Bristol ISWMF Semi-Monthly Status Update (2/16/23 - 2/28/23)

Bernier, Quinn <QBernier@scsengineers.com>

Mon 3/27/2023 11:25 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>;Lock, Tom <TLock@scsengineers.com>;David Cochran <dcochran@bristolva.org>;Willard, Erin <willard.erinm@epa.gov>;Bowers, Stacy (DEQ) <Stacy.Bowers@deq.virginia.gov>;Dick, Bob <BDick@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 February 16-28, 2023.

Quinn Bernier, PE*
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March 27, 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 – February 16th through February 28th, 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 2/16/23 through 2/28/23.

TEMPERATURE MONITORING

Automated Wellhead Temperature Measurements

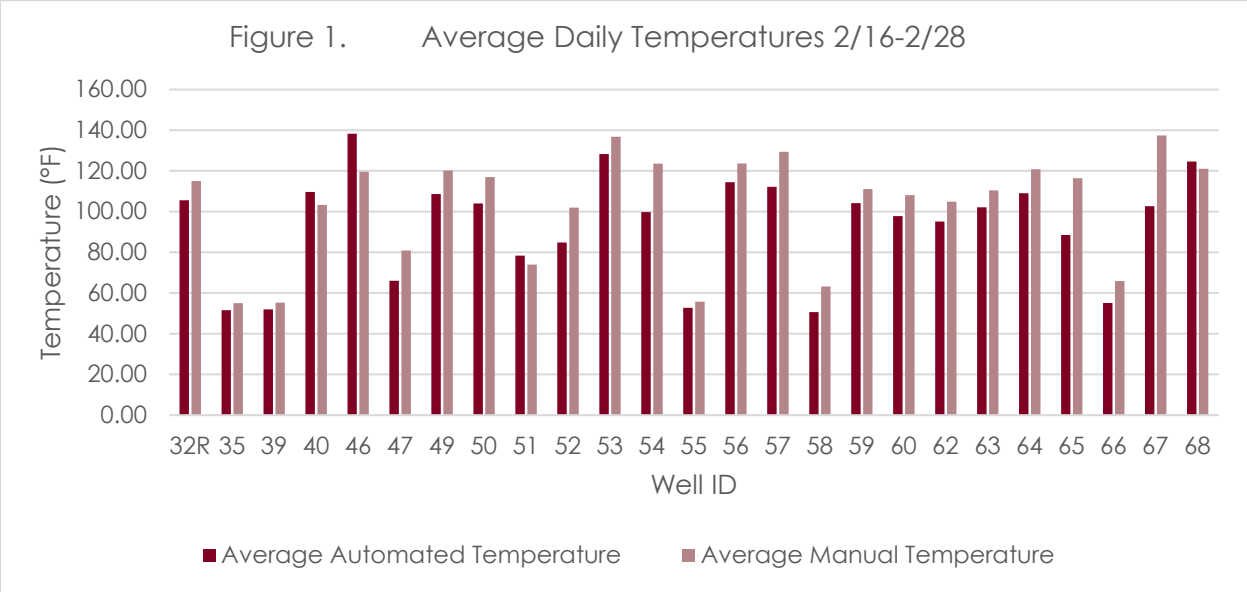
Twenty-five (25) individual landfill gas (LFG) wellheads in the Permit #588 Landfill have automated temperature sensors installed. VDEQ and USEPA have been receiving Daily Gas Well Temperature Reports with data from these automated temperature sensors since 12/1/22.

During the period of monitoring described in this memorandum, two wells (GW-51 and GW-68) were equipped with 2-inch automated temperature sensor tips and the remaining 23 wells had the shorter 1-inch tips. The sensors with 1-inch tips were replaced with sensors having 2-inch tips during the first week of March, meaning that all 25 wellheads now have 2-inch automated sensors. Data from the sensors with 2-inch tips are anticipated to be more comparable to the manual daily temperature measurements made using a handheld digital thermometer inserted into the wellhead monitoring port.

Of the measurements being made during this monitoring period, the manual measurements are considered the most accurate representation of LFG temperatures within the wellheads.

SCS reviewed the automated hourly temperature measurements from 2/16/23 to 2/28/23, and identified the following trends:

- **Temperatures over 145°F:** Temperatures over the NESHAP AAAA compliance threshold of 145°F were recorded at GW-51, GW-53 and GW-67. At GW-51 and GW-53, these instances were sporadic, whereas temperatures greater than 145°F persisted for 40 hours (2/22-2/24) at GW-67. By the end of 2/28/23 temperatures at all wells were less than 145°F.
- **Temperature Trends by Location:** As shown in Figure 1, the wells with the highest average temperatures were GW-46, GW-53, and GW-68. GW-46 and GW-53 are located in close proximity.

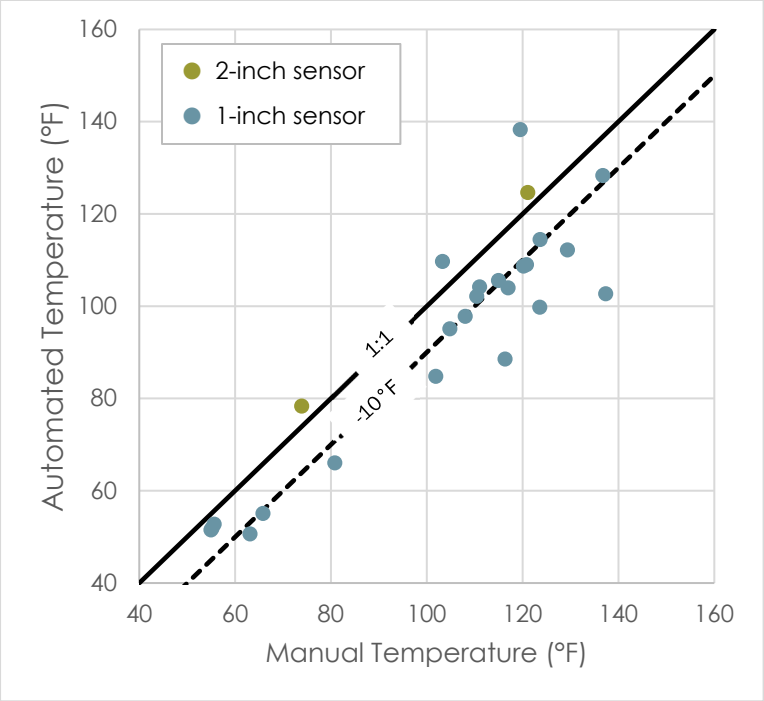


Manual Daily Temperature Monitoring

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.

As shown in Figure 2, the temperatures measured manually during this monitoring period were closest to the automated sensor temperatures in wells with the longer 2-inch sensors at GW-51 and GW-68 (**orange** in Figure 2). This is likely because the temperature probes on the GEM5000 and 2-inch sensors extend further into the well than the 1-inch automated sensors and are less influenced by ambient temperatures.

Figure 2. Manual vs. Automated Temperature Comparison



All daily temperatures recorded manually are provided in **Attachment A**.

Monthly Regulatory Wellhead Temperature Measurements

Routine monthly temperature monitoring for purposes of complying with 40 CFR 60.36f(a)(5) was conducted 2/1/23 – 2/3/23. During this monitoring period, an additional round of wellfield monitoring was conducted on 2/22/23 and 2/28/23. Temperatures greater than 145°F continue to be recorded in GW-37, and a new temperature exceedance was measured at GW-53. The temperature exceedance at GW-57 was resolved on 2/22/23 with a temperature measurement of 144°F. See Table 2 for a list of the status of all exceedances recorded during this monitoring period.

Table 2. February Temperature Exceedance Summary

Well ID	Initial Exceedance Date	Last date/temperature measured	Duration of Exceedance	Status as of 2/28/23
GW-37	4/6/22	2/23/23 149°F	10 months	HOV request submitted 3/8/22
GW-53	2/22/23	2/23/23 145.3°F	6 days	Within 15-day timeline
GW-57	1/5/23	2/23/23 144°F	48 days	Resolved 2/22/23

Work Accomplished During Monitoring Period

LFG Sampling

SCS collected LFG samples from wells GW-37 and GW-53 using 1.5-L Summa canisters on 2/23/23 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. Lab results are summarized in Table 3. Full laboratory analytical data is included in **Attachment B** for further detail.

Table 2. LFG Wellhead Sampling Summary

Sample Date	GW-37		GW-53	
	CO (ppmv)	H2 (Vol. %)	CO (ppmv)	H2 (Vol. %)
2/23/23	152	2.51	483	6.92

The presence of hydrogen in samples from GW-37 and GW-53 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 trenching activities to install the southern section of the Sidewall Odor Mitigation System (SOMS). SCS-FS also tied in the four Pilot Study Phase I horizontal collectors into the main LFG collection and control system (LFGCCS) adjacent to GW-49. Since connection to the main LFGCCS, LFG quality measured at the Pilot Study Phase I collectors is variable, sometimes less than 10% methane and others greater than 45% methane. SCS is still in the process of the initial tuning of these collectors to establish more consistent LFG quality.

LFG header pipe and other materials were delivered to the Landfill in anticipation of the LFG System Phase I installation. SCS and the City were finalizing the proposed LFG well stakeout and well schedule during this monitoring period. The City's contractor is currently scheduled to begin LFG well drilling activities during the week of 3/27/23.

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 events held on 2/23/23 and 2/28/23.

The City has placed intermediate cover throughout the Permit No. 588 Landfill and installed well bore skirts at 19 LFG wells exhibiting methane exceedances at pipe penetrations during past weekly SEM events. The results of the weekly SEM event during this monitoring period indicate that these actions have been effective.

LFG System O&M

The City's O&M contractor replaced wellheads in the Permit #221 Landfill with smaller, 1" QED wellheads, which will allow field staff to fine tune for low LFG flows. In addition, the O&M contractor

removed six pumps and sent them to Pump One for servicing. Pump One agreed to clean and professionally service the pumps as part of a research project with Kroff Chemical. The City and their O&M contractor continue to procure pump parts to better facilitate routine pump maintenance.

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

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Certificate of Analysis

Final Report

Laboratory Order ID 23B1409

Client Name:	SCS Field Services - Harrisburg, PA	Date Received:	February 24, 2023 11:20
	4330 Lewis Road, Suite 1	Date Issued:	March 2, 2023 14:24
	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 02/24/2023 11:20. 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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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	23B1409-01	Air	02/23/2023 09:18	02/24/2023 11:20
53	23B1409-02	Air	02/23/2023 09:32	02/24/2023 11:20

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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 #: 37

Sample ID: 23B1409-01

Sample Matrix: Air

Sampled: 2/23/2023 09:18

Sample Type: LV

Sample Description/Location:

Sub Description/Location:

Canister ID: 063-00008::00324

Canister Size: 1.4L

Initial Vacuum(in Hg): 26

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	152	90.0	90.0		9	1	2/27/23 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	11.5	0.45	0.45		9	1	2/27/23 12:05	MER
Carbon dioxide, as received	26.9	0.45	0.45		9	1	2/27/23 12:05	MER
Hydrogen (H2), as received	2.61	0.18	0.18		9	1	2/27/23 12:05	MER

Volatile Organic Compounds by GCMS
EPA TO-15

Analyte	ppbv Results	MDL	LOQ	Flag/Qual	ug/M³ Results	MDL	LOQ	Dilution	PF	Date/Time Analyzed	Analyst
Benzene	67000	1750	4370		210000	5600	14000	8750	1	2/28/23 15:58	DFH

Surrogate(s)	% Recovery	% Recovery Limits	
4-Bromofluorobenzene (Surr)	109	80-120	2/28/23 15:58

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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 #: 53

Sample ID: 23B1409-02

Sample Matrix: Air

Sampled: 2/23/2023 09:32

Sample Type: LV

Sample Description/Location:

Sub Description/Location:

Canister ID: 063-00086::00287

Canister Size: 1.4L

Initial Vacuum(in Hg): 26

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	483	90.0	90.0		9	1	2/27/23 13:29	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	15.1	0.45	0.45		9	1	2/27/23 13:29	MER
Carbon dioxide, as received	38.0	0.45	0.45		9	1	2/27/23 13:29	MER
Hydrogen (H2), as received	6.92	0.36	0.36		18	1	2/27/23 15:11	MER

Volatile Organic Compounds by GCMS
EPA TO-15

Analyte	ppbv Results	MDL	LOQ	Flag/Qual	ug/M³ Results	MDL	LOQ	Dilution	PF	Date/Time Analyzed	Analyst
Benzene	142000	1750	4370		450000	5600	14000	8750	1	2/28/23 16:42	DFH

Surrogate(s)	% Recovery	% Recovery Limits	
4-Bromofluorobenzene (Surr)	108	80-120	2/28/23 16:42

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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**	
23B1409-01	1.00 mL / 1.00 mL	ALT-145	BGB0944	SGB0971	AG00026
23B1409-02	1.00 mL / 1.00 mL	ALT-145	BGB0944	SGB0971	AG00026
23B1409-01	1.00 mL / 1.00 mL	EPA 3C	BGB0944	SGB0971	AG00026
23B1409-02	1.00 mL / 1.00 mL	EPA 3C	BGB0944	SGB0971	AG00026
23B1409-02RE1	1.00 mL / 1.00 mL	EPA 3C	BGB0944	SGB0971	AG00026

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GCMS			**Preparation Method:**	**No Prep VOC Air**	
23B1409-01	400 mL / 400 mL	EPA TO-15	BGB0979	SGB1011	AK20003
23B1409-02	400 mL / 400 mL	EPA TO-15	BGB0979	SGB1011	AK20003

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Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGB0979 - No Prep VOC Air										
Blank (BGB0979-BLK1)				Prepared & Analyzed: 02/28/2023						
Benzene	<	0.50	ppbv							
Surr: 4-Bromofluorobenzene (Surr)	*5.45*		ppbv	*5.00*		*109*	*80-120*			
LCS (BGB0979-BS1)				Prepared & Analyzed: 02/28/2023						
1,1,1-Trichloroethane	4.97	0.5	ppbv	5.00		99.4	70-130			
1,1,2,2-Tetrachloroethane	5.99	0.5	ppbv	5.00		120	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethane	4.88	0.5	ppbv	5.00		97.6	70-130			
1,1,2-Trichloroethane	5.03	0.5	ppbv	5.00		101	70-130			
1,1-Dichloroethane	4.22	0.5	ppbv	5.00		84.4	70-130			
1,1-Dichloroethylene	4.68	0.5	ppbv	5.00		93.6	70-130			
1,2,4-Trimethylbenzene	5.65	0.5	ppbv	5.00		113	70-130			
1,2-Dibromoethane (EDB)	6.09	0.5	ppbv	5.00		122	70-130			
1,2-Dichlorobenzene	6.19	0.5	ppbv	5.00		124	70-130			
1,2-Dichloroethane	4.37	0.5	ppbv	5.00		87.4	70-130			
1,2-Dichloropropane	4.57	0.5	ppbv	5.00		91.4	70-130			
1,2-Dichlorotetrafluoroethane	5.13	0.5	ppbv	5.00		103	70-130			
1,3,5-Trimethylbenzene	5.64	0.5	ppbv	5.00		113	70-130			
1,3-Butadiene	4.80	0.5	ppbv	5.00		96.0	70-130			
1,3-Dichlorobenzene	6.29	0.5	ppbv	5.00		126	70-130			
1,4-Dichlorobenzene	6.27	0.5	ppbv	5.00		125	70-130			
1,4-Dioxane	4.75	0.5	ppbv	5.00		95.0	70-130			
2-Butanone (MEK)	4.47	0.5	ppbv	5.00		89.4	70-130			
4-Methyl-2-pentanone (MIBK)	5.03	0.5	ppbv	5.00		101	70-130			
Allyl chloride	4.67	0.5	ppbv	5.00		93.4	70-130			
Benzene	4.87	0.5	ppbv	5.00		97.4	70-130			
Benzyl Chloride	5.12	0.5	ppbv	5.00		102	70-130			
Bromodichloromethane	4.69	0.5	ppbv	5.00		93.8	70-130			
Bromoform	3.18	0.5	ppbv	5.00		63.6	70-130			L
Bromomethane	6.04	0.5	ppbv	5.00		121	70-130			
Carbon Disulfide	4.67	0.5	ppbv	5.00		93.4	70-130			

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Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGB0979 - No Prep VOC Air										
LCS (BGB0979-BS1)				Prepared & Analyzed: 02/28/2023						
Carbon Tetrachloride	4.80	0.5	ppbv	5.00		96.0	70-130			
Chlorobenzene	6.03	0.5	ppbv	5.00		121	70-130			
Chloroethane	5.33	0.5	ppbv	5.00		107	70-130			
Chloroform	4.47	0.5	ppbv	5.00		89.4	70-130			
Chloromethane	4.26	0.5	ppbv	5.00		85.2	70-130			
cis-1,2-Dichloroethylene	4.65	0.5	ppbv	5.00		93.0	70-130			
cis-1,3-Dichloropropene	4.90	0.5	ppbv	5.00		98.0	70-130			
Cyclohexane	4.89	0.5	ppbv	5.00		97.8	70-130			
Dichlorodifluoromethane	4.64	0.5	ppbv	5.00		92.8	70-130			
Ethyl acetate	4.65	0.5	ppbv	5.00		93.0	70-130			
Ethylbenzene	5.81	0.5	ppbv	5.00		116	70-130			
Heptane	4.05	0.5	ppbv	5.00		81.0	70-130			
Hexane	4.31	0.5	ppbv	5.00		86.2	70-130			
m+p-Xylenes	11.9	1	ppbv	10.0		119	70-130			
Methylene chloride	4.96	1	ppbv	5.00		99.2	70-130			
Methyl-t-butyl ether (MTBE)	4.28	0.5	ppbv	5.00		85.6	70-130			
Naphthalene	5.50	0.5	ppbv	5.00		110	60-140			
o-Xylene	5.86	0.5	ppbv	5.00		117	70-130			
Propylene	4.20	1	ppbv	5.00		84.0	70-130			
Styrene	5.77	0.5	ppbv	5.00		115	70-130			
Tetrachloroethylene (PCE)	6.22	0.5	ppbv	5.00		124	70-130			
Tetrahydrofuran	4.08	0.5	ppbv	5.00		81.6	70-130			
Toluene	4.92	0.5	ppbv	5.00		98.4	70-130			
trans-1,2-Dichloroethylene	4.61	0.5	ppbv	5.00		92.2	70-130			
trans-1,3-Dichloropropene	4.60	0.5	ppbv	5.00		92.0	70-130			
Trichloroethylene	5.00	0.5	ppbv	5.00		100	70-130			
Trichlorofluoromethane	4.30	0.5	ppbv	5.00		86.0	70-130			
Vinyl acetate	3.93	0.5	ppbv	5.00		78.6	70-130			
Vinyl bromide	5.82	0.5	ppbv	5.00		116	70-130			
Vinyl chloride	4.94	0.5	ppbv	5.00		98.8	70-130			
Surr: 4-Bromofluorobenzene (Surr)	*5.66*		ppbv	*5.00*		*113*	*70-130*			

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Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGB0979 - No Prep VOC Air										
LCS Dup (BGB0979-BSD1)				Prepared & Analyzed: 02/28/2023						
1,1,1-Trichloroethane	4.88	0.5	ppbv	5.00		97.6	70-130	1.83	25	
1,1,2,2-Tetrachloroethane	5.89	0.5	ppbv	5.00		118	70-130	1.68	25	
1,1,2-Trichloro-1,2,2-trifluoroethane	4.84	0.5	ppbv	5.00		96.8	70-130	0.823	25	
1,1,2-Trichloroethane	4.96	0.5	ppbv	5.00		99.2	70-130	1.40	25	
1,1-Dichloroethane	4.15	0.5	ppbv	5.00		83.0	70-130	1.67	25	
1,1-Dichloroethylene	4.64	0.5	ppbv	5.00		92.8	70-130	0.858	25	
1,2,4-Trimethylbenzene	5.55	0.5	ppbv	5.00		111	70-130	1.79	25	
1,2-Dibromoethane (EDB)	5.99	0.5	ppbv	5.00		120	70-130	1.66	25	
1,2-Dichlorobenzene	6.10	0.5	ppbv	5.00		122	70-130	1.46	25	
1,2-Dichloroethane	4.24	0.5	ppbv	5.00		84.8	70-130	3.02	25	
1,2-Dichloropropane	4.47	0.5	ppbv	5.00		89.4	70-130	2.21	25	
1,2-Dichlorotetrafluoroethane	5.03	0.5	ppbv	5.00		101	70-130	1.97	25	
1,3,5-Trimethylbenzene	5.54	0.5	ppbv	5.00		111	70-130	1.79	25	
1,3-Butadiene	4.64	0.5	ppbv	5.00		92.8	70-130	3.39	25	
1,3-Dichlorobenzene	6.20	0.5	ppbv	5.00		124	70-130	1.44	25	
1,4-Dichlorobenzene	6.17	0.5	ppbv	5.00		123	70-130	1.61	25	
1,4-Dioxane	4.62	0.5	ppbv	5.00		92.4	70-130	2.77	25	
2-Butanone (MEK)	4.47	0.5	ppbv	5.00		89.4	70-130	0.00	25	
4-Methyl-2-pentanone (MIBK)	4.84	0.5	ppbv	5.00		96.8	70-130	3.85	25	
Allyl chloride	4.55	0.5	ppbv	5.00		91.0	70-130	2.60	25	
Benzene	4.79	0.5	ppbv	5.00		95.8	70-130	1.66	25	
Benzyl Chloride	5.05	0.5	ppbv	5.00		101	70-130	1.38	25	
Bromodichloromethane	4.58	0.5	ppbv	5.00		91.6	70-130	2.37	25	
Bromoform	3.13	0.5	ppbv	5.00		62.6	70-130	1.58	25	L
Bromomethane	6.07	0.5	ppbv	5.00		121	70-130	0.495	25	
Carbon Disulfide	4.61	0.5	ppbv	5.00		92.2	70-130	1.29	25	
Carbon Tetrachloride	4.70	0.5	ppbv	5.00		94.0	70-130	2.11	25	
Chlorobenzene	5.91	0.5	ppbv	5.00		118	70-130	2.01	25	
Chloroethane	5.38	0.5	ppbv	5.00		108	70-130	0.934	25	
Chloroform	4.44	0.5	ppbv	5.00		88.8	70-130	0.673	25	
Chloromethane	4.16	0.5	ppbv	5.00		83.2	70-130	2.38	25	
cis-1,2-Dichloroethylene	4.55	0.5	ppbv	5.00		91.0	70-130	2.17	25	
cis-1,3-Dichloropropene	4.82	0.5	ppbv	5.00		96.4	70-130	1.65	25	

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Certificate of Analysis

Final Report

Laboratory Order ID 23B1409

Client Name:	SCS Field Services - Harrisburg, PA 4330 Lewis Road, Suite 1 Harrisburg, PA 17111	Date Received: Date Issued:	February 24, 2023 11:20 March 2, 2023 14:24
Submitted To:	Tom Lock	Project Number:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Volatile Organic Compounds by GCMS - Quality Control

Enthalpy Analytical

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BGB0979 - No Prep VOC Air										
LCS Dup (BGB0979-BSD1)				Prepared & Analyzed: 02/28/2023						
Cyclohexane	4.81	0.5	ppbv	5.00		96.2	70-130	1.65	25	
Dichlorodifluoromethane	4.61	0.5	ppbv	5.00		92.2	70-130	0.649	25	
Ethyl acetate	4.65	0.5	ppbv	5.00		93.0	70-130	0.00	25	
Ethylbenzene	5.72	0.5	ppbv	5.00		114	70-130	1.56	25	
Heptane	3.98	0.5	ppbv	5.00		79.6	70-130	1.74	25	
Hexane	4.25	0.5	ppbv	5.00		85.0	70-130	1.40	25	
m+p-Xylenes	11.7	1	ppbv	10.0		117	70-130	1.44	25	
Methylene chloride	4.88	1	ppbv	5.00		97.6	70-130	1.63	25	
Methyl-t-butyl ether (MTBE)	4.21	0.5	ppbv	5.00		84.2	70-130	1.65	25	
Naphthalene	5.42	0.5	ppbv	5.00		108	60-140	1.47	25	
o-Xylene	5.77	0.5	ppbv	5.00		115	70-130	1.55	25	
Propylene	4.08	1	ppbv	5.00		81.6	70-130	2.90	25	
Styrene	5.67	0.5	ppbv	5.00		113	70-130	1.75	25	
Tetrachloroethylene (PCE)	6.07	0.5	ppbv	5.00		121	70-130	2.44	25	
Tetrahydrofuran	3.96	0.5	ppbv	5.00		79.2	70-130	2.99	25	
Toluene	4.84	0.5	ppbv	5.00		96.8	70-130	1.64	25	
trans-1,2-Dichloroethylene	4.62	0.5	ppbv	5.00		92.4	70-130	0.217	25	
trans-1,3-Dichloropropene	4.48	0.5	ppbv	5.00		89.6	70-130	2.64	25	
Trichloroethylene	4.94	0.5	ppbv	5.00		98.8	70-130	1.21	25	
Trichlorofluoromethane	4.31	0.5	ppbv	5.00		86.2	70-130	0.232	25	
Vinyl acetate	3.78	0.5	ppbv	5.00		75.6	70-130	3.89	25	
Vinyl bromide	6.33	0.5	ppbv	5.00		127	70-130	8.40	25	
Vinyl chloride	4.81	0.5	ppbv	5.00		96.2	70-130	2.67	25	
Surr: 4-Bromofluorobenzene (Surr)	*5.67*		ppbv	*5.00*		*113*	*70-130*			

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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 BGB0944 - No Prep VOC GC Air										
Blank (BGB0944-BLK1)					Prepared & Analyzed: 02/27/2023					
Methane	<	0.05	Vol%							
Carbon dioxide	<	0.05	Vol%							
Hydrogen (H2)	<	0.02	Vol%							
Carbon Monoxide	<	10.0	ppmv							
LCS (BGB0944-BS1)					Prepared & Analyzed: 02/27/2023					
Methane	4720	500	ppmv	5000		94.3	0-200			
Methane	4720	0.05	ppmv	5000		94.3	80-120			
Carbon dioxide	4460	500	ppmv	5000		89.2	0-200			
Carbon dioxide	4460	0.05	ppmv	5000		89.2	80-120			
Oxygen (O2)	5120	500	ppmv	5000		102	0-200			
Nitrogen (N2)	5350	2000	ppmv	5000		107	0-200			
Hydrogen (H2)	5940	200	ppmv	5100		117	0-200			
Hydrogen (H2)	5940	0.02	ppmv	5100		117	80-120			
Carbon Monoxide	4920	10	ppmv	5000		98.4	0-200			
Duplicate (BGB0944-DUP1)				**Source: 23B1409-01**	Prepared & Analyzed: 02/27/2023					
Methane	11.7	0.45	Vol%		11.5			1.26	5	
Methane	117000	4500	ppmv		115000			1.26	25	
Carbon dioxide	274000	4500	ppmv		269000			1.94	25	
Carbon dioxide	27.4	0.45	Vol%		26.9			1.94	5	
Oxygen (O2)	72000	4500	ppmv		71100			1.26	25	
Hydrogen (H2)	2.63	0.18	Vol%		2.61			0.597	5	
Hydrogen (H2)	26300	1800	ppmv		26100			0.597	25	
Nitrogen (N2)	460000	18000	ppmv		454000			1.40	25	
Carbon Monoxide	153	90.0	ppmv		152			0.354	25	
Duplicate (BGB0944-DUP2)				**Source: 23B1409-02**	Prepared & Analyzed: 02/27/2023					
Methane	151000	4500	ppmv		151000			0.295	25	
Methane	15.1	0.45	Vol%		15.1			0.295	5	
Carbon dioxide	378000	4500	ppmv		380000			0.359	25	
Carbon dioxide	37.8	0.45	Vol%		38.0			0.359	5	
Oxygen (O2)	71200	4500	ppmv		71200			0.0196	25	
Hydrogen (H2)	69500	1800	ppmv		69700			0.370	25	
Nitrogen (N2)	267000	18000	ppmv		267000			0.332	25	

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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 BGB0944 - No Prep VOC GC Air										
Duplicate (BGB0944-DUP2)				**Source: 23B1409-02**			Prepared & Analyzed: 02/27/2023			
Carbon Monoxide	474	90.0	ppmv		483			1.96	25	

Certified Analytes included in this Report

Analyte	Certifications	Analyte	Certifications
EPA 3C in Air			
Methane	VELAP		
EPA TO-15 in Air			
Benzene	VELAP		

Code	Description	Laboratory ID	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2023
NC	North Carolina DENR	495	12/31/2023
NCDEQ	North Carolina DEQ	495	12/31/2023
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:	[none]
Client Site I.D.:	Bristol	Purchase Order:	07-SO04485

Qualifiers and Definitions

L	LCS recovery is outside of established acceptance limits
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 5/27/22

COMPANY NAME: SCS Field Services - Harrisburg	INVOICE TO: **Same**	PROJECT NAME/Quote #: **Bristol**
CONTACT:	INVOICE CONTACT:	SITE NAME: Bristol
ADDRESS:	INVOICE ADDRESS:	PROJECT NUMBER: 07223016.00
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

063-22E-0019

	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	Hydrocarbons	CH4-C02 Biogenic
1)	37			324	1.4	1/19/23	21.0	4.8	2-23 2023	9:17	26	149	2-23 2023	9:18	10	148.9	LG	x	x	x
2)	53			287	1.4	1/19/23	21.0	3.8	2-23 2023	9:30	26	145.5	2-23 2023	9:32	10	145.5	LG	x	x	x
3)	57			11973		1/19/23			2-23 2023				2-23 2023							
4)																				

310 noise noseq 20.7c

RELINQUISHED:	DATE / TIME	RECEIVED:	DATE / TIME
Ryan Seymour	2/23/23	Fedex c	
RELINQUISHED: Fedex c	DATE / TIME 1:27pm	RECEIVED: Jami Hamrick	DATE / TIME 2/24/23 11:20
RELINQUISHED:	DATE / TIME	RECEIVED:	DATE / TIME

QC Data Package
- Level I ☐
- Level II ☐
- Level III ☐
- Level IV ☐

LAB USE ONLY

SCS Field Services 23B1409
Bristol
Recd: 02/24/2023 Due: 03/03/2023

v130325002

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

Sample Conditions Checklist

Samples Received at:	**20.70°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

Attachment B

Laboratory Analytical Reports

Note	Well Depth	Date Drill	Phase	Month	February	February	February	February	February	February	February	February	February	February	February	February
				Day	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
				Well Number													
ADI	102	10/16/2016	Old Well	**35**	78	70	35	40	41	48	60	60	57	50	51	55	70
ADI	70	9/6/2017	Old Well	**39**	75	72	36	37	39	44	65	67	69	49	50	50	65
ADI	100	9/7/2017	Old Well	**40**	129	125	110	110	112	118	111	117	119	67	71	73	81
ADI	110	10/4/2016	Old Well	**46**	144	138	138	137	139	142	144	145	142	46	54	56	129
ADI	120	10/4/2016	Old Well	**47**	108	100	45	52	56	66	92	90	98	86	87	85	86
6	120	9/17/2013	Old Well	**29**	101	98	88	90	94	95	72	74	77	68	68	69	72
7	100	8/23/2017	Old Well	**30R**	122	115	105	106	105	108	128	127	124	105	80	82	125
8	120	8/30/2017	Old Well	**31R**	138	129	120	122	124	130	124	126	128	125	126	127	125
9	70	7/29/2016	Old Well	**32**	74	76	70	74	78	74	76	77	79	70	72	71	77
10	100	7/28/2016	Old Well	**33**	126	125	119	122	129	127	114	116	120	116	117	119	121
11	100	7/30/2016	Old Well	**34**	127	122	115	118	112	114	107	101	110	112	112	114	115
12	100	8/1/2016	Old Well	**36**	80	79	70	74	77	72	75	77	79	Too Tall	Too Tall	Too Tall	Too Tall
13	100	8/24/2017	Old Well	**37**	150	149	150	149	150	150	150	150	150	149	156	157	148
14	50	8/25/2017	Old Well	**38**	96	90	85	87	88	89	92	91	92	93	90	94	93
15	75	9/8/2017	Old Well	**41**	100	101	95	99	92	90	85	88	79	110	105	108	110
16	57	9/8/2017	Old Well	**42**	116	110	107	110	114	118	108	105	108	105	105	106	109
17	110	10/7/2016	Old Well	**48**	77	76	70	77	79	79	60	66	70	44	48	48	50
1	120	10/1/2021	New Well	**32R**	125	122	110	105	107	109	118	117	110	117	117	118	120
2	110	10/1/2021	New Well	**49**	122	123	98	104	100	100	134	130	129	130	130	132	131
3	96	10/1/2021	New Well	**50**	130	128	110	100	102	101	122	124	127	120	119	120	118
4	114	10/1/2021	New Well	**51**	92	86	64	55	58	57	87	86	88	70	71	70	77
5	109	10/1/2021	New Well	**52**	121	119	70	80	77	72	123	128	124	100	109	100	102
6	91	10/1/2021	New Well	**53**	141	140	112	125	127	124	149	147	141	146	142	144	140
7	91	10/1/2021	New Well	**54**	140	135	94	103	100	101	141	144	140	121	128	129	131
8	104	10/1/2021	New Well	**55**	80	77	32	39	38	49	60	65	62	53	55	56	58
9	109	10/1/2021	New Well	**56**	118	115	110	115	117	122	134	132	122	130	131	132	130
10	103	10/1/2021	New Well	**57**	122	125	97	110	110	140	147	148	142	138	135	137	131
11	92	10/1/2021	New Well	**58**	112	114	30	40	49	66	68	68	66	47	48	43	70
12	72	10/1/2021	New Well	**59**	111	112	99	101	100	110	115	120	124	113	112	113	114
13	120	10/1/2021	New Well	**60**	113	110	94	92	90	98	116	118	115	114	115	115	115
14	105	10/1/2021	New Well	**61**	114	114	105	100	100	101	108	111	115	117	122	123	120
15	120	10/1/2021	New Well	**62**	122	125	77	80	80	88	105	109	110	117	117	118	115
16	117	10/1/2021	New Well	**63**	120	122	92	93	96	99	119	115	110	117	118	117	118
17	120	10/1/2021	New Well	**64**	130	125	102	101	102	106	130	130	122	131	131	132	129
18	100	10/1/2021	New Well	**65**	128	128	77	78	77	90	134	135	130	133	133	134	136
19	102	10/1/2021	New Well	**66**	99	100	38	40	44	46	79	82	80	56	56	57	79
20	100	10/1/2021	New Well	**67**	140	142	114	99	102	110	160	160	150	160	160	160	129
21	75	10/1/2021	New Well	**68**	129	125	129	125	119	125	107	109	111	124	125	122	124