
5	109	10/1/2021	New Well	**52**	129	NM	130	130	132	130	128		132	136	138	114	135	135	137	139
6	91	10/1/2021	New Well	**53**	149	NM	152	150	150	149	150		135	143	140	135	142	141	140	140
7	91	10/1/2021	New Well	**54**	125	NM	135	132	133	132	130		135	135	132	128	135	132	134	136
8	104	10/1/2021	New Well	**55**	96	NM	61	66	64	62	60		NM	NM	NM	NM	55	51	Too Tall	Too Tall
9	109	10/1/2021	New Well	**56**	135	75	124	120	121	120	118		NM	133	136	130	131	131	130	129
10	103	10/1/2021	New Well	**57**	177	NM	175	172	170	165	168		NM	162	160	156	159	157	155	149
11	92	10/1/2021	New Well	**58**	122	NM	80	86	81	80	74		NM	127	129	126	123	120	122	121
12	72	10/1/2021	New Well	**59**	120	NM	138	135	135	132	130		NM	118	114	113	116	116	118	119
13	120	10/1/2021	New Well	**60**	108	NM	115	112	110	109	114		110	116	113	105	114	112	116	118
14	105	10/1/2021	New Well	**61**	119	NM	130	132	129	127	129		133	136	138	122	122	123	121	120
15	120	10/1/2021	New Well	**62**	60	NM	61	66	68	66	69		27	62	60	29	27	35	42	42
16	117	10/1/2021	New Well	**63**	124	NM	126	128	125	127	130		118	120	121	114	124	120	125	128
17	120	10/1/2021	New Well	**64**	145	NM	143	140	140	138	134		133	136	136	132	141	145	144	140
18	100	10/1/2021	New Well	**65**	134	134	134	137	135	132	130		133	134	135	133	134	130	132	128
19	102	10/1/2021	New Well	**66**	130	NM	126	127	125	127	124		NM	49	54	93	116	115	117	120
20	100	10/1/2021	New Well	**67**	120	125	127	125	125	125	128		124	131	128	120	130	132	132	136
21	75	10/1/2021	New Well	**68**	127	NM	126	125	122	126	122		125	125	127	124	125	127	126	125

*Unable to record temperature readings at LFG vertical wells in the Permit 588 Landfill.

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*Note: there was a low level isolated area in the Permit #588 Landfill where emissions hovered over the landfill surface on 1/17/23, 1/23/23, and 1/24/23. Therefore daily temperatures were not recorded on those days or only partial monitoring could be performed by City of Bristol personnel for health and safety reasons.

Attachment B

Laboratory Analytical Reports

1941 Reymet Road ● Richmond, Virginia 23237 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 23A0324

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	January 9, 2023 10:30
	4330 Lewis Road, Suite 1	Date Issued:	January 16, 2023 16:12
	Harrisburg, PA 17111	Project Number:	07220028.00
Submitted To:	Tom Lock	Purchase Order:	07-SO04485
Client Site I.D.:	Bristol		

Enclosed are the results of analyses for samples received by the laboratory on 01/09/2023 10:30. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Technical Director

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

TNI Accredited
VELAP ID 460021

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	Harrisburg, PA 17111	Project Number:	07220028.00
Submitted To:	Tom Lock	Purchase Order:	07-SO04485

Client Site I.D.: Bristol

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
37	23A0324-01	Air	01/06/2023 08:59	01/09/2023 10:30
57	23A0324-02	Air	01/06/2023 09:05	01/09/2023 10:30
64	23A0324-03	Air	01/06/2023 09:15	01/09/2023 10:30

ENTHALPY ANALYTICAL

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Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

ANALYTICAL RESULTS

Project Location:

Field Sample #: 37

Sample ID: 23A0324-01

Sample Matrix: Air

Sampled: 1/6/2023 08:59

Sample Type: LV

Sample Description/Location:

Sub Description/Location:

Canister ID: 063-00245::12848

Canister Size: 1.4L

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg): 3

Receipt Vacuum(in Hg): 3

Flow Controller Type: PASSIVE

Flow Controller ID:

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
ALT-145

Analyte	Result (ppmv)	MDL (ppmv)	LOQ (ppmv)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	151	90.0	90.0		9	1	1/11/23 11:02	MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
EPA 3C

Analyte	Result (Vol%)	MDL (Vol%)	LOQ (Vol%)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Hydrogen (H2), as received	2.22	0.18	0.18		9	1	1/11/23 11:02	MER

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Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

ANALYTICAL RESULTS

Project Location:

Field Sample #: 57

Sample ID: 23A0324-02

Sample Matrix: Air

Sampled: 1/6/2023 09:05

Sample Type: LV

Sample Description/Location:

Sub Description/Location:

Canister ID: 063-00281::13372

Canister Size: 1.4L

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg): 3.4

Receipt Vacuum(in Hg): 3.4

Flow Controller Type: PASSIVE

Flow Controller ID:

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis ALT-145

Analyte	Result (ppmv)	MDL (ppmv)	LOQ (ppmv)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	259	90.0	90.0		9	1	1/11/23 12:38	MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis EPA 3C

Analyte	Result (Vol%)	MDL (Vol%)	LOQ (Vol%)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Hydrogen (H2), as received	3.84	0.18	0.18		9	1	1/11/23 12:38	MER

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ANALYTICAL RESULTS

Project Location:

Field Sample #: 64

Sample ID: 23A0324-03

Sample Matrix: Air

Sampled: 1/6/2023 09:15

Sample Type: LV

Sample Description/Location:

Sub Description/Location:

Canister ID: 063-00284::13382

Canister Size: 1.4L

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg): 3.8

Receipt Vacuum(in Hg): 3.8

Flow Controller Type: PASSIVE

Flow Controller ID:

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
ALT-145

Analyte	Result (ppmv)	MDL (ppmv)	LOQ (ppmv)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	ND	90.0	90.0		9	1	1/11/23 13:33	MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
EPA 3C

Analyte	Result (Vol%)	MDL (Vol%)	LOQ (Vol%)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Hydrogen (H2), as received	0.28	0.18	0.18		9	1	1/11/23 13:33	MER

ENTHALPY ANALYTICAL

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Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis			**Preparation Method:**	**No Prep VOC GC Air**	
23A0324-01	1.00 mL / 1.00 mL	ALT-145	BGA0282	SGA0269	AG00026
23A0324-02	1.00 mL / 1.00 mL	ALT-145	BGA0282	SGA0269	AG00026
23A0324-03	1.00 mL / 1.00 mL	ALT-145	BGA0282	SGA0269	AG00026
23A0324-01	1.00 mL / 1.00 mL	EPA 3C	BGA0282	SGA0269	AG00026
23A0324-02	1.00 mL / 1.00 mL	EPA 3C	BGA0282	SGA0269	AG00026
23A0324-03	1.00 mL / 1.00 mL	EPA 3C	BGA0282	SGA0269	AG00026

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Submitted To:	Tom Lock	Project Number:	07220028.00
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Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0282 - No Prep VOC GC Air										
Blank (BGA0282-BLK1)					Prepared & Analyzed: 01/11/2023					
Hydrogen (H2)	<	0.02	Vol%							
Carbon Monoxide	<	10.0	ppmv							
LCS (BGA0282-BS1)					Prepared & Analyzed: 01/11/2023					
Methane	4170	500	ppmv	5000		83.3	0-200			
Methane	4170	0.05	ppmv	5000		83.3	70-130			
Carbon dioxide	4320	500	ppmv	5000		86.5	0-200			
Carbon dioxide	4320	0.05	ppmv	5000		86.5	70-130			
Oxygen (O2)	5550	0.05	ppmv	5000		111	70-130			
Oxygen (O2)	5550	500	ppmv	5000		111	0-200			
Hydrogen (H2)	5990	200	ppmv	5100		118	0-200			
Hydrogen (H2)	5990	0.02	ppmv	5100		118	70-130			
Nitrogen (N2)	5880	1	ppmv	5000		118	70-130			
Nitrogen (N2)	5880	2000	ppmv	5000		118	0-200			
Carbon Monoxide	5020	10	ppmv	5000		100	0-200			
Carbon Monoxide	5020	0.001	ppmv	5000		100	70-130			
Duplicate (BGA0282-DUP1)				**Source: 23A0324-01**	Prepared & Analyzed: 01/11/2023					
Methane	11.4	0.45	Vol%		11.6			1.61	5	
Carbon dioxide	24.8	0.45	Vol%		25.0			0.855	5	
Oxygen (O2)	7.19	0.45	Vol%		7.31			1.67	5	
Nitrogen (N2)	50.9	9.00	Vol%		51.7			1.51	5	
Hydrogen (H2)	2.21	0.18	Vol%		2.22			0.412	5	
Hydrogen (H2)	21700	1800	ppmv		22200			2.45	25	
Carbon Monoxide	150	90.0	ppmv		151			0.538	25	
Carbon Monoxide	0.02	0.009	Vol%		0.02			0.538	5	
Duplicate (BGA0282-DUP2)				**Source: 23A0324-02**	Prepared & Analyzed: 01/11/2023					
Hydrogen (H2)	3.95	0.18	Vol%		3.84			2.83	5	
Hydrogen (H2)	39500	1800	ppmv		38400			2.83	25	
Carbon Monoxide	260	90.0	ppmv		259			0.104	25	
Carbon Monoxide	0.03	0.009	Vol%		0.03			0.104	5	

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0324

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 9, 2023 10:30 January 16, 2023 16:12
Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0282 - No Prep VOC GC Air										
Duplicate (BGA0282-DUP3)			**Source: 23A0324-03**		Prepared & Analyzed: 01/11/2023					
Hydrogen (H2)	0.29	0.18	Vol%		0.28			4.51	5	
Hydrogen (H2)	2920	1800	ppmv		2790			4.51	25	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0282-DUP4)			**Source: 23A0579-03**		Prepared & Analyzed: 01/13/2023					
Methane	46.6	0.45	Vol%		47.0			0.829	5	
Carbon dioxide	45.3	0.45	Vol%		45.3			0.0420	5	
Oxygen (O2)	0.52	0.45	Vol%		0.53			1.72	5	
Hydrogen (H2)	<	0.18	Vol%		<0.18			NA	5	
Nitrogen (N2)	<	9.00	Vol%		<9.00			NA	5	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0282-DUP5)			**Source: 23A0579-04**		Prepared & Analyzed: 01/13/2023					
Methane	20.7	0.45	Vol%		20.8			0.484	5	
Carbon dioxide	28.6	0.45	Vol%		28.8			0.922	5	
Oxygen (O2)	1.00	0.45	Vol%		1.00			0.0198	5	
Hydrogen (H2)	5.96	0.18	Vol%		5.96			0.0821	5	
Nitrogen (N2)	33.8	9.00	Vol%		34.1			0.690	5	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0282-DUP6)			**Source: 23A0579-05**		Prepared & Analyzed: 01/13/2023					
Methane	22.0	0.45	Vol%		21.9			0.161	5	
Carbon dioxide	24.8	0.45	Vol%		24.7			0.375	5	
Oxygen (O2)	4.89	0.45	Vol%		4.89			0.166	5	
Nitrogen (N2)	34.1	9.00	Vol%		34.0			0.241	5	
Hydrogen (H2)	3.57	0.18	Vol%		3.58			0.308	5	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	

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Final Report

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Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0282 - No Prep VOC GC Air										
Duplicate (BGA0282-DUP7)				**Source: 23A0579-06**	Prepared & Analyzed: 01/13/2023					
Methane	38.6	0.45	Vol%		38.4			0.543	5	
Carbon dioxide	39.3	0.45	Vol%		39.3			0.117	5	
Oxygen (O2)	3.02	0.45	Vol%		3.02			0.117	5	
Hydrogen (H2)	<	0.18	Vol%		<0.18			NA	5	
Nitrogen (N2)	10.7	9.00	Vol%		10.7			0.198	5	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	

Certified Analytes included in this Report

Analyte	Certifications	Analyte	Certifications

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2023
NC	North Carolina DENR	495	07/31/2023
NCDEQ	North Carolina DEQ	495	07/31/2023
NCDOH	North Carolina Department of Health	51714	07/31/2023
NYDOH	New York DOH Drinking Water	12096	04/01/2023
PADEP	NELAP-Pennsylvania Certificate #008	68-03503	10/31/2023
VELAP	NELAP-Virginia Certificate #12157	460021	06/14/2023
WVDEP	West Virginia DEP	350	11/30/2023

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Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Qualifiers and Definitions

RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
PF	Preparation Factor
MDL	Method Detection Limit
LOQ	Limit of Quantitation
ppbv	parts per billion by volume

TIC — Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.

All EPA method 3C results are reported as normalized values when the sum total of all evaluated constituents is outside ± 10% of the absolute.

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formerly Air, Water & Soil Laboratories

AIR ANALYSIS
CHAIN OF CUSTODY

Equipment due 01/27/23

COMPANY NAME: SCS Field Services - Harrisburg	INVOICE TO: **Same**	PROJECT NAME/Quote #: **Bristol**
CONTACT:	INVOICE CONTACT:	SITE NAME: Bristol
ADDRESS:	INVOICE ADDRESS:	PROJECT NUMBER: 07224028.00
PHONE #:	INVOICE PHONE #:	P.O. #:
FAX #: EMAIL:		Pretreatment Program:
Is sample for compliance reporting? (YES) NO	**Regulatory State:** VA	Is sample from a chlorinated supply? (YES) NO — PWS I.D. #:
SAMPLER NAME (PRINT): Ryan Seymour	SAMPLER SIGNATURE: Ryan Seymour	**Turn Around Time:** Circle: 10 (5 Days) or __ Day

Matrix Codes: AA=Indoor/Ambient Air SG=Soil Gas LV=Landfill/Vent Gas OT=Other LV

063-22K-0040

	CLIENT SAMPLE I.D.	Regulator Info: Flow Controller ID	Regulator Info: Cal Flow (mL/min)	Canister Information: Canister ID	Size (L)	Cleaning Batch ID	LAB Outgoing Canister Vacuum (in Hg)	LAB Receiving Canister Vacuum (in Hg)	Sampling Start Information: Barometric Pres. (in Hg): Start Date	Start Time (24hr clock)	Initial Canister Vacuum (in Hg)	Starting Sample Temp °F	Sampling Stop Information: Barometric Pres. (in Hg): Stop Date	Stop Time (24hr clock)	Final Canister Vacuum (in Hg)	Ending Sample Temp °F	Matrix (See Codes)	ANALYSIS: Alt 145 CO	ANALYSIS: Hydrogen	
1)	37	063-0049	5400 5	12848	1.4	221129-02	30	-9 3.1"	1/6/23	8:55	40	149.2	1/6/23	8:59	9	149	LG	x	x	
2)	57	↓	↓	13372	1.4	221129-02	30	-10 3.4"	1/6/23	9:00	40	148.1	1/6/23	9:05	10	148.9	LG	x	x	
3)	64	↓	↓	13382	1.4	221129-02	30	-10 3.8"	1/6/23	9:10	40	145	1/6/23	9:15	10	145.2	LG	x	x	
4)				13384	1.4	221129-02	30										LG	x		

RELINQUISHED:		RECEIVED: FedEx G — DATE / TIME	QC Data Package: Level I ☐
RELINQUISHED: FedEx G — DATE / TIME		RECEIVED: KRC — DATE / TIME: 1/9/23 1030	Level II ☐
RELINQUISHED: — DATE / TIME		RECEIVED: — DATE / TIME	Level III ☐
			Level IV ☐

LAB USE ONLY 310 20.4°C No seal No ice

SCS Field Services 23A0324
Bristol
Recd: 01/09/2023 Due: 01/16/2023

v130325002

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0324

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 9, 2023 10:30 January 16, 2023 16:12
Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Sample Conditions Checklist

Samples Received at:	**20.40°C**
How were samples received?	FedEx Ground
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Work Order Comments

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0671

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	January 13, 2023 10:15
	4330 Lewis Road, Suite 1	Date Issued:	January 20, 2023 16:19
	Harrisburg, PA 17111	Project Number:	07220028.00
Submitted To:	Tom Lock	Purchase Order:	07-SO04485
Client Site I.D.:	Bristol		

Enclosed are the results of analyses for samples received by the laboratory on 01/13/2023 10:15. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Technical Director

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

TNI Accredited
VELAP ID 460021

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0671

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	January 13, 2023 10:15
	4330 Lewis Road, Suite 1	Date Issued:	January 20, 2023 16:19
	Harrisburg, PA 17111	Project Number:	07220028.00
Submitted To:	Tom Lock	Purchase Order:	07-SO04485

Client Site I.D.: Bristol

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
37	23A0671-02	Air	01/12/2023 13:15	01/13/2023 10:15

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Final Report

Laboratory Order ID 23A0671

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 13, 2023 10:15 January 20, 2023 16:19
Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

ANALYTICAL RESULTS

Project Location:
Field Sample #: 37

Sample ID: 23A0671-02
Sample Matrix: Air
Sampled: 1/12/2023 13:15

Sample Type: LV

Sample Description/Location:
Sub Description/Location:
Canister ID: 063-00366::13971
Canister Size: 1.4L

Initial Vacuum(in Hg): 30
Final Vacuum(in Hg):
Receipt Vacuum(in Hg):
Flow Controller Type: Passive
Flow Controller ID:

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
ALT-145

Analyte	Result (ppmv)	MDL (ppmv)	LOQ (ppmv)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	150	90.0	90.0		9	1	1/17/23 11:47	MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
EPA 3C

Analyte	Result (Vol%)	MDL (Vol%)	LOQ (Vol%)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Hydrogen (H2), as received	2.46	0.18	0.18		9	1	1/17/23 11:47	MER

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0671

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 13, 2023 10:15 January 20, 2023 16:19
Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis			**Preparation Method:**	**No Prep VOC GC Air**	
23A0671-02	1.00 mL / 1.00 mL	ALT-145	BGA0503	SGA0475	AG00026
23A0671-02	1.00 mL / 1.00 mL	EPA 3C	BGA0503	SGA0475	AG00026

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Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 13, 2023 10:15 January 20, 2023 16:19
Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0503 - No Prep VOC GC Air										
Blank (BGA0503-BLK1)							Prepared & Analyzed: 01/17/2023			
Methane	<	500	ppmv							
Carbon dioxide	<	500	ppmv							
Oxygen (O2)	<	500	ppmv							
Hydrogen (H2)	<	200	ppmv							
Nitrogen (N2)	<	2000	ppmv							
Hydrogen (H2)	<	0.02	Vol%							
Carbon Monoxide	<	10.0	ppmv							
LCS (BGA0503-BS1)							Prepared & Analyzed: 01/17/2023			
Methane	4040	500	ppmv	5000		80.8	0-200			
Methane	4040	0.05	ppmv	5000		80.8	70-130			
Carbon dioxide	4360	500	ppmv	5000		87.1	0-200			
Carbon dioxide	4360	0.05	ppmv	5000		87.1	70-130			
Oxygen (O2)	5380	0.05	ppmv	5000		108	70-130			
Oxygen (O2)	5380	500	ppmv	5000		108	0-200			
Hydrogen (H2)	5900	200	ppmv	5100		116	0-200			
Nitrogen (N2)	5690	2000	ppmv	5000		114	0-200			
Hydrogen (H2)	5900	0.02	ppmv	5100		116	70-130			
Nitrogen (N2)	5690	1	ppmv	5000		114	70-130			
Carbon Monoxide	4880	0.001	ppmv	5000		97.6	70-130			
Carbon Monoxide	4880	10	ppmv	5000		97.6	0-200			
Duplicate (BGA0503-DUP1)					**Source: 23A0671-02**		Prepared & Analyzed: 01/17/2023			
Methane	114000	4500	ppmv		114000			0.623	25	
Methane	11.4	0.45	Vol%		11.4			0.623	5	
Carbon dioxide	251000	4500	ppmv		247000			1.28	25	
Carbon dioxide	25.1	0.45	Vol%		24.7			1.28	5	
Oxygen (O2)	62700	4500	ppmv		63300			1.07	25	
Oxygen (O2)	6.27	0.45	Vol%		6.33			1.07	5	
Nitrogen (N2)	478000	18000	ppmv		475000			0.487	25	
Hydrogen (H2)	25200	1800	ppmv		24600			2.30	25	
Nitrogen (N2)	47.8	9.00	Vol%		47.5			0.487	5	

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Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0503 - No Prep VOC GC Air										
Duplicate (BGA0503-DUP1)			**Source: 23A0671-02**		Prepared & Analyzed: 01/17/2023					
Hydrogen (H2)	2.52	0.18	Vol%		2.46			2.30	5	
Carbon Monoxide	149	90.0	ppmv		150			1.20	25	
Carbon Monoxide	0.01	0.009	Vol%		0.02			1.20	5	
Duplicate (BGA0503-DUP2)			**Source: 23A0754-01**		Prepared & Analyzed: 01/20/2023					
Methane	292000	4500	ppmv		289000			1.05	25	
Methane	29.2	0.45	Vol%		28.9			1.05	5	
Carbon dioxide	31.4	0.45	Vol%		31.1			0.925	5	
Carbon dioxide	314000	4500	ppmv		311000			0.925	25	
Oxygen (O2)	1.79	0.45	Vol%		1.80			0.333	5	
Oxygen (O2)	17900	4500	ppmv		18000			0.333	25	
Hydrogen (H2)	47000	1800	ppmv		46900			0.363	25	
Nitrogen (N2)	25.9	9.00	Vol%		25.7			0.763	5	
Nitrogen (N2)	259000	18000	ppmv		257000			0.763	25	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0503-DUP3)			**Source: 23A0754-02**		Prepared & Analyzed: 01/20/2023					
Methane	208000	4500	ppmv		207000			0.651	25	
Methane	20.8	0.45	Vol%		20.7			0.651	5	
Carbon dioxide	284000	4500	ppmv		283000			0.451	25	
Carbon dioxide	28.4	0.45	Vol%		28.3			0.451	5	
Oxygen (O2)	1.20	0.45	Vol%		1.19			0.427	5	
Oxygen (O2)	12000	4500	ppmv		11900			0.427	25	
Hydrogen (H2)	57400	1800	ppmv		58000			1.04	25	
Nitrogen (N2)	375000	18000	ppmv		374000			0.283	25	
Nitrogen (N2)	37.5	9.00	Vol%		37.4			0.283	5	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	

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Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0503 - No Prep VOC GC Air										
Duplicate (BGA0503-DUP4)				**Source: 23A0954-01**	Prepared & Analyzed: 01/20/2023					
Methane	<	500	ppmv		108000			NA	25	
Methane	<	0.05	Vol%		10.8			NA	5	
Carbon dioxide	<	0.05	Vol%		23.9			NA	5	
Carbon dioxide	<	500	ppmv		239000			NA	25	
Oxygen (O2)	563	500	ppmv		68900			197	25	
Oxygen (O2)	0.06	0.05	Vol%		6.89			197	5	
Hydrogen (H2)	<	200	ppmv		25000			NA	25	
Nitrogen (N2)	<	2000	ppmv		492000			NA	25	
Nitrogen (N2)	<	1.00	Vol%		49.2			NA	5	
Hydrogen (H2)	<	0.02	Vol%		2.50			NA	5	
Carbon Monoxide	<	10.0	ppmv		144			NA	25	
Carbon Monoxide	<	0.001	Vol%		0.01			NA	5	

Certified Analytes included in this Report

Analyte	Certifications	Analyte	Certifications

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2023
NC	North Carolina DENR	495	07/31/2023
NCDEQ	North Carolina DEQ	495	07/31/2023
NCDOH	North Carolina Department of Health	51714	07/31/2023
NYDOH	New York DOH Drinking Water	12096	04/01/2023
PADEP	NELAP-Pennsylvania Certificate #008	68-03503	10/31/2023
VELAP	NELAP-Virginia Certificate #12157	460021	06/14/2023
WVDEP	West Virginia DEP	350	11/30/2023

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0671

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 13, 2023 10:15 January 20, 2023 16:19
Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Qualifiers and Definitions

RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
PF	Preparation Factor
MDL	Method Detection Limit
LOQ	Limit of Quantitation
ppbv	parts per billion by volume

TIC — Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.

All EPA method 3C results are reported as normalized values when the sum total of all evaluated constituents is outside ± 10% of the absolute.

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formerly Air, Water & Soil Laboratories

AIR ANALYSIS
CHAIN OF CUSTODY

Equipment due 01/27/23

COMPANY NAME: SCS Field Services - Harrisburg	INVOICE TO: **Same**	PROJECT NAME/Quote #: **Bristol**
CONTACT:	INVOICE CONTACT:	SITE NAME:
ADDRESS:	INVOICE ADDRESS:	PROJECT NUMBER: 07220628.06
PHONE #:	INVOICE PHONE #:	P.O. #:
FAX #: EMAIL:		Pretreatment Program:

Is sample for compliance reporting? (YES) NO | **Regulatory State:** VA | Is sample from a chlorinated supply? YES (NO) | PWS I.D. #:

SAMPLER NAME (PRINT): Ryan Seymour SAMPLER SIGNATURE: Ryan Seymour **Turn Around Time:** Circle: 10 (5 Days) or __ Day

Matrix Codes: AA=Indoor/Ambient Air SG=Soil Gas LV=Landfill/Vent Gas OT=Other LV

063-22K-0040

	CLIENT SAMPLE I.D. (water@wc 1/2)	Regulator Info: Flow Controller ID	Regulator Info: Cal Flow (mL/min)	Canister Info: Canister ID	Canister Info: Size (L)	Canister Info: Cleaning Batch ID	Canister Info: LAB Outgoing Canister Vacuum (in Hg)	Canister Info: LAB Receiving Canister Vacuum (in Hg)	Sampling Start Info: Start Date	Sampling Start Info: Start Time (24hr clock)	Sampling Start Info: Initial Canister Vacuum (in Hg)	Sampling Start Info: Starting Sample Temp °F	Sampling Stop Info: Stop Date	Sampling Stop Info: Stop Time (24hr clock)	Sampling Stop Info: Final Canister Vacuum (in Hg)	Sampling Stop Info: Ending Sample Temp °F	Matrix (See Codes)	ANALYSIS: Alt 145 CO	ANALYSIS: Hydrogen	
	Barometric Pres. (in Hg):												Barometric Pres. (in Hg):							
1)	57			13960	1.4	221129-02	30	~~30~~ 28 11	1/12/23	12:55 pm	30	~~-~~ 176	1/12/23	1:02 PM	30	176	LG	x	X	
2)	37			13971	1.4	221128-01	30	~~30~~ 50 "	1/12/23	1:10 pm	30	149	1/12/23	1:15 pm	10	149	LG	x	X	
3)				13384	1.4	221129.02	30		1/12/23				1/12/23				Lv	X	X	
4)																				

RELINQUISHED: Ryan Seymour 1/12/23	RECEIVED: DATE / TIME	QC Data Package Level I ☐	LAB USE ONLY
RELINQUISHED: DATE / TIME 5:30 pm	RECEIVED: Fed Ex E DATE / TIME		
RELINQUISHED: Fed Ex E DATE / TIME	RECEIVED: M Stevens 1/13/23 1015 DATE / TIME		

SCS Field Services **23A0671**
Bristol
Recd: 01/13/2023 **Due: 01/20/2023**

310
20.4C
no seal
no Sc

v130325002

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0671

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 13, 2023 10:15 January 20, 2023 16:19
Submitted To:	Tom Lock	Project Number:	07220028.00
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Sample Conditions Checklist

Samples Received at:	**20.40°C**
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Work Order Comments

Samples logged for VOC Fixed Gases by EPA 3C and ALT 145 CO per Tom Lock via email, which differs from the COC (Alt 145 CO, Hydrogen).
MRS 01/13/23 1213

Sample -01was cacelled due to there not being sufficient sample volume. Client has been notified on 1/17/23 via email. DFE 1/17/23 1401

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	January 20, 2023 9:25
	4330 Lewis Road, Suite 1	Date Issued:	January 27, 2023 14:02
	Harrisburg, PA 17111	Project Number:	[none]
Submitted To:	Tom Lock	Purchase Order:	07-SO04485
Client Site I.D.:	Bristol		

Enclosed are the results of analyses for samples received by the laboratory on 01/20/2023 09:25. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Technical Director

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

TNI Accredited
VELAP ID 460021

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	January 20, 2023 9:25
	4330 Lewis Road, Suite 1	Date Issued:	January 27, 2023 14:02
	Harrisburg, PA 17111	Project Number:	[none]
Submitted To:	Tom Lock	Purchase Order:	07-SO04485

Client Site I.D.: Bristol

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EW37	23A0954-01	Air	01/18/2023 12:32	01/20/2023 09:25

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Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2023 9:25 January 27, 2023 14:02
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

ANALYTICAL RESULTS

Project Location:

Field Sample #: EW37

Sample ID: 23A0954-01

Sample Matrix: Air

Sampled: 1/18/2023 12:32

Sample Type: LV

Sample Description/Location:

Sub Description/Location:

Canister ID: 063-00071::00331

Canister Size: 1.4L

Initial Vacuum(in Hg): 30

Final Vacuum(in Hg):

Receipt Vacuum(in Hg):

Flow Controller Type: PASSIVE

Flow Controller ID:

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
ALT-145

Analyte	Result (ppmv)	MDL (ppmv)	LOQ (ppmv)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	144	90.0	90.0		9	1	1/20/23 15:46	MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis
EPA 3C

Analyte	Result (Vol%)	MDL (Vol%)	LOQ (Vol%)	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Methane, as received	10.8	0.45	0.45		9	1	1/20/23 15:46	MER
Carbon dioxide, as received	23.9	0.45	0.45		9	1	1/20/23 15:46	MER
Oxygen (O2), as received	6.89	0.45	0.45		9	1	1/20/23 15:46	MER
Hydrogen (H2), as received	2.50	0.18	0.18		9	1	1/20/23 15:46	MER
Nitrogen (N2), as received	48.6	18.0	18.0		18	1	1/20/23 16:45	MER

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2023 9:25 January 27, 2023 14:02
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis			**Preparation Method:**	**No Prep VOC GC Air**	
23A0954-01	1.00 mL / 1.00 mL	ALT-145	BGA0503	SGA0613	AG00026
23A0954-01	1.00 mL / 1.00 mL	EPA 3C	BGA0503	SGA0613	AG00026
23A0954-01RE1	1.00 mL / 1.00 mL	EPA 3C	BGA0503	SGA0613	AG00026

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2023 9:25 January 27, 2023 14:02
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0503 - No Prep VOC GC Air										
Blank (BGA0503-BLK1)					Prepared & Analyzed: 01/17/2023					
Methane	<	500	ppmv							
Methane	<	0.05	Vol%							
Carbon dioxide	<	500	ppmv							
Carbon dioxide	<	0.05	Vol%							
Oxygen (O2)	<	500	ppmv							
Oxygen (O2)	<	0.05	Vol%							
Hydrogen (H2)	<	200	ppmv							
Nitrogen (N2)	<	2000	ppmv							
Nitrogen (N2)	<	1.00	Vol%							
Hydrogen (H2)	<	0.02	Vol%							
Carbon Monoxide	<	10.0	ppmv							
LCS (BGA0503-BS1)					Prepared & Analyzed: 01/17/2023					
Methane	4040	500	ppmv	5000		80.8	0-200			
Methane	4040	0.05	ppmv	5000		80.8	70-130			
Carbon dioxide	4360	500	ppmv	5000		87.1	0-200			
Carbon dioxide	4360	0.05	ppmv	5000		87.1	70-130			
Oxygen (O2)	5380	500	ppmv	5000		108	0-200			
Oxygen (O2)	5380	0.05	ppmv	5000		108	70-130			
Nitrogen (N2)	5690	2000	ppmv	5000		114	0-200			
Hydrogen (H2)	5900	200	ppmv	5100		116	0-200			
Hydrogen (H2)	5900	0.02	ppmv	5100		116	70-130			
Nitrogen (N2)	5690	1	ppmv	5000		114	70-130			
Carbon Monoxide	4880	10	ppmv	5000		97.6	0-200			
Carbon Monoxide	4880	0.001	ppmv	5000		97.6	70-130			
Duplicate (BGA0503-DUP1)				**Source: 23A0671-02**	Prepared & Analyzed: 01/17/2023					
Methane	114000	4500	ppmv		114000			0.623	25	
Methane	11.4	0.45	Vol%		11.4			0.623	5	
Carbon dioxide	251000	4500	ppmv		247000			1.28	25	
Carbon dioxide	25.1	0.45	Vol%		24.7			1.28	5	
Oxygen (O2)	62700	4500	ppmv		63300			1.07	25	

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2023 9:25 January 27, 2023 14:02
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0503 - No Prep VOC GC Air										
Duplicate (BGA0503-DUP1)				**Source: 23A0671-02**	Prepared & Analyzed: 01/17/2023					
Oxygen (O2)	6.27	0.45	Vol%		6.33			1.07	5	
Hydrogen (H2)	25200	1800	ppmv		24600			2.30	25	
Nitrogen (N2)	478000	18000	ppmv		475000			0.487	25	
Nitrogen (N2)	47.8	9.00	Vol%		47.5			0.487	5	
Hydrogen (H2)	2.52	0.18	Vol%		2.46			2.30	5	
Carbon Monoxide	149	90.0	ppmv		150			1.20	25	
Carbon Monoxide	0.01	0.009	Vol%		0.02			1.20	5	
Duplicate (BGA0503-DUP2)				**Source: 23A0754-01**	Prepared & Analyzed: 01/20/2023					
Methane	29.2	0.45	Vol%		28.9			1.05	5	
Methane	292000	4500	ppmv		289000			1.05	25	
Carbon dioxide	31.4	0.45	Vol%		31.1			0.925	5	
Carbon dioxide	314000	4500	ppmv		311000			0.925	25	
Oxygen (O2)	17900	4500	ppmv		18000			0.333	25	
Oxygen (O2)	1.79	0.45	Vol%		1.80			0.333	5	
Nitrogen (N2)	25.9	9.00	Vol%		25.7			0.763	5	
Nitrogen (N2)	259000	18000	ppmv		257000			0.763	25	
Hydrogen (H2)	47000	1800	ppmv		46900			0.363	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Duplicate (BGA0503-DUP3)				**Source: 23A0754-02**	Prepared & Analyzed: 01/20/2023					
Methane	20.8	0.45	Vol%		20.7			0.651	5	
Methane	208000	4500	ppmv		207000			0.651	25	
Carbon dioxide	284000	4500	ppmv		283000			0.451	25	
Carbon dioxide	28.4	0.45	Vol%		28.3			0.451	5	
Oxygen (O2)	12000	4500	ppmv		11900			0.427	25	
Oxygen (O2)	1.20	0.45	Vol%		1.19			0.427	5	
Hydrogen (H2)	57400	1800	ppmv		58000			1.04	25	
Nitrogen (N2)	375000	18000	ppmv		374000			0.283	25	
Nitrogen (N2)	37.5	9.00	Vol%		37.4			0.283	5	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2023 9:25 January 27, 2023 14:02
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0503 - No Prep VOC GC Air										
Duplicate (BGA0503-DUP4)				**Source: 23A0954-01**	Prepared & Analyzed: 01/20/2023					
Methane	109000	4500	ppmv		108000			0.960	25	
Methane	10.9	0.45	Vol%		10.8			0.960	5	
Carbon dioxide	24.2	0.45	Vol%		23.9			1.32	5	
Carbon dioxide	242000	4500	ppmv		239000			1.32	25	
Oxygen (O2)	70200	4500	ppmv		68900			1.81	25	
Oxygen (O2)	7.02	0.45	Vol%		6.89			1.81	5	
Hydrogen (H2)	25600	1800	ppmv		25000			2.37	25	
Nitrogen (N2)	497000	18000	ppmv		492000			1.05	25	
Hydrogen (H2)	2.56	0.18	Vol%		2.50			2.37	5	
Carbon Monoxide	145	90.0	ppmv		144			0.374	25	
Carbon Monoxide	0.01	0.009	Vol%		0.01			0.374	5	

Certified Analytes included in this Report

Analyte	Certifications	Analyte	Certifications
EPA 3C in Air			
Methane	VELAP		
Oxygen (O2)	VELAP		
Nitrogen (N2)	VELAP		

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2023
NC	North Carolina DENR	495	07/31/2023
NCDEQ	North Carolina DEQ	495	07/31/2023
NCDOH	North Carolina Department of Health	51714	07/31/2023
NYDOH	New York DOH Drinking Water	12096	04/01/2023
PADEP	NELAP-Pennsylvania Certificate #008	68-03503	10/31/2023
VELAP	NELAP-Virginia Certificate #12157	460021	06/14/2023
WVDEP	West Virginia DEP	350	11/30/2023

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2023 9:25 January 27, 2023 14:02
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Qualifiers and Definitions

RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
PF	Preparation Factor
MDL	Method Detection Limit
LOQ	Limit of Quantitation
ppbv	parts per billion by volume

TIC — Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.

All EPA method 3C results are reported as normalized values when the sum total of all evaluated constituents is outside ± 10% of the absolute.

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formerly Air, Water & Soil Laboratories

AIR ANALYSIS
CHAIN OF CUSTODY

Equipment due 2/6/2023

COMPANY NAME: SCS Field Services - Harrisburg	INVOICE TO: **Same**	PROJECT NAME/Quote #: **Bristol**
CONTACT: Sarah Eadsly	INVOICE CONTACT:	SITE NAME:
ADDRESS:	INVOICE ADDRESS:	PROJECT NUMBER:
PHONE #:	INVOICE PHONE #:	P.O. #:
FAX #: EMAIL:		Pretreatment Program:
Is sample for compliance reporting? (YES) NO	**Regulatory State:** VA	Is sample from a chlorinated supply? YES (NO) PWS I.D. #:
SAMPLER NAME (PRINT): Ryan Seymour	SAMPLER SIGNATURE: Ryan Seymour	**Turn Around Time:** Circle: 10 (5 Days) or __ Day

Matrix Codes: AA=Indoor/Ambient Air SG=Soil Gas LV=Landfill/Vent Gas OT=Other LV

063-23A-0005

	CLIENT SAMPLE I.D.	Regulator Info: Flow Controller ID	Regulator Info: Cal Flow (mL/min)	Canister Information: Canister ID	Size (L)	Cleaning Batch ID	LAB Outgoing Canister Vacuum (in Hg)	LAB Receiving Canister Vacuum (in Hg)	Sampling Start Information: Barometric Pres. (in Hg): 30.03 — Start Date	Start Time (24hr clock)	Initial Canister Vacuum (in Hg)	Starting Sample Temp °F	Sampling Stop Information: Barometric Pres. (in Hg): — Stop Date	Stop Time (24hr clock)	Final Canister Vacuum (in Hg)	Ending Sample Temp °F	Matrix (See Codes)	ANALYSIS: Alt 145 CO	hydrocarbons	CH4 C2 C2 H2
1)	EW37	ST005		331	1.4	221228-01	21.2	3.4"	01/18	~~12:30~~ 12:30 pm	27	149°	01/18	12:32 pm	9	149°	LG	x	X	X
2)				335	1.4	221228-01	21.2										LG	x		
3)				10047	1.4	221228-01	21.2										LG	x		
4)				12453	1.4	221228-01	21.2										LG	x		

20.5°C, 310, no ice, no seal

RELINQUISHED:		RECEIVED: Fedex E — DATE / TIME	QC Data Package: Level I ☐
RELINQUISHED: Fedex E — DATE / TIME		RECEIVED: CSB 1/20/23 0925 — DATE / TIME	Level II ☐
RELINQUISHED: — DATE / TIME		RECEIVED: — DATE / TIME	Level III ☐
			Level IV ☐

LAB USE ONLY

SCS Field Services 23A0954
Bristol
Recd: 01/20/2023 Due: 01/27/2023

v130325002

ENTHALPY ANALYTICAL

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Certificate of Analysis

Final Report

Laboratory Order ID 23A0954

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 20, 2023 9:25 January 27, 2023 14:02
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Sample Conditions Checklist

Samples Received at:	**20.50°C**
How were samples received?	FedEx Express
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Work Order Comments

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Certificate of Analysis

Final Report

Laboratory Order ID 23A1337

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	January 27, 2023 11:02
	4330 Lewis Road, Suite 1	Date Issued:	February 2, 2023 16:04
	Harrisburg, PA 17111	Project Number:	[none]
Submitted To:	Tom Lock	Purchase Order:	07-SO04485
Client Site I.D.:	Bristol		

Enclosed are the results of analyses for samples received by the laboratory on 01/27/2023 11:02. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Technical Director

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

TNI Accredited
VELAP ID 460021

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	4330 Lewis Road, Suite 1	Date Issued:	February 2, 2023 16:04
	Harrisburg, PA 17111	Project Number:	[none]
Submitted To:	Tom Lock	Purchase Order:	07-SO04485

Client Site I.D.: Bristol

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
57	23A1337-02	Air	01/25/2023 12:08	01/27/2023 11:02
37	23A1337-03	Air	01/25/2023 11:55	01/27/2023 11:02

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Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

ANALYTICAL RESULTS

Project Location:
Field Sample #: 57

Sample ID: 23A1337-02
Sample Matrix: Air
Sampled: 1/25/2023 12:08

Sample Type: LV

Sample Description/Location:
Sub Description/Location:
Canister ID: 063-00024::10047
Canister Size: 1.4L

Initial Vacuum(in Hg): 21.1
Final Vacuum(in Hg):
Receipt Vacuum(in Hg):
Flow Controller Type: Passive
Flow Controller ID:

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis ALT-145

Analyte	ppmv Result	MDL	LOQ	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	300	90.0	90.0		9	1	1/31/23 12:05	MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis EPA 3C

Analyte	Vol% Result	MDL	LOQ	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Methane, as received	25.2	0.45	0.45		9	1	1/31/23 12:05	MER
Carbon dioxide, as received	53.8	0.45	0.45		9	1	1/31/23 12:05	MER
Oxygen (O2), as received	1.48	0.45	0.45		9	1	1/31/23 12:05	MER
Hydrogen (H2), as received	6.78	0.36	0.36		18	1	1/31/23 17:27	MER
Nitrogen (N2), as received	ND	9.00	9.00		9	1	1/31/23 12:05	MER
Carbon Monoxide, as received	0.03	0.009	0.009		9	1	1/31/23 12:05	MER

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Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 27, 2023 11:02 February 2, 2023 16:04
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

ANALYTICAL RESULTS

Project Location:

Field Sample #: 37

Sample ID: 23A1337-03

Sample Matrix: Air

Sampled: 1/25/2023 11:55

Sample Type: LV

Sample Description/Location:

Sub Description/Location:

Canister ID: 063-00310::12453

Canister Size: 1.4L

Initial Vacuum(in Hg): 21.1

Final Vacuum(in Hg):

Receipt Vacuum(in Hg):

Flow Controller Type: Passive

Flow Controller ID:

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis ALT-145

Analyte	ppmv Result	MDL	LOQ	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	148	90.0	90.0		9	1	1/31/23 13:12	MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis EPA 3C

Analyte	Vol% Result	MDL	LOQ	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Methane, as received	11.7	0.45	0.45		9	1	1/31/23 13:12	MER
Carbon dioxide, as received	25.8	0.45	0.45		9	1	1/31/23 13:12	MER
Oxygen (O2), as received	6.18	0.45	0.45		9	1	1/31/23 13:12	MER
Hydrogen (H2), as received	2.39	0.18	0.18		9	1	1/31/23 13:12	MER
Nitrogen (N2), as received	45.6	18.0	18.0		18	1	1/31/23 17:43	MER
Carbon Monoxide, as received	0.01	0.009	0.009		9	1	1/31/23 13:12	MER

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Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis			**Preparation Method:**	**No Prep VOC GC Air**	
23A1337-02	1.00 mL / 1.00 mL	ALT-145	BGA0766	SGA0947	AG00026
23A1337-03	1.00 mL / 1.00 mL	ALT-145	BGA0766	SGA0947	AG00026
23A1337-02	1.00 mL / 1.00 mL	EPA 3C	BGA0766	SGA0947	AG00026
23A1337-02RE1	1.00 mL / 1.00 mL	EPA 3C	BGA0766	SGA0947	AG00026
23A1337-03	1.00 mL / 1.00 mL	EPA 3C	BGA0766	SGA0947	AG00026
23A1337-03RE1	1.00 mL / 1.00 mL	EPA 3C	BGA0766	SGA0947	AG00026

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Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0766 - No Prep VOC GC Air										
Blank (BGA0766-BLK1)					Prepared & Analyzed: 01/25/2023					
Methane	<	0.05	Vol%							
Carbon dioxide	<	0.05	Vol%							
Oxygen (O2)	<	0.05	Vol%							
Hydrogen (H2)	<	0.02	Vol%							
Nitrogen (N2)	<	1.00	Vol%							
Carbon Monoxide	<	10.0	ppmv							
Carbon Monoxide	<	0.001	Vol%							
LCS (BGA0766-BS1)					Prepared & Analyzed: 01/25/2023					
Methane	4070	500	ppmv	5000		81.4	0-200			
Methane	4070	0.05	ppmv	5000		81.4	70-130			
Carbon dioxide	4300	500	ppmv	5000		86.0	0-200			
Carbon dioxide	4300	0.05	ppmv	5000		86.0	70-130			
Oxygen (O2)	5260	0.05	ppmv	5000		105	70-130			
Oxygen (O2)	5260	500	ppmv	5000		105	0-200			
Nitrogen (N2)	5810	2000	ppmv	5000		116	0-200			
Hydrogen (H2)	5960	200	ppmv	5100		117	0-200			
Nitrogen (N2)	5810	1	ppmv	5000		116	70-130			
Hydrogen (H2)	5960	0.02	ppmv	5100		117	70-130			
Carbon Monoxide	4950	10	ppmv	5000		99.0	0-200			
Carbon Monoxide	4950	0.001	ppmv	5000		99.0	70-130			
Duplicate (BGA0766-DUP1)				**Source: 23A1035-01**	Prepared & Analyzed: 01/25/2023					
Methane	229000	4500	ppmv		228000			0.633	25	
Methane	22.9	0.45	Vol%		22.8			0.632	5	
Carbon dioxide	286000	4500	ppmv		285000			0.485	25	
Carbon dioxide	28.6	0.45	Vol%		28.5			0.485	5	
Oxygen (O2)	15500	4500	ppmv		15700			1.39	25	
Oxygen (O2)	1.55	0.45	Vol%		1.57			1.39	5	
Nitrogen (N2)	336000	18000	ppmv		336000			0.0580	25	
Hydrogen (H2)	54500	1800	ppmv		54600			0.204	25	
Nitrogen (N2)	33.6	9.00	Vol%		33.6			0.0580	5	

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Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0766 - No Prep VOC GC Air											
Duplicate (BGA0766-DUP1)				**Source: 23A1035-01**		Prepared & Analyzed: 01/25/2023					
Carbon Monoxide		<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide		<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0766-DUP2)				**Source: 23A1035-02**		Prepared & Analyzed: 01/25/2023					
Methane	28.8		0.45	Vol%		28.7			0.285	5	
Methane	288000		4500	ppmv		287000			0.285	25	
Carbon dioxide	31.4		0.45	Vol%		31.1			0.783	5	
Carbon dioxide	314000		4500	ppmv		311000			0.783	25	
Oxygen (O2)	15700		4500	ppmv		15500			0.946	25	
Oxygen (O2)	1.57		0.45	Vol%		1.55			0.946	5	
Hydrogen (H2)	62900		1800	ppmv		62200			1.17	25	
Nitrogen (N2)	25.7		9.00	Vol%		25.5			0.650	5	
Nitrogen (N2)	257000		18000	ppmv		255000			0.650	25	
Carbon Monoxide		<	0.009	Vol%		<0.009			NA	5	
Carbon Monoxide		<	90.0	ppmv		<90.0			NA	25	
Duplicate (BGA0766-DUP3)				**Source: 23A1035-03**		Prepared & Analyzed: 01/25/2023					
Methane	31.0		0.45	Vol%		31.1			0.499	5	
Methane	310000		4500	ppmv		311000			0.499	25	
Carbon dioxide	352000		4500	ppmv		353000			0.417	25	
Carbon dioxide	35.2		0.45	Vol%		35.3			0.417	5	
Oxygen (O2)	1.36		0.45	Vol%		1.37			0.368	5	
Oxygen (O2)	13600		4500	ppmv		13700			0.368	25	
Nitrogen (N2)	21.1		9.00	Vol%		21.2			0.594	5	
Hydrogen (H2)	65600		1800	ppmv		65600			0.0264	25	
Nitrogen (N2)	211000		18000	ppmv		212000			0.594	25	
Carbon Monoxide		<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide		<	0.009	Vol%		<0.009			NA	5	

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Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0766 - No Prep VOC GC Air										
Duplicate (BGA0766-DUP4)				**Source: 23A1035-04**	Prepared & Analyzed: 01/25/2023					
Methane	149000	4500	ppmv		149000			0.483	25	
Methane	14.9	0.45	Vol%		14.9			0.483	5	
Carbon dioxide	253000	4500	ppmv		252000			0.507	25	
Carbon dioxide	25.3	0.45	Vol%		25.2			0.507	5	
Oxygen (O2)	<	4500	ppmv		<4500			NA	25	
Oxygen (O2)	<	0.45	Vol%		<0.45			NA	5	
Nitrogen (N2)	453000	18000	ppmv		451000			0.486	25	
Hydrogen (H2)	18800	1800	ppmv		19000			1.01	25	
Hydrogen (H2)	1.88	0.18	Vol%		1.90			1.01	5	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0766-DUP5)				**Source: 23A1337-02**	Prepared & Analyzed: 01/31/2023					
Methane	251000	4500	ppmv		252000			0.551	25	
Methane	25.1	0.45	Vol%		25.2			0.551	5	
Carbon dioxide	53.6	0.45	Vol%		53.8			0.363	5	
Carbon dioxide	536000	4500	ppmv		538000			0.363	25	
Oxygen (O2)	14600	4500	ppmv		14800			0.833	25	
Oxygen (O2)	1.46	0.45	Vol%		1.48			0.833	5	
Nitrogen (N2)	52200	18000	ppmv		52500			0.508	25	
Hydrogen (H2)	69300	1800	ppmv		68700			0.823	25	
Nitrogen (N2)	<	9.00	Vol%		<9.00			NA	5	
Carbon Monoxide	0.03	0.009	Vol%		0.03			0.239	5	
Carbon Monoxide	301	90.0	ppmv		300			0.239	25	
Duplicate (BGA0766-DUP6)				**Source: 23A1337-03**	Prepared & Analyzed: 01/31/2023					
Methane	117000	4500	ppmv		117000			0.503	25	
Methane	11.7	0.45	Vol%		11.7			0.503	5	
Carbon dioxide	26.0	0.45	Vol%		25.8			0.732	5	
Carbon dioxide	260000	4500	ppmv		258000			0.732	25	
Oxygen (O2)	6.20	0.45	Vol%		6.18			0.409	5	
Oxygen (O2)	62000	4500	ppmv		61800			0.409	25	
Nitrogen (N2)	455000	18000	ppmv		454000			0.181	25	
Hydrogen (H2)	24600	1800	ppmv		23900			3.14	25	
Hydrogen (H2)	2.46	0.18	Vol%		2.39			3.14	5	

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Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0766 - No Prep VOC GC Air										
Duplicate (BGA0766-DUP6)				**Source: 23A1337-03**	Prepared & Analyzed: 01/31/2023					
Carbon Monoxide	145	90.0	ppmv		148			1.60	25	
Carbon Monoxide	0.01	0.009	Vol%		0.01			1.60	5	
Duplicate (BGA0766-DUP7)				**Source: 23A1447-01**	Prepared & Analyzed: 01/31/2023					
Methane	225000	4500	ppmv		222000			1.52	25	
Methane	22.5	0.45	Vol%		22.2			1.52	5	
Carbon dioxide	307000	4500	ppmv		302000			1.49	25	
Carbon dioxide	30.7	0.45	Vol%		30.2			1.49	5	
Oxygen (O2)	4900	4500	ppmv		4820			1.60	25	
Oxygen (O2)	0.49	0.45	Vol%		0.48			1.60	5	
Hydrogen (H2)	20200	1800	ppmv		20500			1.18	25	
Nitrogen (N2)	405000	18000	ppmv		400000			1.22	25	
Nitrogen (N2)	40.5	9.00	Vol%		40.0			1.22	5	
Hydrogen (H2)	2.02	0.18	Vol%		2.05			1.18	5	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0766-DUP8)				**Source: 23A1447-02**	Prepared & Analyzed: 01/31/2023					
Methane	385000	4500	ppmv		386000			0.358	25	
Methane	38.5	0.45	Vol%		38.6			0.358	5	
Carbon dioxide	387000	4500	ppmv		387000			0.128	25	
Carbon dioxide	38.7	0.45	Vol%		38.7			0.128	5	
Oxygen (O2)	<	4500	ppmv		<4500			NA	25	
Oxygen (O2)	<	0.45	Vol%		<0.45			NA	5	
Hydrogen (H2)	63200	1800	ppmv		63300			0.261	25	
Nitrogen (N2)	111000	18000	ppmv		111000			0.102	25	
Nitrogen (N2)	11.1	9.00	Vol%		11.1			0.102	5	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	

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Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGA0766 - No Prep VOC GC Air										
Duplicate (BGA0766-DUP9)			**Source: 23A1447-03**		Prepared & Analyzed: 01/31/2023					
Methane	283000	4500	ppmv		287000			1.55	25	
Methane	28.3	0.45	Vol%		28.7			1.55	5	
Carbon dioxide	317000	4500	ppmv		320000			0.863	25	
Carbon dioxide	31.7	0.45	Vol%		32.0			0.863	5	
Oxygen (O2)	19200	4500	ppmv		19400			1.33	25	
Oxygen (O2)	1.92	0.45	Vol%		1.94			1.33	5	
Hydrogen (H2)	65500	1800	ppmv		65700			0.373	25	
Nitrogen (N2)	263000	18000	ppmv		266000			1.25	25	
Nitrogen (N2)	26.3	9.00	Vol%		26.6			1.25	5	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	
Duplicate (BGA0766-DUPA)			**Source: 23A1447-04**		Prepared & Analyzed: 01/31/2023					
Methane	363000	4500	ppmv		363000			0.0254	25	
Methane	36.3	0.45	Vol%		36.3			0.0254	5	
Carbon dioxide	381000	4500	ppmv		380000			0.123	25	
Carbon dioxide	38.1	0.45	Vol%		38.0			0.123	5	
Oxygen (O2)	19500	4500	ppmv		19500			0.170	25	
Oxygen (O2)	1.95	0.45	Vol%		1.95			0.170	5	
Nitrogen (N2)	147000	18000	ppmv		146000			0.148	25	
Nitrogen (N2)	14.7	9.00	Vol%		14.6			0.148	5	
Hydrogen (H2)	47800	1800	ppmv		47300			1.09	25	
Carbon Monoxide	<	90.0	ppmv		<90.0			NA	25	
Carbon Monoxide	<	0.009	Vol%		<0.009			NA	5	

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Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Certified Analytes included in this Report

Analyte	Certifications	Analyte	Certifications
EPA 3C in Air			
Methane	VELAP		
Oxygen (O2)	VELAP		
Nitrogen (N2)	VELAP		

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2023
NC	North Carolina DENR	495	07/31/2023
NCDEQ	North Carolina DEQ	495	07/31/2023
NCDOH	North Carolina Department of Health	51714	07/31/2023
NYDOH	New York DOH Drinking Water	12096	04/01/2023
PADEP	NELAP-Pennsylvania Certificate #008	68-03503	10/31/2023
VELAP	NELAP-Virginia Certificate #12157	460021	06/14/2023
WVDEP	West Virginia DEP	350	11/30/2023

Qualifiers and Definitions

RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
PF	Preparation Factor
MDL	Method Detection Limit
LOQ	Limit of Quantitation
ppbv	parts per billion by volume
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library. A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.

All EPA method 3C results are reported as normalized values when the sum total of all evaluated constituents is outside ± 10% of the absolute.

ENTHALPY ANALYTICAL
formerly Air, Water & Soil Laboratories

AIR ANALYSIS
CHAIN OF CUSTODY

Equipment due 2/6/2023

COMPANY NAME: SCS Field Services - Harrisburg	INVOICE TO: **Same**	PROJECT NAME/Quote #: **Bristol**
CONTACT: Sarah Endsly	INVOICE CONTACT:	SITE NAME: Bristol
ADDRESS:	INVOICE ADDRESS:	PROJECT NUMBER: 07220028.00
PHONE #:	INVOICE PHONE #:	P.O. #:
FAX #: EMAIL:		Pretreatment Program:
Is sample for compliance reporting? (YES) NO	**Regulatory State:** VA	Is sample from a chlorinated supply? YES (NO)
SAMPLER NAME (PRINT): Ryan Seymour	SAMPLER SIGNATURE: Ryan Seymour	**Turn Around Time:** Circle: 10 (5 Days) or __ Day

PWS I.D. #:

Matrix Codes: AA=Indoor/Ambient Air SG=Soil Gas LV=Landfill/Vent Gas OT=Other ~~LV~~

063-23A-0005

	CLIENT SAMPLE I.D.	Regulator Info: Flow Controller ID	Regulator Info: Cal Flow (mL/min)	Canister Information: Canister ID	Size (L)	Cleaning Batch ID	LAB Outgoing Canister Vacuum (in Hg)	LAB Receiving Canister Vacuum (in Hg)	Sampling Start Information (Barometric Pres. (in Hg): 30.03): Start Date	Start Time (24hr clock)	Initial Canister Vacuum (in Hg)	Starting Sample Temp °F	Sampling Stop Information (Barometric Pres. (in Hg):): Stop Date	Stop Time (24hr clock)	Final Canister Vacuum (in Hg)	Ending Sample Temp °F	Matrix (See Codes)	ANALYSIS: Alt 145 CO	Hydrocarbons	02 CO2 N2 H2
1)	~~EW37~~	~~ST005~~		~~331~~	1.4	221228-01	~~21.2~~		01/18	~~12:30~~ 12:30pm	27	149°	01/18	12:32 pm	9	149°	LG	x	X	X
2)	Empty	ST005		335	1.4	221228-01	21.2	EMPTY - RETURN					-				LG	x	X	X
3)	57	ST005		10047	1.4	221228-01	21.2	~~10~~ 5.6	1/25/23	12:05pm	27	148	1/25/23	12:08pm	10	148	LG	x	X	X
4)	37	↓		12453	1.4	221228-01	21.2	~~10~~ 5.2	1/25/23	11:50AM	26	170	1/25/23	11:55 AM	10	170	LG	x		

19.3°C, 310, no ice, no seal

RELINQUISHED: Ryan Seymour 1/25/23	RECEIVED: FedEx G DATE / TIME	QC Data Package	LAB USE ONLY
RELINQUISHED: FedEx G DATE / TIME	RECEIVED: CSB 1/27/23 1102 DATE / TIME	Level I ☐	**SCS Field Services 23A1337**
RELINQUISHED: DATE / TIME	RECEIVED: DATE / TIME	Level II ☐	**Bristol**
		Level III ☐	**Recd: 01/27/2023 Due: 02/03/2023**
		Level IV ☐	

v130325002

ENTHALPY ANALYTICAL

1941 Reymet Road ● Richmond, Virginia 23237 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 23A1337

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	January 27, 2023 11:02 February 2, 2023 16:04
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Sample Conditions Checklist

Samples Received at:	**19.30°C**
How were samples received?	FedEx Ground
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits or received on ice, and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Work Order Comments