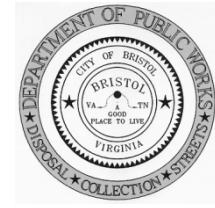




CITY OF BRISTOL, VIRGINIA
Public Works Department
Bristol, Virginia 24201



Street Maintenance Division
2103 Shakesville Road
Phone: (276) 645-7360
FAX: (276) 645-7235

Engineering Division
300 Lee Street
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Collection Division
2125 Shakesville Road
Phone: (276) 645-7380
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Disposal Division
2125 Shakesville Road
Phone: (276) 645-3791
FAX: (276) 591-5237

July 26, 2021

Ms. Kristen Hall
Chief, Air Section Enforcement & Compliance Assurance Division Air
RCRA and Toxics Branch
US EPA Region 3
1650 Arch Street – 3ED21
Philadelphia, PA 19103

RE: Applicability Determination Index Request for Alternative Landfill Gas
Treatment
Bristol, Virginia Integrated Solid Waste Management Facility; Registration No.
2125 Shakesville Rd, Bristol, Virginia, 24201
Registration No. 11184

Sent Via: E-mail to: hall.kristen@epa.gov and to willard.erinm@epa.gov

Dear Ms. Hall:

The purpose of this letter is to present an Applicability Determination Index (ADI) request for the possibility of alternate treatment of landfill gas (LFG) for several gas wells in the gas collection and control system (GCCS) of the Bristol Virginia Integrated Solid Waste Management Facility's (ISWMF) quarry landfill.

In the southern end of the quarry landfill, the GCCS has several LFG wells. Recently, monitoring three of the wells, GW- 39, 40, 46, and 47, have indicated high temperature LFG flowing from them. In addition to these wells, there are several places where LFG is venting upward along the quarry wall. One of these is named the "Southeast Chimney" located on the southeastern quarry wall of the landfill. Monitoring of this chimney has indicated low concentrations of methane and carbon dioxide and the presence of hydrogen gas in the LFG venting out of the chimney. The locations of these wells and the Southeast Chimney are presented on the attached figure of the quarry landfill. The attached tables present the recent results of monitoring of the three gas wells and the chimney.

The presence of high temperature LFG at the three wells, the low concentrations of methane, high concentrations of carbon dioxide, and the presence of hydrogen gas in the LFG flowing from the Southwest Chimney, indicate the possible presence of an underground subsurface reaction (SSR).

The industry standard for corrective actions for an SSR is to pull as much landfill gas and water as possible from the impacted area. Pulling the high temperature landfill gas out of the area will lower

the underground temperatures and slow the rate of the SSR. As such, the Facility intends to install several new gas wells throughout the landfill, including nine new wells in the southern area where GW – 39, 40, 46, and 47 are located.

The GCCS provides LFG to two on-site treatment facilities; a landfill gas to energy (LFGTE) plant owned and operated by Ingenco, and a blower flares system owned and operated by the facility.

Monitoring of the LFG quality from the Southwest Chimney and several of the current gas wells has indicated that the LFG collected by the proposed new wells may not be of sufficient quality to be directed to either of the on-site treatment facilities. The methane concentrations from the vents may be too low and/or the oxygen concentrations too high and may negatively impact the operation of the treatment facilities. Therefore, LFG from these new wells should not be collected and directed to the flare/plant; which will not be in accordance with the requirements of the Facility's federal operating (Title V) permit. The facility's permit requires that all LFG collected from the landfill be directed to either:

1. An open flare designed and operated in accordance with 40 CFR 60.18;
2. A control system device designed and operated to reduce non-methane organic compound (NMOC) emissions by 98%; or
3. A treatment system that processes the collected gas for subsequent sale or use.

The preferred alternative for these wells is to connect them to the existing GCCS. However, if the Facility determines that the LFG from one or more of the new gas wells cannot be directed to the flare/plant, the Facility proposes to direct the gas to alternative treatment processes as described below. The Facility considers that use of any alternative treatment process hopefully would be temporary. Once the SSR begins to subside due to the installation and operation of the new gas wells, the LFG quality is expected to improve, and the wells will eventually be connected to the Facility's GCCS. However, this might not be the case and the alternative(s) may have to be permanent. The options for treatment of the LFG from these new wells will be:

1. **Connect the Gas Wells to the Facility's GCCS** – The Facility may determine that the gas quality from the new wells is high enough such that the wells can be connected to the existing GCCS and directed to the already permitted on-site blower flare station or the on-site landfill gas to energy plant. This is in accordance with the Facility's current Title V permit and no approval is needed. The Facility considers that this option is the most likely, as blending the LFG from these new wells with the gas flows from the existing wells and other proposed wells in other parts of the quarry landfill may result in a gas quality sufficient to be treated by the flare/plant.
2. **Individual Passive Flares with Solar Powered Spark Ignition** – These flares can be mounted on top of the individual gas wells or onto gas header piping that connects several gas wells and is separate from the GCCS. Such flares employ solar powered continuous spark ignition systems to ignite and treat the LFG passively flowing through them. Solar spark flares do not meet the NSPS requirements of 40 CFR 60.18 as they do not have thermocouples and flame pilots. However, they do reduce NMOC emissions by more than 98%.

3. **Activated Carbon Adsorption Treatment System** - The Facility may bring in an activated carbon adsorption system through which the discharge from the gas wells will flow through to remove NMOC's. The flow through the system may be passive, or the Facility may utilize a blower to pull LFG from the wells and direct it to the treatment system.
4. **Additional Blower Flare Station** - The Facility may develop a separate GCCS consisting of several the new wells connected via gas header piping to a separate blower flare station. The station may eventually be permanent depending on the long term gas quality from the wells connected to the station. The station would be designed and operated to meet the requirements of 40 CFR 60.18 and reduce NMOC emissions by more than 98%.

Industry standard well heads will be installed on each affected gas well. The wells will be monitored monthly in accordance with the Facility's Title V permit. Industry standard well heads allow for the monitoring of flow using handheld LFG monitors. The Facility considers that this flow monitoring at each well head will meet the Title V permit's requirement to monitor for flow for Options 2 and Option 3 (if the system is passive).

The Facility is presenting this ADI request to use, if needed, alternative treatment processes for one or more proposed gas wells if their gas quality prevents the wells from being connected to the existing GCCS. If you have any questions or require additional information, please contact me at (276) 645-7300 or at CityManager@bristolva.org or Ernest Hoch at (540) 537-0404 or at ehoch@daa.com.

Sincerely,



Randall C. Eads
City Manager, Bristol VA

Attachments: Bristol Query Landfill Gas Well Locations
Table 1 – Southern Gas Well Monitoring Results
Table 2 – Southern Gas Well Temperatures
Table 3 – Southern Chimney Monitoring Results

CC: Erin Willard
Jeff Hurst – DEQ SWRO Regional Director
Crystal Bazyk – DEQ SWRO Enforcement and Compliance Monitoring
Ernie Hoch – Draper Aden Associates
Don Marickovich – Draper Aden Associates

Table 1 Bristol Southern Gas Well Monitoring Results

Site Name	Point Name	Well #	Suff	Status	Record Date	CH4 [%]	CO2 [%]	O2 (115) [%]	Bal Gas [%]	Init. (11) Temp []	Sys (7) Pressure ["H2O]
Bristol Virginia Landfill	BRTL35R	35	R	Active	1/26/2021 3:40:07 PM	0.7	74.7	1.0	23.6	126.0	-0.03
Bristol Virginia Landfill	BRTL35R	35	R	Active	2/9/2021 1:51:25 PM	0.7	10.2	17.4	71.7	110.0	0.04
Bristol Virginia Landfill	BRTL35R	35	R	Active	2/23/2021 3:43:46 PM	0.4	6.2	19.1	74.3	92.0	0.10
Bristol Virginia Landfill	BRTL35R	35	R	Active	3/10/2021 5:53:34 PM	0.2	70.5	1.5	27.8	128.0	0.00
Bristol Virginia Landfill	BRTL35R	35	R	Active	3/10/2021 5:53:35 PM	0.2	70.5	1.5	27.8	128.0	0.00
Bristol Virginia Landfill	BRTL35R	35	R	Active	3/23/2021 12:57:14 PM	2.1	4.9	18.0	75.0	70.0	-0.02
Bristol Virginia Landfill	BRTL35	35		Active	4/7/2021 11:57:27 AM	0.7	72.0	2.0	25.3	146.0	-0.11
Bristol Virginia Landfill	BRTL35	35		Active	4/21/2021 2:24:00 PM	0.3	40.7	9.3	49.7	120.0	-0.04
Bristol Virginia Landfill	BRTL35	35		Active	5/5/2021 2:44:33 PM	0.5	66.0	2.5	31.0	118.0	-0.04
Bristol Virginia Landfill	BRTL35	35		Active	6/3/2021 12:14:48 PM	0.6	65.4	3.9	30.1	122.0	-0.05
Bristol Virginia Landfill	BRTL35	35		Active	6/17/2021 10:15:25 AM	0.0	59.1	2.4	38.5	112.0	0.01
Bristol Virginia Landfill	BRTL39	39		Active	1/20/2021 11:34:59 AM	16.9	83.1	0.0	0.0	50.0	-31.16
Bristol Virginia Landfill	BRTL39	39		Active	2/23/2021 4:00:39 PM	15.6	84.2	0.2	0.0	66.0	0.06
Bristol Virginia Landfill	BRTL39	39		Active	3/10/2021 5:43:32 PM	10.8	84.9	0.0	4.3	80.0	0.14
Bristol Virginia Landfill	BRTL39	39		Active	3/23/2021 1:01:17 PM	6.8	86.6	6.6	0.0	70.0	-0.02
Bristol Virginia Landfill	BRTL39	39		Active	4/21/2021 1:38:00 PM	4.3	83.6	0.0	12.1	58.0	0.04
Bristol Virginia Landfill	BRTL39	39		Active	5/5/2021 2:17:02 PM	12.8	81.0	0.0	6.2	62.0	-0.05
Bristol Virginia Landfill	BRTL39	39		Active	6/16/2021 3:34:20 PM	9.4	67.1	1.5	22.0	89.0	0.02
Bristol Virginia Landfill	BRTL40	40		Active	1/5/2021 1:20:30 PM	14.4	14.6	13.9	57.1	44.0	-35.24
Bristol Virginia Landfill	BRTL40	40		Active	1/26/2021 3:29:54 PM	54.1	33.4	1.8	10.7	84.0	-19.85
Bristol Virginia Landfill	BRTL40	40		Active	2/23/2021 3:53:53 PM	8.7	8.3	17.1	65.9	62.0	-32.91
Bristol Virginia Landfill	BRTL40	40		Active	3/10/2021 5:46:58 PM	3.6	6.5	18.7	71.2	60.0	-52.22
Bristol Virginia Landfill	BRTL40	40		Active	3/23/2021 1:08:39 PM	4.2	4.6	18.7	72.5	62.0	-25.26
Bristol Virginia Landfill	BRTL40	40		Active	4/7/2021 11:45:40 AM	3.4	3.9	19.0	73.7	78.0	-25.56
Bristol Virginia Landfill	BRTL40	40		Active	4/21/2021 1:48:38 PM	25.6	71.0	1.0	2.4	60.0	-0.01
Bristol Virginia Landfill	BRTL40	40		Active	6/3/2021 11:45:24 AM	0.5	21.6	16.1	61.8	155.0	-0.01
Bristol Virginia Landfill	BRTL40	40		Active	6/16/2021 3:38:59 PM	5.4	56.4	3.4	34.8	139.0	0.00

Table 1 Bristol Southern Gas Well Monitoring Results

Site Name	Point Name	Well #	Suff	Status	Record Date	CH4 [%]	CO2 [%]	O2 (115) [%]	Bal Gas [%]	Init. (11) Temp []	Sys (7) Pressure ["H2O]
Bristol Virginia Landfill	BRTLGW46	46		Active	1/5/2021 1:16:21 PM	33.7	34.8	5.7	25.8	62.0	-35.26
Bristol Virginia Landfill	BRTLGW46	46		Active	1/20/2021 1:58:28 PM	36.0	57.2	1.2	5.6	70.0	-29.88
Bristol Virginia Landfill	BRTLGW46	46		Active	1/26/2021 3:32:40 PM	42.6	43.0	2.8	11.6	70.0	-19.71
Bristol Virginia Landfill	BRTLGW46	46		Active	2/23/2021 3:50:45 PM	21.8	66.0	3.3	8.9	76.0	-33.27
Bristol Virginia Landfill	BRTLGW46	46		Active	3/23/2021 1:15:30 PM	17.9	81.9	0.2	0.0	90.0	-25.35
Bristol Virginia Landfill	BRTLGW46	46		Active	4/21/2021 2:07:41 PM	5.6	79.3	0.0	15.1	140.0	-23.08
Bristol Virginia Landfill	BRTLGW46	46		Active	5/5/2021 2:33:33 PM	2.9	69.1	0.1	27.9	160.0	-0.02
Bristol Virginia Landfill	BRTLGW46	46		Active	6/3/2021 11:40:17 AM	2.1	83.8	0.1	14.0	160.0	-0.06
Bristol Virginia Landfill	BRTLGW46	46		Active	6/16/2021 3:42:49 PM	1.7	61.5	0.1	36.7	159.0	-0.01
Bristol Virginia Landfill	BRTLGW46	46		Active	6/17/2021 4:05:15 PM	4.4	76.2	0.0	19.4	160.0	0.10
Bristol Virginia Landfill	BRTLGW47	47		Active	1/26/2021 3:36:47 PM	1.0	78.3	0.6	20.1	80.0	-16.20
Bristol Virginia Landfill	BRTLGW47	47		Active	2/23/2021 3:45:59 PM	0.9	78.6	0.4	20.1	86.0	-26.95
Bristol Virginia Landfill	BRTLGW47	47		Active	2/23/2021 3:46:00 PM	0.9	78.6	0.4	20.1	86.0	-26.95
Bristol Virginia Landfill	BRTLGW47	47		Active	3/10/2021 5:50:06 PM	0.6	75.8	0.6	23.0	100.0	0.29
Bristol Virginia Landfill	BRTLGW47	47		Active	3/23/2021 1:23:25 PM	0.7	77.0	1.0	21.3	100.0	0.04
Bristol Virginia Landfill	BRTLGW47	47		Active	4/7/2021 11:51:54 AM	1.0	76.3	1.0	21.7	122.0	-0.01
Bristol Virginia Landfill	BRTLGW47	47		Active	4/21/2021 2:16:08 PM	0.3	26.9	13.5	59.3	144.0	-0.01
Bristol Virginia Landfill	BRTLGW47	47		Active	5/5/2021 2:37:46 PM	0.8	75.6	0.0	23.6	130.0	0.04
Bristol Virginia Landfill	BRTLGW47	47		Active	6/3/2021 11:35:52 AM	0.9	79.7	0.0	19.4	132.0	48.01
Bristol Virginia Landfill	BRTLGW47	47		Active	6/16/2021 3:47:15 PM	1.4	68.7	0.1	29.8	120.0	55.97
Bristol Virginia Landfill	BRTLGW47	47		Active	6/17/2021 3:57:40 PM	1.4	64.1	2.6	31.9	155.0	-35.90

Table 2

Bristol: Southern Gas Well Temperatures

June	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
Gas Well	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9
39	n/a	n/a	112	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	135
40	177	173.7	175.7	177.2	183	182.2	182.6	178.2	157.2	172.4	174.8	169.8	167.7	170.2	170.1	169.4	174.8	176.7	178.2
46	178	173.3	181	183.2	182.8	182.8	183.3	179.8	170.5	176.3	175.7	177.2	174.9	178.4	179.2	173.7	176.3	183.4	184.8
47	193	192.5	191	193.8	195.6	195.2	195.5	194.6	191.5	194.1	193.8	192.8	193.8	193.2	194.3	194.3	195.4	195.1	194.8

July	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Mon	Tue	Wed	Thu	Fri	Sat	Mon
Gas Well	10	11	12	13	14	15	16	17	19	20	21	22	23	24	26
35	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	<130	146.7
39	135.2	134.7	133.8	134.8	N/A	150.7	143.7	145.7	144.8	<130	<130	<130	<130	<130	146.7
40	176.3	179.2	173.3	171.5	175.2	175.3	174.5	173.1	175.9	178.6	180.2	180.7	178.6	180	179.6
46	180.4	177.6	164	175.3	178.2	179.7	180.9	181.9	182.4	183.2	183.2	183	180.2	178.2	182.3
47	194.2	194.6	195.1	192.8	193.3	192.5	193.7	194.4	194.6	194	193.8	194.3	193.2	194.6	194.6

Table 3 Bristol: Southern Chimney Monitoring Results

Bristol Samples		GEM Results							
Location	DATE	CH4 %	CO2 %	O2%	H2S ppm	CO ppm	Time	Temp	Hydrogen PPM
North West Central Chimney	Wednesday, January 13, 2021	10	10.7	15.8	3	?	4:00 PM	N/A	N/A
So end Cleanout Cluster	Thursday, April 15, 2021	40.2	59.7	0.1		55		N/A	N/A
So end Cleanout Cluster	Thursday, April 15, 2021	59.1	40.9	0		27		N/A	N/A
So end Cleanout Cluster	Thursday, April 15, 2021	39.7	60.3	0		54		N/A	N/A
So end Cleanout	Friday, April 16, 2021	40.1	59.9	0.1		577		N/A	N/A
So end Cleanout	Friday, April 16, 2021	34.3	43.0	5.0		41		N/A	N/A
So end Cleanout	Friday, April 16, 2021	59.6	40.2	0.2		29		N/A	N/A
So end Cleanout	Friday, April 16, 2021	32.0	26.8	4.7	190	38		N/A	N/A
So end Cleanout	Friday, April 16, 2021	41.7	57.2	0.6	523	59		N/A	N/A
So end Cleanout	Friday, April 16, 2021	55.5	37.7	1.2	212	35		N/A	N/A
So end Cleanout	Friday, April 16, 2021	41.3	58.5	0.2	444	60		N/A	N/A
So end Cleanout	Friday, April 16, 2021	41.0	58.8	0.4	317	64		N/A	N/A
So end Cleanout	Friday, April 16, 2021	41.2	59.0	0.1	432	64		N/A	N/A
So end Cleanout	Saturday, April 17, 2021	8.2	5.9	17.2	5	19	10:33 AM	N/A	N/A
South East Wall Chimney	Friday, April 16, 2021	18.0	47.7	7.3	235	857	10:41 AM	N/A	N/A
South East Wall Chimney	Saturday, April 17, 2021	23.6	59.7	3.9	324	805	10:51 AM	N/A	N/A
South East Wall Chimney	Sunday, April 18, 2021	16.6	49	7.3	278	652	11:00 AM	N/A	N/A
South East Wall Chimney	Monday, April 19, 2021	24.8	64.8	2.7	467	897	10:11 AM	N/A	N/A
South East Wall Chimney	Tuesday, April 20, 2021	24	62.6	2.9	295	1106	9:54 AM	N/A	N/A
South East Wall Chimney	Wednesday, April 21, 2021	0.05	1.3	18.4	5	5	2:49 PM	N/A	1075
South East Wall Chimney	Thursday, April 22, 2021	1.4	4.3	12.5	250	220	8:27 AM	N/A	2975-3000
South East Wall Chimney	Friday, April 23, 2021	26.9	67.3	2.5	441	527	7:45 AM	N/A	2350
Well 46	Saturday, April 24, 2021							122	
Well 47	Saturday, April 24, 2021							122	
South East Wall Chimney	Saturday, April 24, 2021	5.5	20.1	14.4	35	217	11:29 AM	N/A	No CO too high in area
Gas Well	Saturday, April 24, 2021							Approx. 100	0.163
Gas Well	Sunday, April 25, 2021							Approx. 100	0.113
South East Wall Chimney	Sunday, April 25, 2021	22.7	53.3	6.4	196	477	10:54 AM	N/A	1200
South East Wall Chimney	Monday, April 26, 2021	17.8	44.2	7	109	501	10:10 AM	N/A	14450

Table 3 Bristol Southern Chimney Monitoring Results

Bristol Samples		GEM Results							
Location	DATE	CH4 %	CO2 %	O2%	H2S ppm	CO ppm	Time	Temp	Hydrogen PPM
Wet Well	Monday, April 26, 2021	1.7	18	13.7	0	1	3:37 PM	N/A	0 PPM
Gas Well	Monday, April 26, 2021							Approx. 100	9.9% Coming Down
South East Wall Chimney	Tuesday, April 27, 2021	6.9	21.7	13.4	61	397	10:11 AM	N/A	13825
North End Clean Out	Tuesday, April 27, 2021	39	44.7	3.6	44	23	8:52 AM	N/A	N/A
Wet Well	Tuesday, April 27, 2021	0	0.1	18.7	0	0	9:39 AM	N/A	N/A
South East Wall Chimney	Wednesday, April 28, 2021	11.6	31.9	11.3	141	545	2:09 PM	3125	3150 windy
Gas Well	Wednesday, April 28, 2021							164	From SCS Brandon
Gas Well	Wednesday, April 28, 2021							144	From SCS Brandon
Gas Well	Wednesday, April 28, 2021							138	From SCS Brandon
North West Central Chimney	Wednesday, April 28, 2021	0.03	0.05	18.3	0	0	2:36 PM	N/A	375
South East Wall Chimney	Thursday, April 29, 2021	10.4	29	12	112	261	8:38 AM	N/A	14525 Windy
South East Wall Chimney	Friday, April 30, 2021	13.4	35.5	10.4	191	324	9:54 AM	N/A	1475
South East Wall Chimney	Saturday, May 1, 2021	28.4	65	3	159	683	9:31 AM	N/A	19375
South East Wall Chimney	Sunday, May 2, 2021	12	29.3	11.2	204	235	3:36 PM	N/A	2675
South East Wall Chimney	Monday, May 3, 2021	29.7	67.8	1.9	367	708	10:02 AM	N/A	15300
15' south of SE Chimney	Monday, May 3, 2021	23.3	53.7	5.3	92	600	10:06 AM	N/A	48000
North West Central Chimney	Monday, May 3, 2021	0	0	0	0	0	9:30 AM	N/A	0
No reading taken	Tuesday, May 4, 2021								No CO too high in area
South East Wall Chimney	Wednesday, May 5, 2021	15.4	38	9.8	348	370	1:30 PM	N/A	1475
South East Wall Chimney	Thursday, May 6, 2021	27.2	71	1.6	701	737	9:29 AM	N/A	250 Windy
No reading taken	Friday, May 7, 2021								No CO too high in area
No reading taken	Saturday, May 8, 2021								No CO too high in area
South East Wall Chimney	Sunday, May 9, 2021	25.2	65.3	2.5	527	641	10:27 AM	N/A	17450
South East Wall Chimney	Monday, May 10, 2021	22.5	58.5	4.7	433	598	8:48 AM	N/A	20000
South East Wall Chimney	Tuesday, May 11, 2021	29.9	67.9	2.2	498	593	10:35 AM	N/A	18025
South East Wall Chimney	Wednesday, May 12, 2021	28.2	70.2	1.5	444	525	9:32 AM	N/A	28000
15' south of SE Chimney	Wednesday, May 12, 2021	25.9	62.4	3.4	482	48	9:35 AM	N/A	3650
South East Wall Chimney	Thursday, May 13, 2021	20.4	52.6	5.2	87	424	2:18 PM	N/A	2500
South East Wall Chimney	Friday, May 14, 2021	27.6	65.3	2.7	380	490	12:19 PM	N/A	45000

Table 3 Bristol Southern Chimney Monitoring Results

Bristol Samples		GEM Results							
Location	DATE	CH4 %	CO2 %	O2%	H2S ppm	CO ppm	Time	Temp	Hydrogen PPM
15' south of SE Chimney	Friday, May 14, 2021	22.8	55.5	5.5	51	394	12:22 PM	N/A	30000
No reading taken	Saturday, May 15, 2021							N/A	
No reading taken	Sunday, May 16, 2021							N/A	
South East Wall Chimney	Monday, May 17, 2021	24.5	62.5	3.4	244	587	1:30 PM	N/A	52000
15' south of SE Chimney	Tuesday, May 18, 2021	11.6	32.4	12.6	89	212	1:32 PM	N/A	24000
No reading taken	Tuesday, May 18, 2021							N/A	
No reading taken	Wednesday, May 19, 2021							N/A	
South East Wall Chimney	Thursday, May 20, 2021	22.4	57.6	4.8	303	586	2:29 PM	N/A	69000
15' south of SE Chimney	Thursday, May 20, 2021	10.4	26.6	11.6	49	183	2:32 PM	N/A	7625
South East Wall Chimney	Friday, May 21, 2021	23.3	64.5	2.5	428	823	1:08 PM	N/A	65000
15' south of SE Chimney	Friday, May 21, 2021	26.4	64.7	2.4	82	492	1:10 PM	N/A	58000
No reading taken	Saturday, May 22, 2021							N/A	
No reading taken	Sunday, May 23, 2021							N/A	
South East Wall Chimney	Monday, May 24, 2021	23.1	63.1	2.7	574	939	2:58 PM	N/A	No reading taken
South East Wall Chimney	Tuesday, May 25, 2021	28.8	70	1.2	347	649	9:30 AM	N/A	No reading taken
South East Wall Chimney	Wednesday, May 26, 2021	28.1	69.5	1.1	472	644	8:04 AM	N/A	30000
15' south of SE Chimney	Wednesday, May 26, 2021	29.2	69.8	1	125	509	8:01 AM	N/A	2125
South East Wall Chimney	Thursday, May 27, 2021	29.4	68.5	1.2	95	455	10:08 AM	N/A	No reading taken
South East Wall Chimney	Friday, May 28, 2021	27.9	68.6	1.4	415	623	9:01 AM	N/A	No reading taken
No reading taken	Saturday, May 29, 2021							N/A	
No reading taken	Sunday, May 30, 2021							N/A	
No reading taken	Monday, May 31, 2021							N/A	
South East Wall Chimney	Wednesday, June 2, 2021	29.2	68.7	1.6	425	700	11:54 AM	N/A	71000
15' south of SE Chimney	Wednesday, June 2, 2021	30.5	68.2	1.3	116	449	11:58 AM	N/A	56000
South East Wall Chimney	Thursday, June 3, 2021	27.3	67.9	2.2	607	727	2:07 PM	N/A	775
15' south of SE Chimney	Thursday, June 3, 2021	29.2	67.9	1.6	142	747	2:10 PM	N/A	49000
No reading	Friday, June 4, 2021							N/A	Working on other priority
No reading	Sunday, June 6, 2021							N/A	Weekend
No reading	Sunday, June 6, 2021							N/A	Weekend

Table 3 **Bristol Southern Chimney Monitoring Results**

Bristol Samples		GEM Results							
Location	DATE	CH4 %	CO2 %	O2%	H2S ppm	CO ppm	Time	Temp	Hydrogen PPM
No reading	Monday, June 7, 2021							N/A	Holiday
South East Wall Chimney	Tuesday, June 8, 2021	25.6	65.8	1.6	554	794	11:47 AM	N/A	81000
No reading	Wednesday, June 9, 2021							N/A	Took reading failed photo error
South East Wall Chimney	Thursday, June 10, 2021	22	56	4.7	539	947	2:55 PM	N/A	No reading taken
15' south of SE Chimney	Thursday, June 10, 2021	14	29.9	11.6	78	309	2:55 PM	N/A	No reading taken
South East Wall Chimney	Friday, June 11, 2021	26.5	72.8	0.07	879	750	7:08 AM	N/A	No reading taken
15' south of SE Chimney	Friday, June 11, 2021							N/A	No reading
No reading	Saturday, June 12, 2021							N/A	Weekend
No reading	Sunday, June 13, 2021							N/A	Weekend
South East Wall Chimney	Monday, June 14, 2021	26.9	72.6	0.06	830	640	7:44 AM	N/A	No reading taken
South East Wall Chimney	Monday, June 14, 2021	27.9	71.7	0.04	238	481	3:33 PM	N/A	36000
15' south of SE Chimney	Monday, June 14, 2021	29.2	66.4	2.1	352	1408	3:33 PM	N/A	4400
South East Wall Chimney	Tuesday, June 15, 2021	19.4	42.3	8.5	50	192	2:18 PM	N/A	25000
15' south of SE Chimney	Tuesday, June 15, 2021	0.5	0.4	19.9	7	21	2:18 PM	N/A	9400
South East Wall Chimney	Wednesday, June 16, 2021	27.7	71.7	0.6	799	477	7:32 AM	N/A	47,000
15' south of SE Chimney	Wednesday, June 16, 2021	28.8	70.3	0.9	275	387	7:32 AM	N/A	3000
South East Wall Chimney	Thursday, June 17, 2021	27.9	71	1.1	484	460	9:40 AM	N/A	24,000
15' south of SE Chimney	Thursday, June 17, 2021	29.7	68.9	1.4	186	380	9:40 AM	N/A	32,000
South East Wall Chimney	Friday, June 18, 2021	28.7	70.2	1	498	525	10:10 AM	N/A	29000
15' south of SE Chimney	Friday, June 18, 2021	29.3	69.6	1	156	365	10:10 AM	N/A	8,075
South East Wall Chimney	Saturday, June 19, 2021	30	69.1	0.9	154	270	10:20 AM	N/A	37,000
15' south of SE Chimney	Saturday, June 19, 2021	30.4	68.3	1.2	124	286	10:20 AM	N/A	35,000
South East Wall Chimney	Monday, June 21, 2021	29	70.2	0.8	151	251	7:55 AM	N/A	18,500
15' south of SE Chimney	Monday, June 21, 2021	28.6	64.2	1.9	156	314	7:55 AM	N/A	15,250
South East Wall Chimney	Tuesday, June 22, 2021	7.5	15.7	14.9	0	593	2:07 PM	N/A	19,000
15' south of SE Chimney	Tuesday, June 22, 2021	4.1	9.7	17.9	0	589	2:07 PM	N/A	10,725
South East Wall Chimney	Wednesday, June 23, 2021	31.8	66.2	2	No read	No readin	3:00 PM	N/A	26000
15' south of SE Chimney	Wednesday, June 23, 2021	28.8	57.8	3.1	No read	No readin	3:00 PM	N/A	7800
South East Wall Chimney	Monday, June 28, 2021	29.8	67.9	1.3	381	706	12:16 PM	N/A	21,000

Table 3 **Bristol Southern Chimney Monitoring Results**

Bristol Samples		GEM Results							
Location	DATE	CH4 %	CO2 %	O2%	H2S ppm	CO ppm	Time	Temp	Hydrogen PPM
15' south of SE Chimney	Monday, June 28, 2021	28.2	56	2.3	44	559	12:17 PM	N/A	17,500
South East Wall Chimney	Tuesday, June 29, 2021	27.3	72.4	0.2	127	339	8:02 AM	N/A	
15' south of SE Chimney	Tuesday, June 29, 2021	24.8	74.9	0.3	821	691	8:02 AM	N/A	
South East Wall Chimney	Wednesday, June 30, 2021	25.8	52.7	4.3	142	327	9:17 AM	N/A	
15' south of SE Chimney	Wednesday, June 30, 2021	21.5	42.1	3.6	434	261	9:17 AM	N/A	
South East Wall Chimney	Thursday, July 1, 2021	20.7	48.3	7.3	160	352	2:55 PM	N/A	
15' south of SE Chimney	Thursday, July 1, 2021	6.1	12.6	15.2	30	84	2:55 PM	N/A	
South East Wall Chimney	Friday, July 2, 2021	22.5	56.6	6.9	224	326	1:30 PM	N/A	
15' south of SE Chimney	Friday, July 2, 2021	20.7	48.8	5.7	111	75	1:30 PM	N/A	
South East Wall Chimney	Tuesday, July 6, 2021	26.1	73.3	0.6	840	581	8:27 AM	N/A	
15' south of SE Chimney	Tuesday, July 6, 2021	29.8	57.8	2.5	38	407	8:29 AM	N/A	
South East Wall Chimney	Wednesday, July 7, 2021	31.1	68.2	0.8	219	346	2:14 PM	N/A	
15' south of SE Chimney	Wednesday, July 7, 2021	28.8	66.7	1.9	209	435	2:15 PM	N/A	
South East Wall Chimney	Thursday, July 8, 2021	30.6	68	0.8	85	313	8:12 AM	N/A	
15' south of SE Chimney	Thursday, July 8, 2021	27.3	71.9	0.8	539	474	8:12 AM	N/A	
South East Wall Chimney	Friday, July 9, 2021	24.3	59.5	4.4	457	546	2:32 PM	N/A	
15' south of SE Chimney	Friday, July 9, 2021	7.5	18.9	15.8	46	23	2:34 PM	N/A	
South East Wall Chimney	Monday, July 12, 2021	21.1	52.5	6.5	533	459	2:54 PM	N/A	
15' south of SE Chimney	Monday, July 12, 2021	11	26.9	11.6	155	196	2:54 PM	N/A	
South East Wall Chimney	Monday, July 17, 2021	27.7	71.4	0.9	486	379	9:38 AM	N/A	
15' south of SE Chimney	Monday, July 17, 2021	27.4	72.1	0.5	166	236	9:38 AM	N/A	
South East Wall Chimney	Tuesday, July 18, 2021	26.5	72.7	0.8	603	351	9:18 AM	N/A	
15' south of SE Chimney	Tuesday, July 18, 2021	30.6	68.4	1	44	194	9:18 AM	N/A	
South East Wall Chimney	Wednesday, July 19, 2021	29	70.3	0.8	61	202	2:58 PM	N/A	
15' south of SE Chimney	Wednesday, July 19, 2021	22.7	48.5	3.5	75	181	2:58 PM	N/A	
South East Wall Chimney	Thursday, July 20, 2021	29.2	69.8	1	617	298	9:38 AM	N/A	
15' south of SE Chimney	Thursday, July 20, 2021	29.4	56.6	3.7	24	169	9:38 AM	N/A	
South East Wall Chimney	Friday, July 21, 2021	29.5	69.7	0.8	541	316	9:09 AM	N/A	
15' south of SE Chimney	Friday July 21, 2021	28.5	57.2	2.7	65	189	9:09 AM	N/A	

