# December Monthly Compliance Report

Solid Waste Permit #588 Bristol Integrated Solid Waste Management Facility 2655 Valley Drive Bristol, VA 24201 (276) 645-7233

## SCS ENGINEERS

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#### INTRODUCTION

On behalf of the City of Bristol, Virginia (City), SCS Engineers has prepared this report to the Virginia Department of Environmental Quality (VDEQ) outlining steps taken towards the action items outlined in the Plan of Action submitted to VDEQ on July 6, 2022. This report covers the Solid Waste Permit #588 landfill during the month of December.

#### 1.0 GAS COLLECTION

The City has continued steps to operate, develop, and improve the facility's landfill gas collection and control system (GCCS). The following sections describe steps City is taking in collaboration with its consultants and operations and monitoring contractor.

#### 1.1 SURFACE AND LEACHATE COLLECTION EMISSIONS

#### 1.1.1 Surface Emissions

#### 1.1.1.1 Monitoring

In addition to standard regulatory quarterly surface emissions monitoring, SCS performed additional surface emissions monitoring on December 2, 2022, December 9, 2022, December 16, 2022, December 19, 2022 and December 27, 2022. These Weekly Surface Emissions Monitoring (SEM) Events were performed in accordance with Section 3.5 of the Plan of Action in Response to the Expert Panel Report, submitted to VDEQ on July 6, 2022.

The monitoring in December generally conforms to the requirements of 40 CFR 63.1960(c) and (d), and 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21. The landfill gas (LFG) collection system is required to operate such that the methane concentration is less than 500 ppm above background at the landfill surface.

The monitoring route included the entire waste footprint of the Permit No. 588 landfill. Sampling was conducted with a Thermo Scientific TVA-2020 Flame Ionization Detector (FID) at 30-meter intervals and where visual observations indicated the potential for elevated concentrations of LFG, such as distressed vegetation and surface cover cracks. In addition, in accordance with 40 CFR 63.1958(d)(ii)(2) and 40 CFR 60.34f(d), monitoring was conducted at all surface cover penetrations within the waste footprint outside of the active filling area.

SCS submitted letters to VDEQ outlining the results on December 7, 2022, December 14, 2022, December 21, 2022, December 28, 2022, and January 4, 2023. Copies of those submittals are included in Appendix A. Table 1 summarizes the results of the three monitoring events in December.

Table 1. Summary of December Surface Emissions Monitoring

Description	December 2, 2022	December 9, 2022	December 16, 2022	December 19, 2022	December 27, 2022
Number of Points Sampled	146	149	149	149	149
Number of Points in Serpentine Route	100	100	100	100	100
Number of Points at Surface Cover Penetrations	46	49	49	49	49

Description	December 2, 2022	December 9, 2022	December 16, 2022	December 19, 2022	December 27, 2022
Number of Exceedances <sup>1</sup>	11	7	6	4	3
Number of Serpentine Exceedances	0	0	0	0	0
Number of Pipe Penetration Exceedances	11	7	6	4	3

The number of exceedances decreased over the course of the month of December. The corrective actions taken by the City and SCS to facilitate this reduction is described in the section below.

#### 1.1.1.2 **Corrective Actions**

The City purchased Landtec polyvinyl chloride (PVC) well-bore seals (seals) from QED. The seals measure approximately 10 feet by 10 feet with a mounting boot in the center of the seal. The seals are designed to surround the landfill gas well casing and are intended to be buried approximately 1 foot below the surface.

Installation of the seals on existing wells presents challenges when compared to installation during well construction. The existing wells have multiple pipes attached that convey air, gas, and condensate and the removal of these lines requires substantial time and effort. Additionally, many of the wells were equipped with a flange adaptor that limits the feasibility of slipping the seals over the well. SCS believes that the most efficient method of installation would be to cut the seals to place the on the wells and then re-attach the edges of the seal. After consulting with the vendor and SCS' geosynthetics installation technician, SCS intends to reattach the edges of the seal by heat bonding the edges and pressing them together.

These seals were installed throughout the month of December resulting in compliant readings at every location that received a well-bore seal. On December 19, 2022 well-bore seals were installed on wells EW-40, EW-47, and EW-51. On December 20, 2022 well-bore seals were installed on wells EW-39, EW-41, EW-54, and EW-60. On December 21, 2022 well-bore seals were installed on wells EW-42 and EW-57. Additional soil around the well-bore seals should be applied to select locations where methane values continue to approach and/or occasionally exceed the 500-ppm limit. However, overall the well-bore seals have proven to be an effective way to reduce methane emissions at pipe penetrations.

#### 1.1.2 **Leachate Collection Emissions**

SCS Field Services (SCS-FS) visited the Bristol Landfill during the month of December and performed monitoring of the leachate, witness zone, and gradient control clean-outs at the northern and southern ends of the landfill. The results of that monitoring are included in SCS-FS' summary report for the month of December dated January 5, 2022. A copy of this report is included in Appendix B. The monitoring data for the clean-outs at the southern end of the landfill are listed as LC01 - LC10. The monitoring data for the clean-outs at the northern end of the landfill are listed as NC01 - NC10. Based on site records and correspondence, SCS prepared a summary of the pipe numbering relative to the function of the pipes shown in Table 2.

<sup>&</sup>lt;sup>1</sup> Exceedance locations were marked in the field with red flagging and were identified to landfill personnel to initiate corrective actions.

Table 2. Cleanout Pipe Identification

N	lorthern Cleanouts	Southern Cleanouts			
ID#	D# Description		Description		
NC01	Leachate East	LC01	Gradient West		
NC02	Leachate Center	LC02	Gradient East		
NC03	Leachate West	LC03	Leachate Center		
NC04	Witness East	LC04	Witness East		
NC05	Witness Center	LC05	Leachate West		
NC06	Witness West	LC06	Gradient Center West		
NC07	Gradient East	LC07	Leachate East		
NC08	Gradient Center East	LC08	Gradient Center East		
NC09	Gradient Center West	LC09	Leachate West		
NC10	Gradient West	LC10	Witness Center		

#### 1.2 EXISTING GAS EXTRACTION SYSTEM PERFORMANCE

SCS and SCS-FS have been coordinating with the City to improve the performance of the existing gas system. Specific actions taken to maintain and improve the system are detailed in SCS-FS' summary report for the month of December.

#### 1.3 REMOTE MONITORING SYSTEM

SCS Remote Monitoring & Control (SCS-RMC) had previously furnished 25 industrial internet of things (IIoT) temperature sensors for installation on landfill gas wells at the Bristol Landfill, VA. The sensors are capable of recording and transmitting gas temperatures and GPS locations. The sensors will upload data collected via a cellular connection to a database managed by SCS-RMC.

As outlined in the November Monthly Compliance Report for the SWP #588 Landfill the system is currently undergoing commissioning. Sensors with a longer probe length have been ordered and will be installed on two wells once they arrive on site. Once installed, these two sensors will be used to evaluate the effectiveness of the longer probes. If the longer probes are deemed to be effective, the rest of the temperature sensors will be replaced with sensors that utilize longer probes.

Despite the system still being subject to ongoing commissioning, the City began sharing data with VDEQ on a daily basis per the Department's request. This reporting began with the November 30, 2022 data which was submitted on December 1, 2022. Daily averages for each wellhead are reported to the Department the following day. A copy of the December reports are included as Appendix C.

The sensor on Well 68 was damaged and is not currently reporting temperatures. A replacement sensor has been ordered and will be installed once it arrives on site. The system is still in the commissioning phase, and caution should be used when making any interpretations based on the data in this report.

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#### 1.4 LARGE-DIAMETER DUAL-PHASE EXTRACTION WELLS

SCS completed design work on an expansion of the existing GCCS during the month of December. The proposed expansion includes at least 5 large diameter dual-phase extraction wells. SCS will submitted the design to VDEQ prior to December 31, 2022. The City has commenced solicitation of contractor's bids for this project by advertising for bids on December 12, 2022 and conducting the Pre-bid Meeting on December 16, 2022. The contractor's bids are due to the City on January 12, 2023. Upon establishing the proposed schedule for executing the field construction activities, which will be negotiated between the City and the selected Contractor, the City will inform VDEQ of the anticipated milestone dates. In accordance with typical protocols, the Construction Certification Report documenting the CQA activities related to construction of this subsequent phase of the project will be submitted to VDEQ upon completion. A copy of the bid package is included in Appendix D.

#### 1.5 VDEQ CONCURRENCE ON WELLS

The City has engaged with VDEQ in discussions about the proposed approach for landfill GCCS improvements and expansions. On October 27, 2022 SCS provided VDEQ with an overview of the proposed GCCS expansion design outlined in Section 1.4. SCS submitted the design of the landfill GCCS expansion to VDEQ on December 31, 2022. The City and SCS intend to continue engaging with the Department throughout the design and installation process. The City intends to delay installation of temporary or final cover systems until the City and VDEQ agree that the GCCS is sufficient.

#### 2.0 SIDEWALL ODOR MITIGATION

The City has initiated design work to address fugitive emissions emanating from the quarry sidewalls. Specific aspects of the proposed design features are outlined in the following sections.

#### 2.1 PERIMETER GAS COLLECTION SYSTEM

SCS' design of the GCCS expansion outlined in Section 1.5 includes perimeter LFG wells. These wells will be placed closer to the sidewall to intercept landfill gas that potentially could migrate to the quarry wall. These wells will supplement the sidewall odor mitigation system described in section 2.2. SCS submitted the design to VDEQ which includes these wells on December 31, 2022. The City has commenced solicitation of contractor's bids for this project by advertising for bids on December 12, 2022 and conducting the Pre-bid Meeting on December 16, 2022. The contractor's bids are due to the City on January 12, 2023. Upon establishing the proposed schedule for executing the field construction activities, which will be negotiated between the City and the selected Contractor, the City will inform VDEQ of the anticipated milestone dates. In accordance with typical protocols, the Construction Certification Report documenting the CQA activities related to construction of this subsequent phase of the project will be submitted to VDEQ upon completion. A copy of the bid package is included in Appendix D.

#### 2.2 SIDEWALL ODOR MITIGATION SYSTEM

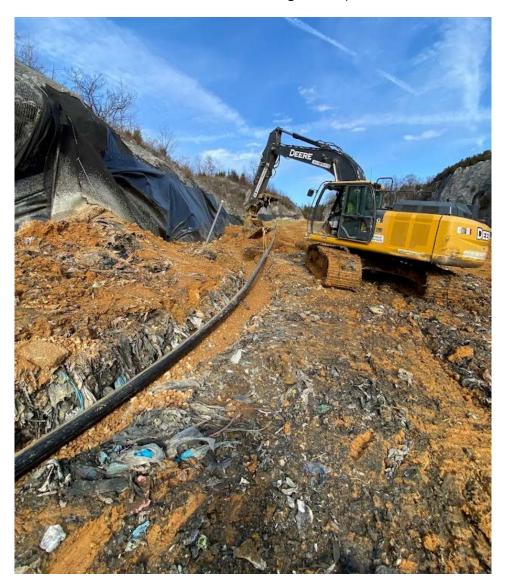
On behalf of the City and in an effort to capture emissions from the quarry sidewall, SCS designed a sidewall odor mitigation system during the month of October. On October 20, 2022 SCS provided an overview of the proposed system to VDEQ staff. The design of this system was prepared and

submitted to VDEQ on November 1st. A project manual detailing the system specifications of the system was developed concurrently with the design of the system.

#### 2.3 PILOT SYSTEM CONSTRUCTION

On December 19, 2022 SCS Field Services Construction began work on the Pilot system by placing 8" dewatering pumps, and later that day began the trench for the perforated horizontal collector piping. The next day, the 6" horizontal collector pipe was installed and on December 21, 2022 the crew backfilled the pipe trench with 2 feet of stone and prepped the liner for installation after the Christmas holiday. Installation of the horizontal collector in shown in Figure 1. On December 29, 2022 the liner crew arrived and prepared the liner for installation. On December 30, 2022 the liner crew installed and completed the liner flap expansion.

Figure 1. Installation of Sidewall Odor Mitigation System Horizontal Collector



#### 2.4 FULL SYSTEM CONSTRUCTION

The remainder of the sidewall odor mitigation system will be constructed as part of Phase 2. Based on constructability and effectiveness of Phase 1, modifications to the design and methods of construction may be made prior to constructing Phase 2. The City intends to include stipulations in the construction contract that require the contractor to complete Phase 2 before June 14, 2023.

#### 3.0 WASTE TEMPERATURE MONITORING

On behalf of the City, SCS designed a temperature monitoring system to collect temperature data throughout the waste mass. The steps taken by the City to implement this system are described in the following sections.

#### 3.1 TEMPERATURE MONITORING SYSTEM DESIGN

The temperature monitoring system consists of 9 boreholes drilled into the waste mass. A steel casing will be placed in each borehole and the hole will be backfilled around the casing with aggregate. A series of temperature sensors will be placed inside the steel casing. At the top of each borehole, an industrial internet of things (IIoT) transmitter will collect the data from the sensors and transmit it to a cloud-based RMC system. The City submitted design of the temperature monitoring system to VDEO on November 30, 2022.

#### 3.2 TEMPERATURE MONITORING SYSTEM INSTALLATION

On December 1, 2022 Connelly continued to drill the core for TP-8 reaching 220'. On December 5, 2022 Connelly finished drilling for TP-8 and installed the 2" stainless steel casing with rock and bentonite backfill. On that same day, Connelly began drilling the borehole for TP-9 reaching 140'. On December 6, 2022 Connelly finished drilling TP-9 at 205 feet and installed the steel casing, finishing the backfill the next day on December 7, 2022.

On December 12, 2022 through December 15, 2022 Connelly installed the bollards around the temperature probes. During drilling, Connelly installed a 1" PVC pipe inside of the bollard sleeve for water collection. On December 20, 2022 Connelly installed boots and the temporary caps on all of the nine temperature probes and installed all thermistors down each of the wells.

On December 28, 2022 the RMC units for each temperature probe was installed.

#### **4.0** LEACHATE EXTRACTION AND MONITORING

The City has begun taking steps to improve the extraction of leachate from the waste mass and collect analytical data about the leachate. The following sections detail steps taken to achieve these goals.

#### 4.1 EXISTING SYSTEM OPTIMIZATION

During mobilizations to conduct surface emissions monitoring outlined in Section 1.1.1, SCS also collected stroke counter data from the pumps installed in the GCCS wells. Stroke counts were

collected from 18 wells on December 2, 2022; December 9, 2022; December 16, 2022; December 19, 2022; and December 27, 2022. The data collected is summarized in Table 3.

Table 3. Summary of Dual Extraction Well Pump Stroke Counter Data

Based on and counts

Well	December 2, 2022	December 9, 2022	December 16, 2022	December 19, 2022	December 27, 2022
GW64	97969	97973	98003	98004	98027
GW61	211970	211981	211981	211981	212008
GW50	593221	593313	593313	593315	607679
GW49	439612	439615	439615	439615	439615
GW60	55269	55269	55269	55269	144373
GW52	227419	227419	227419	227419	227419
GW68	1311931	1335030	1409778	1409778	1487938
GW67	135015	165370	191140	191140	193258
GW54	105751	105815	105815	105815	105861
GW55	529010	529010	529010	529010	529010
GW58	1615366	1615366	1615368	1615368	1615378
GW59	757001	864350	864361	864361	925221
GW57	124846	124848	124848	124848	124848
GW65	3365	3365	3365	3365	3572
GW63	47632				
GW62	113971	113988	113988	113988	113988
GW53	1845157	1849467	1849468	1849468	1849469

this data stroke taken on

November 23, 2022, SCS can estimate the number of gallons of liquid pumped from each well. SCS assumed that each stroke correlates to approximately 0.3 gallons of liquid removed from the well. This data will then be used to repair or replace pumps or replace nonfunctional stroke counters. Estimates of the quantities of liquids removed between the reading dates is shown in Table 4 below.

Table 4. Summary of Dual Extraction Well Pump Liquids Removal

Well	Liquids Removed (gal) November 23, 2022	Liquids Removed (gal) December 2, 2022	Liquids Removed (gal) December 9, 2022	Liquids Removed (gal) December 16, 2022	Liquids Removed (gal) December 19, 2022
Weil	to December 2, 2022	to December 9, 2022	to December 16, 2022	to December 19, 2022	to December 27, 2022
EW64	0.0	0.2	1.3	0.1	0.9
EW61	7.3	0.5	0.0	0.0	1.0

Well	Liquids Removed (gal) November 23, 2022 to December 2, 2022	Liquids Removed (gal) December 2, 2022 to December 9, 2022	Liquids Removed (gal) December 9, 2022 to December 16, 2022	Liquids Removed (gal) December 16, 2022 to December 19, 2022	Liquids Removed (gal) December 19, 2022 to December 27, 2022
EW50	18.5	3.9	0.0	0.2	538.7
EW49	0.0	0.1	0.0	0.0	0.0
EW60	0.0	0.0	0.0	0.0	3341.4
EW52 <sup>2</sup>	0.0	0.0	0.0	0.0	0.0
EW68	0.0	990.0	3203.5	0.0	2931.0
EW67	0.0	1300.9	1104.4	0.0	79.4
EW54	0.0	2.7	0.0	0.0	1.7
EW55	0.0	0.0	0.0	0.0	0.0
EW58 <sup>3</sup>	0.0	0.0	0.1	0.0	0.4
EW59	0.0	4600.7	0.5	0.0	2282.3
EW57	0.0	0.1	0.0	0.0	0.0
EW65	0.0	0.0	0.0	0.0	7.8
EW63	0.0	-	-	-	-
EW62	0.0	0.7	0.0	0	0.0
EW53	11746.6	184.7	0.0	0	0.0

During the month of December, Piedmont Industrial Services (Piedmont) replaced 9 pumps at GW-50, 52, 53, 54, 55, 57, 58, 60, and 67. On December 5, 2022 the pumps in EW-51, EW-55, EW-62, and EW-68 were cleaned, tested and replaced. On December 6, 2022 the pumps in EW-52, EW-53, and EW-54 were cleaned, tested and replaced. On December 21, 2022 the pumps in EW-50, EW-57, EW-60, and EW-61 were cleaned, tested and replaced.

The effects of those repairs varied as shown in this data. In some cases repairs showed improvement in pump performance, but that performance was not always observed in the following week's stroke count data. The City's contractors will continue repairs of pumping infrastructure and pumps during the month of January.

The City and SCS understand that operations of dewatering pumps are critical to address issues related to heat, odors, and the efficient operation of the GCCS. The landfill conditions present a challenging environment for pump operations. Pumps require servicing after relatively short intervals. Figure 2 shows an example of challenges posed by the landfill conditions. This pump was clogged by materials in the gas well.

<sup>&</sup>lt;sup>2</sup> Subsequent investigation indicated that the pump in EW 52 is working but strokes are not being recorded.

<sup>&</sup>lt;sup>3</sup> Subsequent investigation indicated that the pump in EW 58 is working but strokes are not being recorded.



Figure 2. Material Clogging Landfill Gas Well Dewatering Pump

Such short maintenance intervals require significant resources to maintain operations of the pumps. The City and SCS are working to identify ways to improve pump reliability.

SCS and the City plan to trial a Lorentz pump at one select well. The Lorentz pumps are advertised to be able to perform well in conditions like those at the Landfill. The pumps are designed to be able to remove liquid and some solids that often interfere with pumping at other pumps. If the trial is successful the Facility will consider purchasing additional pumps. During the December leachate sampling event liquid temperatures were measured to determine the appropriate class of pump to be used in the trial.

#### 4.2 SAMPLING AND ANALYSIS PLAN

On November 1, 2022, SCS submitted to VDEQ the Dual Phase Landfill Gas Extraction Well Leachate Monitoring Plan for the Bristol Integrated Solid Waste Management Facility Solid Waste Permit #588 Landfill. The Plan documents procedures and instructions necessary to implement a leachate monitoring program for the Dual Phase Landfill Gas Extraction Wells (LFG-EWs) installed within the Permit #588 Landfill. The Plan was prepared in response to the Expert Panel Report prepared by the Expert Panel convened by the Virginia Department of Environmental Quality to address odor problems and operational concerns at the Facility.

On December 1, 2022, SCS submitted to VDEQ the revised Plan addressing comments provided by VDEQ in an email dated November 28, 2022 regarding laboratory analytical methods. The revised Plan included modified sections addressing extraction well and pump maintenance and sample collection procedures.

#### 4.3 SAMPLING AND ANALYSIS

#### 4.3.1 Sample Collection

On December 20 and 21, 2022, SCS collected leachate samples from seven Dual Phase LFG-EWs (EW-50, EW-52, EW-57, EW-59, EW-60, EW-67, and EW-68). Pumps were not running at the time of sample collection in the following wells: EW-49, EW-51, EW-53, EW-54, EW-55, EW-58, EW-61, EW-62, EW-64, and EW-65. There was no pump in EW-56 at the time of sample collection. The pump in EW-63 was disconnected from the air supply. At the time of sample collection dissolved oxygen, oxidation-reduction potential, pH, specific conductance, temperature, and turbidity were measured and recorded. The sample collection log is included in **Appendix F**.

The samples were delivered to Enthalpy Analytical in Richmond, Virginia and Pace Analytical for analysis. The Enthalpy's Virginia Division of Consolidated Laboratory Services (VELAP) certifications are provided on the certificate of analysis included in **Appendix F**. The samples were analyzed for the following parameters utilizing the following analytical methods. The samples sent to Pace were only analyzed for volatile fatty acids (VFAs). Due to equipment malfunction, the VFA results were not available at the time of this report submission. The December 2022 VFA results and Pace's VELAP certification will be provided in the January 2023 Monthly Compliance Report.

Table 5. Laboratory Analytical Parameters and Methods

Parameter	Analytical Method
Ammonia	EPA 350.1 R2.0
Biological Oxygen Demand	SM22 5210B-2021
Chemical Oxygen Demand	SM22 5220D-2011
Nitrate and Nitrite	SM22 4500-NO3F-2011
Total Kjeldahl Nitrogen	EPA 351.2 R2.0
Semi-Volatile Organic Compound: Anthracene	SW-846 Method 8270E
Total Metals: Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Nickel, Selenium, Silver, and Zinc	SW-846 Method 6010D
Total Metal: Mercury	SW-846 Method 7470A
Total Recoverable Phenolics	SW-846 Method 9065
Volatile Fatty Acids: Acetic Acid, Butyric Acid, Lactic Acid, Propionic Acid, and Pyruvic Acid	SW-846 Method 8015
Volatile Organic Compounds: Acetone, Benzene, Ethyl benzene, Methyl ethyl ketone, Tetrahydrofuran, Toluene, and Total Xylenes	SW-846 Method 8260D

#### 4.3.2 Quality Assurance and Quality Control

Field quality control (QC) involved the collection and analysis of trip blanks to verify that the sample collection and handling processes did not impair the quality of the samples. Trip blanks were prepared for volatile organic compound (VOC) analysis via Solid Waste (SW)-846 Method 8260D. In conjunction with the preparation of the groundwater sample collection bottle set, laboratory personnel filled each trip blank sample bottle with distilled/deionized water and transported them with the empty bottle kits to SCS. Field personnel handled the trip blanks like a sample; they remained un-opened, were transported in the sample cooler, and were returned to the laboratory for analyses. A trip blank is used to indicate potential contamination due to the potential migration of VOCs from the air at the site or in the sample shipping containers, through the septum or around the lid of the sampling vials and into the sample.

Laboratory quality assurance/quality control (QA/QC) involves the routine collection and analysis of method reagent blanks, matrix spike (MS) and matrix spike duplicate (MSD) samples, and laboratory control samples (LCS). A brief summary of each of these is presented below:

- **Method Blank** The method blank is deionized water subjected to the same reagents and manipulations to which site samples are subjected. Positive results in the method blanks may indicate either contamination of the chemical reagents or the glassware and implements used to store or prepare the sample and resulting solutions.
- MS/MSD A MS is an aliquot of a field sample with a known concentration of target parameter added to it. A MSD is an intra-laboratory split sample spiked with a known concentration of target parameter. Spiking for each occurs prior to sample analysis. MS/MSD samples are collected for every batch of twenty or fewer samples. Matrix spike recoveries are used to indicate what effect the sample matrix may have on the reported concentration and/or the performance of the sample preparation and analysis.
- LCS These samples consist of distilled/deionized water injected with the parameters of
  interest for single parameter methods and selected parameters for multi-parameter
  methods according to the appropriate analytical method. LCS samples are prepared and
  analyzed for each batch containing twenty or fewer samples. LCS recoveries are used to
  monitor analytical accuracy.

Surrogate recoveries are also measured as a part of laboratory QA/QC. Surrogates are organic compounds that are similar to the parameters of interest in chemical composition, extraction, and chromatography, but are not normally found in environmental samples. These compounds are inserted into blank, standards, samples, and spiked samples prior to analysis for organic parameters only. Percent recoveries are calculated for each surrogate. Spike recoveries at or below acceptance criteria indicate whether analytical results can be considered biased high or biased low.

Field and laboratory QA/QC also involves the routine collection and analysis of duplicate field samples. These samples are collected at a rate of one per sample event. A duplicate is a separate sample collected independently in such a manner that it equally represents the medium at a given time and location. Co-located samples provide intra-laboratory precision information for the entire measurement system, including sample collection, homogeneity, handling, shipping, storage, preparation, and analysis.

No trip or method blank detects were identified for the December 2022 monitoring event. The laboratory analysis report for the December 2022 monitoring event trip blank is included in

**Appendix F.** The December 2022 monitoring event laboratory QA/QC report, including the method blank results, are included in **Appendix F**.

#### 4.3.3 Data Validation

To identify analytical data that may not represent valid results, data from the monitoring events were validated by the Laboratory and SCS in accordance with United States Environmental Protection Agency (EPA) guidance<sup>4</sup>. Data flagged with a "J" qualifier indicates the quantitation of the parameter is less than the laboratory's limit of quantitation but greater than the laboratory's limit of detection (LOD); thus, the concentration is considered estimated. Samples with parameter detections less than five times that of the trip blank, field blank, and/or method blank detection but greater than the laboratory's LOD are flagged with a "B" qualifier. Samples with common laboratory contaminant parameter detections less than 10 times that of the trip blank, field blank, and/or method/laboratory blank detection but greater than the laboratory's LOD are flagged with a "B" qualifier. Data with a "B" qualifier are considered not validated as the detection may be anomalous due to cross-contamination during sampling, transportation of samples, or laboratory analysis. No leachate results were flagged with a "B" qualifier for the December 2022 monitoring event as no constituents were detected in the December 2022 trip and method blanks.

#### 4.3.4 Laboratory Analytical Results

Parameter results for the November 2022 monitoring event are presented on **Table 7**. The associated certificate of analysis is included in **Appendix F**. Parameter results from the December 2022 and previous monitoring event (November 2022) are presented on a table in **Appendix F**. As previously stated, the December 2022 VFA results were not available at the time of this report submission. The December 2022 VFA results will be provided in the January 2023 Monthly Compliance Report.

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<sup>&</sup>lt;sup>4</sup> United States Environmental Protection Agency. Guidance for Data Usability in Risk Assessment (Part A-14). April 1992.

United States Environmental Protection Agency. Office of Superfund Remediation and Technology Innovation. National Functional Guidelines for Inorganic Superfund Methods Data Review. January 2017. United States Environmental Protection Agency. Office of Superfund Remediation and Technology Innovation. National Functional Guidelines for Organic Superfund Methods Data Review. January 2017.

Table 6. Monthly LFG-EW Leachate Monitoring Event Summary

Well ID	EW-50	EW-52	EW-57	EW-59	EW-60	EW-67	EW-68	LOD	100
Parameter	December 2022 Concentration		LOD	LOQ					
Ammonia as N (mg/L)	1700	2280	2110	1410	1310	1150	1780	100	100
Biological Oxygen Demand (mg/L)	6440	12500	11400	9240	3330	8360	6770	0.2	2
	7440							1000	1000
Chemical Oxygen Demand (mg/L)				13200	8000	20300	14100	2000	2000
Chemical Oxygen Demana (mg/t)			22400					5000	5000
		86800						10000	10000
						ND		0.2	0.2
Nitrate as N (mg/L)					ND			0.2	0.6
Niliale as in (ilig/L)	ND	ND	ND	ND				1.1	5.1
							ND	1.5	5.5
Nitrite as N (mg/L)					0.12 J			0.1	0.5
Nillie as in (Hig/L)	ND	ND	ND	ND		ND	ND	1	5
Total Kjeldahl Nitrogen (mg/L)	1510	3570	1790	1830	1490	1340	1940	200	500
Total Recoverable Phenolics (mg/L)					8.94			0.3	0.5
Total Recoverable Friendics (Hig/L)	24.9	54.6	28.3	32		20.2	36	1.5	2.5
SEMI-VOLATILE ORGANIC COMPOUNI	O (ug/L)								
				ND	ND		ND	9.35	9.35
Anthracene			ND			ND		11.7	11.7
Annidene		ND						23.4	23.4
	ND							485	971
TOTAL METALS (mg/L)									
Arsenic	1.02	0.406	0.174	1.69	0.49	0.159	0.574	0.02	0.04
Barium	0.566	0.803	0.978	0.438	0.214	0.856	0.793	0.01	0.02
Cadmium	ND	0.0104	ND	ND	ND	ND	ND	0.004	0.008
Chromium	0.503	1.08	1.76	0.274	0.319	0.499	0.822	0.016	0.02

Table 6. Monthly LFG-EW Leachate Monitoring Event Summary

Well ID	EW-50	EW-52	EW-57	EW-59	EW-60	EW-67	EW-68	LOD	LOQ
Parameter		December 2022 Concentration						LOD	LOQ
TOTAL METALS (mg/L)									
Copper	ND	ND	ND	ND	ND	ND	ND	0.016	0.02
Lead	ND	0.0381	ND	ND	ND	ND	ND	0.012	0.02
	0.00051							0.0004	0.0004
Mercury			0.00118	ND	0.00588	0.0048	ND	0.0008	0.0008
		ND						0.004	0.004
Nickel	0.1722	0.5025	0.2989	0.1299	0.287	0.1853	0.346	0.014	0.02
Selenium	ND	ND	ND	ND	ND	ND	ND	0.08	0.1
Silver	ND	0.0187 J	ND	ND	ND	ND	ND	0.01	0.02
Zinc	0.208	29.7	0.162	0.0686	0.75	0.364	0.286	0.02	0.02
VOLATILE ORGANIC COMPOUNDS (ug	g/L)								
2-Butanone (MEK)	3140				3390			30	100
2-BOTATIONE (MEK)		26800	27700	5670		21700	7150	300	1000
				15600	5170		9800	700	1000
Acetone	8500							1750	2500
		53100	49900			45600		3500	5000
Panzana	301	2960		6.3 J	622	1750	179	4	10
Benzene			6550					40	100
Ethylbenzene	67.3	172	287	ND	48.5	108	27.4	4	10
Totrahydrofuran	151			170	1120		663	100	100
Tetrahydrofuran		5210	19800			6130		1000	1000
Toluene	122	175	195	ND	113	113	48.3	5	10
Xylenes, Total	161	222	186	ND	112	197	59.9	10	30

J = Parameter was detected at a concentration greater than the laboratory's LOD, but less than the laboratory's LOQ. Concentration is considered estimated.

--- = not applicable

LOQ = laboratory's Limit of Quantitation

LOD = laboratory's Limit of Detection

mg/L = milligrams per liter ND = Not Detected ug/L = micrograms per liter

#### **4.3.5** Monitoring Data Evaluation and Interpretation

As an ETLF, the characteristics of leachate from the SWP588 Landfill are anticipated to be different than that of leachate from a typical sanitary landfill. **Table 8** provides a comparison of the December 2022 concentrations detected in the leachate from the LFG-EWs to concentrations commonly detected in mature landfills<sup>5</sup> (greater than 10 years old) for select parameters. The below table also provides data for leachate samples collected from the SWP588 Landfill's leachate collection system in July and November 2022.

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Iania /	Loachata Cam	MACITIAN I	Comparison
Table 7.	Leachate Com	י דוכאוווכטבוי	
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Parameter	Typical Mature Sanitary Landfill Leachate	SWP588 Dual Phase LFG-EWs Leachate	SWP588 Leachate Collection System
Ammonia as N (mg/L)	20 - 40	1150 - 2280	406
BOD (mg/L)	100 - 200	3330 - 12500	2170
COD (mg/L)	100 - 500	7440 - 86800	1760
pH (s.u.)	6.5 - 7.5	5.44 – 8.12	7.61

mg/L = milligrams per liter

In addition to the parameters listed above, the concentrations of 2-butanone, acetone, benzene, and tetrahydrofuran detection in the leachate from the LFG-EWs is considered high for leachate from a sanitary landfill but typical for leachate from an ETLF and especially for samples collected from areas of the landfill with very high temperatures. These high concentrations are the products of endothermic pyrolysis of the waste in an ETLF.

#### **5.0** SETTLEMENT MONITORING AND MANAGEMENT

The City is taking steps to track and manage settlement occurring in the landfill. A summary of actions taken to quantify and manage settlement is included in the sections below.

#### 5.1 SETTLEMENT MONITORING AND MANAGEMENT PLAN

On behalf of the City, SCS prepared a settlement monitoring and management plan. The plan provides for means and methods for monitoring surface elevations across the surface of the landfill, prior to, and after placement of the EVOH cover system. The settlement monitoring and management plan includes procedures for placement of settlement monitoring before and after the placement of the EVOH cover.

Settlement monitoring outlined in the plan includes two components:

- Installation and monitoring of settlement plates installed within the waste mass
- Monthly surveys of the landfill topography

December Monthly Compliance Report, SWP#588

ND = Not detected. Number shown in parenthesis is the laboratory's limit of detection.

s.u. = standard units

<sup>&</sup>lt;sup>5</sup> Tchobanoglous, George, Hilary Theisen, and Samuel Vigil. Integrated Solid Waste Management Engineering Principles and Management Issues. McGraw-Hill, Inc. New York. 1993.

The plan also addresses data collection procedures, settlement analysis, settlement plate design, and reporting procedures. The plan was submitted to VDEQ on November 15, 2022.

#### **5.2** MONTHLY SURVEYS

#### 5.2.1 Topographic Data Collection

The City, through SCS, collected topographic data of the Solid Waste Permit #588 Landfill using photogrammetric methods via an unmanned aerial vehicle (UAV or drone). On December 2, 2022 the flight was completed and the topographic data collected. The topographic data collected is shown on Sheet 2 in Appendix E.

The topography within the landfill footprint was compared to topographic data collected by SCS using photogrammetric methods on November 8, 2022. A drawing depicting the December 2, 2022 topography is included as Sheet 1 in Appendix E.

Based on a comparison of the topographic data collected on those two dates, settlement occurred that reduced the volume of waste in the landfill by approximately 6,700 cubic yards. During that same time period approximately 10,800 cubic yards of fill were placed on the landfill. This fill was primarily soil placed in anticipation of the sidewall odor mitigation system construction. This resulted in a net volume increase of approximately 4,100 cubic yards.

The largest settlement occurred primarily in the southern end of the landfill where the waste settled by 1 foot or more in some areas. Settlement in the northern portion of the landfill was generally less substantial. Some areas around the edges of the waste exhibited an increase in elevation, likely due to sediment deposition during storm events. A visual depiction of settlement and filling at the landfill during this time is depicted on Sheet 3 in Appendix E.

SCS calculated the waste footprint for purposes of analysis to be 752,610 square feet. Based on that area and the net volume change, the average elevation change within the waste is approximately 0.1 feet.

SCS will collect topographic data covering the landfill surface again in January using photogrammetric methods via UAV. This data will be compared to the data collected in December. This data is expected to allow for better analysis since filling is anticipated to be limited.

#### **5.2.2** Settlement Plate Surveys

On November 7, 2022 SCS field services installed 12 settlement plates on the Solid Waste Permit #588 landfill. The construction and installation of the settlement plates generally conforms to the design outline in the Settlement Monitoring and Management Plan. The tops of the PVC pipes were sprayed painted orange to improve visibility. Figure 3 shows one of the as-built settlement plates.



Figure 3. Settlement Plate after Installation

The locations of the settlement plates were surveyed by the City's surveyor on November 14, 2022. The settlement plates were surveyed again on December 13, 2022. The settlement plate locations are depicted on Sheet 4 in Appendix E. The surveyed coordinates<sup>6</sup> of the settlement plates are shown in Table 8.

Table 8. Settlement Plate Locations

Settlement Plate	Northing	Easting	Elevation on November 14, 2022	Elevation on December 13, 2022	Elevation Change
SP-1	3397886.0	10412078.5	1,834.4	1834.2	-0.2
SP-2	3397806.1	10412364.0	1,810.6	1809.9	-0.7
SP-3	3397787.3	10412537.0	1,783.7	1783.6	-0.1
SP-4	3398250.5	10412183.8	1,817.5	1816.7	-0.8
SP-5	3398256.3	10412339.0	1,800.8	1800.1	-0.7

<sup>&</sup>lt;sup>6</sup> Settlement plate locations and coordinates are based on a local coordinate system.

Settlement Plate	Northing	Easting	Elevation on November 14, 2022	Elevation on December 13, 2022	Elevation Change
SP-6	3398249.4	10412510.9	1,777.7	1777.4	-0.2
SP-7	3398737.7	10412157.2	1,828.6	1828.5	-0.1
SP-8	3398679.2	10412290.4	1,807.3	1807.0	-0.4
SP-9	3398673.3	10412400.5	1,785.9	1785.9	0.0
SP-10	3399080.4	10412092.0	1,840.2	1840.2	0.0
SP-11	3399216.1	10412183.6	1,816.3	1816.3	0.0
SP-12	3399381.6	10412019.4		1810.6	-0.1

Settlement Plates 2, 4, 5, and 8 demonstrated substantial elevation change. These settlement plates are towards the center of the waste mass and in the southern end of the landfill. This area is where waste was most recently placed and is expected to show the most rapid settlement. This area is also the location of the gas wells exhibiting higher temperatures. Settlement Plate 8 exhibited less of a change in elevation compared to the other three plates and is located further north than the other settlement plates.

The rest of the settlement plates exhibited minimal settlement or values that are within the expected range for landfill settlement. The elevations changes of the settlement plates are generally consistent with elevation changes exhibited by a review of topographic data as outlined in Section 5.2.1.

The settlement plates will be surveyed again during the month of January. The elevations surveyed will be compared to the elevations surveyed the previous months.

#### **6.0** INTERMEDIATE COVER AND EVOH COVER SYSTEM

The City is taking steps to provide intermediate and temporary cover of the wastes in the landfill. The sections below outline the steps taken by the City.

#### **6.1** INTERMEDIATE COVER INSTALLATION

The City completed hauling and placement of a 12-inch thick intermediate cover across the entire landfill prior to October 10, 2022. The cover was placed in accordance with 9VAC20-81-140(B)(1)(d). SCS coordinated with the City to dig a series of test holes to verify cover thickness in select locations. Details of these verifications

#### **6.2** EVOH COVER SYSTEM DESIGN

SCS has begun the process of preparing a scope for the EVOH cover system design for submittal to the City. The anticipated scope includes conceptual design, stormwater analysis and design, and the eventual preparation of construction documents.

SCS plans to specify a 40 mil 7-layer co-extruded linear low-density polyethylene (LLDPE) geomembrane containing an inner core of ethylene vinyl alcohol(EVOH) geomembrane for enhanced

barrier performance to volatile organic compounds (VOCs). A reinforced geotextile windscreen overlay will be required to protect the geomembrane from wind damage and prolonged UV exposure.

Prior to the installation of the EVOH geomembrane, sufficient grading of the quarry will be required to enable stormwater drainage to the proposed stormwater retention basin. As part of this effort, SCS is identifying areas of the quarry which will require regrading.

SCS has also started examining potential alignments and design profiles for the proposed stormwater channel running from the northern end of the quarry to the proposed basin. SCS is considering a channel with 2 foot depth, 10 foot bottom width, and 3:1 side slopes.

SCS is also designing surface-level LFG collection strips to be positioned on top of the intermediate cover soil and directly below the EVOH geomembrane. The LFG collection strips will likely include an ADS AdvanEDGE or similar product with an underlying geosynthetic roll. The strips will be placed at regular intervals along the quarry floor, generally running from a low point along the eastern side of the quarry to a high point along the western side. LFG collection wellheads will be positioned near the high point of the collection strips to allow potential gas collection for the purpose of relieving pressure underneath the EVOH cover.

#### **6.3** EVOH COVER SYSTEM PROCUREMENT

City has initiated discussion with the EVOH cover vendor, Viaflex, to facilitate future procurement of an EVOH cover system. SCS is preparing a detailed technical specification that the City will use for the EVOH cover system procurement.

#### **6.4** EVOH COVER SYSTEM INSTALLATION

Installation of the EVOH cover system will begin after the installation of other infrastructure is complete.

#### 7.0 STORM WATER MANAGEMENT

SCS is reviewing the topography collected on October 7, 2022 to determine the scope of design needed to manage stormwater on the site. SCS is preparing an approach for submittal to the City that will address stormwater management design, construction, and stormwater sampling.

#### 8.0 CEASE WASTE ACCEPTANCE

The City ceased acceptance of offsite waste at the Solid Waste Permit #588 landfill prior to September 12, 2022.

#### 9.0 LONG-TERM PLAN

SCS submitted the Monitoring, Maintenance, and Repair Plan to VDEQ for the SWP #588 landfill on December 30, 2022. The Plan documents procedures for monitoring, maintaining, and repair/upgrade for the landfill cover, leachate and gas collection system, sidewall odor mitigation system, and the stormwater management controls for the City of Bristol Integrated Solid Waste Management Facility Solid Waste Permit #588 Landfill. The Plan is intended to be a "living" document to be revised as construction is completed and new information becomes available. A copy of the plan is included in Appendix G.

#### 10.0 COMMUNITY OUTREACH PROGRAM

The City's consultant leading community outreach, McGuireWoods Consulting, outlined the actions taken as part of their community outreach efforts. For the month of December, those actions include:

- December ongoing basis: Frequent updates were posted on the newly established BristalVALandfill.org site and the existing City of Bristol Landfill Notifications and Information page covering several important updates including:
  - Progress updates during installation of the thermocouple system at the quarry landfill
  - Approval of contracts related to construction for the Sidewall Odor Mitigation system
  - Information related to the Motion for Mediation between Bristol, VA and Bristol, TN
  - Bristol, VA's request for contractor bids related to the Landfill Gas System expansion
  - Residents notified that work on the Sidewall Odor Mitigation System could result in increased odor due to disturbances at the landfill related to construction
- December 13th: Email communication sent to the list of members of the public signed up through the Bristol, VA website, the new BristolVALandfill.org website, or at the November 1 Open House to receive information via email
  - Email provided a status update on the installation of the thermocouple system installation and construction of the Sidewall Odor Mitigation System
  - Email included a link where recipients can view a graphic of the Sidewall Odor Mitigation System as designed
  - Residents notified that work on the Sidewall Odor Mitigation System could result in increased odor due to disturbances at the landfill related to construction
- **December 16th**: Email communication sent to the list of members of the public signed up through the Bristol, VA website, the new BristolVALandfill.org website, or at the November 1 Open House to receive information via email
  - Email informed the public that borehole drilling related to installation of the thermocouple system was complete and provided a timeline for installation of the bollard casings for the system
  - Email also included an update on construction of the Sidewall Odor Mitigation System

## Appendix A

## Surface Emissions Monitoring Summary Letters

December 7, 2022 File No. 02218208.04

Mr. Jonathan Chapman Enforcement Specialist Virginia Department of Environmental Quality SW Regional Office 355-A Deadmore Street Abingdon, VA 24210

Subject: Weekly Surface Emissions Monitoring Event – December 2, 2022

Bristol Integrated Solid Waste Facility - Bristol, Virginia

#### Dear Mr. Chapman:

On behalf of the City of Bristol (City), SCS Engineers (SCS), is pleased to submit the results of the Weekly Surface Emissions Monitoring event performed at the Bristol Integrated Solid Waste Facility located in Bristol, Virginia on December 2, 2022. This Weekly Surface Emissions Monitoring (SEM) Event was performed in accordance with Section 3.5 of the Plan of Action in Response to the Expert Panel Report, submitted to VDEQ on July 6, 2022.

The monitoring generally conforms to the requirements of 40 CFR 63.1960(c) and (d), and 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21. The landfill gas (LFG) collection system is required to operate such that the methane concentration is less than 500 ppm above background at the landfill surface.

The monitoring route included applicable areas of the Permit No. 588 landfill. Sampling was conducted with a Thermo Scientific TVA-2020 Flame Ionization Detector (FID) at 30-meter intervals and where visual observations indicated the potential for elevated concentrations of LFG, such as distressed vegetation and surface cover cracks. In addition, in accordance with 40 CFR 63.1958(d)(ii)(2) and 40 CFR 60.34f(d), monitoring was conducted at all surface cover penetrations within the waste footprint outside of the active filling area, including at the newly installed temperature probes. The approximate monitoring route and sampling locations are presented in the attached Drawing.

At the time of monitoring, all areas of the Permit No. 588 landfill footprint are subject to regulatory monitoring based on the regulatory time schedule stipulated in 40 CFR 63.1960(b) and 40 CFR 60.36f(b). The Permit 588 Landfill has a surface area of approximately 17.3 acres. Therefore, the minimum number of sampling points to cover the appropriate portion of the landfill footprint, utilizing a 30-meter grid interval, is approximately 82 (4.75 points per acre). A summary of the results of the surface emissions monitory is provided in Table 1.



Table 1. Summary of Surface Emissions Monitoring

Description	Quantity
Number of Points Sampled	146
Number of Points in Serpentine Route	100
Number of Points at Surface Cover Penetrations	46
Number of Exceedances <sup>1</sup>	11
Number of Serpentine Exceedances	0
Number of Pipe Penetration Exceedances	11

Proposed corrective actions at these locations involved addition and compaction of low permeability soil as well as vacuum adjustments to adjacent vertical wells. In some select locations a foam seal or a well bore skirt may be installed. Results of corrective actions and remonitoring results will be presented in subsequent reports.

#### Remonitoring of Ongoing Exceedances

In accordance with 40 CFR 63.1960(c)(4)(ii) and 40 CFR 60.36f(c)(4)(ii), corrective actions and a remonitoring event are to be performed within 10 days of the initial exceedance. In accordance with 40 CFR 63.1960(c)(4)(iii) and 40 CFR 60.36f(c)(4)(iii) additional corrective actions and a second 10-day retest are to be performed if the initial 10-day retest indicates methane values greater than the regulatory threshold. The Facility performed corrective actions including wellhead vacuum adjustments and addition of soil cover prior to this event at locations that previously exhibited elevated methane concentrations.

In accordance with 40 CFR 63.1960(c)(4)(v) and 40 CFR 60.36f(c)(4)(v) a new well or collection device must be installed or an alternate remedy must be submitted within 120-days at locations That continue to exhibit methane concentrations above the regulatory threshold for two consecutive retests.

A summary of ongoing exceedance points is provided in Table 2.

<sup>1</sup> Exceedance locations were marked in the field with red flagging and were identified to landfill personnel to initiate corrective actions.

Table 2. Ongoing Weekly SEM Exceedances

Point ID	Initial Exceedance Date	12/2/22 Event	12/2/22 Event Result	Comments
EW-50	11/4/22	30-Day Retest	Pass	No Further Action
EW-66	11/14/22	N/A	Pass	Requires 30-Day Retest
EW-60	11/23/22	First 10-Day Retest	Fail	Requires 2 <sup>nd</sup> 10-Day Retest
EW-67	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-56	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-57	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-41	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-53	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-40	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-51	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-68	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-42	8/12/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-52	8/19/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-39	8/19/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-48	8/26/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-47	8/26/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-54	9/2/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-35	9/9/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-55	11/4/22	N/A	Pass	Subject to 1960(c)(4)(v)

Mr. Jonathan Chapman December 7, 2022 Page 4

If you have questions or require additional information, please contact either of the undersigned.

Sincerely,

Charles J. Warren Project Manager SCS Engineers Lucas S. Nachman Project Professional SCS Engineers

Lucus D. Nachman

LSN/LEH/cjw

cc: Randall Eads, City of Bristol

Mike Martin, City of Bristol Joey Lamie, City of Bristol Jake Chandler, City of Bristol Susan "Tracey" Blalock, VDEQ

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Encl. Surface Emissions Monitoring Results

**Bristol SEM Route Drawing** 

## EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 2, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

	Methane			ordinates	_
ID#	Concentration	Compliance	Lat.	Long.	Comments
1	27.5 PPM	OK			Start Serpentine
2	307.0 PPM	OK			Route
3	18.1 PPM	OK			
4	12.1 PPM	OK			
5	14.1 PPM	OK			
6	6.9 PPM	OK			
7	1.6 PPM	OK			
8	5.0 PPM	OK			
9	5.2 PPM	OK			
10	7.5 PPM	OK			
11	2.5 PPM	OK			
12	3.6 PPM	OK			
13	18.1 PPM	OK			
14	3.5 PPM	OK			
15	4.6 PPM	OK			
16	14.1 PPM	OK			
1 <i>7</i>	141.0 PPM	OK			
18	9.7 PPM	OK			
19	16.3 PPM	OK			
20	18.7 PPM	OK			
21	50.4 PPM	OK			
22	15.6 PPM	OK			
23	16.0 PPM	OK			
24	16.3 PPM	OK			
25	173.0 PPM	OK			
26	35.3 PPM	OK			
27	42.2 PPM	OK			
28	81.5 PPM	OK			
29	6.3 PPM	OK			
30	3.5 PPM	OK			
31	3.5 PPM	OK			
32	14.6 PPM	OK			
33	63.8 PPM	OK			
34	71.8 PPM	OK			
35	17.6 PPM	OK			
36	7.1 PPM	OK			
37	4.0 PPM	OK			
38	6.1 PPM	OK			
39	3.4 PPM	OK			
40	52.4 PPM	OK			
41	149.0 PPM	OK			
42	93.2 PPM	OK			

## EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 2, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

	Methane		GPS Co	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
43	5.7 PPM	OK			
44	2.7 PPM	OK			
45	2.6 PPM	OK			
46	4.2 PPM	OK			
47	4.3 PPM	OK			
48	14.3 PPM	OK			
49	29.6 PPM	OK			
50	18.4 PPM	OK			
51	7.6 PPM	OK			
52	40.6 PPM	OK			
53	18.4 PPM	OK			
54	4.2 PPM	OK			
55	36.5 PPM	OK			
56	6.4 PPM	OK			
57	4.1 PPM	OK			
58	16.5 PPM	OK			
59	2.4 PPM	OK			
60	4.7 PPM	OK			
61	3.2 PPM	OK			
62	1.8 PPM	OK			
63	2.0 PPM	OK			
64	15.0 PPM	OK			
65	5.0 PPM	OK			
66	7.8 PPM	OK			
67	6.4 PPM	OK			
68	5.4 PPM	OK			
69	9.7 PPM	OK			
70	9.3 PPM	OK			
71	22.9 PPM	OK			
72	3.5 PPM	OK			
73	10.9 PPM	OK			
74	25.3 PPM	OK			
75	23.8 PPM	OK			
76	0.9 PPM	OK			
77	0.8 PPM	OK			
<i>7</i> 8	0.7 PPM	OK			
79	9.9 PPM	OK			
80	44.8 PPM	OK			
81	21.2 PPM	OK			
82	183.0 PPM	OK			
83	408.0 PPM	OK			
84	80.5 PPM	OK OK			

## EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 2, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

	Methane		GPS Co	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
85	55.0 PPM	OK			
86	38.1 PPM	OK			
87	20.3 PPM	OK			
88	26.2 PPM	OK			
89	4.0 PPM	OK			
90	1.8 PPM	OK			
91	40.5 PPM	OK			
92	3.1 PPM	OK			
93	20.8 PPM	OK			
94	3.0 PPM	OK			
95	146.0 PPM	OK			
96	53.8 PPM	OK			
97	126.0 PPM	OK			
98	91.4 PPM	OK			
99	2.9 PPM	OK			
100	24.0 PPM	OK			<b>End Serpentine</b>
					Route
101	682.0 PPM	HIGH_ALRM	36.59916	-82.14769	EW-35
102	296.0 PPM	OK			EW-52
103	168.0 PPM	OK			TP-4
104	1583.0 PPM	HIGH_ALRM	36.59931	-82.14742	EW-60
105	270.0 PPM	OK			EW-48
106	22.4 PPM	OK			TP-6
107	0.8 PPM	OK			EW-61
108	6.5 PPM	OK			EW-36
109	437.0 PPM	OK			EW-34
110	9.0 PPM	OK			EW-50
111	11800.0 PPM	HIGH_ALRM	36.59864	-82.14774	EW-67
112	26.4 PPM	OK			EW-47
113	1351.0 PPM	HIGH_ALRM	36.59865	-82.14743	EW-54
114	3778.0 PPM	HIGH_ALRM	36.59869	-82.14711	EW-55
115	3.1 PPM	OK			TP-2
116	10.5 PPM	OK			EW-46
11 <i>7</i>	9.4 PPM	OK			EW-66
118	4.5 PPM	OK			EW-58
119	98.2 PPM	OK			EW-57
120	174.0 PPM	OK			TP-1
121	0.8 PPM	OK			EW-59
122	5108.0 PPM	HIGH_ALRM	36.59789	-82.14790	EW-56
123	154.0 PPM	OK			EW-41
124	10900.0 PPM	HIGH_ALRM	36.59841	-82.14793	EW-53
125	2420.0 PPM	HIGH_ALRM	36.59864	-82.14796	EW-40

## EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 2, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

	Methane		GPS Cod	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
126	71.7 PPM	OK			TP-3
127	1367.0 PPM	HIGH_ALRM	36.59884	-82.14786	EW-51
128	43.4 PPM	OK			EW-39
129	9737.0 PPM	HIGH_ALRM	36.59912	-82.14790	EW-68
130	57.2 PPM	OK			TP-5
131	286.0 PPM	OK			EW-38
132	3.0 PPM	OK			EW-49
133	2.9 PPM	OK			EW-31R
134	1.8 PPM	OK			EW-65
135	1.8 PPM	OK			EW-37
136	12.4 PPM	OK			EW-64
1 <i>37</i>	14.3 PPM	OK			EW-30R
138	28.4 PPM	OK			EW-63
139	2046.0 PPM	HIGH_ALRM	36.60107	-82.14805	EW-42
140	28.2 PPM	OK			EW-33R
141	2.9 PPM	OK			EW-62
142	1.9 PPM	OK			EW-29R
143	4.5 PPM	OK			EW-25
144	30.7 PPM	OK			EW-24
145	11.6 PPM	OK			EW-32
146	11.0 PPM	OK			EW-32R

Number of locations sampled: 146
Number of exceedance locations: 11

#### **NOTES:**

Points 1 through 100 represent serpentine SEM route.
Points 101 through 146 represent SEM at Pipe Penetrations

Tollis To Tillough 140 represent 32M di Tipe Fellen dic

Weather Conditions: Sunny  $50^{\circ}F$  Wind: 0 MPH

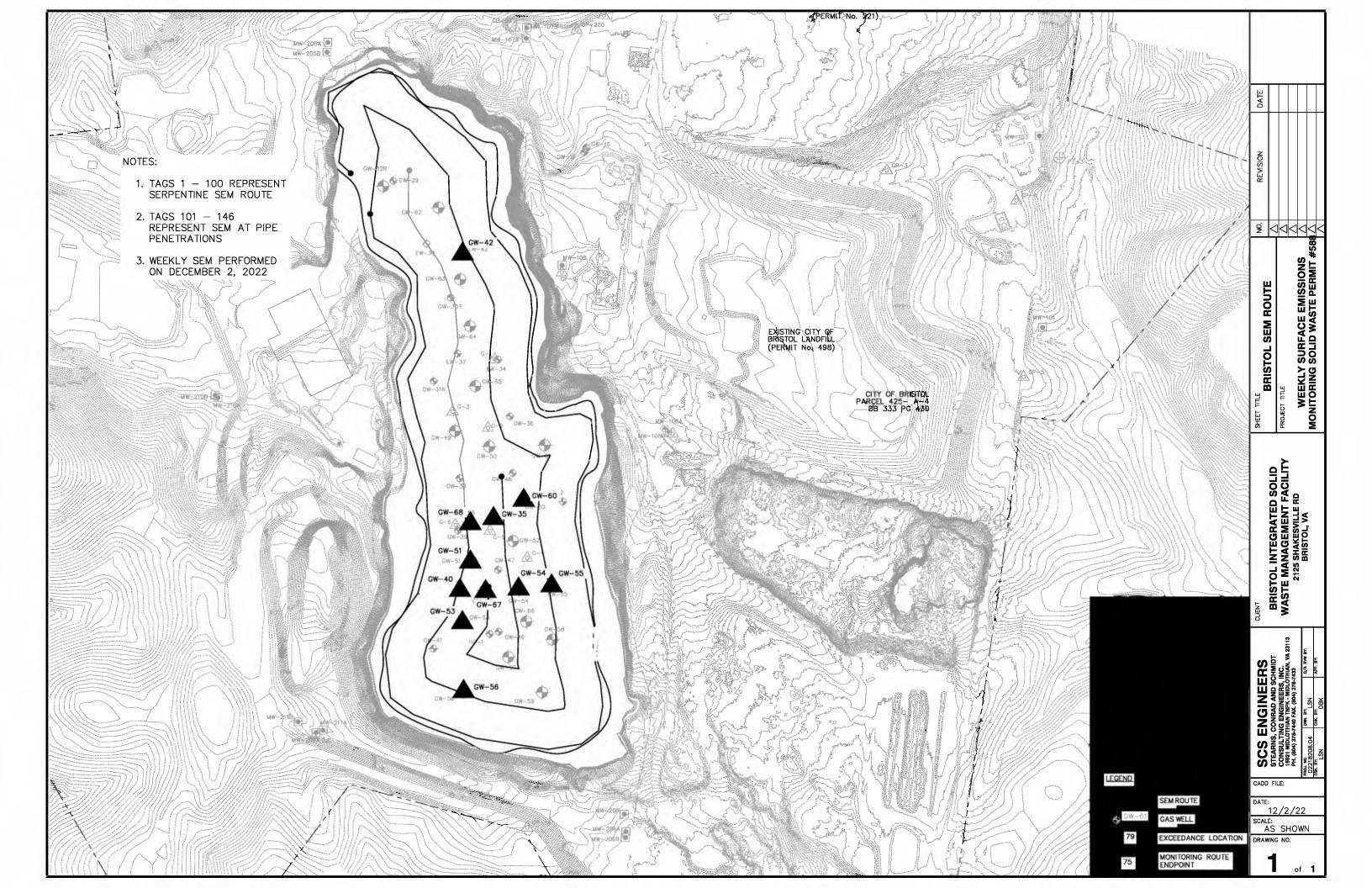
 Sampling Calibration: Methane - 500 ppm, Zero Air - 0.0 ppm

 12/2/2022
 9:50
 ZERO
 0.1 PPM

 12/2/2022
 9:54
 SPAN
 499.0 PPM

**Background Reading:** 

12/2/2022 10:00 Upwind 1.6 PPM 12/2/2022 10:02 Downwind 1.4 PPM



December 14, 2022 File No. 02218208.04

Mr. Jonathan Chapman Enforcement Specialist Virginia Department of Environmental Quality SW Regional Office 355-A Deadmore Street Abingdon, VA 24210

Subject: Weekly Surface Emissions Monitoring Event – December 9, 2022

Bristol Integrated Solid Waste Facility - Bristol, Virginia

#### Dear Mr. Chapman:

On behalf of the City of Bristol (City), SCS Engineers (SCS), is pleased to submit the results of the Weekly Surface Emissions Monitoring event performed at the Bristol Integrated Solid Waste Facility located in Bristol, Virginia on December 9, 2022. This Weekly Surface Emissions Monitoring (SEM) Event was performed in accordance with Section 3.5 of the Plan of Action in Response to the Expert Panel Report, submitted to VDEQ on July 6, 2022.

The monitoring generally conforms to the requirements of 40 CFR 63.1960(c) and (d), and 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21. The landfill gas (LFG) collection system is required to operate such that the methane concentration is less than 500 ppm above background at the landfill surface.

The monitoring route included applicable areas of the Permit No. 588 landfill. Sampling was conducted with a Thermo Scientific TVA-2020 Flame Ionization Detector (FID) at 30-meter intervals and where visual observations indicated the potential for elevated concentrations of LFG, such as distressed vegetation and surface cover cracks. In addition, in accordance with 40 CFR 63.1958(d)(ii)(2) and 40 CFR 60.34f(d), monitoring was conducted at all surface cover penetrations within the waste footprint, including at the newly installed temperature probes. The approximate monitoring route and sampling locations are presented in the attached Drawing.

At the time of monitoring, all areas of the Permit No. 588 landfill footprint are subject to regulatory monitoring based on the regulatory time schedule stipulated in 40 CFR 63.1960(b) and 40 CFR 60.36f(b). The Permit 588 Landfill has a surface area of approximately 17.3 acres. Therefore, the minimum number of sampling points to cover the appropriate portion of the landfill footprint, utilizing a 30-meter grid interval, is approximately 82 (4.75 points per acre). A summary of the results of the surface emissions monitory is provided in Table 1.



Table 1. Summary of Surface Emissions Monitoring

Description	Quantity
Number of Points Sampled	149
Number of Points in Serpentine Route	100
Number of Points at Surface Cover Penetrations	49
Number of Exceedances <sup>1</sup>	7
Number of Serpentine Exceedances	0
Number of Pipe Penetration Exceedances	7

Proposed corrective actions at these locations involved addition and compaction of low permeability soil as well as vacuum adjustments to adjacent vertical wells. In some select locations a foam seal or a well bore skirt may be installed. Results of corrective actions and remonitoring results will be presented in subsequent reports.

#### Remonitoring of Ongoing Exceedances

In accordance with 40 CFR 63.1960(c)(4)(ii) and 40 CFR 60.36f(c)(4)(ii), corrective actions and a remonitoring event are to be performed within 10 days of the initial exceedance. In accordance with 40 CFR 63.1960(c)(4)(iii) and 40 CFR 60.36f(c)(4)(iii) additional corrective actions and a second 10-day retest are to be performed if the initial 10-day retest indicates methane values greater than the regulatory threshold. The Facility performed corrective actions including wellhead vacuum adjustments and addition of soil cover prior to this event at locations that previously exhibited elevated methane concentrations.

In accordance with 40 CFR 63.1960(c)(4)(v) and 40 CFR 60.36f(c)(4)(v) a new well or collection device must be installed or an alternate remedy must be submitted within 120-days at locations that continue to exhibit methane concentrations above the regulatory threshold for two consecutive retests.

A summary of ongoing exceedance points is provided in Table 2.

<sup>1</sup> Exceedance locations were marked in the field with red flagging and were identified to landfill personnel to initiate corrective actions.

Table 2. Ongoing Weekly SEM Exceedances

Point ID	Initial Exceedance Date	12/9/22 Event	12/9/22 Event Result	Comments
EW-66	11/14/22	30-Day Retests	Fail	Subject to 1960(c)(4)(v)
EW-60	11/23/22	2nd 10-Day Retest	Fail	Subject to 1960(c)(4)(v)
EW-67	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-56	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-57	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-41	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-53	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-40	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-51	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-68	8/4/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-42	8/12/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-52	8/19/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-39	8/19/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-48	8/26/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-47	8/26/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-54	9/2/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-35	9/9/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-55	11/4/22	N/A	Pass	Subject to 1960(c)(4)(v)

Mr. Jonathan Chapman December 14, 2022 Page 4

If you have questions or require additional information, please contact either of the undersigned.

Sincerely,

Charles J. Warren Project Manager SCS Engineers Lucas S. Nachman Project Professional SCS Engineers

LSN/LEH/cjw

cc: Randall Eads, City of Bristol

Mike Martin, City of Bristol Joey Lamie, City of Bristol Jake Chandler, City of Bristol Susan "Tracey" Blalock, VDEQ

Clarle Varian

Encl. Surface Emissions Monitoring Results

**Bristol SEM Route Drawing** 

	Methane		GPS Co	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
1	10.7 PPM	ОК			Start Serpentine
2	19.6 PPM	OK			Route
3	86.1 PPM	OK			
4	44.8 PPM	OK			
5	65.1 PPM	OK			
6	6.0 PPM	OK			
7	17.4 PPM	OK			
8	4.7 PPM	OK			
9	7.7 PPM	OK			
10	32.7 PPM	OK			
11	6.6 PPM	OK			
12	11.5 PPM	OK			
13	17.0 PPM	OK			
14	18.0 PPM	OK			
15	18.7 PPM	OK			
16	30.0 PPM	OK			
1 <i>7</i>	12.9 PPM	OK			
18	14.2 PPM	OK			
19	27.7 PPM	OK			
20	28.5 PPM	OK			
21	20.2 PPM	OK			
22	23.7 PPM	OK			
23	12.2 PPM	OK			
24	90.3 PPM	OK			
25	30.4 PPM	OK			
26	34.0 PPM	OK			
27	103.0 PPM	OK			
28	17.6 PPM	OK			
29	24.5 PPM	OK			
30	22.6 PPM	OK			
31	45.2 PPM	OK			
32	12.6 PPM	OK			
33	42.2 PPM	OK			
34	8.9 PPM	OK			
35	6.5 PPM	OK			
36	19.9 PPM	OK			
37	42.1 PPM	OK			
38	13.5 PPM	OK			
39	187.0 PPM	OK			
40	83.8 PPM	OK			
41	3.0 PPM	OK			
42	6.3 PPM	OK			

ID#	Methane Concentration	Compliance	GPS Coo	ordinates Long.	Comments
	Concentration	Compilance	Laii	Long.	Comments
43	6.2 PPM	OK			
44	6.2 PPM	OK			
45	13.2 PPM	OK			
46	4.0 PPM	OK			
47	3.4 PPM	OK			
48	4.2 PPM	OK			
49	3.5 PPM	OK			
50	3.1 PPM	OK			
51	3.9 PPM	OK			
52	2.7 PPM	OK			
53	3.1 PPM	OK			
54	3.3 PPM	OK			
55	3.2 PPM	OK			
56	5.2 PPM	OK			
57	3.0 PPM	OK			
58	3.4 PPM	OK			
59	2.2 PPM	OK			
60	2.4 PPM	OK			
61	3.2 PPM	OK			
62	1 <i>4.</i> 7 PPM	OK			
63	27.3 PPM	OK			
64	3.5 PPM	OK			
65	4.1 PPM	OK			
66	6.0 PPM	OK			
67	6.0 PPM	OK			
68	4.8 PPM	OK			
69	4.6 PPM	OK			
70	32.9 PPM	OK			
71	33.5 PPM	OK			
72	13.2 PPM	OK			
73	87.6 PPM	OK			
74	5.7 PPM	OK			
75	55.5 PPM	OK			
76	8.7 PPM	OK			
77	27.0 PPM	ОК			
78	36.0 PPM	OK			
79	18.0 PPM	OK			
80	30.1 PPM	OK			
81	3.7 PPM	ОК			
82	31.2 PPM	OK			
83	6.6 PPM	OK			
84	33.0 PPM	OK			

	Methane		GPS Co	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
85	38.9 PPM	OK			
86	62.3 PPM	OK			
87	4.4 PPM	OK			
88	6.4 PPM	OK			
89	3.3 PPM	OK			
90	3.3 PPM	OK			
91	16.7 PPM	OK			
92	6.9 PPM	OK			
93	11.9 PPM	OK			
94	3.9 PPM	OK			
95	4.0 PPM	OK			
96	15.5 PPM	OK			
97	168.0 PPM	OK			
98	24.9 PPM	OK			
99	27.7 PPM	OK			
100	4.7 PPM	OK			End Serpentine
					Route
101	2061.0 PPM	HIGH_ALRM	36.59916	-82.14769	EW-35
102	275.0 PPM	OK			EW-52
103	33.8 PPM	OK			TP-4
104	3351.0 PPM	HIGH_ALRM	36.59931	-82.14742	EW-60
105	165.0 PPM	OK			EW-48
106	15.9 PPM	OK			TP-6
107	6.8 PPM	OK			EW-61
108	8.0 PPM	OK			EW-36
109	7471.0 PPM	HIGH_ALRM	36.60032	-82.14770	EW-34
110	69.5 PPM	OK			EW-50
111	1490.0 PPM	HIGH_ALRM	36.59864	-82.14774	EW-67
112	421.0 PPM	OK			EW-47
113	282.0 PPM	OK			EW-54
114	253.0 PPM	OK			EW-55
115	16.5 PPM	OK			TP-2
116	77.9 PPM	OK			EW-46
117	715.0 PPM	HIGH_ALRM	36.59842	-82.14735	EW-66
118	54.5 PPM	OK			EW-58
119	235.0 PPM	OK			EW-57
120	27.1 PPM	OK			TP-1
121	197.0 PPM	OK			EW-59
122	3121.0 PPM	HIGH_ALRM	36.59789	-82.14790	EW-56
123	474.0 PPM	OK	30.37707	-02.14/ 70	EW-41
123	8610.0 PPM	HIGH_ALRM	36.59841	-82.14793	EW-53
125	492.0 PPM	OK	30.37041	-02.14/ /3	EW-40

126 127	Concentration	Compliance	Lat.		
			Lat.	Long.	Comment
107	70.0 PPM	OK			TP-3
12/	239.0 PPM	OK			EW-51
128	41.6 PPM	OK			EW-39
129	6.3 PPM	OK			TP-5
130	69.3 PPM	OK			EW-68
131	62.1 PPM	OK			EW-38
132	1 <i>4.7</i> PPM	OK			TP-7
133	26.2 PPM	OK			EW-49
134	11.2 PPM	OK			EW-31R
135	10.3 PPM	OK			EW-65
136	11.4 PPM	OK			EW-37
1 <i>37</i>	8.9 PPM	OK			TP-8
138	9.9 PPM	OK			EW-64
139	21.6 PPM	OK			EW-30R
140	12.8 PPM	OK			EW-63
141	20.1 PPM	OK			EW-42
142	13.2 PPM	OK			TP-9
143	7.3 PPM	OK			EW-33R
144	3.9 PPM	OK			EW-62
145	4.3 PPM	OK			EW-29R
146	72.7 PPM	OK			EW-25
147	28.2 PPM	OK			EW-24
148	4.8 PPM	OK			EW-32
149	6.2 PPM	OK			EW-32R

### EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 9, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

Methane GPS Coordinates

ID # Concentration Compliance Lat. Long. Comments

#### **NOTES:**

Points 1 through 100 represent serpentine SEM route.

Points 101 through 149 represent SEM at Pipe Penetrations

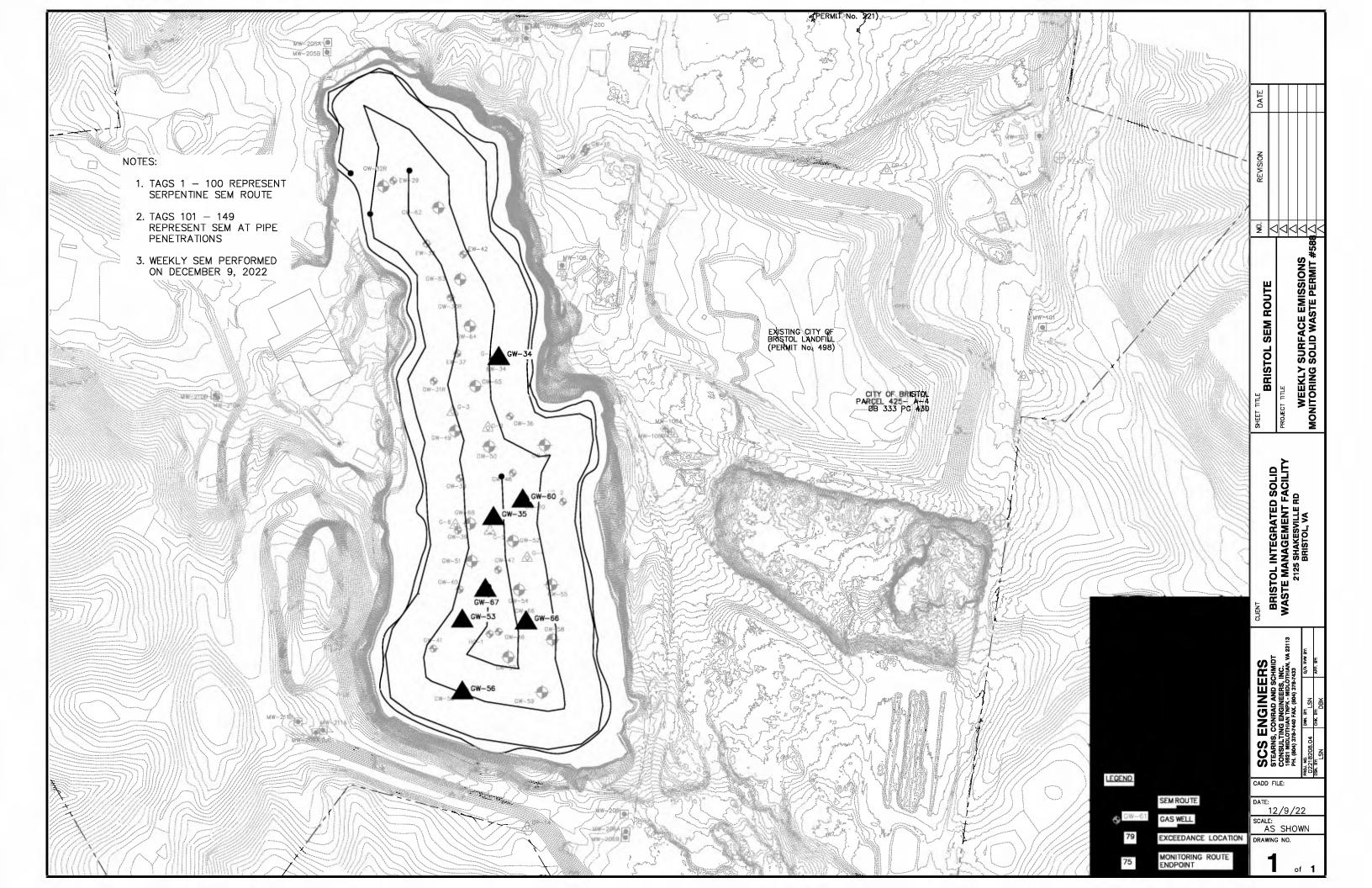
Weather Conditions: Cloudy, 50°F Wind: E - 10 MPH

<u>Sampling Calibration: Methane - 500 ppm, Zero Air - 0.0 ppm</u> 12/9/2022 8:28 ZERO 0.0 PPM

12/9/2022 8:31 SPAN 502.0 PPM

Background Reading:

12/9/2022 8:35 Upwind 3.1 PPM 12/9/2022 8:41 Downwind 9.1 PPM



December 21, 2022 File No. 02218208.04

Mr. Jonathan Chapman Enforcement Specialist Virginia Department of Environmental Quality SW Regional Office 355-A Deadmore Street Abingdon, VA 24210

Subject: Weekly Surface Emissions Monitoring Event – December 16, 2022

Bristol Integrated Solid Waste Facility - Bristol, Virginia

#### Dear Mr. Chapman:

On behalf of the City of Bristol (City), SCS Engineers (SCS), is pleased to submit the results of the Weekly Surface Emissions Monitoring event performed at the Bristol Integrated Solid Waste Facility located in Bristol, Virginia on December 16, 2022. This Weekly Surface Emissions Monitoring (SEM) Event was performed in accordance with Section 3.5 of the Plan of Action in Response to the Expert Panel Report, submitted to VDEQ on July 6, 2022.

The monitoring generally conforms to the requirements of 40 CFR 63.1960(c) and (d), and 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21. The landfill gas (LFG) collection system is required to operate such that the methane concentration is less than 500 ppm above background at the landfill surface.

The monitoring route includes the entire waste footprint of the Permit No. 588 landfill. Sampling was conducted with a Thermo Scientific TVA-2020 Flame Ionization Detector (FID) at 30-meter intervals and where visual observations indicated the potential for elevated concentrations of LFG, such as distressed vegetation and surface cover cracks. In addition, in accordance with 40 CFR 63.1958(d)(ii)(2) and 40 CFR 60.34f(d), monitoring was conducted at all surface cover penetrations within the waste footprint, including at the newly installed temperature probes. The approximate monitoring route and sampling locations are presented in the attached Drawing.

At the time of monitoring, all areas of the Permit No. 588 landfill footprint are subject to regulatory monitoring based on the regulatory time schedule stipulated in 40 CFR 63.1960(b) and 40 CFR 60.36f(b). The Permit 588 Landfill has a surface area of approximately 17.3 acres. Therefore, the minimum number of sampling points to cover the appropriate portion of the landfill footprint, utilizing a 30-meter grid interval, is approximately 82 (4.75 points per acre). A summary of the results of the surface emissions monitory is provided in Table 1.



Table 1. Summary of Surface Emissions Monitoring

Description	Quantity
Number of Points Sampled	149
Number of Points in Serpentine Route	100
Number of Points at Surface Cover Penetrations	49
Number of Exceedances <sup>1</sup>	6
Number of Serpentine Exceedances	0
Number of Pipe Penetration Exceedances	6

Proposed corrective actions at these locations involved addition and compaction of low permeability soil as well as vacuum adjustments to adjacent vertical wells. In some select locations a foam seal or a well bore skirt may be installed Results of corrective actions and remonitoring results will be presented in subsequent reports.

#### Remonitoring of Ongoing Exceedances

In accordance with 40 CFR 63.1960(c)(4)(ii) and 40 CFR 60.36f(c)(4)(ii), corrective actions and a remonitoring event are to be performed within 10 days of the initial exceedance. In accordance with 40 CFR 63.1960(c)(4)(iii) and 40 CFR 60.36f(c)(4)(iii) additional corrective actions and a second 10-day retest are to be performed if the initial 10-day retest indicates methane values greater than the regulatory threshold. The Facility performed corrective actions including wellhead vacuum adjustments and addition of soil cover prior to this event at locations that previously exhibited elevated methane concentrations.

In accordance with 40 CFR 63.1960(c)(4)(v) and 40 CFR 60.36f(c)(4)(v) a new well or collection device must be installed or an alternate remedy must be submitted within 120-days at locations that continue to exhibit methane concentrations above the regulatory threshold for two consecutive retests.

During the first few weeks of December, several well bore skirts have been installed at several pipe penetrations that had ongoing exceedances from previous weekly SEM events. Monitoring of these points during the December 16, 2022 weekly event, indicated methane concentrations below 500 ppm at several of these locations. Therefore, these exceedances are considered resolved. A notification of alternate remedy documenting these corrective actions will be submitted to VDEQ under separate cover.

A summary of ongoing exceedance points is provided in Table 2.

<sup>1</sup> Exceedance locations were marked in the field with red flagging and were identified to landfill personnel to initiate corrective actions.

Table 2. Ongoing Weekly SEM Exceedances

Point ID	Initial Exceedance Date	12/16/22 Event	12/16/22 Event Result	Comments
EW-34	12/9/22	10-Day Retest	Pass	Requires 30-Day Retest
EW-67	8/4/22	N/A	Pass	Exceedance Resolved
EW-56	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-57	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-41	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-53	8/4/22	N/A	Pass	Exceedance Resolved
EW-40	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-51	8/4/22	N/A	Pass	Exceedance Resolved
EW-68	8/4/22	N/A	Pass	Exceedance Resolved
EW-42	8/12/22	N/A	Pass	Exceedance Resolved
EW-52	8/19/22	N/A	Pass	Exceedance Resolved
EW-39	8/19/22	N/A	Pass	Exceedance Resolved
EW-48	8/26/22	N/A	Pass	Exceedance Resolved
EW-47	8/26/22	N/A	Pass	Subject to 1960(c)(4)(v)
EW-54	9/2/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-35	9/9/22	N/A	Pass	Exceedance Resolved
EW-55	11/4/22	N/A	Pass	Exceedance Resolved
EW-66	11/14/22	N/A	Pass	Exceedance Resolved
EW-60	11/23/22	N/A	Fail	Subject to 1960(c)(4)(v)

Mr. Jonathan Chapman December 21, 2022 Page 4

If you have questions or require additional information, please contact either of the undersigned.

Sincerely,

Quinn F. Bernier, PE Project Professional SCS Engineers Lucas S. Nachman Project Professional SCS Engineers

Lucus D. Nachman

LSN/QFB/cjw

cc: Randall Eads, City of Bristol

Mike Martin, City of Bristol Joey Lamie, City of Bristol Jake Chandler, City of Bristol Susan "Tracey" Blalock, VDEQ

Encl. Surface Emissions Monitoring Results

**Bristol SEM Route Drawing** 

	Methane			ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
1	161.0 PPM	OK			Start Serpentine
2	92.7 PPM	OK			Route
3	17.4 PPM	OK			
4	1 <i>7</i> .8 PPM	OK			
5	25.5 PPM	OK			
6	44.7 PPM	OK			
7	114.0 PPM	OK			
8	42.4 PPM	OK			
9	12.2 PPM	OK			
10	2.6 PPM	OK			
11	3.9 PPM	OK			
12	7.9 PPM	OK			
13	19.8 PPM	OK			
14	3.1 PPM	OK			
15	3.9 PPM	OK			
16	19.4 PPM	OK			
1 <i>7</i>	8.7 PPM	OK			
18	29.8 PPM	OK			
19	19.4 PPM	OK			
20	66.2 PPM	OK			
21	4.9 PPM	OK			
22	7.8 PPM	OK			
23	32.1 PPM	OK			
24	4.9 PPM	OK			
25	15.5 PPM	OK			
26	6.8 PPM	OK			
27	7.2 PPM	OK			
28	13.1 PPM	OK			
29	33.2 PPM	OK			
30	26.5 PPM	OK			
31	15.3 PPM	OK			
32	7.5 PPM	OK			
33	65.7 PPM	OK			
34	45.5 PPM	OK			
35	141.0 PPM	OK			
36	17.7 PPM	OK			
37	22.1 PPM	OK			
38	101.0 PPM	OK			
39	160.0 PPM	OK			
40	28.8 PPM	OK			
41	5.7 PPM	OK			
42	4.6 PPM	OK			

ID#	Methane Concentration	Compliance	GPS Co Lat.	ordinates Long.	Comments
וו טוו	Concentration	Compilance	Edi.	Long.	Comments
43	7.8 PPM	OK			
44	7.3 PPM	OK			
45	42.8 PPM	OK			
46	7.5 PPM	OK			
47	11.8 PPM	OK			
48	8.9 PPM	OK			
49	30.8 PPM	OK			
50	30.8 PPM	OK			
51	15.9 PPM	OK			
52	9.7 PPM	OK			
53	37.5 PPM	OK			
54	13.0 PPM	OK			
55	5.2 PPM	OK			
56	29.4 PPM	OK			
57	5.8 PPM	OK			
58	11.4 PPM	OK			
59	15.9 PPM	OK			
60	7.5 PPM	OK			
61	12.6 PPM	OK			
62	10.7 PPM	OK			
63	7.7 PPM	OK			
64	8.2 PPM	OK			
65	17.4 PPM	OK			
66	5.8 PPM	OK			
67	14.3 PPM	OK			
68	4.6 PPM	OK			
69	38.9 PPM	OK			
70	277.0 PPM	OK			
<i>7</i> 1	70.7 PPM	OK			
72	9.4 PPM	OK			
73	3.7 PPM	OK			
74	15.3 PPM	OK			
75	13.9 PPM	OK			
76	9.1 PPM	OK			
77	4.0 PPM	OK			
78	6.5 PPM	OK			
79	8.9 PPM	OK			
80	147.0 PPM	OK			
81	9.4 PPM	OK			
82	182.0 PPM	OK			
83	140.0 PPM	OK			
84	56.4 PPM	OK			

	Methane		GPS Co	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
85	8.1 PPM	OK			
86	9.9 PPM	OK			
87	8.0 PPM	OK			
88	6.6 PPM	OK			
89	10.8 PPM	OK			
90	3.3 PPM	OK			
91	2.8 PPM	OK			
92	134.0 PPM	OK			
93	38.0 PPM	OK			
94	15.4 PPM	OK			
95	12.6 PPM	OK			
96	82.4 PPM	OK			
97	20.3 PPM	OK			
98	23.7 PPM	OK			
99	32.1 PPM	OK			
100	61.0 PPM	OK			<b>End Serpentine</b>
					Route
101	147.0 PPM	OK			EW-35
102	338.0 PPM	OK			EW-52
103	113.0 PPM	OK			TP-4
104	3240.0 PPM	HIGH_ALRM	36.59931	-82.14742	EW-60
105	43.6 PPM	OK			EW-48
106	22.2 PPM	OK			TP-6
107	14.1 PPM	OK			EW-61
108	9.1 PPM	OK			EW-36
109	142.0 PPM	OK			EW-34
110	5.7 PPM	OK			EW-50
111	338.0 PPM	OK			EW-67
112	414.0 PPM	OK			EW-47
113	2995.0 PPM	HIGH_ALRM	36.59865	-82.14743	EW-54
114	389.0 PPM	OK			EW-55
115	69.8 PPM	OK			TP-2
116	47.3 PPM	OK			EW-46
11 <i>7</i>	87.1 PPM	OK			EW-66
118	17.3 PPM	OK			EW-58
119	1336.0 PPM	HIGH_ALRM	36.59815	-82.14750	EW-57
120	352.0 PPM	OK			TP-1
121	44.0 PPM	OK			EW-59
122	2243.0 PPM	HIGH_ALRM	36.59789	-82.14790	EW-56
123	1385.0 PPM	HIGH_ALRM	36.59839	-82.14760	EW-41
124	135.0 PPM	OK		-	EW-53
125	5662.0 PPM	HIGH_ALRM	36.59864	-82.14796	EW-40

	Methane		GPS Co	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comment
126	85.2 PPM	ОК			TP-3
127	227.0 PPM	OK			EW-51
128	85.6 PPM	OK			EW-39
129	103.0 PPM	OK			TP-5
130	159.0 PPM	OK			EW-68
131	208.0 PPM	OK			EW-38
132	11.5 PPM	OK			TP-7
133	10.0 PPM	OK			EW-49
134	5.8 PPM	OK			EW-31R
135	5.4 PPM	OK			EW-65
136	4.1 PPM	OK			EW-37
1 <i>37</i>	5.4 PPM	OK			TP-8
138	6.3 PPM	OK			EW-64
139	10.0 PPM	OK			EW-30R
140	4.2 PPM	OK			EW-63
141	18.2 PPM	OK			EW-42
142	75.1 PPM	OK			TP-9
143	5.6 PPM	OK			EW-33R
144	2.8 PPM	OK			EW-62
145	4.5 PPM	OK			EW-29R
146	11.0 PPM	OK			EW-25
147	9.7 PPM	OK			EW-24
148	2.6 PPM	OK			EW-32
	36.3 PPM	OK			EW-32R

### EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 16, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

Methane	GPS Coordinates

ID # Concentration Compliance Lat. Long. Comments

#### **NOTES:**

Points 1 through 100 represent serpentine SEM route.

Points 101 through 149 represent SEM at Pipe Penetrations

Weather Conditions: Partly Cloudy, 35°F Wind: W - 15 MPH

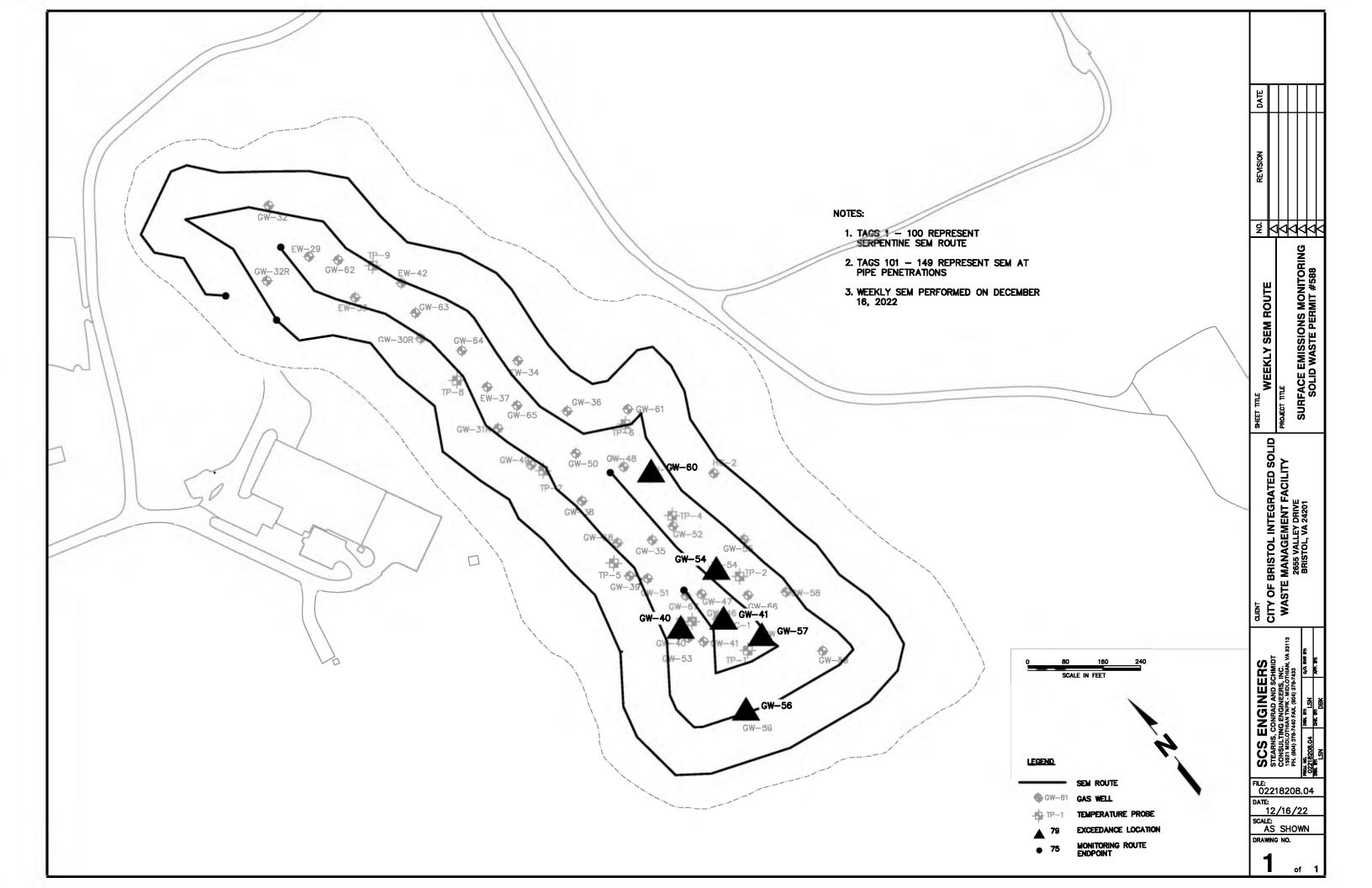
 Sampling Calibration: Methane - 500 ppm, Zero Air - 0.0 ppm

 12/16/2022
 10:11
 ZERO
 0.0 PPM

 12/16/2022
 10:13
 SPAN
 501.0 PPM

**Background Reading:** 

12/16/2022 10:14 Upwind 3.9 PPM 12/16/2022 10:19 Downwind 1.8 PPM



December 28, 2022 File No. 02218208.04

Mr. Jonathan Chapman Enforcement Specialist Virginia Department of Environmental Quality SW Regional Office 355-A Deadmore Street Abingdon, VA 24210

Subject: Weekly Surface Emissions Monitoring Event – December 19, 2022

Bristol Integrated Solid Waste Facility - Bristol, Virginia

#### Dear Mr. Chapman:

On behalf of the City of Bristol (City), SCS Engineers (SCS), is pleased to submit the results of the Weekly Surface Emissions Monitoring event performed at the Bristol Integrated Solid Waste Facility located in Bristol, Virginia on December 19, 2022. This Weekly Surface Emissions Monitoring (SEM) Event was performed in accordance with Section 3.5 of the Plan of Action in Response to the Expert Panel Report, submitted to VDEQ on July 6, 2022.

The monitoring generally conforms to the requirements of 40 CFR 63.1960(c) and (d), and 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21. The landfill gas (LFG) collection system is required to operate such that the methane concentration is less than 500 ppm above background at the landfill surface.

The monitoring route includes the entire waste footprint of the Permit No. 588 landfill. Sampling was conducted with a Thermo Scientific TVA-2020 Flame Ionization Detector (FID) at 30-meter intervals and where visual observations indicated the potential for elevated concentrations of LFG, such as distressed vegetation and surface cover cracks. In addition, in accordance with 40 CFR 63.1958(d)(ii)(2) and 40 CFR 60.34f(d), monitoring was conducted at all surface cover penetrations within the waste footprint, including at the newly installed temperature probes. The approximate monitoring route and sampling locations are presented in the attached Drawing.

At the time of monitoring, all areas of the Permit No. 588 landfill footprint are subject to regulatory monitoring based on the regulatory time schedule stipulated in 40 CFR 63.1960(b) and 40 CFR 60.36f(b). The Permit 588 Landfill has a surface area of approximately 17.3 acres. Therefore, the minimum number of sampling points to cover the appropriate portion of the landfill footprint, utilizing a 30-meter grid interval, is approximately 82 (4.75 points per acre). A summary of the results of the surface emissions monitory is provided in Table 1.



Table 1. Summary of Surface Emissions Monitoring

Description	Quantity
Number of Points Sampled	149
Number of Points in Serpentine Route	100
Number of Points at Surface Cover Penetrations	49
Number of Exceedances <sup>1</sup>	4
Number of Serpentine Exceedances	0
Number of Pipe Penetration Exceedances	4

Proposed corrective actions at these locations involved addition and compaction of low permeability soil as well as vacuum adjustments to adjacent vertical wells. In some select locations a foam seal or a well bore skirt may be installed Results of corrective actions and remonitoring results will be presented in subsequent reports.

#### Remonitoring of Ongoing Exceedances

In accordance with 40 CFR 63.1960(c)(4)(ii) and 40 CFR 60.36f(c)(4)(ii), corrective actions and a remonitoring event are to be performed within 10 days of the initial exceedance. In accordance with 40 CFR 63.1960(c)(4)(iii) and 40 CFR 60.36f(c)(4)(iii) additional corrective actions and a second 10-day retest are to be performed if the initial 10-day retest indicates methane values greater than the regulatory threshold. The Facility performed corrective actions including wellhead vacuum adjustments and addition of soil cover prior to this event at locations that previously exhibited elevated methane concentrations.

In accordance with 40 CFR 63.1960(c)(4)(v) and 40 CFR 60.36f(c)(4)(v) a new well or collection device must be installed or an alternate remedy must be submitted within 120-days at locations that continue to exhibit methane concentrations above the regulatory threshold for two consecutive retests.

Throughout December, several well bore skirts have been installed at several pipe penetrations that had ongoing exceedances from previous weekly SEM events. Monitoring of these points during the December 19, 2022 weekly event, indicated methane concentrations below 500 ppm at several of these locations. Therefore, these exceedances are considered resolved. A notification of alternate remedy documenting these corrective actions and requesting additional alternate remedies for the points that continue to exhibit elevated methane concentrations will be submitted to VDEQ under separate cover.

A summary of ongoing exceedance points is provided in Table 2.

<sup>1</sup> Exceedance locations were marked in the field with red flagging and were identified to landfill personnel to initiate corrective actions.

Table 2. Ongoing Weekly SEM Exceedances

Point ID	Initial Exceedance Date	12/19/22 Event	12/19/22 Event Result	Comments
EW-34	12/9/22	N/A	Pass	Requires 30-Day Retest
EW-56	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-57	8/4/22	N/A	Pass	Exceedance Resolved
EW-41	8/4/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-40	8/4/22	N/A	Pass	Exceedance Resolved
EW-47	8/26/22	N/A	Pass	Exceedance Resolved
EW-54	9/2/22	N/A	Fail	Subject to 1960(c)(4)(v)
EW-60	11/23/22	N/A	Fail	Subject to 1960(c)(4)(v)

Mr. Jonathan Chapman December 28, 2022 Page 4

If you have questions or require additional information, please contact either of the undersigned.

Sincerely,

Quinn F. Bernier, PE Project Professional SCS Engineers Lucas S. Nachman Project Professional SCS Engineers

Lucus D. Nachman

LSN/QFB/cjw

cc: Randall Eads, City of Bristol

Mike Martin, City of Bristol Joey Lamie, City of Bristol Jake Chandler, City of Bristol Susan "Tracey" Blalock, VDEQ

Encl. Surface Emissions Monitoring Results

**Bristol SEM Route Drawing** 

	Methane		GPS Co	ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
1	286.0 PPM	OK			Start Serpentine
2	171.0 PPM	OK			Route
3	14.9 PPM	OK			
4	6.9 PPM	OK			
5	23.0 PPM	OK			
6	26.6 PPM	OK			
7	17.6 PPM	OK			
8	5.8 PPM	OK			
9	6.1 PPM	OK			
10	7.3 PPM	OK			
11	20.2 PPM	OK			
12	8.4 PPM	OK			
13	16.8 PPM	OK			
14	10.2 PPM	OK			
15	7.2 PPM	OK			
16	9.2 PPM	OK			
1 <i>7</i>	6.8 PPM	OK			
18	53.4 PPM	OK			
19	7.7 PPM	OK			
20	5.3 PPM	OK			
21	8.8 PPM	OK			
22	10.3 PPM	OK			
23	1 <i>4.</i> 7 PPM	OK			
24	7.3 PPM	OK			
25	38.5 PPM	OK			
26	58.1 PPM	OK			
27	6.7 PPM	OK			
28	8.0 PPM	OK			
29	5.8 PPM	OK			
30	8.4 PPM	OK			
31	6.2 PPM	OK			
32	12.5 PPM	OK			
33	130.0 PPM	OK			
34	86.9 PPM	OK			
35	410.0 PPM	OK			
36	87.5 PPM	OK			
37	142.0 PPM	OK			
38	152.0 PPM	OK			
39	57.5 PPM	OK			
40	36.1 PPM	OK			
41	96.0 PPM	OK			
42	34.0 PPM	OK			

ID#	Methane Concentration	Compliance	GPS Co	ordinates Long.	Comments
43	26.0 PPM	OK			
44	19.1 PPM	OK			
45	17.8 PPM	OK			
46	7.4 PPM	OK			
47	7.3 PPM	OK			
48	14.3 PPM	OK			
49	66.7 PPM	OK			
50	104.0 PPM	OK			
51	7.6 PPM	OK			
52	4.3 PPM	OK			
53	21.9 PPM	OK			
54	10.7 PPM	OK			
55	28.0 PPM	OK			
56	13.5 PPM	OK			
57	3.3 PPM	OK			
58	7.3 PPM	OK			
59	39.0 PPM	OK			
60	4.4 PPM	OK			
61	3.3 PPM	OK			
62	4.4 PPM	OK			
63	6.5 PPM	OK			
64	7.7 PPM	OK			
65	9.3 PPM	OK			
66	6.2 PPM	OK			
67	21.7 PPM	OK			
68	7.8 PPM	OK			
69	147.0 PPM	OK			
70 71	12.5 PPM	OK			
71 72	21.1 PPM	OK			
72 72	6.9 PPM	OK			
73 74	5.9 PPM	OK OK			
74 75	5.6 PPM	OK			
75 74	2.3 PPM	OK			
76	5.2 PPM	OK			
77 70	5.9 PPM	OK			
78 70	29.5 PPM	OK OK			
79 90	32.0 PPM	OK OK			
80	9.6 PPM	OK OK			
81	117.0 PPM	OK			
82	9.9 PPM	OK			
83	92.6 PPM	OK OK			
84	85.6 PPM	OK			

	Methane			ordinates	
ID#	Concentration	Compliance	Lat.	Long.	Comments
85	12.6 PPM	OK			
86	38.3 PPM	OK			
87	19.9 PPM	OK			
88	1 <i>7</i> .2 PPM	OK			
89	1.5 PPM	OK			
90	2.0 PPM	OK			
91	5.7 PPM	OK			
92	5.4 PPM	OK			
93	120.0 PPM	OK			
94	214.0 PPM	OK			
95	25.2 PPM	OK			
96	250.0 PPM	OK			
97	221.0 PPM	OK			
98	37.9 PPM	OK			
99	31.7 PPM	OK			
100	8.4 PPM	OK			<b>End Serpentine</b>
					Route
101	242.0 PPM	OK			EW-35
102	127.0 PPM	OK			EW-52
103	181.0 PPM	OK			TP-4
104	1826.0 PPM	HIGH_ALRM	36.59931	-82.14742	EW-60
105	125.0 PPM	OK			EW-48
106	6.3 PPM	OK			TP-6
107	5.0 PPM	OK			EW-61
108	4.5 PPM	OK			EW-36
109	107.0 PPM	OK			EW-34
110	31.8 PPM	OK			EW-50
111	54.4 PPM	OK			EW-67
112	193.0 PPM	OK			EW-47
113	1119.0 PPM	HIGH_ALRM	36.59865	-82.14743	EW-54
114	241.0 PPM	OK			EW-55
115	115.0 PPM	OK			TP-2
116	66.8 PPM	OK			EW-46
11 <i>7</i>	92.2 PPM	OK			EW-66
118	23.5 PPM	OK			EW-58
119	8.9 PPM	OK			EW-57
120	156.0 PPM	OK			TP-1
121	20.7 PPM	OK			EW-59
122	2352.0 PPM	HIGH_ALRM	36.59789	-82.14790	EW-56
123	2054.0 PPM	HIGH_ALRM	36.59839	-82.14760	EW-41
124	213.0 PPM	OK			EW-53
125	329.0 PPM	OK			EW-40

Methane			GPS Cod		
ID#	Concentration	Compliance	Lat.	Long.	Comment
126	267.0 PPM	ОК			TP-3
127	464.0 PPM	OK			EW-51
128	472.0 PPM	OK			EW-39
129	178.0 PPM	OK			TP-5
130	125.0 PPM	OK			EW-68
131	164.0 PPM	OK			EW-38
132	1.9 PPM	OK			TP-7
133	1.9 PPM	OK			EW-49
134	1.9 PPM	OK			EW-31R
135	2.0 PPM	OK			EW-65
136	1.6 PPM	OK			EW-37
1 <i>37</i>	2.4 PPM	OK			TP-8
138	3.6 PPM	OK			EW-64
139	7.7 PPM	OK			EW-30R
140	8.9 PPM	OK			EW-63
141	145.0 PPM	OK			EW-42
142	4.8 PPM	OK			TP-9
143	5.8 PPM	OK			EW-33R
144	6.2 PPM	OK			EW-62
145	51.8 PPM	OK			EW-29R
146	187.0 PPM	OK			EW-25
147	102.0 PPM	OK			EW-24
148	7.9 PPM	OK			EW-32
149	9.2 PPM	OK			EW-32R
				1	
	Number of locations	sampled:	149		
	Number of exceedance	e locations:	4		

### EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 19, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

Methane GPS Coordinates

ID # Concentration Compliance Lat. Long. Comments

#### **NOTES:**

Points 1 through 100 represent serpentine SEM route.

Points 101 through 149 represent SEM at Pipe Penetrations

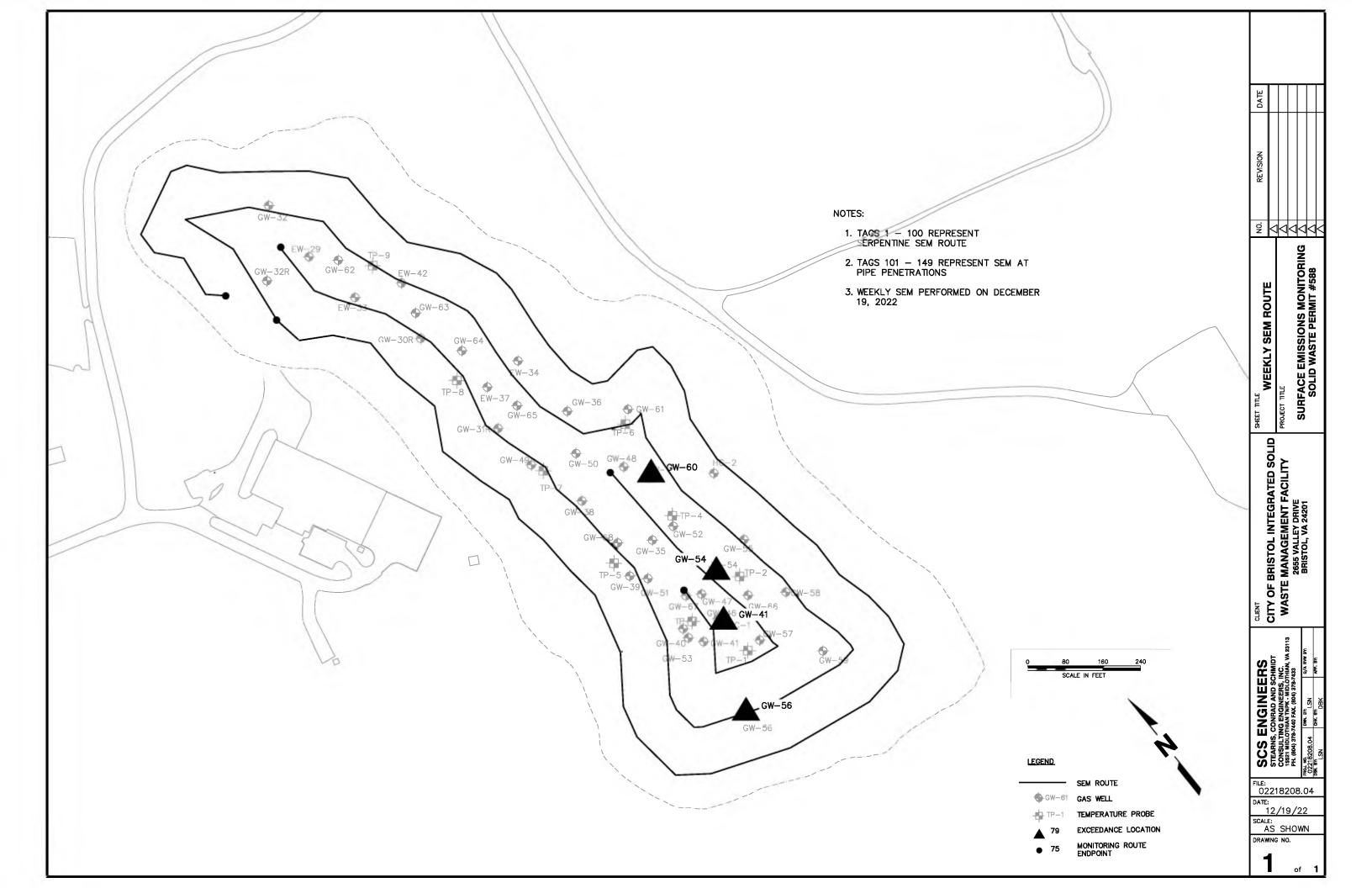
Weather Conditions: Sunny, 30°F Wind: W - 10 MPH

 $\underline{\text{Sampling Calibration: Methane - 500 ppm, Zero Air - 0.0 ppm}}$ 

12/19/2022 9:48 ZERO 0.1 PPM 12/19/2022 9:52 SPAN 501.0 PPM

**Background Reading:** 

12/19/2022 10:00 Upwind 2.6 PPM 12/19/2022 10:07 Downwind 7.8 PPM



January 4, 2023 File No. 02218208.04

Mr. Jonathan Chapman Enforcement Specialist Virginia Department of Environmental Quality SW Regional Office 355-A Deadmore Street Abingdon, VA 24210

Subject: Weekly Surface Emissions Monitoring Event – December 27, 2022

Bristol Integrated Solid Waste Facility - Bristol, Virginia

#### Dear Mr. Chapman:

On behalf of the City of Bristol (City), SCS Engineers (SCS), is pleased to submit the results of the Weekly Surface Emissions Monitoring event performed at the Bristol Integrated Solid Waste Facility located in Bristol, Virginia on December 27, 2022. This Weekly Surface Emissions Monitoring (SEM) Event was performed in accordance with Section 3.5 of the Plan of Action in Response to the Expert Panel Report, submitted to VDEQ on July 6, 2022.

The monitoring generally conforms to the requirements of 40 CFR 63.1960(c) and (d), and 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21. The landfill gas (LFG) collection system is required to operate such that the methane concentration is less than 500 ppm above background at the landfill surface.

The monitoring route includes the entire waste footprint of the Permit No. 588 landfill. Sampling was conducted with a Thermo Scientific TVA-2020 Flame Ionization Detector (FID) at 30-meter intervals and where visual observations indicated the potential for elevated concentrations of LFG, such as distressed vegetation and surface cover cracks. In addition, in accordance with 40 CFR 63.1958(d)(ii)(2) and 40 CFR 60.34f(d), monitoring was conducted at all surface cover penetrations within the waste footprint, including at the newly installed temperature probes. The approximate monitoring route and sampling locations are presented in the attached Drawing.

At the time of monitoring, all areas of the Permit No. 588 landfill footprint are subject to regulatory monitoring based on the regulatory time schedule stipulated in 40 CFR 63.1960(b) and 40 CFR 60.36f(b). The Permit 588 Landfill has a surface area of approximately 17.3 acres. Therefore, the minimum number of sampling points to cover the appropriate portion of the landfill footprint, utilizing a 30-meter grid interval, is approximately 82 (4.75 points per acre). A summary of the results of the surface emissions monitory is provided in Table 1.



Table 1. Summary of Surface Emissions Monitoring

Description	Quantity
Number of Points Sampled	149
Number of Points in Serpentine Route	100
Number of Points at Surface Cover Penetrations	49
Number of Exceedances <sup>1</sup>	3
Number of Serpentine Exceedances	0
Number of Pipe Penetration Exceedances	3

Proposed corrective actions at these locations involved addition and compaction of low permeability soil as well as vacuum adjustments to adjacent vertical wells. In some select locations a foam seal or a well bore skirt may be installed. Results of corrective actions and remonitoring will be presented in subsequent reports.

#### Remonitoring of Ongoing Exceedances

In accordance with 40 CFR 63.1960(c)(4)(ii) and 40 CFR 60.36f(c)(4)(ii), corrective actions and a remonitoring event are to be performed within 10 days of the initial exceedance. In accordance with 40 CFR 63.1960(c)(4)(iii) and 40 CFR 60.36f(c)(4)(iii) additional corrective actions and a second 10-day retest are to be performed if the initial 10-day retest indicates methane values greater than the regulatory threshold. The Facility performed corrective actions including wellhead vacuum adjustments and addition of soil cover prior to this event at locations that previously exhibited elevated methane concentrations.

In accordance with 40 CFR 63.1960(c)(4)(v) and 40 CFR 60.36f(c)(4)(v) a new well or collection device must be installed or an alternate remedy must be submitted within 120-days at locations that continue to exhibit methane concentrations above the regulatory threshold for two consecutive retests.

Several well bore skirts have recently been installed at pipe penetrations that had ongoing exceedances from previous weekly SEM events. Monitoring of these points during the December 27, 2022 weekly event, indicated methane concentrations below 500 ppm. Therefore, these exceedances are considered resolved. A notification of alternate remedy documenting these corrective actions will be submitted to VDEQ under separate cover.

A summary of ongoing exceedance points is provided in Table 2.

<sup>1</sup> Exceedance locations were marked in the field with red flagging and were identified to landfill personnel to initiate corrective actions.

Table 2. Ongoing Weekly SEM Exceedances

Point ID	Initial Exceedance Date	12/27/22 Event	12/27/22 Event Result	Comments
EW-34	12/9/22	N/A	Pass	Requires 30-Day Retest
EW-56	8/4/22	N/A	Pass	Exceedance Resolved
EW-41	8/4/22	N/A	Pass	Exceedance Resolved
EW-54	9/2/22	N/A	Pass	Exceedance Resolved
EW-60	11/23/22	N/A	Pass	Exceedance Resolved

If you have questions or require additional information, please contact either of the undersigned.

Sincerely,

Quinn F. Bernier, PE **Project Professional** 

SCS Engineers

Lucas S. Nachman **Project Professional** SCS Engineers

Lucus D. Nachman

LSN/QFB/cjw

Randall Eads, City of Bristol cc:

> Mike Martin, City of Bristol Joey Lamie, City of Bristol Jonathan Hayes, City of Bristol Jake Chandler, City of Bristol Susan "Tracey" Blalock, VDEQ

Surface Emissions Monitoring Results Encl.

**Bristol SEM Route Drawing** 

		GPS Coordinates			
ID#	Methane Concentration	Compliance	Lat.	Long.	Comments
1	72.0 PPM	ОК			Start Serpentine
2	414.0 PPM	OK			Route
3	24.8 PPM	OK			
4	25.6 PPM	OK			
5	13.9 PPM	OK			
6	7.1 PPM	OK			
7	4.4 PPM	OK			
8	3.0 PPM	OK			
9	3.4 PPM	OK			
10	3.1 PPM	OK			
11	5.9 PPM	OK			
12	8.6 PPM	OK			
13	6.6 PPM	OK			
14	4.3 PPM	OK			
15	56.4 PPM	OK			
16	6.2 PPM	OK			
1 <i>7</i>	3.9 PPM	OK			
18	4.8 PPM	OK			
19	13.8 PPM	OK			
20	11.5 PPM	OK			
21	19.0 PPM	OK			
22	32.0 PPM	OK			
23	261.0 PPM	OK			
24	44.9 PPM	OK			
25	13.0 PPM	OK			
26	8.3 PPM	OK			
27	19.4 PPM	OK			
28	67.3 PPM	OK			
29	111.0 PPM	OK			
30	36.3 PPM	OK			
31	7.5 PPM	OK			
32	19.9 PPM	OK			
33	40.7 PPM	OK			
34	103.0 PPM	OK			
35	51.1 PPM	OK OK			
36	21.3 PPM	OK OK			
37	5.1 PPM	OK OK			
38	35.0 PPM	OK OK			
38 39	214.0 PPM	OK OK			
39 40					
	15.6 PPM	OK OK			
41 42	149.0 PPM 9.9 PPM	OK OK			

Methane GPS Coordinates					
ID#	Concentration	Compliance	Lat.	Long.	Comments
43	4.0 PPM	ОК			
44	3.6 PPM	OK			
45	5.5 PPM	OK			
46	4.3 PPM	OK			
47	11.9 PPM	OK			
48	193.0 PPM	OK			
49	108.0 PPM	OK			
50	12.1 PPM	OK			
51	46.0 PPM	OK			
52	68.4 PPM	OK			
53	37.5 PPM	OK			
54	24.2 PPM	OK			
55	11.8 PPM	OK			
56	7.0 PPM	OK			
57	30.7 PPM	OK			
58	5.6 PPM	OK			
59	19.1 PPM	OK			
60	11.5 PPM	OK			
61	25.5 PPM	OK			
62	87.5 PPM	OK			
63	36.6 PPM	OK			
64	69.3 PPM	OK			
65	6.5 PPM	OK			
66	26.7 PPM	OK			
67	104.0 PPM	OK			
68	280.0 PPM	OK			
69	12.4 PPM	OK			
70	145.0 PPM	OK			
71	24.6 PPM	OK			
72	5.3 PPM	OK			
73	138.0 PPM	OK			
74	120.0 PPM	OK			
 75	12.0 PPM	OK			
76	33.6 PPM	OK			
77	51.2 PPM	OK			
78	152.0 PPM	OK			
79	15.0 PPM	OK			
80	89.3 PPM	OK			
81	146.0 PPM	OK			
82	13.2 PPM	OK			
83	19.4 PPM	OK			
84	23.7 PPM	OK OK			

	Methane		GPS Co		
ID#	Concentration	Compliance	Lat.	Long.	Comments
85	6.7 PPM	OK			
86	20.6 PPM	OK			
87	11.6 PPM	OK			
88	10.4 PPM	OK			
89	41.3 PPM	OK			
90	7.0 PPM	OK			
91	24.4 PPM	OK			
92	34.6 PPM	OK			
93	8.6 PPM	OK			
94	4.1 PPM	OK			
95	9.9 PPM	OK			
96	10.9 PPM	OK			
97	20.4 PPM	OK			
98	11.8 PPM	OK			
99	339.0 PPM	OK			
100	43.3 PPM	OK			End Serpentine
					Route
101	326.0 PPM	OK			EW-35
102	1353.0 PPM	HIGH_ALRM	36.59900	-82.14749	EW-52
103	23.4 PPM	OK			TP-4
104	184.0 PPM	OK			EW-60
105	124.0 PPM	OK			EW-48
106	149.0 PPM	OK			TP-6
107	113.0 PPM	OK			EW-61
108	226.0 PPM	OK			EW-36
109	261.0 PPM	OK			EW-34
110	57.5 PPM	OK			EW-50
111	150.0 PPM	OK			EW-67
112	43.0 PPM	OK			EW-47
113	141.0 PPM	OK			EW-54
114	1269.0 PPM	HIGH_ALRM	36.59869	-82.14714	EW-55
115	45.4 PPM	OK			TP-2
116	30.6 PPM	OK			EW-46
11 <i>7</i>	336.0 PPM	OK			EW-66
118	277.0 PPM	OK			EW-58
119	130.0 PPM	OK			EW-57
120	73.7 PPM	OK			TP-1
121	13.2 PPM	OK			EW-59
122	81.8 PPM	OK			EW-56
123	212.0 PPM	OK			EW-41
124	184.0 PPM	OK			EW-53
125	2151.0 PPM	HIGH_ALRM	36.59864	-82.14796	EW-40

	Methane			GPS Coordinates		
ID#	Concentration	Compliance	Lat.	Long.	Comment	
126	180.0 PPM	ОК			TP-3	
127	264.0 PPM	OK			EW-51	
128	64.1 PPM	OK			EW-39	
129	41.8 PPM	OK			TP-5	
130	393.0 PPM	OK			EW-68	
131	225.0 PPM	OK			EW-38	
132	483.0 PPM	OK			TP-7	
133	24.5 PPM	OK			EW-49	
134	40.7 PPM	OK			EW-31R	
135	12.4 PPM	OK			EW-65	
136	14.2 PPM	OK			EW-37	
1 <i>37</i>	369.0 PPM	OK			TP-8	
138	8.5 PPM	OK			EW-64	
139	19.0 PPM	OK			EW-30R	
140	7.4 PPM	OK			EW-63	
141	48.8 PPM	OK			EW-42	
142	58.0 PPM	OK			TP-9	
143	18.2 PPM	OK			EW-33R	
144	14.2 PPM	OK			EW-62	
145	286.0 PPM	OK			EW-29R	
146	255.0 PPM	OK			EW-25	
147	76.4 PPM	OK			EW-24	
148	80.6 PPM	OK			EW-32	
	3.5 PPM	OK			EW-32R	

### EXHIBIT 1. SURFACE EMISSIONS MONITORING RESULTS WEEKLY MONITORING EVENT - DECEMBER 27, 2022 BRISTOL INTEGRATED SOLID WASTE FACILITY - BRISTOL, VIRGINIA

Methane GPS Coordinates

ID # Concentration Compliance Lat. Long. Comments

#### **NOTES:**

Points 1 through 100 represent serpentine SEM route.

Points 101 through 149 represent SEM at Pipe Penetrations

Weather Conditions: Cloudy, 30°F Wind: Calm

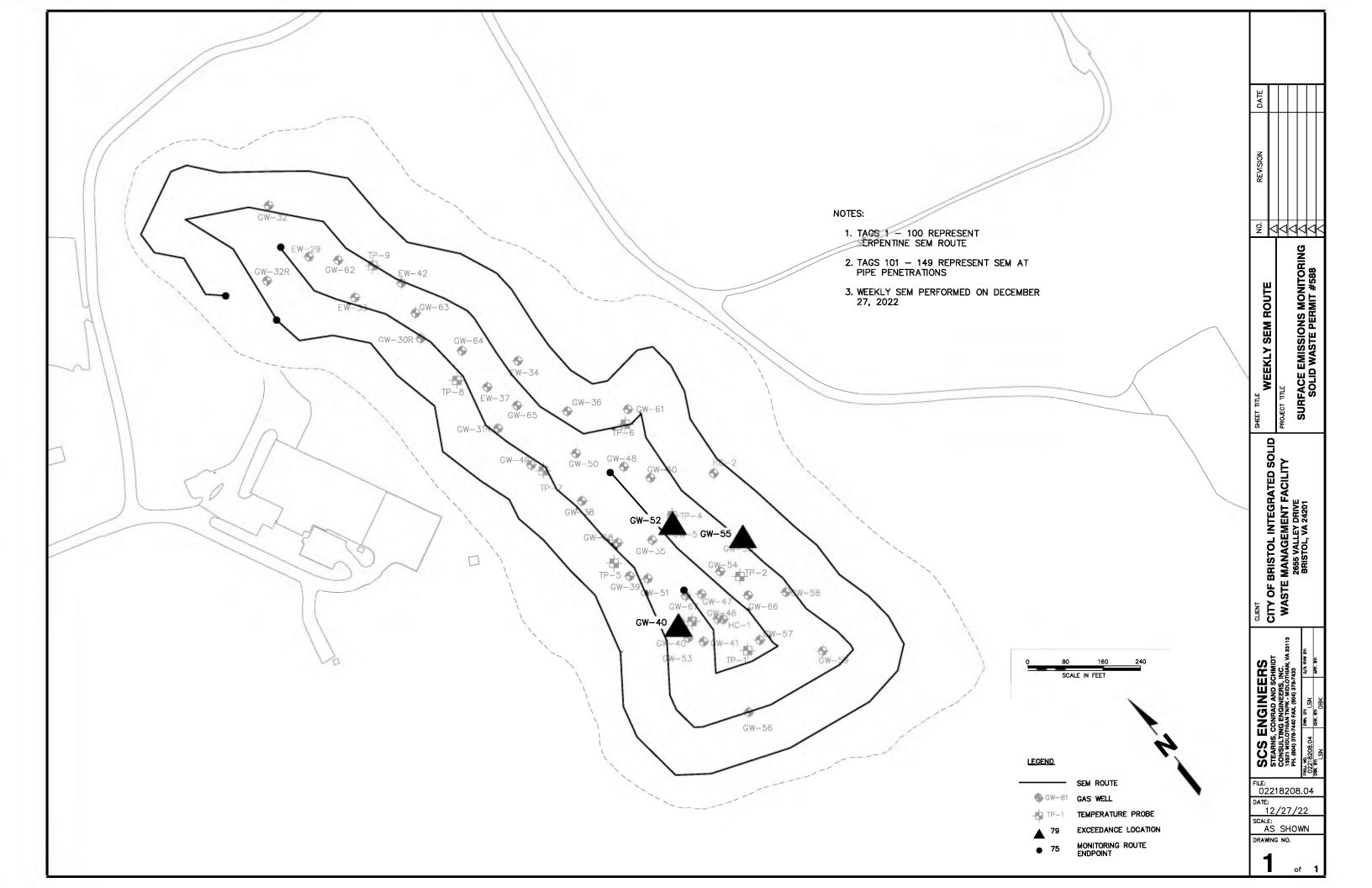
 Sampling Calibration: Methane - 500 ppm, Zero Air - 0.0 ppm

 12/27/2022
 9:35
 ZERO
 0.0 PPM

 12/27/2022
 9:41
 SPAN
 500.0 PPM

**Background Reading:** 

12/27/2022 9:43 Upwind 2.4 PPM 12/27/2022 9:46 Downwind 3.4 PPM



# Appendix B SCS-FS December Summary Report

## SCS FIELD SERVICES

January 5, 2023 Job No. 07220028.00

Mr. Michael Martin City of Bristol 2125 Shakesville Road Bristol, VA 24201

Subject: Summary of Operation, Monitoring, and Maintenance (OM&M) Services for Gas

Collection Control System (GCCS) at the City of Bristol Landfill, Bristol, Virginia

December 2022

Dear Mr. Martin:

SCS Field Services (SCS-FS) visited the Bristol Landfill during the month of December, 2022, for routine and non-routine monitoring and maintenance on the gas collection and control system (GCCS). This report summarizes the work performed and presents the data collected. The monitoring data is presented in the following attachments:

Attachment 1. Wellfield Monitoring Data

Attachment 2. Exceedance Detail Report

Attachment 3. Enhanced Monitoring Record Form and Analytical Results

Attachment 4. Daily Logs

#### **GCCS SITE ACTIVITES**

On December 8, SCS-FS visited the landfill for routine and non-routine monitoring. The Flare was operating and the Ingenco Power Plant was not operating. SCS-FS monitored the blower/flare station (BFS), the extraction wells (EW) in Cell 221 and 588 and the North and South Leachate Clean-outs. SCS-FS was unable to monitor EW-55, because it was too tall too reach safely.

On December 9, SCS-FS conducted non-routine recheck enhanced monitoring and carbon monoxide (CO) analysis (enhanced monitoring) for compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) at wells EW-37, -51, -54, and -67. SCS-FS sampled for CO at EW-37, -51, and -67, and submitted the samples to Enthalpy Analytical for analysis. Analytical results are included in Attachment 3. No CO sample was collected at EW-54 since it was below the regulatory limit of 145°F during the recheck monitoring.

Between December 5 and 9, SCS-FS made the following repairs and system modifications:

- Installed bentonite plugs around extraction wells EW-35, -39, -40, -47, -48, -51, -52, -54, -55, -56, -57, -62, -63, and -68.
- Replaced flex hose and clamps at extraction well EW-55.
- Removed stuck pump in extraction well EW-56.

On December 14, SCS-FS monitored the BFS and conducted non-routine enhanced monitoring at EW-37, -51, and -67. Samples were collected for CO at EW-37 and -67, and submitted to Enthalpy Analytical for analysis. No CO sample was collected at EW-51 since it was below the regulatory limit of 145°F during the recheck monitoring. At VDEQ's request, the sample from EW-67 was also analyzed for hydrogen. Laboratory results report a hydrogen concentration of 22.5 percent volume in the sample. High concentrations of hydrogen with elevated wellhead temperatures are generally considered indicators of an exothermic chemical reaction in the waste mass as opposed to aerobic decomposition.

SCS-FS was unable to monitor EW-55 on December 14 because the wellhead was too tall too reach safely.

On December 20, SCS-FS monitored the BFS and conducted non-routine enhanced monitoring at EW-37 and -67. Sample was collected for CO at EW-37, and submitted to Enthalpy Analytical for analysis. No CO sample was collected at EW-67 since it was below the regulatory limit of 145°F during the recheck monitoring. SCS-FS also performed routine monitoring at EW-55 after access to the wellhead was improved by placing soil around it.

On December 30, SCS-FS was onsite to monitor the BFS and perform enhanced monitoring at EW-37. Field data was not collected due to a malfunction of the portable landfill gas analyzer. SCS-FS visually observed EW-37 and collected a sample for laboratory analysis.

#### RECOMMENDATIONS

SCS-FS has the following recommendations based on observations made during our site visits:

- Continue adding cover to the landfill surface and realigning the header so liquid drains to condensate sumps.
- Maintain spare pumps in working order.
- Connect wells GW-20 and -21 in permit area 498 to the active extraction system.
- Keep the main valve for SWP# 221 at the BFS open to maintain a vacuum of at least
   -10 of water column on the wellfield.

SCS-FS appreciates the opportunity to provide our services. Please contact either of the undersigned if you have any questions or need additional information.

Very truly yours,

Mike Gibbons Project Manager

**SCS FIELD SERVICES** 

mil lite

Thomas M. Lock

Vice President / Northeast Region Manager

SCS FIELD SERVICES

Thoms M. Jok

**Attachments** 

cc: Bob Dick, SCS Engineers

## Attachments

- 1. Wellfield Monitoring Data
- 2. Exceedance Detail Report
- 3. Enhanced Monitoring Record Forms and Analytical Results
- 4. Daily Logs

Attachment 1

Wellfield Monitoring Data

## Bristol Virginia Landfill - Blower/Flare Data - 12/01/2022 to 12/31/2022

Point Name	Record Date	CH4 (% by vol)	CO2 (% by vol)	O2 (% by vol)	Bal Gas (% by vol)	Static Pressure ("H2O)	Temp (F)	Flow (scfm)	Comments
Blower Inlet	12/8/2022 10:04	34.9	34.3	3.8	27.0	-25.1	57.6	0.0	
Blower Inlet	12/8/2022 10:40	35.8	34.6	3.8	25.8	-24.3	50.0	635.0	
Blower Inlet	12/8/2022 14:37	37.0	36.2	3.3	23.5	-24.5	68.1	0.0	
Blower Inlet	12/9/2022 08:42	36.2	35.3	3.4	25.1	-24.2	51.0	241.0	
Blower Inlet	12/9/2022 10:45	36.5	35.1	3.8	24.6	-24.2	52.2	250.0	
Blower Inlet	12/14/2022 08:24	35.1	35.1	3.9	25.9	-24.3	52.1	318.0	
Blower Inlet	12/20/2022 11:03	32.3	30.4	4.3	33.0	-24.7	54.5	230.0	
Blower Outlet	12/8/2022 10:06	33.2	32.5	4.8	29.5	1.0	59.5	0.0	
L221 Header	12/8/2022 14:38	36.2	27.2	7.6	29.0	-24.2	68.6	689.9	
L221 Header	12/20/2022 11:05	23.9	20.4	10.5	45.2	-24.3	50.2	230.0	
Technician/Weather									
Field Technician	Record Date	Ambient Temp	Barometric Pressure	Wind Speed	Wind Direction	General Weather	_	_	
RYAN SEYMOUR	12/8/2022	51	28.24	12	NE	Partly cloudy	_		
RYAN SEYMOUR	12/9/2022	51	28.13	3	NW	Partly cloudy			
RYAN SEYMOUR	12/14/2022	42	28.03	3	NW	Partly cloudy	_		
RYAN SEYMOUR	12/20/2022	41	28.34	7	SW	Partly cloudy			

## Bristol Virginia Landfill - Extraction Well Data - 12/01/2022 to 12/31/2022

Point Name	Record Date	CH4 (% by vol)	CO2 (% by vol)	O2 (% by vol)	Bal Gas (% by vol)	Init Static Pressure ("H2O)	Adj Static Pressure ("H20)	Temp (F)	Flow (scfm)	System Pressure ("H20)	Comments
01	12/8/2022 11:39	59.7	39.4	0.0	0.9	-3.8	-3.7	58.3	133.4	-3.0	Increased Flow/Vacuum
01	12/8/2022 11:41	60.0	40.0	0.0	0.0	-3.6	-3.6	57.5	126.1	-3.6	Opened Valve 1/2 to 1 Turn
02	12/8/2022 11:33	56.0	37.0	1.1	5.9	-1.7	-4.0	64.2	134.5	-3.2	Increased Flow/Vacuum
03	12/8/2022 11:16	56.6	40.6	0.6	2.2	-0.6	-2.7	58.4	121.9	-3.6	Opened Valve 1/2 to 1 Turn
04	12/8/2022 11:03	58.9	41.1	0.0	0.0	-2.3	-2.3	58.2	125.7	-3.8	Increased Flow/Vacuum
05	12/8/2022 10:54	58.3	41.7	0.0	0.0	-3.5	-3.6	56.6	125.3	-3.8	Increased Flow/Vacuum
05	12/8/2022 10:57	58.3	41.7	0.0	0.0	-3.9	-3.9	56.4	125.3	-3.8	Increased Flow/Vacuum
06	12/8/2022 12:19	57.4	35.0	1.5	6.1	-3.1	-3.0	61.4	127.3	-3.4	Opened Valve 1/2 Turn or Less
07	12/8/2022 12:15	58.4	41.1	0.0	0.5	-2.1	-2.1	61.6	134.9	-3.4	No Change
08	12/8/2022 12:12	60.5	39.5	0.0	0.0	-1.4	-1.4	61.8	126.4	-3.5	Increased Flow/Vacuum
09	12/8/2022 12:03	59.7	40.3	0.0	0.0	-3.1	-3.0	68.8	124.8	-3.4	Increased Flow/Vacuum
09	12/8/2022 12:04	59.6	40.4	0.0	0.0	-3.4	-3.4	62.6	125.4	-3.4	Increased Flow/Vacuum
10	12/8/2022 11:59	57.6	42.4	0.0	0.0	-1.6	-2.1	63.7	145.2	-3.6	Opened Valve 1/2 to 1 Turn
11	12/8/2022 11:51	59.5	40.2	0.3	0.0	-4.4	-4.5	63.9	140.3	-3.2	Increased Flow/Vacuum
12	12/8/2022 11:45	55.5	37.1	1.4	6.0	-4.2	-4.2	57.8	136.2	-4.2	Opened Valve 1/2 to 1 Turn
13	12/8/2022 11:09	57.5	40.6	0.0	1.9	-3.6	-3.6	56.6	125.8	-3.7	Increased Flow/Vacuum
13	12/8/2022 11:11	57.2	40.2	0.1	2.5	-3.5	-3.6	56.8	125.6	-3.7	Increased Flow/Vacuum
14	12/8/2022 12:09	63.3	36.7	0.0	0.0	-0.2	-0.2	71.5	127.2	-3.5	Increased Flow/Vacuum
15	12/8/2022 11:53	60.3	39.7	0.0	0.0	-4.5	-4.3	60.6	140.6	-4.3	Increased Flow/Vacuum
15	12/8/2022 11:55	60.0	40.0	0.0	0.0	-4.3	-4.8	58.0	143.9	-4.8	Increased Flow/Vacuum
16	12/8/2022 12:33	52.4	37.4	0.0	10.2	-6.8	-6.1	60.8	124.7	-8.3	No Change
17	12/8/2022 12:35	58.2	41.6	0.0	0.2	-7.7	-8.2	61.7	128.8	-8.8	Increased Flow/Vacuum
18	12/8/2022 12:43	52.9	39.9	0.0	7.2	-5.3	-5.9	60.4	123.7	-9.7	Opened Valve 1/2 to 1 Turn
19	12/8/2022 12:52	17.9	16.1	0.9	65.1	-10.6	-10.4	57.7			Opened Valve 1/2 Turn or Less
19	12/9/2022 09:10	9.4	16.0	0.0	74.6	-13.1	-13.0	51.8	0.0		Increased Flow/Vacuum
19	12/20/2022 11:11	7.0	11.4	6.5	75.1	-21.7	-21.6	46.7	1.0		Fully Closed
19	12/20/2022 12:03	0.3	6.0	19.0	74.7	-17.7	-17.8	52.7	0.0	-23.1	Increased Flow/Vacuum
23	12/8/2022 12:24	0.4	0.5	20.9	78.2	-0.3	-0.2	53.1	122.9	-3.9	Increased Flow/Vacuum
24	12/8/2022 11:34	0.9	1.4	20.5	77.2	-1.2	-1.2	57.8	8.6	-22.6	
25	12/8/2022 11:37	0.0	0.3	21.1	78.6	-0.1	-0.1	58.7	13.9	-22.8	
29	12/8/2022 11:15	60.0	39.0	0.2	0.8	-4.0	-4.0	99.6	127.0	-4.0	
29	12/8/2022 11:15	60.0	39.0	0.2	0.8	-4.0	-4.0	99.6	127.0	-4.0	
30R	12/8/2022 12:45	22.0	34.3	3.5	40.2	-21.6	-21.6	129.4		-21.1	
31R	12/8/2022 12:08	25.7	25.1	5.1	44.1	-0.8	-0.8	132.9	51.6	-7.9	
32R	12/8/2022 11:10	50.1	39.1	0.0	10.8	-1.8	-1.8	130.1	24.4	-5.4	
32	12/8/2022 11:29	58.9	41.1	0.0	0.0	-4.7	-4.6	72.6		-8.6	

## Bristol Virginia Landfill - Extraction Well Data - 12/01/2022 to 12/31/2022

Point Name	Record Date	CH4 (% by vol)	CO2 (% by vol)	O2 (% by vol)	Bal Gas (% by vol)	Init Static Pressure ("H2O)	Adj Static Pressure ("H20)	Temp (F)	Flow (scfm)	System Pressure ("H20)	Comments
33	12/8/2022 11:51	35.3	27.3	5.0	32.4	-1.4	-1.4	130.5	65.4	-8.0	
34	12/8/2022 12:35	2.4	74.0	0.0	23.6	-4.9	-4.4	139.2		-4.3	
35	12/8/2022 13:40	0.2	0.4	21.4	78.0	-10.4	-10.4	68.0	33.6	-20.3	
36	12/8/2022 13:00	24.8	16.0	13.2	46.0	-22.0	-22.0	65.3		-22.0	
37	12/8/2022 12:32	18.7	28.4	6.3	46.6	-1.6	-1.6	151.2		-8.1	
37	12/9/2022 09:19	19.0	28.3	6.7	46.0	-1.5	-1.5	148.5		-7.1	High Temp
37	12/14/2022 08:37	17.4	28.4	6.2	48.0	-1.6	-1.6	148.6		-7.8	
37	12/20/2022 11:19	14.7	25.2	6.6	53.5	-1.5	-1.5	148.6		-6.9	Fully Open
38	12/8/2022 13:18	38.1	25.5	8.0	28.4	-14.2	-14.2	82.5		-14.2	
39	12/8/2022 13:28	5.8	6.5	18.6	69.1	-10.7	-10.2	60.7	203.4	-9.3	
40	12/8/2022 14:11	54.4	45.6	0.0	0.0	-9.7	-9.1	132.9	31.0	-15.2	
41	12/8/2022 14:05	53.4	46.4	0.2	0.0	-19.5	-18.4	73.4	26.0	-18.3	
42	12/8/2022 11:56	55.3	40.2	0.8	3.7	-0.9	-0.9	115.7	54.1	-0.8	
46	12/8/2022 14:14	45.7	44.1	0.0	10.2	-1.3	-1.3	140.0	34.4	-19.8	
47	12/8/2022 13:58	42.2	37.3	5.5	15.0	-21.6	-21.6	94.4		-21.6	
48	12/8/2022 13:10	2.4	3.0	19.9	74.7	-21.0	-21.0	61.1		-21.0	
49	12/8/2022 12:49	30.9	34.0	1.2	33.9	-8.1	-8.0	137.0	166.3	-8.0	
50	12/8/2022 12:56	42.8	30.8	4.3	22.1	-1.6	-1.6	105.3	13.2	-1.5	
51	12/8/2022 13:34	3.2	70.6	1.3	24.9		-12.2	174.4		-13.5	
51	12/8/2022 13:35	4.8	68.0	1.3	25.9	-13.7	-13.3	175.7		-11.6	
51	12/9/2022 09:42	5.5	70.1	0.9	23.5	-7.2	-7.4	163.1		-7.9	High Temp
51	12/14/2022 10:11	18.2	63.9	1.1	16.8	-5.5	-5.5	104.1	134.0	-5.5	Recheck
52	12/8/2022 13:44	36.6	54.4	1.7	7.3	-19.8	-19.2	138.1	28.4	-18.6	
53	12/8/2022 14:08	40.5	59.5	0.0	0.0	-16.8	-16.8	140.0	0.0	-18.6	
54	12/8/2022 13:54	31.1	68.9	0.0	0.0	-0.7	-0.2	151.5	43.4	-20.5	
54	12/9/2022 09:35	33.6	62.4	4.0	0.0	-0.4	-0.3	143.8	105.3	-20.6	Increased Flow/Vacuum
54	12/9/2022 09:38	35.1	63.7	1.1	0.1	-6.8	-8.8	138.4	104.2	-20.4	Increased Flow/Vacuum
55	12/20/2022 11:28	10.3	25.6	13.2	50.9	-21.4	-21.4	97.5		-20.8	Well needs extension/lowered,Fully Open
56	12/8/2022 14:25	48.8	51.2	0.0	0.0	-19.9	-19.9	140.2	0.0	-19.8	No Change
57	12/8/2022 14:23	32.1	31.4	5.1	31.4	-6.8	-6.9	113.8	168.7	-24.0	Opened Valve 1/2 Turn or Less
58	12/8/2022 14:23	20.0	18.9	8.1	53.0	-11.6	-11.6	127.2	0.0	-11.6	
59	12/8/2022 14:17	45.1	40.2	3.3	11.4	-17.4	-17.3	131.2	0.0	-19.9	No Change
60	12/8/2022 13:14	59.6	40.2	0.0	0.2	-6.0	-6.0	126.2	0.0	-6.0	
61	12/8/2022 13:06	39.0	54.6	0.1	6.3	-0.3	-0.1	58.9	29.3	-0.1	
62	12/8/2022 11:42	22.2	21.0	7.7	49.1	-0.7	-0.8	129.7	22.7	-8.2	
63	12/8/2022 12:03	26.1	26.8	6.2	40.9	-0.2	-0.2	134.5	25.2	-7.9	

## Bristol Virginia Landfill - Extraction Well Data - 12/01/2022 to 12/31/2022

Point Name	Record Date	CH4 (% by vol)	CO2 (% by vol)	O2 (% by vol)	Bal Gas (% by vol)	Init Static Pressure ("H2O)	Adj Static Pressure ("H20)	Temp (F)	Flow (scfm)	System Pressure ("H20)	Comments
64	12/8/2022 12:22	29.8	32.2	6.3	31.7	-5.0	-4.0	139.3		-8.0	
65	12/8/2022 12:40	9.8	14.9	10.9	64.4	-1.2	-1.2	133.4	0.0	-1.2	
66	12/8/2022 14:20	44.9	55.0	0.1	0.0	-2.2	-2.1	128.6	79.1	-2.1	
67	12/8/2022 14:01	16.4	54.2	3.2	26.2	-4.3	-3.8	159.5	107.8	-21.2	
67	12/9/2022 09:30	16.1	55.0	3.0	25.9	-7.5	-7.5	172.2	99.8	-21.1	High Temp
67	12/14/2022 10:02	20.4	61.1	2.2	16.3	-2.7	-2.8	175.3	17.7	-20.2	Slightly Open
67	12/20/2022 11:24	15.2	28.6	10.5	45.7	-20.1	-20.1	134.7	7.0	-20.5	Fully Open
68	12/8/2022 13:22	56.0	40.1	1.3	2.6	-12.2	-12.2	127.3	8.2	-20.0	
HC01	12/8/2022 14:17	6.8	5.8	18.9	68.5	-20.0	-20.0	58.3	0.0		

## Bristol Virginia Landfill - North South Leachate Clean-Outs Data - 12/01/2022 to 12/31/2022

Point Name	Record Date	CH4 (% by vol)	CO2 (% by vol)	O2 (% by vol)	Bal Gas (% by vol)	Init Static Pressure ("H2O)	Adj Static Pressure ("H20)	Temp (F)	Flow (scfm)	Comments
LC01	12/8/2022 13:06	51.7	48.3	0.0	0.0	-20.6	-20.5	59.0	0.0	Increased Flow/Vacuum
LC01	12/8/2022 13:08	51.7	48.3	0.0	0.0	-20.3	-20.3	58.4	0.0	No Change
LC02	12/8/2022 13:10	46.6	48.5	0.0	4.9	-20.7	-20.6	58.3	0.0	No Change
LC03	12/8/2022 13:16	14.5	7.3	16.8	61.4	-21.7	-24.0	72.2	0.0	
LC04	12/8/2022 13:19	21.6	13.0	11.0	54.4	-22.4	-21.7	75.7	0.0	No Change
LC05	12/8/2022 13:22	52.1	44.2	0.0	3.7	-21.9	-21.2	74.9	0.0	Opened Valve 1/2 to 1 Turn
LC06	12/8/2022 13:24	36.0	23.1	8.2	32.7	-22.5	-21.7	72.5	0.0	Increased Flow/Vacuum
LC08	12/8/2022 13:27	49.0	45.8	0.0	5.2	-20.7	-20.2	72.9	0.0	Increased Flow/Vacuum
LC09	12/8/2022 13:29	35.4	22.5	8.1	34.0	-22.0	-23.1	72.4	0.0	Increased Flow/Vacuum
LC10	12/8/2022 13:31	13.9	9.8	16.2	60.1	-21.9	-21.9	71.5	0.0	No Change
NC01	12/8/2022 13:39	0.2	0.3	21.4	78.1	-19.7	-19.6	72.0	0.0	No Change
NC02	12/8/2022 13:42	0.1	0.2	21.6	78.1	-19.6	-19.6	73.9	0.0	No Change
NC02	12/8/2022 13:45	0.1	0.2	21.6	78.1	-19.6	-19.6	75.4	0.0	
NC03	12/8/2022 13:48	0.2	0.1	21.6	78.1	-19.7	-19.7	76.5	0.0	No Change
NC04	12/8/2022 13:50	13.3	9.8	13.4	63.5	-19.9	-19.8	76.7	0.0	Increased Flow/Vacuum
NC05	12/8/2022 13:54	10.8	9.7	12.9	66.6	-19.7	-19.6	75.1	0.0	Increased Flow/Vacuum
NC06	12/8/2022 13:55	0.1	0.1	21.7	78.1	-19.7	-19.7	73.8	0.0	Increased Flow/Vacuum
NC07	12/8/2022 13:57	15.6	10.9	10.7	62.8	-19.8	-19.8	73.4	0.0	No Change
NC08	12/8/2022 13:59	24.0	17.3	3.1	55.6	-19.8	-19.9	73.6	0.0	Opened Valve 1/2 Turn or Less
NC09	12/8/2022 14:00	25.5	18.6	2.4	53.5	-19.8	-21.0	73.9	0.0	Increased Flow/Vacuum
NC10	12/8/2022 14:02	0.2	0.3	21.2	78.3	-19.9	-19.8	72.7	0.0	No Change

## Attachment 2

**Exceedance Detail Report** 

						% by Vo	lume	Tempera	ture (°F)	Static P	ressure							
Point ID	Point Name	Record Date	Days Between Readings	Point Status	Effective Date	CH4	O2	Initial Temp	Adjusted Temp	Initial Static Pressure (H2O)	Adjusted Static Pressure (H2O)	Operation Comments	CO Req	Total Days Open	Corrective Action Comments	Corre	ctive Action Due	Dates
BRTLGW37				Active				>= 145	>= 145	>= 0	>= 0				NESHAP AAAA HOV 145	5 Day	15 Day	120 Day
	37	3/30/2022 12:20:33 PM	0			13.8	6.4	150	150	-1.24	-1.75	heck,,,,,	N			4/3/2022	4/13/2022	7/27/2022
	37	4/6/2022 12:14:16 PM	7			14.2	7.3	3 149	149	<mark>9</mark> -1.98	-1.95	Comments:No Change,,,,,,	, N					
	37	4/13/2022 1:45:11 PM	7			16.5	7	<sup>'</sup> 159	159	<del>)</del> -1.70	-1.70	Comments:,,,,,	N					1
	37	4/13/2022 1:47:58 PM	0			16	7	<sup>'</sup> 159	159	<del>)</del> -2.10	-2.14	Comments:,,,,,	N					1
	37	4/21/2022 7:24:55 AM	8			13.1	8.3	159	159	-2.35	-2.27	Comments:,,,,,	N					1
	37	5/4/2022 12:21:07 PM	13			13	7.3	149	149	-2.57	-2.42	Open,No Change,,,,,	N					1
	37	5/16/2022 10:51:43 AM	12			11.6	9.8	150	150	-2.21	-2.39	Comments:Adjustment,,,,,,	N					İ
	37	5/16/2022 2:09:00 PM	0			14.9	9.8	159	159	-2.48	-2.48	Comments:,,,,,,	N					1
	37	5/24/2022 10:23:52 AM	8			17	7.8	150	150	-3.44	-3.43	Comments:,,,,,,	N					İ
	37	5/24/2022 10:26:15 AM	0			17.3	7.9	150	150	-3.47	-3.44	Comments:,,,,,,	N					1
	37	6/1/2022 12:43:16 PM	8			22	6.2	150	150	<mark>-2.89</mark>	-2.89	Comments:,,,,,,	N					İ
	37	6/8/2022 11:34:45 AM	7			6.5	14.8	155.8	155.9	-12.72	-12.63	Comments:,,,,,,	N					İ
	37	6/16/2022 1:35:06 PM	8			21.6	6.7	153.9	153.8	-2.56	-2.54	Comments:,,,,,,	N					ĺ
	37	7/6/2022 12:59:43 PM	20			19.2	6.6	154.2	153.8	-2.44	-2.43	Comments:,,,,,,	N					1
	37	7/11/2022 1:31:12 PM	5			19.8	6.7	155.5	155.5	-2.25	-2.19	Comments:,,,,,	N					ĺ
	37	7/11/2022 1:36:48 PM	0			19.6	6.5	155.7	155.8	-2.12	-2.10	Comments:,,,,,,	N					1
	37	8/3/2022 12:31:49 PM	23			20	7.3	155.5	155.5	-2.39	-2.38	Comments:,,,,,	N					ĺ
	37	8/3/2022 12:35:39 PM	0			20.2	7.3	155.4	155.4	-2.72	-2.77	Comments:,,,,,,	N					1
	37	8/3/2022 2:29:58 PM	0			19.5	6.6	152.2	152.9	-3.03	-3.01	Comments:,,,,,,	N					
	37	8/24/2022 11:44:07 AM	21			19.2	7.6	152.7	152.8	-15.16	-15.14	Open,,,,,,	N					
	37	9/1/2022 11:37:46 AM	8			20.8	7.6	155	154.7	<b>'</b> -3.14	-3.14	Comments:,,,,,,	N					
	37	9/1/2022 12:28:35 PM	0			18.9	7.9	152.7	152.7	<mark>'</mark> -15.15	-15.13	Comments:,,,,,,	N					
	37	10/12/2022 10:08:08 AM	41			20.5	7.6	152	151.5	-2.69	-2.64	Comments:,,,,,,	N					1
	37	10/12/2022 2:36:59 PM	0			28.3	7.1	151	151	-2.74	-2.75	Comments:,,,,,	N					ĺ
	37	10/19/2022 10:59:40 AM	7			20	7.4	149	149.1	-2.94	-2.85	Comments:,,,,,	N					
	37	11/10/2022 10:40:07 AM	22			18.2	7.1	147.6	147.7	<mark>'</mark> -13.82	-13.78	Comments:Fully Open,,,,,,	N					ĺ
	37	11/17/2022 10:50:44 AM	7			18.4	7.3	147.2	147.3	-8.91	-8.90	Comments:Fully Open,,,,,,	N					1
	37	12/8/2022 12:32:15 PM	21			18.7	6.3	151.2	150.8	-1.64	-1.61	Comments:,,,,,	N					
	37	12/9/2022 9:19:24 AM	1			19	6.7	148.5	148.5	-1.51	-1.53	Comments:High Temp,,,,,,	N					
	37	12/14/2022 8:37:04 AM	5			17.4	6.2	148.6	148.6	-1.56		Comments:,,,,,	N					1
	37	12/20/2022 11:19:00 AM	6			14.7	6.6	148.6	148.6	-1.45	-1.47	Comments:Fully Open,,,,,,	N	277				
BRTLGW51				Active				>= 145	>= 145	>= 0	>= 0				NESHAP AAAA HOV 145	5 Day	15 Day	120 Day
	51	12/8/2022 1:34:12 PM	0			3.2	1.3	174.4	175.7	,	-12.24	Comments:,,,,,	N		good reading on 12/14/2022	12/12/2022	12/22/2022	4/6/2023
	51	12/8/2022 1:35:45 PM	0			4.8	1.3	175.7	175.3	-13.74	-13.27	Comments:,,,,,,	N		good reading on 12/14/2022			1
	51	12/9/2022 9:42:48 AM	1			5.5	0.9	163.1	165.5			Comments:High Temp,,,,,,	N		good reading on 12/14/2022			
	51	12/14/2022 10:11:03 AM	5			18.2	1.1	104.1	104.2	2 -5.51	-5.50	Comments:Recheck,,,,,,	N	7				İ
BRTLGW54				Active				>= 145	>= 145	>= 0	>= 0				NESHAP AAAA HOV 145	5 Day	15 Day	120 Day
	54	12/8/2022 1:54:58 PM	0			31.1	0	151.5	151.5	-0.72	-0.22	Comments:,,,,,	N		good reading on 12/09/2022	12/12/2022	12/22/2022	4/6/2023
	54	12/9/2022 9:35:09 AM	1			33.6	4	143.8	144	·		Flow/Vacuum,,,,,	N	2	-		,,,	1. 5.2020
BRTLGW67				Active				>= 145	>= 145	>= 0	>= 0				NESHAP AAAA HOV 145	5 Day	15 Day	120 Day
	67	11/3/2022 12:00:51 PM	0			37.4	0	154.1	151.4	-18.32	-17.60	Comments:,,,,,,	N			11/7/2022	11/17/2022	3/2/2023
	67	11/4/2022 9:20:55 AM	1			33.7	0.3		147.8			Comments:,,,,,,	N					
	67	11/10/2022 10:55:52 AM	6			38.1	0.0		169.3			Open,,,,,,	N					1
	67	11/17/2022 10:59:01 AM	7			32.2	-		155			Comments:,,,,,,						1
	6/	11/1 <i>//</i> 2022 10:59:01 AM	7			32.2	0.1	154.6	155	<mark>-19.00</mark>	-18.98	Comments:,,,,,,	N			l	l	l

## Exceedance Detail Report

Date Range: 12/01/2022 to 12/31/2022

	Report D	<u>ate: 01/0</u>	) <u>5/2023</u>
Site Nam	e: Bristol	Virginia	Landfill

						% by Vo	olume	Tempera	ture (°F)	Static P	ressure							
Point ID	Point Name	Record Date	Days Between Readings	Point Status	Effective Date	CH4	O2	Initial Temp	Adjusted Temp	Initial Static Pressure (H2O)	Adjusted Static Pressure (H2O)	Operation Comments	CO Req	Total Days Open	Corrective Action Comments	Correc	ctive Action Due	e Dates
	67	11/29/2022 11:14:00 AM	12			36.3	0	153.7	154.6	-19.40	-19.42	Comments:Fully Open,,,,,,	N					
	67	12/8/2022 2:01:30 PM	9			16.4	3.2	159.5	159.5	-4.33	-3.78	Comments:,,,,,,	N					
	67	12/9/2022 9:30:44 AM	1			16.1	3	172.2	173	-7.45	-7.49	Comments:High Temp,,,,,,	N					
	67	12/14/2022 10:02:15 AM	5			20.4	2.2	175.3	175.5	-2.74	-2.76	Open,,,,,,	N					
	67	12/20/2022 11:24:51 AM	6			15.2	10.5	134.7	134.6	-20.14	-20.14	Comments:Fully Open,,,,,,	N	48				
Points	s with Exceedances		4					Parameter e	xceeds rul	e (Exceedanc	ce)							
С	losed Exceedances		2															
	Open Exceedances		2					Parameter i	n complian	ce (Exceedar	nce cleared)							

## Attachment 3

**Enhanced Monitoring Record Forms and Analytical Results** 

- FORM TO BE COMPLETED IF ANY WELLHEAD TEMPERATURES OVER 145F THAT CANNOT BE CORRECTED IN 7 DAYS
- WEEKLY MONITORING MUST BEGIN WITHIN 7 DAYS OF EXCEEDANCE FOR CO AND VISUAL OBSERVATIONS
- TEMPERATURES AT OR ABOVE 165F REQUIRE ANNUAL DOWNHOLE TEMPERATURE MONITORING (10FT INTERVALS)
- TEMPERATURES AT OR ABOVE 170F REQUIRE 24-HOUR PADEP NOTIFICATION; IMMEDIATELY CONTACT ENGINEERS IN THIS CASE

Landfill Name: Bristol Technician: Ryan Seymour

Lanum	i Name: Brist	·										
		GE	M Read	ing			If Temp >145	F			If Temp ≥170F	
Well ID	Date & Time	CH4 (%)	O2 (%)	Well Temp (°F)	Gas Sample Collected	Pickup Scheduled?	Visible Emissions (e.g. smoke)?	Smoldering Ash Observed?	Damage to Well?	Downhole Temp Monitoring Performed?	Contacted Engineers for Notification?	Comments
					Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	
37	2022-12-09 10:27:00	19.0	6.7	148.5	yes	yes	no	no	no	no	no	N/A
67	2022-12-09 09:43:00	16.1	3.0	172.2	yes	yes	no	no	no	no	no	N/A
54	2022-12-09 09:29:00	33.6	4.0	143.8	no	no	no	no	no	no	no	Under temp no need for sample
51	2022-12-09 09:05:00	5.5	0.9	163.1	yes	yes	no	no	no	no	no	Well had water coming out of it during sampling. I probably didn't get a good sample due to the water going in my hose every time I tried to pull the gas through the train.

- FORM TO BE COMPLETED IF ANY WELLHEAD TEMPERATURES OVER 145F THAT CANNOT BE CORRECTED IN 7 DAYS
- WEEKLY MONITORING MUST BEGIN WITHIN 7 DAYS OF EXCEEDANCE FOR CO AND VISUAL OBSERVATIONS
- TEMPERATURES AT OR ABOVE 165F REQUIRE ANNUAL DOWNHOLE TEMPERATURE MONITORING (10FT INTERVALS)
- TEMPERATURES AT OR ABOVE 170F REQUIRE 24-HOUR PADEP NOTIFICATION; IMMEDIATELY CONTACT ENGINEERS IN THIS CASE

Landfill Name: Bristol Technician: Ryan Seymour

		GE	M Read	ling			If Temp >145	F		If Temp ≥165F	If Temp ≥170F	
Well ID	Date & Time	CH4 (%)	O2 (%)	Well Temp (°F)	Gas Sample Collected	Pickup Scheduled?	Visible Emissions (e.g. smoke)?	Smoldering Ash Observed?	Damage to Well?	Downhole Temp Monitoring Performed?	Contacted Engineers for Notification?	Comments
					Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	
37	2022-12-14 09:24:00	17.4	6.2	148.6	yes	yes	no	no	no	no	no	N/a
67	2022-12-14 09:37:00	20.4	2.2	175.3	yes	yes	no	no	no	no	no	Sampling CO and hydrogen
51	2022-12-14 09:34:00	18.2	1.1	104.1	no	no	no	no	no	no	no	Temp is under 145

- FORM TO BE COMPLETED IF ANY WELLHEAD TEMPERATURES OVER 145F THAT CANNOT BE CORRECTED IN 7 DAYS
- WEEKLY MONITORING MUST BEGIN WITHIN 7 DAYS OF EXCEEDANCE FOR CO AND VISUAL OBSERVATIONS
- TEMPERATURES AT OR ABOVE 165F REQUIRE ANNUAL DOWNHOLE TEMPERATURE MONITORING (10FT INTERVALS)
- TEMPERATURES AT OR ABOVE 170F REQUIRE 24-HOUR PADEP NOTIFICATION; IMMEDIATELY CONTACT ENGINEERS IN THIS CASE

Landfill Name: Bristol Technician: Ryan Seymour

		GE	M Read	ling			If Temp >145	F		If Temp ≥165F	If Temp ≥170F	
Well ID	Date & Time	CH4 (%)	O2 (%)	Well Temp (°F)	Gas Sample Collected	Pickup Scheduled?	Visible Emissions (e.g. smoke)?	Smoldering Ash Observed?	Damage to Well?	Downhole Temp Monitoring Performed?	Contacted Engineers for Notification? Y/N	Comments
					Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	1/N	
37	2022-12-20 11:00:00	14.7	6.6	148.6	yes	yes	no	no	no	no	no	N/A
67	2022-12-20 11:09:00	15.2	10.5	134.7	no	no	no	no	no	no	no	Well is now under temp

- FORM TO BE COMPLETED IF ANY WELLHEAD TEMPERATURES OVER 145F THAT CANNOT BE CORRECTED IN 7 DAYS
- WEEKLY MONITORING MUST BEGIN WITHIN 7 DAYS OF EXCEEDANCE FOR CO AND VISUAL OBSERVATIONS
- TEMPERATURES AT OR ABOVE 165F REQUIRE ANNUAL DOWNHOLE TEMPERATURE MONITORING (10FT INTERVALS)
- TEMPERATURES AT OR ABOVE 170F REQUIRE 24-HOUR PADEP NOTIFICATION; IMMEDIATELY CONTACT ENGINEERS IN THIS CASE

Landfill Name: Bristol Technician: Ryan seymour

		GE	M Read	ing			If Temp >145	F		If Temp ≥165F	If Temp ≥170F	
Well ID	Date & Time	CH4 (%)	O2 (%)	Well Temp (°F)	0000.00	Pickup Scheduled?	Visible Emissions (e.g. smoke)?	Smoldering Ash Observed?	Damage to Well?	Downhole Temp Monitoring Performed?	Contacted Engineers for Notification?	Comments
					Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	
37	2022-12-30 10:23:00	0	0	0	yes	yes	no	no	no	no	no	No reading taken gem malfunctioned



## **Certificate of Analysis**

#### Final Report

#### Laboratory Order ID 22L0597

Client Name: SCS Field Services - Harrisburg, PA

Date Received: December 12, 2022 10:04

4330 Lewis Road, Suite 1

Date Issued: December 19, 2022 14:34

Harrisburg, PA 17111

Project Number: [none]

Submitted To: Mlke Byk

m.mish.

Purchase Order:

07220028.00

Client Site I.D.: Bristol

Enclosed are the results of analyses for samples received by the laboratory on 12/12/2022 10:04. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Mandy Mishra

**Laboratory 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.

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## **Certificate of Analysis**

## Final Report

## Laboratory Order ID 22L0597

Client Name: SCS Field Services - Harrisburg, PA

Date Received: December 12, 2022 10:04

4330 Lewis Road, Suite 1

Date Issued: December 19, 2022 14:34

Harrisburg, PA 17111

Project Number: [none]

Submitted To: Mlke Byk

Purchase Order: 07220028.00

Client Site I.D.: Bristol

#### **ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
37	22L0597-01	Air	12/09/2022 09:32	12/12/2022 10:04
51	22L0597-02	Air	12/09/2022 09:48	12/12/2022 10:04
67	22L0597-04	Air	12/09/2022 10:05	12/12/2022 10:04



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0597

Client Name: SCS Field Services - Harrisburg, PA

4330 Lewis Road, Suite 1

Date Received: Date Issued:

December 12, 2022 10:04

December 19, 2022 14:34

Harrisburg, PA 17111

Submitted To: MIke Byk Project Number:

[none]

Client Site I.D.: **Bristol**  Purchase Order:

07220028.00

**ANALYTICAL RESULTS** 

Project Location: Field Sample #: 37 Sample Description/Location: Sub Description/Location:

Initial Vacuum(in Hg): 30 Final Vacuum(in Hg): 7

Sample ID: 22L0597-01

Canister ID: 063-00474::15038D

Receipt Vacuum(in Hg): 7

Sample Matrix: Air

Sampled: 12/9/2022 09:32

Canister Size: 1.4L

Flow Controller Type: PASSIVE

Flow Controller ID:

Sample Type: LV

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

		ppmv		ALT-145			Data/Time	
Analyte	Result	MDL	LOQ	Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
Carbon Monoxide, as received	144	90.0	90.0		9	1	12/15/22 10:21	MER



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0597

SCS Field Services - Harrisburg, PA Client Name:

4330 Lewis Road, Suite 1

Date Received: Date Issued:

December 12, 2022 10:04

December 19, 2022 14:34

Harrisburg, PA 17111

Submitted To: MIke Byk Project Number:

[none]

Client Site I.D.: **Bristol**  Purchase Order:

07220028.00

**ANALYTICAL RESULTS** 

Project Location: Field Sample #: 51 Sample Description/Location: Sub Description/Location: Canister ID: 063-00470::15044D Initial Vacuum(in Hg): 30 Final Vacuum(in Hg): 20

Sample ID: 22L0597-02

Receipt Vacuum(in Hg): 20 Flow Controller Type: PASSIVE

Sample Matrix: Air

Canister Size: 1.4L

Flow Controller ID:

Sampled: 12/9/2022 09:48

Sample Type: LV

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

		ppmv		ALT-145			Deta/Time
Analyte	Result	MDL	LOQ	Flag/Qual	Dilution	PF	Date/Time Analyzed Analyst
Carbon Monoxide, as received	1570	90.0	90.0		9	1	12/15/22 13:06 MER



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0597

Date Received:

Client Name: SCS Field Services - Harrisburg, PA

55 Field Services - Harrisburg, FA

4330 Lewis Road, Suite 1 Date Issued:

Harrisburg, PA 17111

Submitted To: Mlke Byk Project Number: [none]

Client Site I.D.: Bristol Purchase Order: 07220028.00

**ANALYTICAL RESULTS** 

Project Location: Sample Description/Location:

Field Sample #: 67 Sub Description/Location:

Sample ID: 22L0597-04 Canister ID: 063-00472::15042D

Canister Size: 1.4L

Sample Matrix: Air

Sampled: 12/9/2022 10:05

Sample Type: LV

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

ALT-145

ppmv Date/Time Analyte Result MDL LOQ Flag/Qual Dilution PF Analyzed Analyst 669 9 Carbon Monoxide, as received 90.0 90.0 1 12/15/22 11:17 MER

December 12, 2022 10:04

December 19, 2022 14:34

Initial Vacuum(in Hg): 30

Receipt Vacuum(in Hg): 7

Flow Controller Type: PASSIVE

Final Vacuum(in Hg): 7

Flow Controller ID:



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0597

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 12, 2022 10:04

4330 Lewis Road, Suite 1

Date Issued: D

December 19, 2022 14:34

Harrisburg, PA 17111

Submitted To: MIke

Mlke Byk

Project Number:

[none]

Client Site I.D.: Bristol

Purchase Order:

07220028.00

## Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compo	unds by GC/TCD - Unadjusted, as	s received basis	Preparation Method:	No Prep VOC GC Air	
22L0597-01	1.00 mL / 1.00 mL	ALT-145	BFL0593	SFL0542	AG00026
22L0597-02	1.00 mL / 1.00 mL	ALT-145	BFL0593	SFL0542	AG00026
22L0597-04	1.00 mL / 1.00 mL	ALT-145	BFL0593	SFL0542	AG00026



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0597

Client Name: SCS Field Services - Harrisburg, PA

Date Received:
Date Issued:

December 12, 2022 10:04

4330 Lewis Road, Suite 1

December 19, 2022 14:34

Harrisburg, PA 17111

Submitted To: Mlke Byk

Project Number:

[none]

Client Site I.D.: Bristol

Purchase Order: 07220028.00

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

	R	eporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BFL0593 - No Prep VOC	GC Air									
Blank (BFL0593-BLK1)					Prep	pared & A	Analyzed	: 12/15/2	022	
Carbon Monoxide	<	10.0	ppmv							
LCS (BFL0593-BS1)					Prep	pared & A	Analyzed	: 12/15/2	022	
Carbon Monoxide	4960	10	ppmv	5000		99.1	0-200			
Duplicate (BFL0593-DUP1)		Sou	ırce: 22L	0597-01	Prep	pared & /	Analyzed	: 12/15/2	022	
Carbon Monoxide	148	90.0	ppmv		144			2.65	25	
Duplicate (BFL0593-DUP2)		Sou	ırce: 22L	0597-02	Prep	pared & /	Analyzed	: 12/15/2	022	
Carbon Monoxide	1580	90.0	ppmv		1570	)	-	1.08	25	
Duplicate (BFL0593-DUP3)		Sou	ırce: 22L	0597-04	Prep	pared & /	Analyzed	: 12/15/2	022	
Carbon Monoxide	682	90.0	ppmv		669		· ·	1.93	25	
Duplicate (BFL0593-DUP4)		Sou	ırce: 22L	0933-01	Prep	pared & A	Analyzed	: 12/19/2	022	
Methane	130000	4500	ppmv		12900	00	-	1.42	25	
Carbon dioxide	257000	4500	ppmv		25500	00		0.970	25	
Oxygen (O2)	68700	4500	ppmv		6810	0		0.826	25	
Nitrogen (N2)	469000	18000	ppmv		46500	00		0.932	25	
Hydrogen (H2)	26200	1800	ppmv		2510	0		4.46	25	
Carbon Monoxide	159	90.0	ppmv		163	i		2.62	25	
Duplicate (BFL0593-DUP5)		Sou	ırce: 22L	0933-02	Prep	pared & A	Analyzed	: 12/19/2	022	
Methane	85900	4500	ppmv		8590	0		0.00460	25	
Carbon dioxide	577000	4500	ppmv		57400	00		0.542	25	
Oxygen (O2)	23400	4500	ppmv		2340	0		0.0169	25	
Hydrogen (H2)	231000	1800	ppmv		23000	00		0.501	25	
Nitrogen (N2)	82400	18000	ppmv		8220	0		0.277	25	
Carbon Monoxide	1140	90.0	ppmv		1080	)		4.76	25	



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0597

SCS Field Services - Harrisburg, PA Client Name:

Date Received:

December 12, 2022 10:04

4330 Lewis Road, Suite 1

Date Issued:

Purchase Order:

December 19, 2022 14:34

Harrisburg, PA 17111

MIke Byk Submitted To:

Client Site I.D.:

**Project Number:** [none]

Certifications

07220028.00

**Bristol Certified Analytes included in this Report** 

Analyte Certifications **Analyte** 

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

Qualifers Qual

TIC

-RE Denotes sample was re-analyzed

PF Preparation Factor MDL Method Detection Limit LOQ Limit of Quantitation ppbv parts per billion by volume

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.



## AIR ANALYSIS CHAIN OF CUSTODY

**Equipment due 12/22/2022** 

		-						•	J. J.J.			Ja. b			·				
СО	MPANY NAME	: SCS Fie	ld Servi	ces - Harri	sbu	rg IN	VOICE TO	Same				PROJ	ECT NAM	E/Quote #	#: Bristo	)l			
СО	NTACT: Mike	Byk				IN	VOICE CO	NTACT:		18		SITE	NAME:	Bristol		36			
AD	DRESS:					IN	VOICE AD	DRESS:				PROJ	ECT NUM		122000	18.00	,		
РН	ONE #:		A per	or Jane	E.	IN	VOICE PH	ONE #:	Led B	7		P.O. #							
FA	X #:	1784 1	phy here	EN	1AIL		1					Pretre	atment Pr	ogram:					
ls s	ample for comp	liance rep	orting?	YES NO		Regulate	ory State:	VA Is	sample fro	m a chlorii	nated sup	oly?	YES A	PV	VS I.D. #:				
SA	MPLER NAME	(PRINT):	Ryan S	Seymour	-	SA	MPLER S	IGNATUR	E: Juyan	Sum	ome	Turn	Around T	ime: Circ	ole: 10 (	5 Days	)	or .	Da
Matr	ix Codes: AA=Indoo	r/Ambient Ai	SG=Soil	Gas LV=Land	dfill/V								063	-22K-001	8				
		Regulator	Info	Canister In	forn	nation			Sampling S	Start Inform	ation		Sampling	Stop Inform	nation		es)	AN	ALYS
	CLIENT						LAB	LAB	Barometric	Pres. (in Ho	g):		Barometric	Pres. (in H	g):		e Codes)		
	SAMPLE I.D.	Flow Controller ID	1 1011	Canister ID	Size (L)	Cleaning Batch ID	Outgoing Canister Vacuum (in Hg)	Receiving Canister Vacuum (in Hg)	Start Date	Start Time	Initial Canister Vacuum (in Hg)	Starting Sample Temp °F	Stop Date	Stop Time	Final Canister Vacuum (in Hg)	Ending Sample Temp °F	atrix (	Alt 145 CO	
1)	37	76001	20154	4504 <del>3</del> 15033	1.4	221110-02	30	7	12/9/22		30	148	12/9/22	9:32 Am	7	1.8	LG		2
2)	51			15044	1.4	221110-02	30	20	12/4/22	9:42 Am	30	163	12/9/22	9:48 14M	20	163	LG	x	F
3)	54-			13038			30		12/	Car.	30	138	12/9/22	Nor	undt	138			
4)	67	71	4	15042			30	7	12/9/2	10:00 pm	30	172	12/9/22	10:05	7	172			
				15039 4			of the		atch.	14.	31		0.3 NO	,14	1050	91			100
	NQUISHED: NQUISHED: NQUISHED:	Suymi Dexa	DAT	E / TIME	REC	EEIVED:	12/	DAT   DAT   2   2   2   2	TE / TIME	QC Data P Level II Level III Level IV		SCS l Bristo	Field Se I		22L05	597			
† <u>-</u>												Recd:	12/12/20	22 Due	: 12/19/2	022			

51 had water coining out. Some may have romoremised +



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0597

SCS Field Services - Harrisburg, PA Client Name:

December 12, 2022 10:04 Date Received: Date Issued:

4330 Lewis Road, Suite 1

December 19, 2022 14:34

07220028.00

Harrisburg, PA 17111

Submitted To: MIke Byk Project Number: [none]

Client Site I.D.: **Bristol** Purchase Order:

## **Sample Conditions Checklist**

Samples Received at:	20.30°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?	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**

Sample -04:67 analysis was not indicated on the COC. The sample has been logged for ALT 145 COT per project history. Mike Gibbons notified via email. YO 12 DEC 2022 1659



## **Certificate of Analysis**

#### Final Report

#### Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received: Decemb

December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued:

December 20, 2022 15:39

Harrisburg, PA 17111

Project Number:

07226028.00

Submitted To:

Ryan Seymour

Purchase Order:

07-SO04485

Client Site I.D.:

Bristol

Enclosed are the results of analyses for samples received by the laboratory on 12/16/2022 09:25. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

**Ted Soyars** 

**Technical Director** 

100001415

#### 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.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical, Inc.





## **Certificate of Analysis**

## Final Report

## Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received: December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued: December 20, 2022 15:39

Harrisburg, PA 17111

Project Number: 07226028.00

Ryan Seymour

Purchase Order: 07-SO04485

Client Site I.D.: Bristol

Submitted To:

#### **ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
37	22L0933-01	Air	12/14/2022 09:56	12/16/2022 09:25
67	22L0933-02	Air	12/14/2022 10:03	12/16/2022 09:25



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Harrisburg, PA 17111

4330 Lewis Road, Suite 1

Sample Description/Location:

Canister ID: 063-00184::11073D

Sub Description/Location:

Canister Size: 1.4L

Submitted To:

Client Site I.D.:

**Bristol** 

Ryan Seymour Project Number: 07226028.00

07-SO04485

**ANALYTICAL RESULTS** 

Project Location:

Field Sample #: 37

Sample ID: 22L0933-01 Sample Matrix: Air

Sampled: 12/14/2022 09:56

Sample Type: LV

Purchase Order:

Date Received:

Date Issued:

Initial Vacuum(in Hg): 21.2

Final Vacuum(in Hg): 4.6

Receipt Vacuum(in Hg): 4.6

December 16, 2022 9:25

December 20, 2022 15:39

Flow Controller Type: Passive

Flow Controller ID:

	Vol	atile Organ	ic Compour	nds by GC/TCD - Unadjusted, as	received basis			
		ppmv		ALT-145			Date/Time	
Analyte	Result	MDL	LOQ	Flag/Qual	Dilution	PF	Analyzed	Analyst
Carbon Monovide, as received	163	00.0	00.0		0	1	12/10/22 13:12	DEH



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0933

SCS Field Services - Harrisburg, PA Client Name:

4330 Lewis Road, Suite 1

Date Received: Date Issued:

December 16, 2022 9:25

December 20, 2022 15:39

Harrisburg, PA 17111

Submitted To: Ryan Seymour

**Bristol** 

Project Number:

07226028.00

Purchase Order:

07-SO04485

**ANALYTICAL RESULTS** 

Project Location:

Field Sample #: 67

Sample Type: LV

Sample ID: 22L0933-02 Sample Matrix: Air

Client Site I.D.:

Sampled: 12/14/2022 10:03

Sample Description/Location: Sub Description/Location:

Canister ID: 063-00197::11322D

Canister Size: 1.4L

Initial Vacuum(in Hg): 21.2 Final Vacuum(in Hg): 3.6 Receipt Vacuum(in Hg): 3.6

Flow Controller Type: Passive

Flow Controller ID:

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

ALT-145 ppmv

Date/Time LOQ Flag/Qual Dilution Analyzed

Analyte Result MDL Analyst 1080 Carbon Monoxide, as received 90.0 90.0 9 1 12/19/22 11:26 DFH

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

EPA 3C Vol% Date/Time Result MDL LOQ Flag/Qual Dilution ΡF Analyzed Analyst Analyte Hydrogen (H2), as received 22.5 1.08 1.08 54 1 12/19/22 12:19 DFH



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received: Date Issued:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

December 20, 2022 15:39

Harrisburg, PA 17111

Submitted To: Ryan Seymour

Project Number:

07226028.00

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 Compo	ounds by GC/TCD - Unadjust	ed, as received basis	Preparation Method:	No Prep VOC GC Air	
22L0933-02	1.00 mL / 1.00 mL	EPA 3C	BFL0532	SFL0656	AG00026
22L0933-02RE1	1.00 mL / 1.00 mL	EPA 3C	BFL0532	SFL0656	AG00026
22L0933-01	1.00 mL / 1.00 mL	ALT-145	BFL0593	SFL0660	AG00026
22L0933-02	1.00 mL / 1.00 mL	ALT-145	BFL0593	SFL0660	AG00026



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued:

December 20, 2022 15:39

Harrisburg, PA 17111

Submitted To: Ry

Carbon Monoxide

Ryan Seymour

Project Number:

07226028.00

Client Site I.D.: Bristol

Purchase Order: 07-SO04485

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

	R	eporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BFL0532 - No Prep VO	C GC Air									
Blank (BFL0532-BLK1)					Prepa	ared &	Analyzed	: 12/14/20	22	
Hydrogen (H2)	<	0.02	Vol%							
LCS (BFL0532-BS1)					Prepa	ared &	Analyzed	: 12/14/20	22	
Methane	4120	0.05	ppmv	5000		82.4	70-130			
Carbon dioxide	4280	0.05	ppmv	5000		85.6	70-130			
Oxygen (O2)	5150	0.05	ppmv	5000		103	70-130			
Nitrogen (N2)	5510	1	ppmv	5000		110	70-130			
Hydrogen (H2)	5920	0.02	ppmv	5100		116	70-130			
Carbon Monoxide	4950	0.001	ppmv	5000		99.0	70-130			
Duplicate (BFL0532-DUP1)		Sou	urce: 22L	0475-02	Prepa	ared &	Analyzed	: 12/14/20	22	
Methane	<	0.15	Vol%		<0.15	5		NA	5	
Carbon dioxide	<	0.15	Vol%		<0.15	5		NA	5	
Oxygen (O2)	22.1	0.15	Vol%		22.0			0.493	5	
Nitrogen (N2)	74.9	3.00	Vol%		74.9			0.0113	5	
Hydrogen (H2)	<	0.06	Vol%		<0.06	6		NA	5	
Carbon Monoxide	<	0.003	Vol%		0.02			NA	5	
Duplicate (BFL0532-DUP2)		Sou	urce: 22L	0475-03	Prepa	ared &	Analyzed	: 12/14/20	22	
Methane	<	0.15	Vol%		<0.15	5		NA	5	
Carbon dioxide	<	0.15	Vol%		<0.15	5		NA	5	
Oxygen (O2)	21.6	0.15	Vol%		21.3			1.46	5	
Nitrogen (N2)	73.3	3.00	Vol%		72.5			1.05	5	
Hydrogen (H2)	<	0.06	Vol%		<0.06	6		NA	5	
Carbon Monoxide	<	0.003	Vol%		<0.003	3		NA	5	
Duplicate (BFL0532-DUP3)		Sou	ırce: 22L	0475-04	Prepa	ared &	Analyzed	: 12/14/20	22	
Methane	<	0.15	Vol%		<0.15	5		NA	5	
Carbon dioxide	<	0.15	Vol%		<0.15	5		NA	5	
Oxygen (O2)	22.3	0.15	Vol%		21.9			1.74	5	
Hydrogen (H2)	<	0.06	Vol%		<0.06	6		NA	5	
Nitrogen (N2)	75.5	3.00	Vol%		74.0			1.91	5	

< 0.003

NA

5

0.003

Vol%



## **Certificate of Analysis**

Final Report

## Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued:

December 20, 2022 15:39

Harrisburg, PA 17111

Submitted To: Ryan Seymour

Project Number:

07226028.00

Client Site I.D.: Bristol

Purchase Order:

07-SO04485

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

## **Enthalpy Analytical**

	Reporting			Spike	Source	Source		%REC		
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BFL0532 - No Prep VOC	GC Air									
Ouplicate (BFL0532-DUP4)	Source: 22L0475-05		0475-05	Prepared & Analyzed: 12/14/2022				022		
Methane	<	0.15	Vol%		<0.1	5		NA	5	
Carbon dioxide	<	0.15	Vol%		<0.1	5		NA	5	
Oxygen (O2)	21.6	0.15	Vol%		21.1			2.37	5	
Nitrogen (N2)	74.1	3.00	Vol%		72.7			1.90	5	
Hydrogen (H2)	<	0.06	Vol%		<0.0	6		NA	5	
Carbon Monoxide	<	0.003	Vol%		<0.00	13		NA	5	
Ouplicate (BFL0532-DUP5)	Source: 22L0475-06			Prep	Prepared & Analyzed: 12/14/2022					
Methane	<	0.15	Vol%		<0.1	5		NA	5	
Carbon dioxide	<	0.15	Vol%		<0.1	5		NA	5	
Oxygen (O2)	22.0	0.15	Vol%		21.4			2.74	5	
Hydrogen (H2)	<	0.06	Vol%		<0.0	6		NA	5	
Nitrogen (N2)	74.8	3.00	Vol%		73.0	)		2.44	5	
Carbon Monoxide	<	0.003	Vol%		<0.00	13		NA	5	
Ouplicate (BFL0532-DUP6)	Source: 22L0475-07			0475-07	Prep	ared &				
Methane	<	0.15	Vol%		<0.1	5		NA	5	
Carbon dioxide	<	0.15	Vol%		<0.1	5		NA	5	
Oxygen (O2)	21.8	0.15	Vol%		21.4			1.68	5	
Nitrogen (N2)	73.8	3.00	Vol%		72.9	)		1.19	5	
Hydrogen (H2)	<	0.06	Vol%		<0.0	6		NA	5	
Carbon Monoxide	<	0.003	Vol%		<0.00	13		NA	5	
Ouplicate (BFL0532-DUP8)	Source: 22L0840-01RE			1 Prep	ared &	Analyzed				
Methane	50.3	0.45	Vol%		50.5	i		0.471	5	
Carbon dioxide	19.8	0.45	Vol%		19.9	)		0.745	5	
Oxygen (O2)	3.77	0.45	Vol%		3.67			2.72	5	
Hydrogen (H2)	<	0.18	Vol%		<0.1	В		NA	5	
Nitrogen (N2)	21.3	9.00	Vol%		21.0	)		1.41	5	
Carbon Monoxide	<	0.009	Vol%		<0.00	19		NA	5	



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0933

SCS Field Services - Harrisburg, PA Client Name:

Date Received:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued:

December 20, 2022 15:39

Harrisburg, PA 17111

Ryan Seymour Submitted To:

Project Number:

07226028.00

Client Site I.D.: Bristol Purchase Order:

07-SO04485

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

#### **Enthalpy Analytical**

	R	eporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BFL0532 - No Prep VO	C GC Air									
Duplicate (BFL0532-DUP9)		Soi	urce: 22L	0840-02	Prep	ared & /	Analyzed	: 12/16/20	)22	
Methane	21.8	0.45	Vol%		21.6			0.941	5	
Carbon dioxide	13.7	0.45	Vol%		13.5			1.47	5	
Oxygen (O2)	6.78	0.45	Vol%		7.39			8.67	5	Р
Hydrogen (H2)	<	0.18	Vol%		<0.18	3		NA	5	
Carbon Monoxide	<	0.009	Vol%		<0.00	9		NA	5	
Duplicate (BFL0532-DUPA)		Soi	urce: 22L	0840-03	Prep	ared & /	Analyzed	: 12/16/20	)22	
Methane	2.42	0.45	Vol%		2.43			0.466	5	
Carbon dioxide	10.2	0.45	Vol%		10.4			1.81	5	
Oxygen (O2)	6.94	0.45	Vol%		6.97			0.394	5	
Hydrogen (H2)	<	0.18	Vol%		<0.18	3		NA	5	
Carbon Monoxide	<	0.009	Vol%		<0.00	9		NA	5	
Duplicate (BFL0532-DUPB)		Soi	urce: 22L	0840-04	Prep	ared & /	Analyzed	: 12/16/20	)22	
Methane	11.8	0.45	Vol%		11.9			0.691	5	
Carbon dioxide	10.0	0.45	Vol%		9.97			0.411	5	
Oxygen (O2)	5.69	0.45	Vol%		5.57			2.24	5	
Hydrogen (H2)	<	0.18	Vol%		<0.18	3		NA	5	
Carbon Monoxide	<	0.009	Vol%		<0.00	9		NA	5	
Duplicate (BFL0532-DUPD)		Soi	urce: 22L	0840-05	Prep	ared & /	Analyzed	: 12/19/20	)22	
Methane	58.2	0.45	Vol%		58.2			0.0663	5	
Carbon dioxide	7.85	0.45	Vol%		7.88			0.365	5	
Oxygen (O2)	4.95	0.45	Vol%		4.82			2.60	5	
Hydrogen (H2)	<	0.18	Vol%		<0.18	3		NA	5	
Nitrogen (N2)	23.9	9.00	Vol%		23.4			2.03	5	
Carbon Monoxide	<	0.009	Vol%		<0.00	9		NA	5	



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued:

December 20, 2022 15:39

Harrisburg, PA 17111

Submitted To: Ryan Seymour

Project Number:

07226028.00

Client Site I.D.: Bristol

Purchase Order: 07-SO04485

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

#### **Enthalpy Analytical**

	R	eporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BFL0532 - No Prep VO	C GC Air									
Duplicate (BFL0532-DUPE)		Soi	urce: 22L	0933-02	Prep	ared & A	Analyzed	I: 12/19/20	22	
Methane	8.59	0.45	Vol%		8.59	)		0.00461	5	
Carbon dioxide	57.7	0.45	Vol%		57.4			0.542	5	
Oxygen (O2)	2.34	0.45	Vol%		2.34	1		0.0169	5	
Nitrogen (N2)	<	9.00	Vol%		<9.0	0		NA	5	
Carbon Monoxide	0.11	0.009	Vol%		0.11			4.76	5	
Batch BFL0593 - No Prep VO	C GC Air									
Blank (BFL0593-BLK1)					Prep	ared & A	Analyzed	I: 12/15/20	22	
Carbon Monoxide	<	10.0	ppmv							
LCS (BFL0593-BS1)					Prep	ared & A	Analyzed	I: 12/15/20	22	
Carbon Monoxide	4960	10	ppmv	5000		99.1	0-200			
Duplicate (BFL0593-DUP1)		Soi	ırce: 22L	0597-01	Prep	ared & A	Analyzed	I: 12/15/20	22	
Carbon Monoxide	148	90.0	ppmv		144			2.65	25	
Duplicate (BFL0593-DUP2)		Soi	urce: 22L	0597-02	Prep	ared & A	Analyzed	I: 12/15/20	22	
Carbon Monoxide	1580	90.0	ppmv		1570	)		1.08	25	
Duplicate (BFL0593-DUP3)		Soi	urce: 22L	0597-04	Prep	ared & A	Analyzed	I: 12/15/20	22	
Carbon Monoxide	682	90.0	ppmv		669			1.93	25	
Duplicate (BFL0593-DUP4)		Soi	ırce: 22L	0933-01	Prep	ared & A	Analyzed	I: 12/19/20	122	
Methane	130000	4500	ppmv		12900	00		1.42	25	
Carbon dioxide	257000	4500	ppmv		25500	00		0.970	25	
Oxygen (O2)	68700	4500	ppmv		6810	0		0.826	25	
Hydrogen (H2)	26200	1800	ppmv		2510	0		4.46	25	
Nitrogen (N2)	469000	18000	ppmv		46500	00		0.932	25	
Carbon Monoxide	159	90.0	ppmv		163			2.62	25	



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued:

December 20, 2022 15:39

Harrisburg, PA 17111

Bristol

Submitted To: Ryan Seymour

Client Site I.D.:

Project Number:

07226028.00

Purchase Order:

07-SO04485

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

#### **Enthalpy Analytical**

Dunlianta (PEL 0502 DUDE)		801		0022.02	Dron	arad 9 /	\nalvzod	. 12/10/2	022		
Batch BFL0593 - No Prep VOC	GC Air										
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual	
	R	eporting		Spike	Source		%REC		RPD		

Duplicate (BFL0593-DUP5)		So	urce: 22L0933-02	Prepared & Analyzed: 12/19/2022				
Methane	85900	4500	ppmv	85900	0.00460	25		
Carbon dioxide	577000	4500	ppmv	574000	0.542	25		
Oxygen (O2)	23400	4500	ppmv	23400	0.0169	25		
Nitrogen (N2)	82400	18000	ppmv	82200	0.277	25		
Hydrogen (H2)	231000	1800	ppmv	230000	0.501	25		
Carbon Monoxide	1140	90.0	ppmv	1080	4.76	25		
Duplicate (BFL0593-DUP6)		Soi	urce: 22L0948-01	Prepared & Ar	nalyzed: 12/19/202	22		
Methane	146000	4500	ppmv	147000	0.929	25		

Methane	146000	4500	ppmv	147000	0.929	25
Carbon dioxide	493000	4500	ppmv	496000	0.653	25
Oxygen (O2)	5170	4500	ppmv	5230	1.11	25
Hydrogen (H2)	371000	1800	ppmv	374000	0.919	25
Nitrogen (N2)	<	18000	ppmv	<18000	NA	25
Carbon Monoxide	<	90.0	ppmv	<90.0	NA	25

Duplicate (BFL0593-DUP7)		Soi	urce: 22L0948-02	Prepared & Analyzed: 12/19/2022				
Methane	419000	4500	ppmv	418000	0.327	25		
Carbon dioxide	431000	4500	ppmv	429000	0.624	25		
Oxygen (O2)	<	4500	ppmv	<4500	NA	25		
Hydrogen (H2)	35000	1800	ppmv	34600	1.02	25		
Nitrogen (N2)	66200	18000	ppmv	65900	0.460	25		
Carbon Monoxide	<	90.0	ppmv	<90.0	NA	25		

### **Certified Analytes included in this Report**

Analyte	Certifications	Analyte	Certifications	
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## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0933

SCS Field Services - Harrisburg, PA Client Name:

Date Received:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

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Harrisburg, PA 17111

Submitted To: Ryan Seymour

Bristol

Client Site I.D.:

**Project Number:** 

07226028.00

Purchase Order:

07-SO04485

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**

Р Duplicate analysis does not meet the acceptance criteria for precision

RPD Relative Percent Difference

Qualifers Qual

TIC

-RE Denotes sample was re-analyzed

PF Preparation Factor MDL Method Detection Limit LOQ Limit of Quantitation ppbv parts per billion by volume

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.



formerly Air, Water & Soil Laboratories

## **AIR ANALYSIS CHAIN OF CUSTODY**

Equipment due 12/23

co	MPANY NAME	SCS Field	d Servi	ces - Harri	isbu	rg IN	VOICE TO	: Same				PROJ	ECT NAM	E/Quote #	#: Bristo	ol .			
co	NTACT: Lya	n Seyn	nour			IN	VOICE CC	NTACT:				SITE	NAME:	distol					
ADI	DRESS:	•		INVOICE ADDRESS:										PROJECT NUMBER: 07226028.00					
PH	ONE #:					יאו	VOICE PH	ONE #:				P.O. #							
FAX #: EMAIL:											Pretre	atment Pr	ogram:						
Is sample for compliance reporting (YES) NO   Regulatory State: V/ Is sample from a chlorinated supply? YES (NO) PWS											VS I.D. #:								
SAMPLER NAME (PRINT): Ryan Seynow SAMPLER SIGNATURE: Paper Supper 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																			
		Regulator	Info	Canister In	forn	nation			Sampling S	Start Inform	ation		Sampling	Stop Inforn	nation		88	ΑN	ALYSI
	CLIENT						LAB	LAB	Barometric	Pres. (in Ho	a):		Barometric	Pres. (in H	g):		e Codes)	0	
	SAMPLE I.D.	Flow Controller ID	Cal Flow (mL/min)	Canister ID	Size (L)	Cleaning Batch ID	Outgoing Canister Vacuum (in Hg)	Receiving Canister Vacuum (in Hg)	Start Date	Start Time	Initial Canister Vacuum (ir Hg)	Starting Sample Temp *F	Stop Date	Stop Time	Final Canister Vacuum (in Hg)	Ending Sample Temp *F	Matrix (se	Alt 145 C	Hydrogen
1)	37			11073		221121-01	21.2	10 12 12 12 14 15 15 15 15 15 15 15 15 15 15 15 15 15	12/14/22	9:54 BM	27	148	12/22	9:56	10	148	1 1	l i	
2)	67			11322	1.4	221122-03	21.2	90FE/2	12/14/22	10:00 AM	27	170	14/22	10:03	9	175	LG	x	X
3)				11325	1.4	221122-03	21.2										LG	x	
4)				12408	1.4	221121-01	21.2										LG	x	
	VOLUCIED: A				Íneo								20.4°C	310,0	o icc,	ന്റ ട	Ca 1		
KELII	NQUISHED: MOW	Sumo	V	12/12/12	REC	EIVED:	Feder t	DAT	E / TIME	1	ackage L/	AB USE	ONLY	·	•				
RELI	NQUISHED:	<del></del>	DAT	1.45/40 1.45/40		EIVED:		DAT	E / TIME	Level I Level II		scs i	ield Se	rvices	22L09	33			
RELI	rdex t NQUISHED:			/・ <b>リフ/バ</b> E / TIME	_	EIVED:	ן 12/	16/22 C	E / TIME	Level III	i i	Bristol	iciu se	ı vices					
								37		Level IV			10/1//00	11 D	12/22/20	122			
					Ь				••••	1-515.74		keca:	12/16/20	zz Due:	12/23/20	,,,,			



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L0933

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 16, 2022 9:25

4330 Lewis Road, Suite 1

Date Issued:

December 20, 2022 15:39

Harrisburg, PA 17111

Submitted To: Ryan Seymour

**Bristol** 

Client Site I.D.:

Project Number:

07226028.00

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?	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**



### **Certificate of Analysis**

#### Final Report

#### Laboratory Order ID 22L1142

Client Name: SCS Field Services - Harrisburg, PA

Date Received: De

December 21, 2022 10:05

4330 Lewis Road, Suite 1

Date Issued:

December 29, 2022 15:25

Harrisburg, PA 17111

Project Number:

[none]

Submitted To: Ryan Seymour

100001415

Purchase Order:

07-SO04485

Client Site I.D.: Bristol

Enclosed are the results of analyses for samples received by the laboratory on 12/21/2022 10:05. 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.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical, Inc.





## **Certificate of Analysis**

#### Final Report

#### Laboratory Order ID 22L1142

SCS Field Services - Harrisburg, PA Client Name:

Date Received: December 21, 2022 10:05

4330 Lewis Road, Suite 1

December 29, 2022 15:25 Date Issued:

Harrisburg, PA 17111

Project Number:

[none]

Submitted To: Ryan Seymour Purchase Order: 07-SO04485

Client Site I.D.: Bristol

#### **ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
37	22L1142-01	Air	12/20/2022 11:22	12/21/2022 10:05



### **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L1142

SCS Field Services - Harrisburg, PA Client Name:

Date Received: 4330 Lewis Road, Suite 1

December 29, 2022 15:25 Date Issued:

Harrisburg, PA 17111

Submitted To: Ryan Seymour Project Number: [none]

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

**ANALYTICAL RESULTS** 

Project Location: Sample Description/Location:

Field Sample #: 37 Sub Description/Location:

Canister ID: 063-00018::12410

Sample ID: 22L1142-01 Canister Size: 1.4 Sample Matrix: Air

Final Vacuum(in Hg): 1.4 Receipt Vacuum(in Hg): 1.4 Flow Controller Type: Passive

Initial Vacuum(in Hg): 30

December 21, 2022 10:05

Flow Controller ID:

Sample Type: LG

Sampled: 12/20/2022 11:22

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

ppmv AL1-145			ALI-145		Date/Time		
Analyte	Result	MDL	LOQ	Flag/Qual	Dilution	PF	Analyzed Analyst
Carbon Monoxide, as received	151	90.0	90.0		9	1	12/27/22 10:43 MER



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L1142

Client Name: SCS Field Services - Harrisburg, PA

Date Received: Date Issued:

December 21, 2022 10:05

4330 Lewis Road, Suite 1

Jaio locaca.

December 29, 2022 15:25

Harrisburg, PA 17111

Submitted To: Ryan Seymour

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 Compo	ounds by GC/TCD - Unadjusted, as r	eceived basis	Preparation Method:	No Prep VOC GC Air	
22L1142-01	1.00 mL / 1.00 mL	ALT-145	BFL0875	SFL0920	AG00026



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L1142

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 21, 2022 10:05

4330 Lewis Road, Suite 1

Reporting

834

90.0

ppmv

Date Issued:

December 29, 2022 15:25

Harrisburg, PA 17111

Submitted To: Ry

Carbon Monoxide

Ryan Seymour

Project Number:

%REC

[none]

RPD

Client Site I.D.: Bristol

Purchase Order: 07-SO04485

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

Source

Spike

	- 11	eporting		Spike	Source		/OINEC		INFD		
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual	
Batch BFL0875 - No Prep VO	C GC Air										
Blank (BFL0875-BLK1)					Prep	ared &	Analyzed	: 12/22/20	)22		
Carbon Monoxide	<	10.0	ppmv								
LCS (BFL0875-BS1)					Prep	ared &	Analyzed	: 12/22/20	)22		
Methane	4180	500	ppmv	5000		83.7	0-200				
Carbon dioxide	4220	500	ppmv	5000		84.5	0-200				
Oxygen (O2)	5520	500	ppmv	5000		110	0-200				
Nitrogen (N2)	5820	2000	ppmv	5000		116	0-200				
Hydrogen (H2)	5950	200	ppmv	5100		117	0-200				
Carbon Monoxide	4990	10	ppmv	5000		99.7	0-200				
Duplicate (BFL0875-DUP1)		Soi	urce: 22L	0990-01	Prep	ared &	Analyzed	: 12/22/20	)22		
Methane	78900	4500	ppmv		7860	0		0.390	25		
Carbon dioxide	648000	4500	ppmv		64300	00		0.656	25		
Oxygen (O2)	9330	4500	ppmv		9380	)		0.571	25		
Nitrogen (N2)	28900	18000	ppmv		2890	0		0.194	25		
Hydrogen (H2)	269000	1800	ppmv		26800	00		0.439	25		
Carbon Monoxide	1550	90.0	ppmv		1540	)		0.954	25		
Duplicate (BFL0875-DUP2)		Soi	urce: 22L	0990-02	Prep	ared &	Analyzed	: 12/22/20	)22		
Methane	305000	4500	ppmv		30500	00		0.0312	25		
Carbon dioxide	573000	4500	ppmv		57300	00		0.0282	25		
Oxygen (O2)	6820	4500	ppmv		6860	)		0.601	25		
Hydrogen (H2)	54000	1800	ppmv		5360	0		0.598	25		
Nitrogen (N2)	20200	18000	ppmv		2040	0		0.832	25		
Carbon Monoxide	525	90.0	ppmv		523			0.360	25		
Duplicate (BFL0875-DUP3)		Soi	urce: 22L	0990-03	Prep	ared &	Analyzed	: 12/22/20	)22		
Methane	41700	4500	ppmv		4150	0		0.373	25		
Carbon dioxide	776000	4500	ppmv		77500	00		0.0435	25		
Oxygen (O2)	<	4500	ppmv		<450	0		NA	25		
Nitrogen (N2)	<	18000	ppmv		<1800	00		NA	25		
Hydrogen (H2)	160000	1800	ppmv		16200	00		1.06	25		

829

0.660

25



## **Certificate of Analysis**

Final Report

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December 21, 2022 10:05

4330 Lewis Road, Suite 1

December 29, 2022 15:25 Date Issued:

Harrisburg, PA 17111

Ryan Seymour Submitted To:

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**

	R	Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BFL0875 - No Prep VO	C GC Air									
Duplicate (BFL0875-DUP4)		Sou	urce: 22L	0990-04	Prep	ared & /	Analyzed	: 12/22/20	)22	
Methane	26600	4500	ppmv		2590	0		2.56	25	
Carbon dioxide	726000	4500	ppmv		72300	00		0.465	25	
Oxygen (O2)	<	4500	ppmv		<450	0		NA	25	
Hydrogen (H2)	152000	1800	ppmv		15200	00		0.0122	25	
Nitrogen (N2)	29500	18000	ppmv		2920	0		1.10	25	
Carbon Monoxide	1240	90.0	ppmv		1240	)		0.371	25	
Duplicate (BFL0875-DUP5)		Sou	urce: 22L	0991-01	Prep	ared & /	Analyzed	: 12/22/20	)22	
Methane	239000	4500	ppmv		24100	00		0.831	25	
Carbon dioxide	573000	4500	ppmv		57500	00		0.475	25	
Oxygen (O2)	13200	4500	ppmv		1330	0		1.05	25	
Hydrogen (H2)	41600	1800	ppmv		4160	0		0.162	25	
Nitrogen (N2)	88400	18000	ppmv		8920	0		0.898	25	
Carbon Monoxide	326	90.0	ppmv		334			2.59	25	
Duplicate (BFL0875-DUP6)		Sou	urce: 22L	0991-02	Prep	ared & /	Analyzed	: 12/22/20	)22	
Methane	125000	4500	ppmv		12400	00		0.207	25	
Carbon dioxide	371000	4500	ppmv		37200	00		0.217	25	
Oxygen (O2)	81800	4500	ppmv		8210	0		0.388	25	
Hydrogen (H2)	29900	1800	ppmv		2960	0		0.694	25	
Nitrogen (N2)	334000	18000	ppmv		33500	00		0.269	25	
Carbon Monoxide	303	90.0	ppmv		307			1.21	25	
Duplicate (BFL0875-DUP7)		Sou	urce: 22L	0991-03	Prep	ared & /	Analyzed	: 12/22/20	)22	
Methane	46300	4500	ppmv		4600	0		0.619	25	
Carbon dioxide	796000	4500	ppmv		79800	00		0.242	25	
Oxygen (O2)	<	4500	ppmv		<450	0		NA	25	
Hydrogen (H2)	122000	1800	ppmv		12300	00		0.903	25	
Nitrogen (N2)	<	18000	ppmv		<1800	00		NA	25	
Carbon Monoxide	609	90.0	ppmv		609			0.0739	25	



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L1142

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 21, 2022 10:05

4330 Lewis Road, Suite 1

Date Issued:

December 29, 2022 15:25

Harrisburg, PA 17111

Submitted To: F

Ryan Seymour

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**

	R	eporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BFL0875 - No Prep VOC	GC Air									
Duplicate (BFL0875-DUP8)		Sou	urce: 22L1	1142-01	Prep	ared & /	Analyzed	: 12/27/20	22	
Methane	128000	4500	ppmv		12900	00		1.30	25	
Carbon dioxide	255000	4500	ppmv		25600	00		0.436	25	
Oxygen (O2)	69500	4500	ppmv		7040	0		1.28	25	
Nitrogen (N2)	496000	18000	ppmv		50200	00		1.07	25	
Hydrogen (H2)	22100	1800	ppmv		2210	0		0.0318	25	
Carbon Monoxide	150	90.0	ppmv		151			0.957	25	
Duplicate (BFL0875-DUP9)	Source: 22L1008-01			Prep	ared & /	Analyzed				
Methane	419000	4500	ppmv		41900	00		0.0330	25	
Carbon dioxide	363000	4500	ppmv		38000	00		4.67	25	
Oxygen (O2)	10600	4500	ppmv		1070	0		1.05	25	
Nitrogen (N2)	166000	18000	ppmv		16600	00		0.0595	25	
Hydrogen (H2)	3210	1800	ppmv		3270	)		1.66	25	
Carbon Monoxide	<	90.0	ppmv		<90.	0		NA	25	
Duplicate (BFL0875-DUPA)		Sou	urce: 22L'	1008-02	Prep	ared & /	Analyzed	: 12/27/20	22	
Methane	212000	4500	ppmv		21100	00		0.610	25	
Carbon dioxide	159000	4500	ppmv		17600	00		10.2	25	
Oxygen (O2)	118000	4500	ppmv		11800	00		0.224	25	
Hydrogen (H2)	10500	1800	ppmv		9330	)		11.9	25	
Nitrogen (N2)	427000	18000	ppmv		42500	00		0.332	25	
Carbon Monoxide	<	90.0	ppmv		<90.	0		NA	25	

### Certified Analytes included in this Report

Analyte	Certifications	Analyte	Certifications	
---------	----------------	---------	----------------	--



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L1142

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 21, 2022 10:05

4330 Lewis Road, Suite 1

Date Issued: Dece

December 29, 2022 15:25

Harrisburg, PA 17111

Submitted To: F

Ryan Seymour

Project Number:

[none]

Client Site I.D.: Bristol

Purchase Order:

07-SO04485

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

TIC

-RE Denotes sample was re-analyzed

PF Preparation Factor
MDL Method Detection Limit
LOQ Limit of Quantitation
ppbv parts per billion by volume

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  $\pm$  10% of the absolute.



formerly Air, Water & Soil Laboratories

## AIR ANALYSIS CHAIN OF CUSTODY

**Equipment due 12/23** 

								VIIAIII	01 003	1001		quipii	ieiii uue	7 12/23					
	MPANY NAME				isbu	ırg IN	VOICE TO	: Same	)			PROJ	ECT NAM	E/Quote #	#: Bristo	ol			
CC	ONTACT: Rya.	n Sew	how			IN'	VOICE CC	NTACT:				SITE	NAME:	Bristo					
ΑD	DRESS:					IN'	VOICE AD	DRESS:				PROJ	ECT NUM		722002	8,00			
PH	IONE #:					IN'	VOICE PH	ONE #:				P.O. #	<u>:</u>						
FΑ	X #:	-		EN	ΛΑΙΙ	_:						Pretre	atment Pi	ogram:					
ls :	sample for comp	liance rep	orting?	YES NO	)	Regulat	ory State:	Is	sample fro	m a chlori	nated sup	ply?	YES (	10) PV	VS I.D. #:	,			
SA	MPLER NAME	(PRINT):	Fxan	Seymou	r	SA	MPLER S	IGNATUR	E: Man	Sam	por_	Turn	Around T	ime: Circ	cle: 10	5 Days	ý	or _	_ Day
Mat	rix Codes: AA=Indoo	r/Ambient Air	SG=Soil	Gas LV=Lan	dfill/	ent Gas OT	=Other <u>U</u>		<del>-</del>				063	3-22K-002	7	-			
	-	Regulator	Info	Canister II	nforr	nation			Sampling	Start Inform	ation		Sampling	Stop Inforn	nation		ŝ	ANA	ALYSI
	CLIENT						LAB	LAB	Barometric	Pres. (in H	g):		Barometri	c Pres. (in H	g):		Codes)		
	SAMPLE I.D.	Flow Controller ID	Cal Flow (mL/min)	Canister ID	Stre (L)	Cleaning Batch ID	Outgoing Canister Vacuum (in Hg)	Receiving Canister Vacuum (in Hg)	Start Date	Start Time	Initial Canister Vacuum (ir Hg)	Starting Sample Temp *F	Stop Date	Stop Time	Final Canister Vacuum (in Hg)	Ending Sample Temp *F	Matrix (See C	Alt 145 C	
1)	37	KF2		12410	1.4	221121-01	21.2	8£	12/20/	11:20	27	]48	12/20,	11:22	8	148	LG		
2)				12415	1.4	221121-01	21.2										LG	x	
3)				11325	1.4	221122-	21.2												
4)				12408	1.9	22/12/-	21.2												
	•			,			•		•			•	18.	300, 31	Ö, NO	ice.	ทอ	SC	,1
[4	NOUISHED:	mor		13/20/22	REC	EIVED:	edex E	DAT	E / TIME	QC Data P Level I	ackage <b>L</b> #	B USE	ONLY		•	<b>-</b>			
rage	QUISHED:	edex E		E / TIME		EIVED:		DAT  21/22	1005	Level II		22L11	SCS F Bristol	ield Se	rvices	22L	114	12	
lια	01		DAT	E / TIME	REC	EIVED:		DAT	E / TIME	Level III		1142	Recd: 1	2/21/202	2 Due:	10.			
										Level IV					~ Due: ]		<b>202</b>		<del></del>



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 22L1142

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

December 21, 2022 10:05

4330 Lewis Road, Suite 1

Date Issued:

December 29, 2022 15:25

Harrisburg, PA 17111

Submitted To: R

Ryan Seymour

Project Number:

[none]

Client Site I.D.: Bristol

Purchase Order:

07-SO04485

## **Sample Conditions Checklist**

Samples Received at:	18.30°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**



## **Certificate of Analysis**

#### Final Report

#### Laboratory Order ID 23A0017

Client Name: SCS Field Services - Harrisburg, PA

Date Received: January 3, 2023 11:55

4330 Lewis Road, Suite 1

Date Issued: January 5, 2023 14:06

Harrisburg, PA 17111

Project Number: 07220028.00

Submitted To: Tom Lock

100001415

Purchase Order:

07-SO04485

Client Site I.D.: Bristol

Enclosed are the results of analyses for samples received by the laboratory on 01/03/2023 11:55. 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.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical, Inc.





## **Certificate of Analysis**

#### Final Report

#### Laboratory Order ID 23A0017

Client Name: SCS Field Services - Harrisburg, PA

Date Received: January 3, 2023 11:55

4330 Lewis Road, Suite 1

Date Issued: January 5, 2023 14:06

Harrisburg, PA 17111

Project Number: 07220028.00

Tom Lock

Purchase Order: 07-SO04485

Client Site I.D.: Bristol

Submitted To:

#### **ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
37	23A0017-01	Air	12/30/2022 11:50	01/03/2023 11:55



### **Certificate of Analysis**

Final Report

#### Laboratory Order ID 23A0017

SCS Field Services - Harrisburg, PA Client Name:

Date Received: 4330 Lewis Road, Suite 1

Date Issued: January 5, 2023 14:06

January 3, 2023 11:55

Harrisburg, PA 17111

Submitted To: Tom Lock

**Bristol** 

Project Number:

07220028.00

Purchase Order:

07-SO04485

#### **ANALYTICAL RESULTS**

Project Location:

Sample Type: LV

Field Sample #: 37

Sample ID: 23A0017-01

Sample Matrix: Air

Client Site I.D.:

Sampled: 12/30/2022 11:50

Sample Description/Location: Sub Description/Location:

Canister ID: 063-00021::12408

Canister Size: 1.4L

Initial Vacuum(in Hg):

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 ppmv

Date/Time Analyte Result MDL LOQ Flag/Qual Dilution ΡF Analyzed Analyst 180 Carbon Monoxide, as received 90.0 90.0 9 1 1/4/23 15:20 MER

Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis EPA 3C Vol% Date/Time Result MDL LOQ Flag/Qual Dilution ΡF Analyzed Analyst Analyte 13.6 0.45 0.45 9 1/4/23 15:20 MER Methane, as received 1 Carbon dioxide, as received 27.5 0.45 0.45 9 1 1/4/23 15:20 MER Oxygen (O2), as received 5.87 0.45 0.45 9 1 1/4/23 15:20 MER Hydrogen (H2), as received 2.51 0.18 0.18 9 1 1/4/23 15:20 MER Nitrogen (N2), as received 42.5 9.00 9.00 1/4/23 15:20 MER



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 23A0017

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

January 3, 2023 11:55

4330 Lewis Road, Suite 1

Date Issued:

January 5, 2023 14:06

Harrisburg, PA 17111

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 Compo	ounds by GC/TCD - Unadjusted, as r	eceived basis	Preparation Method:	No Prep VOC GC Air	
23A0017-01	1.00 mL / 1.00 mL	ALT-145	BGA0076	SGA0057	AG00026
23A0017-01	1.00 mL / 1.00 mL	EPA 3C	BGA0076	SGA0057	AG00026



## **Certificate of Analysis**

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#### Laboratory Order ID 23A0017

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Date Received:

January 3, 2023 11:55

4330 Lewis Road, Suite 1

Date Issued:

January 5, 2023 14:06

Harrisburg, PA 17111

**Bristol** 

Submitted To: Tom Lock

Client Site I.D.:

Project Number:

07220028.00

Purchase Order:

07-SO04485

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

#### **Enthalpy Analytical**

	R	eporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
Batch BGA0076 - No Prep VO	C GC Air									
Blank (BGA0076-BLK1)					Prep	pared & A	Analyzed	: 01/04/2	023	
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							
LCS (BGA0076-BS1)					Prep	pared & /	Analyzed	: 01/04/2	023	
Methane	4650	500	ppmv	5000		93.0	0-200			
Methane	4650	0.05	ppmv	5000		93.0	70-130			
Carbon dioxide	4120	500	ppmv	5000		82.4	0-200			
Carbon dioxide	4120	0.05	ppmv	5000		82.4	70-130			
Oxygen (O2)	5410	500	ppmv	5000		108	0-200			
Oxygen (O2)	5410	0.05	ppmv	5000		108	70-130			
Nitrogen (N2)	5570	1	ppmv	5000		111	70-130			
Hydrogen (H2)	5950	200	ppmv	5100		117	0-200			
Hydrogen (H2)	5950	0.02	ppmv	5100		117	70-130			
Nitrogen (N2)	5570	2000	ppmv	5000		111	0-200			
Carbon Monoxide	4890	10	ppmv	5000		97.9	0-200			
Carbon Monoxide	4890	0.001	ppmv	5000		97.9	70-130			
Duplicate (BGA0076-DUP1)		So	urce: 23A	0017-01	Prep	pared &	Analyzed	: 01/04/2	023	
Methane	137000	4500	ppmv		13600	00		0.606	25	
Methane	13.7	0.45	Vol%		13.6	6		0.606	5	
Carbon dioxide	278000	4500	ppmv		27500	00		1.02	25	
Carbon dioxide	27.8	0.45	Vol%		27.5	5		1.02	5	
Oxygen (O2)	5.90	0.45	Vol%		5.87	7		0.422	5	
Oxygen (O2)	59000	4500	ppmv		5870	0		0.422	25	
Nitrogen (N2)	42.7	9.00	Vol%		42.5	5		0.610	5	
Hydrogen (H2)	25300	1800	ppmv		2510	0		0.583	25	
Nitrogen (N2)	427000	18000	ppmv		42500	00		0.610	25	
Hydrogen (H2)	2.53	0.18	Vol%		2.51			0.583	5	



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 23A0017

Client Name: SCS Field Services - Harrisburg, PA

Date Received:

January 3, 2023 11:55

4330 Lewis Road, Suite 1

Date Issued:

January 5, 2023 14:06

Harrisburg, PA 17111

Bristol

Submitted To: Tom Lock

Client Site I.D.:

Project Number:

07220028.00

Purchase Order:

07-SO04485

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

### **Enthalpy Analytical**

	Reporting			Spike	Source	%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC Limits	RPD	Limit	Qual

#### Batch BGA0076 - No Prep VOC GC Air

Duplicate (BGA0076-DUP1)		Sou	urce: 23A0017-01	Prepared & A	Prepared & Analyzed: 01/04/2023		
Carbon Monoxide	184	90.0	ppmv	180	2.28	25	
Carbon Monoxide	0.02	0.009	Vol%	0.02	2.28	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



## **Certificate of Analysis**

Final Report

#### Laboratory Order ID 23A0017

SCS Field Services - Harrisburg, PA Client Name:

January 3, 2023 11:55 Date Received: Date Issued:

4330 Lewis Road, Suite 1

January 5, 2023 14:06

Harrisburg, PA 17111

Submitted To: Tom Lock

**Bristol** 

Project Number: 07220028.00

Purchase Order:

07-SO04485

#### **Qualifiers and Definitions**

RPD Relative Percent Difference

Qual Qualifers

Client Site I.D.:

-RE Denotes sample was re-analyzed

PF Preparation Factor MDL Method Detection Limit LOQ Limit of Quantitation parts per billion by volume ppbv

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.

SCS Field Service.

		Fr. y		- American de la companya della companya della companya de la companya della comp	Jub # 07220028.00					
Sample	Flow Control a	, Claw	Canister ID	Size	Clean batch #	Lab outgoing	Lelb recteurs			
37	063-00491	5005	12408	1.4	21/122-03	21.2	can Vac			
37	Sert Date 12/20/22	Stept time		starting temp	Stop Date 12/20/22	Stop time	final Can Vac			
							End temp			
! Ryan Sel Suman Ce 2/30/2022	lexe dexe	Sis Alt Hydr EPR	145 X rogan X + 3C X	\	SCS Field Services Bristol Recd: 01/03/2023 Due					
2/30/2022	1155				90	le				

using this cause my last copy was ruined.



### **Certificate of Analysis**

Final Report

#### Laboratory Order ID 23A0017

SCS Field Services - Harrisburg, PA Client Name:

Date Received: January 3, 2023 11:55 Date Issued:

4330 Lewis Road, Suite 1

January 5, 2023 14:06

Harrisburg, PA 17111

Submitted To: Tom Lock

Bristol

Client Site I.D.:

Project Number: 07220028.00

Purchase Order: 07-SO04485

## **Sample Conditions Checklist**

Samples Received at:	20.90°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**

Per Tom Lock via email:

\*Logged for standard 5-day TAT, as no TAT indicated on COC.

\*Logged for ALT-145 for CO and EPA 3C for Methane, Carbon Dioxide, Oxygen, Hydrogen, and Nitrogen, as COC indicates ALT 145, Hydrogen, EPA 3C.

\*Logged as LV, as no matrix indicated on COC.

MRS 01/03/23 1619

Attachment 4

Daily Logs

# **DAILY LOG**

<b>JOB NO</b> . 07	220028.00	TASK N	Ο.	00001		DATE	12.8		ROJECT Ame bris	TOL	
<b>TEMP</b> 53	}	WEATH	ER	Partly cl	oudy	B.P.	28.1		IND 2NE		
SCS-FS	LABOR	HOURS		OT					HOURS	ОТ	
Ryan Seymo	our	12									
Will Fabre		10									
								DAILY TOTAL	22		
EQUIP, SV	CS, , MLG	QTY	U	INITS					QTY	UNITS	
GEM	5000	2		Day	MX4				2	Day	
Tru	ıck	2		Day		G	enerato	or		Day	
INSTRUMI	ENT CALIBR	ATION (CAL. GAS	S)	СН	14	СН	1	02	CO2		
MC	DEL	S/N		(%-V		(%-LI		LOW CALE %-VOL)	(%-VOL)	H2S (PPM)	
50	000	500399		50	)			20.9	35.0		
GW13- closed GW3-adjusted GW15- adjusted GW12- adjusted GW11- adjusted GW10- adjusted GW14-adjusted GW8- adjusted GW6- adjusted GW6- adjusted GW19- adjusted	Blower re Exceeda ment opened ad it down sho ad vacuum upsted vacuum ups	ortly  ortly  up  ortly  up  ortly  up  ortly  down. No gas  down. Little gas	use it d is st	was pouritraight mud	% 02 being tal	end its too	BAL-:		wered or the dirt n	eeds brought up ar	ound it.
PREPARI RYAN SEYMOU	ED BY:	.,		ACCEP <sup>1</sup>		<b>/</b> :					

RYAN SEYMOUR

## **DAILY LOG**

JOB NO.	07220028.00	TASK N	Ο.	00004		DATE	12.9	.22	PRO NAM	JECT IE	BRIST	ΓOL	
TEMP	51	WEATH	ER	Partly cl	oudy	B.P.	28.8	0	WIN	D	3mph	NW	
SCS-	-FS LABOR	HOURS		OT						HOL	JRS	OT	
Rya	n Seymour	10											
								DAILY TOTA	٩L	10			
EQUIP	, SVCS, , MLG	QTY	U	INITS						QT	Υ	UNITS	
G	EM 5000	1		Day			MX4			1		Day	
	Truck	1		Day		G	enerato	or				Day	
INSTRUMENT CALIBRATION (CAL. GAS)  MODEL S/N		S)	CH (%-V		CH <sup>4</sup> (%-LE		02 LOW CAL %-VOL)		CC (%-V		H2S (PPM)		
	5000	500399		50	)			20.9		34	.9	,	
SUMMA	Blower r	on site for reched eading: CH4- 36.2 edances were 51,	2% (	C02-35.3	% 02	2- 3.4 %	BAL-	25.1%	oped tl	nem off t	o Air wa	ater n soil.	
I increas	ed vacuum at 54	19 again. Etools r and dropped the ipple tips on the s	temp	down belo	ow samp	le temp. So	l did r		ple for	it.			
PREP	ARED BY:			ACCEP <sup>-</sup>	TED BY	<b>/</b> :							

**SEYMOUR** 

## DAILY LOG

JOB NO. 0722	20028.00	TASK NO	<b>)</b> . <u>(</u>	0004		DATE	12.1	4.22	PRO.		BRIST	OL	
<b>TEMP</b> 42		WEATHE	ER F	Partly cl	oudy	B.P.	28.8	0	WIND	)	3mph N	٧W	
SCS-FS LA	BOR	HOURS	0	)T						HOU	RS	OT	
Ryan Seyr	nour	10											
								DAILY TOTA	AL.	10			
EQUIP, SVCS	, , MLG	QTY	UN	ITS						QT	Υ	UNITS	
GEM 50	00	1	Da	ay			MX4			1		Day	
Truck		1	Da	ay		Ge	enerat	or				Day	
INSTRUMENT CALIBRATION (CAL. GAS)  MODEL S/N			5)	CH (%-V		CH <sup>2</sup> (%-LE		02 LOW CALI %-VOL)		CO (%-V		H2S (PPM)	
5000	)	500399		50	)		•	20.9		34.	.9		
SUMMARY	Blower rea	on site for rechect ading: CH4- 35.1 dances were 67,	% C0	02-35.1	% 02	- 3.9 %	BAL-	-26%	em off t	o Air wa	ater n soil	l.	
Etools needs to	add a syste	em side reading f	or it. I	emailed	them and	d asked the	m to fi	x it					
55 needs dirt po	ut around it.	So I can get a re	ading f	for it.									
Met Sandy and	let Sandy and Wayne with health and safety. Im going to do her hydrogen samples Monday next week.												
PREPARED RYAN	PREPARED BY: ACCEPTED BY:												

**SEYMOUR** 

## DAILY LOG

JOB NO. 0722	20028.00	TASK NO	<b>o.</b> 00004		DATE	12.20		ROJECT AME	BRIST	OL	
<b>TEMP</b> 41		WEATHE	<b>ER</b> Partly o	cloud	B.P.	28.3	4 <b>W</b>	'IND	7mph	SW	
SCS-FS LA	BOR	HOURS	OT					НО	URS	OT	
Ryan Seyr	nour	12									
							DAILY TOTAL	12			
EQUIP, SVCS	, , MLG	QTY	UNITS					Q	.TY	UNITS	
GEM 50	00	1	Day			MX4			1	Day	
Truck		1	Day		Ge	enerato	r			Day	
INSTRUMEN MODE		TION (CAL. GAS		H4 VOL)	CH4 (%-LE		02 LOW CALE %-VOL)	_	O2 VOL)	H2S (PPM)	
5000	)	500399	į	50		•	20.9	3	4.9		
SUMMARY	Blower rea	on site for recheck ading: CH4- 32.3 dances were 67,	% C02-30.4	· % 02	- 4.3 %	BAL-2	28%	145. But 6	7 was in tl	he clear at 133 deg	rees
I Grabbed 2 rea	adings from	19 because etool	ls only update	ed one Bris	stol gam file						
PREPARED RYAN	BY:		ACCEF	PTED BY	<b>/</b> :						

**SEYMOUR** 

## **DAILY LOG**

JOB NO.	07220028.00	TASK N	Ο.	00004		DATE	12.3		PROJEC NAME	BRIST	ΓOL	
TEMP	48	WEATH	ER	Partly cl	oud	B.P.	28.3	4	WIND	2mph	NE	
SCS-F	S LABOR	HOURS		OT					ı	HOURS	OT	
Ryan	Seymour	12										
								DAILY TOTA	L 12			
EQUIP,	SVCS, , MLG	QTY	Į	JNITS						QTY	UNITS	
GE	M 5000	1		Day			MX4			1	Day	
7	Truck	1		Day		G	enerato	or			Day	
INSTRUMENT CALIBRATION (CAL. GAS)  CH4  MODEL S/N (%-VOL					CH- (%-LE		02 LOW CALE %-VOL)		CO2 %-VOL)	H2S (PPM)		
	5000	500399		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<u> </u>	(70 ==	,	70 102)		,, , , , , , , , , , , , , , , , , , ,		
SUMMAF	Blower re	my gem on when							rying to ca	alibrate it and	d rectify the issue b	ut it
Methane o	•	over 1100%. The	en wh	en I tried t	to take a	reading off	a well	it told me all m	nethane s	tayed at 80%	6.	
										•	st my 3 readings.	
		out my gem. I wil		•		-					, ,	
PREPA	RED BY:		_	ACCEP.	TED BY	/:						

JOB NO. 07220028.00 TASK NO.	10 <b>DAT</b>	E 12/05/22 <b>PROJECT NAME</b> Bris	tol Landfill
TEMP: °F		WEATHER	
(List employee completing form first.) Chris Boggs 1	HOURS 2 2	SCS-FS LABOR	HOURS
EQUIPMENT		EQUIPMENT	
WORK PERFORMED - DESCRIPTION OF ITEM (Example, Routine, SEM, etc)		WORK PERFORMED DESCRIPTION OF ITEM	
Notes	Installed well bore s	skirts.	

JOB NO.	07220028.00	TASK NO.	10	DATE	12/06/22	PROJECT NAME	≣ Bristol L	andfill.	
TEMP:		°F			WEATH	ER			
(List emplo	SCS-FS LABOR yee completing form f	First.)	HOURS			SCS-FS LABOR		HOURS	
Carl Dixon		7							
	EQUIPN	MENT				EQUIPME	NT		
	RFORMED - DESCRIF example, Routine, SEI				WORK PERFORM DESCRIPTION O				
NI (			1 ( 11 1		I: ( B II I ( I				
Notes			installed w	eli bole s	oriits. I ulieu stuor	k pump in well EW-56	J. IVallieu of	ut.	

JOB NO.	07220028.00	TASK NO.	5	DATE	12/07/22	PROJECT NA	<b>ME</b> Bristo	ol Landfill		
TEMP:		°F			WEATHER					
	SCS-FS LABOR		HOURS			SCS-FS LABOR		HOURS		
Chris Boggs	yee completing form to	1								
Carl Dixon		1								
EQUIPMENT					EQUIPMENT					
	RFORMED - DESCRII xample, Routine, SE				WORK PERFORM DESCRIPTION O					
Notes			Installed fle	ex hose o	on EW-55 with ne	w clamps. Well is 8	3 ft. tall.			

JOB NO.	07220028.00	TASK NO.	10	DATE	E 12/08/22	PROJECT NA	ME Bristo	ol Landfill	
TEMP:		°F			WEATHER				
	SCS-FS LABOR yee completing form t		HOURS			SCS-FS LABOR		HOURS	
Chris Boggs		8							
Carl Dixon		8							
	EQUIPN	MENT				EQUIP	MENT		
WORK PERFORMED - DESCRIPTION OF ITEM (Example, Routine, SEM, etc)					WORK PERFORM DESCRIPTION O				
		1							
No.4			المالم المالم		-l		:-4-		
Notes					olug around well u 8, 51, 52, 53, 54,				

JOB NO. 07220028.00 TASK NO.	10 <b>DAT</b>	E 12/09/22	PROJECT NAME B	Bristol Landfill		
TEMP: °F		WEATHER				
SCS-FS LABOR (List employee completing form first.)  Chris Boggs 6  Carl Dixon 4		SC	CS-FS LABOR	HOURS		
EQUIPMENT		EQUIPMENT				
WORK PERFORMED - DESCRIPTION OF ITEM (Example, Routine, SEM, etc)		WORK PERFORMED DESCRIPTION OF IT				
Notes	Cleaning, loading u	p. Travel nome.				

### Appendix C

Solid Waste Permit 588 Daily Wellhead Temperature Averages

The data provided in this report represent initial readings provided by field instrumentation without Validation, analysis, quality assurance review, or context based on operating conditions. This report is subject to revision following quality assurance review and an analysis of operating conditions. SCS will continue to provide a supplemental report with additional information and further analysis on a bi-monthly basis at a minimum.

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SCS ENGINEERS

07222143.00 | December 1, 2022

Well ID	Average Temperature (°F)
Well 32R	118.5
Well 35	51.3
Well 39	78.4
Well 40	118.5
Well 46	128.6
Well 47	70.0
Well 49	127.6
Well 50	102.8
Well 51	86.6
Well 52	112.8
Well 53	125.0
Well 54	112.3
Well 55	80.7
Well 56	113.4
Well 57	114.8
Well 58	111.6
Well 59	111.8
Well 60	102.4
Well 62	105.4
Well 63	102.6
Well 64	96.5
Well 65	84.9
Well 66	97.2
Well 67	98.0
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 2, 2022

Well ID	Average Temperature (°F)
Well 32R	118.8
Well 35	53.4
Well 39	77.6
Well 40	119.5
Well 46	128.6
Well 47	70.8
Well 49	128.1
Well 50	102.9
Well 51	93.6
Well 52	113.9
Well 53	125.4
Well 54	113.4
Well 55	79.1
Well 56	114.5
Well 57	115.4
Well 58	112.0
Well 59	112.4
Well 60	102.9
Well 62	105.3
Well 63	101.8
Well 64	97.0
Well 65	85.8
Well 66	102.2
Well 67	98.6
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 3, 2022

Well ID	Average Temperature (°F)
Well 32R	118.7
Well 35	54.6
Well 39	75.8
Well 40	120.2
Well 46	128.3
Well 47	70.5
Well 49	128.7
Well 50	102.6
Well 51	101.4
Well 52	114.6
Well 53	125.3
Well 54	113.5
Well 55	77.0
Well 56	115.1
Well 57	115.6
Well 58	112.3
Well 59	112.5
Well 60	103.1
Well 62	104.9
Well 63	100.1
Well 64	96.7
Well 65	86.0
Well 66	105.9
Well 67	97.4
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 4, 2022

Well ID	Average Temperature (°F)
Well 32R	118.5
Well 35	54.1
Well 39	73.0
Well 40	120.2
Well 46	127.9
Well 47	69.5
Well 49	129.1
Well 50	102.0
Well 51	112.1
Well 52	115.1
Well 53	125.3
Well 54	112.5
Well 55	74.5
Well 56	115.9
Well 57	115.5
Well 58	112.1
Well 59	112.4
Well 60	102.9
Well 62	104.0
Well 63	97.3
Well 64	95.6
Well 65	85.9
Well 66	105.6
Well 67	91.7
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 5, 2022

Well ID	Average Temperature (°F)
Well 32R	117.6
Well 35	54.8
Well 39	54.9
Well 40	121.2
Well 46	126.0
Well 47	67.2
Well 49	128.9
Well 50	104.2
Well 51	99.0
Well 52	114.2
Well 53	127.4
Well 54	110.8
Well 55	80.5
Well 56	118.4
Well 57	116.9
Well 58	109.6
Well 59	110.2
Well 60	102.0
Well 62	105.1
Well 63	110.2
Well 64	101.0
Well 65	87.3
Well 66	104.9
Well 67	109.7
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 6, 2022

Well ID	Average Temperature (°F)
Well 32R	117.4
Well 35	55.2
Well 39	52.2
Well 40	121.3
Well 46	125.6
Well 47	66.9
Well 49	128.9
Well 50	104.4
Well 51	99.6
Well 52	114.8
Well 53	127.7
Well 54	110.6
Well 55	80.6
Well 56	119.2
Well 57	117.2
Well 58	109.5
Well 59	109.8
Well 60	102.0
Well 62	106.7
Well 63	113.5
Well 64	101.1
Well 65	87.6
Well 66	104.9
Well 67	110.9
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 7, 2022

Well ID	Average Temperature (°F)
Well 32R	117.4
Well 35	55.1
Well 39	49.6
Well 40	121.6
Well 46	125.5
Well 47	66.7
Well 49	128.9
Well 50	104.6
Well 51	91.8
Well 52	114.2
Well 53	128.0
Well 54	110.8
Well 55	82.8
Well 56	119.0
Well 57	117.4
Well 58	109.2
Well 59	109.8
Well 60	101.8
Well 62	106.4
Well 63	116.7
Well 64	101.4
Well 65	87.7
Well 66	104.9
Well 67	115.0
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 8, 2022

Well ID	Average Temperature (°F)
Well 32R	117.1
Well 35	54.2
Well 39	48.6
Well 40	121.4
Well 46	125.5
Well 47	65.9
Well 49	128.7
Well 50	105.0
Well 51	85.6
Well 52	112.7
Well 53	127.9
Well 54	109.9
Well 55	83.6
Well 56	118.6
Well 57	117.1
Well 58	108.6
Well 59	109.6
Well 60	101.3
Well 62	105.7
Well 63	116.3
Well 64	103.2
Well 65	87.2
Well 66	104.0
Well 67	119.0
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 9, 2022

Well ID	Average Temperature (°F)
Well 32R	116.8
Well 35	53.4
Well 39	47.7
Well 40	121.2
Well 46	125.5
Well 47	64.9
Well 49	128.4
Well 50	106.9
Well 51	78.0
Well 52	113.1
Well 53	127.7
Well 54	108.2
Well 55	82.8
Well 56	118.1
Well 57	116.7
Well 58	108.0
Well 59	109.4
Well 60	100.6
Well 62	105.2
Well 63	115.9
Well 64	104.3
Well 65	86.6
Well 66	103.0
Well 67	120.6
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 10, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 10, 2022

Well ID	Average Temperature (°F)
Well 32R	116.5
Well 35	52.5
Well 39	46.5
Well 40	121.0
Well 46	125.5
Well 47	63.6
Well 49	128.2
Well 50	107.8
Well 51	70.2
Well 52	113.2
Well 53	127.4
Well 54	107.1
Well 55	82.6
Well 56	117.4
Well 57	115.9
Well 58	107.3
Well 59	109.3
Well 60	100.0
Well 62	104.7
Well 63	115.4
Well 64	103.6
Well 65	86.0
Well 66	101.8
Well 67	116.1
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 11, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 11, 2022

Well ID	Average Temperature (°F)
Well 32R	116.1
Well 35	51.3
Well 39	45.2
Well 40	120.6
Well 46	125.1
Well 47	62.2
Well 49	128.0
Well 50	108.2
Well 51	66.1
Well 52	116.4
Well 53	127.0
Well 54	106.4
Well 55	82.6
Well 56	116.4
Well 57	116.3
Well 58	107.2
Well 59	109.1
Well 60	99.2
Well 62	104.2
Well 63	115.0
Well 64	103.5
Well 65	85.2
Well 66	100.0
Well 67	116.4
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 12, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 12, 2022

Well ID	Average Temperature (°F)
Well 32R	114.2
Well 35	43.8
Well 39	41.7
Well 40	118.3
Well 46	123.9
Well 47	58.4
Well 49	126.9
Well 50	106.7
Well 51	67.1
Well 52	114.5
Well 53	125.1
Well 54	105.7
Well 55	80.1
Well 56	112.1
Well 57	114.5
Well 58	101.3
Well 59	108.4
Well 60	95.9
Well 62	99.5
Well 63	111.7
Well 64	104.8
Well 65	81.6
Well 66	79.9
Well 67	114.3
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 13, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 13, 2022

Well ID	Average Temperature (°F)
Well 32R	114.0
Well 35	43.2
Well 39	41.5
Well 40	118.0
Well 46	123.6
Well 47	58.0
Well 49	126.8
Well 50	106.5
Well 51	66.6
Well 52	115.1
Well 53	124.8
Well 54	105.5
Well 55	80.2
Well 56	111.2
Well 57	114.4
Well 58	100.4
Well 59	108.4
Well 60	95.5
Well 62	99.0
Well 63	111.3
Well 64	105.1
Well 65	81.2
Well 66	77.0
Well 67	116.7
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 14, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 14, 2022

Well ID	Average Temperature (°F)
Well 32R	113.8
Well 35	42.3
Well 39	41.2
Well 40	117.7
Well 46	123.3
Well 47	57.7
Well 49	126.7
Well 50	106.2
Well 51	66.4
Well 52	115.3
Well 53	124.6
Well 54	105.4
Well 55	79.6
Well 56	111.0
Well 57	114.5
Well 58	99.3
Well 59	108.4
Well 60	95.1
Well 62	98.4
Well 63	110.8
Well 64	105.3
Well 65	80.8
Well 66	73.4
Well 67	115.8
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 15, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 15, 2022

Well ID	Average Temperature (°F)
Well 32R	113.5
Well 35	41.0
Well 39	40.6
Well 40	117.5
Well 46	123.2
Well 47	57.3
Well 49	126.6
Well 50	105.7
Well 51	67.4
Well 52	112.8
Well 53	124.4
Well 54	105.8
Well 55	78.8
Well 56	110.7
Well 57	114.0
Well 58	98.4
Well 59	108.3
Well 60	94.6
Well 62	97.6
Well 63	110.3
Well 64	105.6
Well 65	80.2
Well 66	69.2
Well 67	111.5
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 16, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 16, 2022

Well ID	Average Temperature (°F)
Well 32R	113.2
Well 35	39.5
Well 39	39.9
Well 40	117.0
Well 46	123.4
Well 47	56.7
Well 49	126.5
Well 50	105.6
Well 51	69.8
Well 52	112.4
Well 53	124.2
Well 54	105.9
Well 55	78.1
Well 56	110.4
Well 57	113.4
Well 58	97.6
Well 59	108.0
Well 60	94.1
Well 62	96.7
Well 63	109.8
Well 64	105.7
Well 65	79.6
Well 66	67.8
Well 67	108.8
Well 68	0.0

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07222143.00 | December 17, 2022

#### Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 17, 2022

Well ID	Average Temperature (°F)
Well 32R	113.0
Well 35	39.1
Well 39	40.1
Well 40	116.5
Well 46	123.6
Well 47	56.9
Well 49	126.4
Well 50	105.9
Well 51	73.3
Well 52	113.1
Well 53	124.0
Well 54	106.2
Well 55	78.4
Well 56	110.2
Well 57	113.0
Well 58	97.2
Well 59	107.9
Well 60	94.2
Well 62	96.0
Well 63	109.5
Well 64	106.2
Well 65	79.6
Well 66	68.5
Well 67	107.3
Well 68	0.0

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07222143.00 | December 18, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 18, 2022

Well ID	Average Temperature (°F)
Well 32R	112.7
Well 35	38.9
Well 39	41.2
Well 40	115.8
Well 46	123.8
Well 47	57.8
Well 49	126.5
Well 50	105.8
Well 51	79.1
Well 52	114.1
Well 53	123.8
Well 54	106.4
Well 55	78.9
Well 56	110.0
Well 57	112.6
Well 58	96.8
Well 59	107.7
Well 60	94.8
Well 62	95.2
Well 63	109.3
Well 64	107.2
Well 65	79.9
Well 66	70.7
Well 67	106.2
Well 68	0.0

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07222143.00 | December 19, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 19, 2022

Well ID	Average Temperature (°F)
Well 32R	80.0
Well 35	34.2
Well 39	37.2
Well 40	74.8
Well 46	93.6
Well 47	43.9
Well 49	105.3
Well 50	83.7
Well 51	62.6
Well 52	78.4
Well 53	95.9
Well 54	97.8
Well 55	53.8
Well 56	77.6
Well 57	117.8
Well 58	62.9
Well 59	82.5
Well 60	80.8
Well 62	52.3
Well 63	77.2
Well 64	96.3
Well 65	62.8
Well 66	52.6
Well 67	87.0
Well 68	0.0

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07222143.00 | December 20, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 20, 2022

Well ID	Average Temperature (°F)
Well 32R	76.0
Well 35	34.2
Well 39	37.6
Well 40	69.6
Well 46	89.9
Well 47	43.0
Well 49	102.7
Well 50	80.8
Well 51	62.6
Well 52	75.3
Well 53	92.5
Well 54	96.7
Well 55	50.8
Well 56	73.5
Well 57	118.3
Well 58	58.0
Well 59	79.3
Well 60	79.5
Well 62	46.5
Well 63	73.3
Well 64	94.7
Well 65	60.9
Well 66	52.3
Well 67	84.8
Well 68	0.0

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SCS ENGINEERS

07222143.00 | December 21, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 21, 2022

Well ID	Average Temperature (°F)
Well 32R	70.8
Well 35	33.1
Well 39	36.7
Well 40	63.2
Well 46	84.9
Well 47	40.0
Well 49	99.3
Well 50	77.5
Well 51	57.5
Well 52	67.8
Well 53	88.0
Well 54	94.8
Well 55	46.3
Well 56	68.7
Well 57	119.0
Well 58	52.0
Well 59	75.1
Well 60	78.1
Well 62	39.3
Well 63	68.2
Well 64	92.3
Well 65	57.8
Well 66	48.9
Well 67	81.6
Well 68	0.0

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07222143.00 | December 22, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 22, 2022

Well ID	Average Temperature (°F)
Well 32R	63.5
Well 35	31.4
Well 39	33.8
Well 40	54.5
Well 46	78.2
Well 47	35.6
Well 49	94.6
Well 50	72.7
Well 51	49.7
Well 52	59.0
Well 53	81.7
Well 54	92.9
Well 55	40.1
Well 56	61.4
Well 57	120.3
Well 58	46.3
Well 59	69.7
Well 60	72.6
Well 62	31.3
Well 63	60.9
Well 64	89.9
Well 65	53.5
Well 66	40.7
Well 67	77.1
Well 68	0.0

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07222143.00 | December 23, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 23, 2022

Well ID	Average Temperature (°F)
Well 32R	53.4
Well 35	28.4
Well 39	29.0
Well 40	42.6
Well 46	68.9
Well 47	29.6
Well 49	88.3
Well 50	66.3
Well 51	37.9
Well 52	49.3
Well 53	73.1
Well 54	91.6
Well 55	31.6
Well 56	50.8
Well 57	117.5
Well 58	40.4
Well 59	62.1
Well 60	64.2
Well 62	29.0
Well 63	51.4
Well 64	83.5
Well 65	47.9
Well 66	34.3
Well 67	72.2
Well 68	0.0

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07222143.00 | December 24, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 24, 2022

Well ID	Average Temperature (°F)
Well 32R	41.1
Well 35	28.0
Well 39	27.8
Well 40	30.6
Well 46	58.1
Well 47	28.1
Well 49	81.0
Well 50	60.8
Well 51	28.5
Well 52	44.2
Well 53	65.4
Well 54	96.9
Well 55	28.7
Well 56	39.5
Well 57	114.8
Well 58	41.0
Well 59	53.1
Well 60	60.1
Well 62	28.8
Well 63	43.2
Well 64	78.1
Well 65	45.0
Well 66	34.4
Well 67	74.1
Well 68	0.0

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07222143.00 | December 25, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 25, 2022

Well ID	Average Temperature (°F)
Well 32R	31.1
Well 35	28.5
Well 39	28.4
Well 40	30.2
Well 46	63.4
Well 47	28.6
Well 49	71.7
Well 50	55.7
Well 51	29.0
Well 52	49.4
Well 53	72.3
Well 54	103.9
Well 55	29.5
Well 56	42.2
Well 57	110.2
Well 58	45.7
Well 59	56.9
Well 60	60.3
Well 62	29.5
Well 63	38.5
Well 64	71.7
Well 65	43.7
Well 66	36.9
Well 67	79.5
Well 68	0.0

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07222143.00 | December 26, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 26, 2022

Well ID	Average Temperature (°F)
Well 32R	34.3
Well 35	27.7
Well 39	27.4
Well 40	28.2
Well 46	73.4
Well 47	27.6
Well 49	71.9
Well 50	58.5
Well 51	27.7
Well 52	44.8
Well 53	72.7
Well 54	102.9
Well 55	28.9
Well 56	42.4
Well 57	113.1
Well 58	50.0
Well 59	67.2
Well 60	70.1
Well 62	27.9
Well 63	40.5
Well 64	69.3
Well 65	45.7
Well 66	37.7
Well 67	78.6
Well 68	0.0

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07222143.00 | December 27, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 27, 2022

Well ID	Average Temperature (°F)
Well 32R	31.9
Well 35	31.2
Well 39	30.6
Well 40	32.4
Well 46	88.9
Well 47	31.5
Well 49	86.5
Well 50	69.5
Well 51	32.0
Well 52	65.8
Well 53	97.3
Well 54	111.3
Well 55	32.8
Well 56	55.2
Well 57	83.1
Well 58	59.3
Well 59	76.7
Well 60	64.0
Well 62	32.7
Well 63	47.1
Well 64	89.8
Well 65	54.1
Well 66	45.6
Well 67	88.0
Well 68	0.0

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07222143.00 | December 28, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 28, 2022

Well ID	Average Temperature (°F)
Well 32R	69.1
Well 35	36.0
Well 39	40.1
Well 40	60.4
Well 46	70.2
Well 47	45.3
Well 49	74.7
Well 50	61.2
Well 51	64.1
Well 52	73.7
Well 53	95.4
Well 54	109.0
Well 55	50.7
Well 56	68.1
Well 57	79.8
Well 58	47.6
Well 59	60.9
Well 60	77.3
Well 62	38.2
Well 63	64.5
Well 64	75.8
Well 65	55.1
Well 66	61.6
Well 67	92.5
Well 68	0.0

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07222143.00 | December 29, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 29, 2022

Well ID	Average Temperature (°F)
Well 32R	120.0
Well 35	44.1
Well 39	57.8
Well 40	113.7
Well 46	128.1
Well 47	70.1
Well 49	129.7
Well 50	108.6
Well 51	95.2
Well 52	104.1
Well 53	128.0
Well 54	104.1
Well 55	85.2
Well 56	112.8
Well 57	104.8
Well 58	103.0
Well 59	107.5
Well 60	108.9
Well 62	43.5
Well 63	116.6
Well 64	123.4
Well 65	86.9
Well 66	110.6
Well 67	103.3
Well 68	0.0

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07222143.00 | December 30, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 30, 2022

Well ID	Average Temperature (°F)
Well 32R	119.4
Well 35	49.6
Well 39	65.0
Well 40	116.5
Well 46	129.8
Well 47	74.2
Well 49	129.4
Well 50	109.8
Well 51	98.6
Well 52	115.3
Well 53	127.7
Well 54	108.6
Well 55	88.6
Well 56	116.2
Well 57	105.7
Well 58	111.3
Well 59	107.5
Well 60	61.1
Well 62	48.0
Well 63	117.5
Well 64	123.9
Well 65	88.4
Well 66	111.5
Well 67	105.5
Well 68	0.0

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07222143.00 | December 31, 2022

# Solid Waste Permit 588 Daily Wellhead Temperature Averages for Dec 31, 2022

Well ID	Average Temperature (°F)
Well 32R	119.4
Well 35	53.1
Well 39	64.4
Well 40	117.9
Well 46	129.2
Well 47	76.4
Well 49	129.6
Well 50	110.9
Well 51	96.9
Well 52	117.9
Well 53	128.2
Well 54	116.4
Well 55	91.0
Well 56	118.0
Well 57	114.9
Well 58	111.6
Well 59	107.4
Well 60	49.7
Well 62	49.9
Well 63	118.2
Well 64	124.5
Well 65	91.6
Well 66	113.7
Well 67	110.1
Well 68	0.0

### Appendix D

Landfill Gas Collection System Expansion: Stage 1

# Invitation for Bids No. SW-23-012 Landfill Gas Collection System Expansion: Stage 1

Bristol Integrated Solid Waste Management Facility



City of Bristol 300 Lee Street Bristol, Virginia 24201 276-645-7380



### SCS ENGINEERS

02218208.14-1 | December 9, 2022

15521 Midlothian Turnpike, Suite 305 Midlothian, VA 23113 804-378-7440

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#### **SECTION 00 11 10**

# INVITATION FOR BIDS IFB# SW-23-012

# LANDFILL GAS COLLECTION SYSTEM EXPANSION: STAGE 1

#### **BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY**

Sealed bids will be received by the City of Bristol, Virginia (referred to as City or OWNER) in the Purchasing Department Office, 300 Lee Street, Bristol, VA 24201, until **2:00 pm on Thursday, January 12, 2023** and immediately thereafter publicly opened and read aloud for providing labor, material and equipment pertaining to the installation of the Stage 1 Landfill Gas (LFG) Collection System Expansion at the Bristol Integrated Solid Waste Management Facility in Bristol, VA. The sealed envelope shall be addressed to City of Bristol Purchasing Department, attention of Emily Compton. The City reserves the right to reject any or all bids and to waive informalities and irregularities.

A Non-Mandatory on-site, in-person Pre-Bid Meeting will be held at **10:00 am on Friday, December 16, 2022.** There will be an option to participate remotely in the Pre-Bid Meeting via video conference. Bidders that do not attend the on-site in-person Pre-Bid Meeting must schedule and conduct a separate site visit prior to submitting the Bid. All questions proposed by potential Bidders must be submitted in writing by 5:00 pm on Thursday, January 5, 2023.

- Invitations to participate in the Pre-Bid Meeting remotely via video conference can be obtained by contacting Mr. Bob Dick, PE of SCS Engineers at (804) 486-1911 or BDick@scsengineers.com.
- Separate site visits may be scheduled by contacting Mike Martin, Solid Waste Administrator, at (423) 571-7332 or <a href="martin@bristolva.org">mmartin@bristolva.org</a>, or Joey Lamie, Project Manager, at (276) 645-3726 or Joey.Lamie@bristolva.org.

All work will be in accordance with the Drawings and Specifications which are on file with the City of Bristol and SCS Engineers.

Bids will be received under the Single-Prime bidding method only. Bids must be on the standard form provided in the Project Manual. Bids may be submitted via courier, mail, or hand delivered. Bids submitted via fax or electronic mail or other means will not be accepted.

The scope of work includes, but is not limited to, installation of approximately 35 vertical LFG extraction wells, approximately 4,000 linear feet of belowgrade HDPE LFG collection piping, approximately 4,100 linear feet of belowgrade forcemain/pneumatic supply piping, approximately 25 dedicated dewatering pumps (exact number dependent on drilling activities), various connections to the existing LFG Collection System, isolation valves, and related site work.

The Bidding Documents may be obtained by contacting SCS Engineers at 15521 Midlothian Turnpike, Suite 305, Midlothian, Virginia 23113, (804) 486-1911. Requests for electronic copies of the Bidding Documents should be directed to Mr. Bob Dick, PE at (804) 486-1911 or BDick@scsengineers.com.



### CITY OF BRISTOL

Jacob Chandler, PE, Director of Public Works

### **END OF SECTION 00 11 10**



#### **SECTION 00 21 10**

### INSTRUCTIONS TO BIDDERS

For a Bid to be considered, it must be in accordance with the following instructions:

#### 1. **BIDS**

Bids must be made on the Bid Forms provided herein, and all blank spaces for Bids, Alternates and Unit Prices, applicable to bidder's work, shall be properly filled in. When requested Alternates are not Bid, the Bid may be considered non responsive. The Bidders agree that Bids submitted on the specified Bid Forms, which are detached from specifications, will be considered and will have the same force and effect as if attached thereto. Numbers shall be stated both in writing and in figures for the Base Bids and Alternates.

Any modification to the Bid Forms (including Alternates and/or Unit Prices) may disqualify the Bid and may cause the Bid to be rejected.

The Contractor shall fill in the Bid Forms as follows:

- A. If the documents are executed by a sole Owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person.
- В. If the documents are executed by a Partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.
- C. If the documents are executed on the part of a Corporation, they shall be executed by either the President or the Vice-President and attested by either the Secretary or Assistant Secretary. In all cases the title of the office of such person shall appear after their signatures.
- D. If the Bid is made by a Joint Venture, it shall be executed by each member of the Joint Venture in the above form for sole Owner, Partnership, or Corporation, whichever form is applicable.
- E. All signatures shall be properly witnessed or attested as applicable.
- F. Each Bid shall be addressed and delivered as indicated in Item 5 of the Instructions to Bidders. The address of the Bidder, the Bidder's license number and, if applicable, the designated portion of the Work for which Bid is submitted should also be referenced on the Bid envelope.
- G. It shall be the specific responsibility of the Bidder to deliver the Bid to the proper official at the appointed place and prior to the announced time for the opening of Bids. Later delivery of a Bid for any reason, including delivery by the United States Mail, shall disqualify the Bid.
- Η. Modifications of previously deposited Bids or requests for withdrawal will be acceptable only if delivered in person or in writing to the place of the Bid opening prior to the time for opening Bids.

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- I. Unit Prices quoted in the Bid shall include overhead and profit and shall be the full compensation for the Contractor's cost involved in the work.
- J. Failure to submit a Bid on the official City of Bristol Virginia form provided for that purpose shall be a cause for rejection of the Bid. Modification of or additions to any portion of the Invitation for Bid/Request for Bid may be cause for rejection of the Bid; however, the City of Bristol Virginia reserves the right to decide, on a case by case basis, in its sole discretion, whether to reject such a Bid as nonresponsive. As a precondition to its acceptance, the City of Bristol Virginia may, in its sole discretion, request that the bidder/proposer withdraw or modify nonresponsive portions of a Bid which do not affect quality, quantity, price, or delivery. No modification of or addition to the provisions of the contract shall be effective unless reduced to writing and signed by the parties.

#### 2. QUALIFICATIONS OF BIDDERS

The Bidder shall provide a summary of relevant experience with active landfill gas collection system construction, involving well drilling, wellhead installation, pipe and valve installation, condensate management infrastructure installation, and dewatering pump installation. The Bidder shall submit as part of the Bid, information related to previous relevant projects including job location and work summary, contract amount and duration, and contact name and phone number on the forms provided herein. A minimum of three (3) relevant active landfill gas collection system construction projects shall be submitted with the Bid. It is the Bidder's responsibility to submit sufficient documentation to demonstrate relevancy.

The City of Bristol Virginia may make such reasonable investigations as deemed proper and necessary to determine the ability of the bidder/proposer to perform the services/furnish the goods and the bidder/proposer shall furnish to the City of Bristol Virginia all such information and data for this purpose as may be requested. The City of Bristol Virginia reserves the right to inspect bidder's/proposer's physical facilities prior to award to satisfy questions regarding the bidder/proposer's capabilities. The City of Bristol Virginia further reserves the right to reject any Bid if the evidence submitted by, or investigations of, such bidder/proposer fails to satisfy the City of Bristol Virginia that such bidder/proposer is properly qualified to carry out the obligations of the contract and to provide the services and/or furnish the goods contemplated therein.

#### 3. EXAMINATION OF CONDITIONS

It is understood and mutually agreed that by submitting a Bid the Contractor acknowledges his/her careful examination of the Bidding Documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site; and has satisfied himself/herself as to the nature of the work, the condition of existing infrastructure, the conformation of the ground, the character, quality and quantity of the materials to be encountered; the general and local conditions; the construction hazards; and all other matters, including but not limited to, the labor situation which can in any way affect the work under the Contract; and including all safety measures required by the latest edition of the Occupational Safety Health Act and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a Bid, the Contractor acknowledges that he/she has satisfied himself/herself as to the feasibility and meaning of the plans, drawings, specifications, and other Contract Documents for the construction of the work and that he/she accepts all the terms, conditions and stipulations contained therein; and that he/she is prepared to work in cooperation with the Owner and all other Contractors performing work on the site.

Bristol ISWMF – LFG Collection System Expansion: Stage 1 Instructions to Bidders 00 21 10-2 Reference is made to the Contract Documents for the identification of those surveys and investigative reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the Licensed Professional who prepared the documents. Copies of all such surveys and reports are available to the Bidders, upon request. All Bidders are responsible for reviewing these documents prior to submission of their Bid.

Each Bidder may, at his/her own expense, make such additional surveys and investigations, as he/she may deem necessary to determine his/her Bid price for the performance of the work. Any on-site investigation shall be done at the convenience of the Owner. The Owner will honor any reasonable request for access to the site.

#### 4. ADDENDA

Any Addenda to bidding documents issued during the time of bidding will be sent to each Bidder, and are to be considered covered in the Bid. It is the Contractor's responsibility to ascertain prior to Bid time, which Addenda have been issued and confirm that his/her Bid includes any changes covered by the Addenda.

Should the Bidder find discrepancies in, or omissions from, the drawings or documents or should he/she be in doubt as to their meaning, he/she shall at once notify the Licensed Professional who prepared said drawings or documents. Neither the Owner nor the Licensed Professional who prepared the bidding documents will be responsible for any oral instructions.

The Bidder on his/her Bid shall acknowledge all Addenda. Failure to do so may disqualify the Bid and may cause the Bid to be rejected.

#### 5. RECEIPT OF BIDS

All copies of the Bid, the Bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. All sealed Bid envelopes shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof and marked on the outside of the envelope as follows:

City of Bristol Purchasing Department Emily Compton, Procurement Specialist City Hall 300 Lee Street Bristol, Virginia 24201

LANDFILL GAS COLLECTION SYSTEM EXPANSION: STAGE 1
BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

Due Date: Thursday, January 12, 2023 at 2:00 P.M. ET IFB# SW-23-012

To be considered for selection, Bids must be received by the City of Bristol Virginia Purchasing Department 300 Lee Street, Bristol, VA 24201, by the designated date and hour. Bids received in the City of Bristol Virginia Purchasing Department after the date and hour designated are automatically disqualified and will not be considered. The City of Bristol Virginia is not responsible for delays in the delivery of mail by the U.S. Postal Service, private couriers, or other means of delivery. It is the sole

Bristol ISWMF – LFG Collection System Expansion: Stage 1
Instructions to Bidders 00.2

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responsibility of the bidder/proposer to ensure that its Bid reaches the City of Bristol Virginia Purchasing Department by the designated time and hour.

#### 6. REJECTION OF BIDS

The Owner reserves the unqualified right to reject any and all Bids. Reasons for rejection may include, but shall not be limited to, the following:

- A. If the Form of Bid furnished to the Bidder is not used or is altered.
- B. If the Bidder fails to insert a price for all Bid items, Alternates and Unit Prices requested.
- C. If the Bidder adds any provisions reserving the right to accept or reject any award.
- D. If there are unauthorized additions or conditional Bids, or irregularities of any kind which tend to make the Bid incomplete, indefinite, or ambiguous as to its meaning.
- E. If the Bidder fails to complete the Bid forms where information is requested so the Bid may be properly evaluated by the Owner.
- F. If the Unit Prices contained in the Bid Schedule are unacceptable to the Owner.
- G. If the Bidder fails to demonstrate relevant experience to the satisfaction of the Owner in accordance with the criteria outlined under Qualifications of Bidders.
- H. If the Bidder fails to comply with other instructions stated herein.

#### 7. BID EVALUATION AND AWARD

The City of Bristol, Virginia will make the award on a Grand Total or Total Bid Price to the lowest responsive and responsible bidder. Should the successful Bidder default and fail to execute a Contract, the Contract may be awarded to the next lowest responsive and responsible Bidder.

In accordance with Section 00 45 13, Bidder must submit certain information pertaining to Bidder's qualifications along with the Bid. Before awarding a Contract, the Owner may require the apparent low Bidder to supply supplemental information and documentation, or request clarifications, to qualify himself/herself to be a responsible Bidder by furnishing any or all of the following data:

- A. The latest financial statement showing assets and liabilities of the company or other information satisfactory to the Owner.
- B. A listing of similar completed projects of similar size, with contact persons and telephone numbers.
- C. Permanent name and address of place of business.
- D. The number of regular employees of the organization and length of time the organization has been in business under present name and percentage of work typically performed by the contractor's firm.
  - 1. Qualifications of key employees assigned to this Project.

Bristol ISWMF – LFG Collection System Expansion: Stage 1
Instructions to Bidders 00 21 10-4

- 2. References for key employees assigned to this Project.
- E. The name and home office address of the Surety proposed and the name and address of the responsible local claim agent.
- F. The names of members of the firm who hold appropriate trade licenses, together with license numbers.
- G. Complete list of all subcontractors and suppliers proposed.
- H. Any pending arbitration or mediation cases or lawsuits. This may include all arbitration, mediation and lawsuits settled or resolved within last ten (10) years.

Failure or refusal to furnish any of the above information if requested shall constitute a basis for disqualification of any Bidder.

In determining the lowest responsible Bidder, the Owner may consider the past performance of the Bidder on construction contracts. Particular concern will be given to completion times, quality of work, cooperation with other Contractors, and cooperation with the Designer and Owner.

Should the Owner adjudge that the apparent low Bidder is not the lowest "responsible" Bidder by virtue of the above information, said apparent low Bidder will be so notified and his/her Bid Security shall be returned to him/her.

The Owner shall have the right to accept Alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and the Alternates accepted.

The Owner reserves the right to reject any and all Bids, to waive all technicalities and irregularities, and to make the award as considered to be in the best interest of the Owner.

Upon the award or the announcement of the decision to award a contract as a result of this solicitation, the City of Bristol Virginia will publicly post such notice on the City of Bristol Virginia website (<a href="www.bristolva.org">www.bristolva.org</a>) if the amount of the transaction is \$30,000 or more. Award information may also be obtained by contacting the buyer whose name appears on this solicitation.

#### 8. BID SECURITY

Each Bid shall be accompanied by bid security in accordance with the instructions specified in Section 00 43 10. Bids shall be accompanied by a cashier's or bank check or Bid Guarantee Bond in the amount of not less than five percent (5%) of the bid made payable to the City of Bristol, Virginia, Owner, and subject to the conditions provided in the Instruction to Bidders.

# 9. PERFORMANCE BOND

The successful Bidder, upon award of Contract, shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the Contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's requirements under such contract.

During execution of the Work, Contractor's inability to achieve the Proposed Borehole Depth values shown on the Drawings, or inability to install LFG extraction wells to these Proposed Borehole Depth values, shall not constitute non-performance or failure to fulfill the undertakings, covenants, terms,

Bristol ISWMF – LFG Collection System Expansion: Stage 1 Instructions to Bidders 00 21 10-5 Invitation for Bids

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conditions, and agreements of the Contract, provided such inability is solely attributed to landfill subsurface characteristics or conditions encountered during drilling of the boreholes and/or installation of the LFG extraction wells.

#### PAYMENT BOND

The successful Bidder, upon award of Contract, shall furnish a Payment Bond in an amount equal to one hundred percent (100%) of the Contract price. A "payment bond" is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

#### 11. PRE-BID CONFERENCE

Bidders are required to attend either an on-site, in-person Pre-Bid Conference at the time and place stipulated in the Bidding Documents or to conduct a separate site visit prior to submitting the bid.

Site visits may be scheduled by contacting Mike Martin, Solid Waste Administrator, at (423) 571-7332 or <a href="martin@bristolva.org">mmartin@bristolva.org</a>, or Joey Lamie, Project Manager, at (276) 645-3726 or <a href="Joey.Lamie@bristolva.org">Joey.Lamie@bristolva.org</a>.

#### 12. BIDS TO BE BID

<u>Landfill Gas Collection System Expansion: Stage 1 for the City of Bristol Integrated Solid Waste</u>

<u>Management Facility</u>

## 13. INFORMATION TO BIDDER

All questions concerning the plans and specifications should be directed to the Licensed Professional who prepared said documents, which is Mr. Bob Dick, PE of SCS Engineers at (804) 486-1911 or <a href="mailto:BDick@scsengineers.com">BDick@scsengineers.com</a>.

Address all inquiries and correspondence regarding this ITB to:

Emily Compton, Procurement Specialist 300 Lee Street Bristol, VA 24201

Email: emily.compton@bristolva.org

Phone: (276) 645-7328

**END OF SECTION 00 21 10** 

# **SECTION 00 41 13**

# **BID FORM**

# LANDFILL GAS COLLECTION SYSTEM EXPANSION: STAGE 1 BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

Engineer's Project No. 02218208.14-1

# 1.0 OWNER AND BIDDER

1.1

This Bid is submitted to: City of Bristol, Purchasing Department

1.2

The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

# 2.0 ATTACHMENTS TO THIS BID

The following documents are submitted with and made a condition of this Bid:

- List of Proposed Subcontractors;
- List of Proposed Suppliers:
- Evidence of authority to do business in the Commonwealth of Virginia; or a written covenant to obtain such authority within the time for acceptance of Bids;
- Contractor's license number as evidence of Virginia Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids; and,
- Required Bidder Qualification Statement with supporting data.

# 3.0 BASIS OF BID—UNIT PRICES

#### 3.1 UNIT PRICE BIDS

# A. Unit Price

#	Description	Estimated Quantity	Unit	Unit Price	Subtotal		
	Base Bid Items						
1	Mobilization/Demobilization	1	Lump Sum	\$	\$		
2	8-inch PVC LFG Extraction Well w/ 36-inch Borehole (less than or equal to 150 feet deep)	1,911	VF	\$	\$		
3	12-inch CPVC LFG Extraction Well w/ 36-inch Borehole (less than or equal to 150 feet deep)	2,100	VF	\$	\$		
4	12-inch CPVC LFG Extraction Well w/ 36-inch Borehole (greater than 150 feet deep)	933	VF	\$	\$		
5	2-inch LFG Dual Extraction Wellheads	20	EA	\$	\$		
6	3-inch LFG Dual Extraction Wellheads	14	EA	\$	\$		
7	4-inch LFG Collection Piping (belowgrade)	500	FT	\$	\$		
8	6-inch LFG Collection Piping (belowgrade)	450	FT	\$	\$		
9	8-inch LFG Collection Piping (belowgrade)	3,100	FT	\$	\$		
10	2-inch Airline Piping and 4-inch Liquids Forcemain Piping (belowgrade)	100	FT	\$	\$		
11	2-inch Airline Piping and 4-inch Liquids Forcemain Piping (belowgrade in common trench w/ LFG piping)	4,050	FT	\$	\$		
12	8-inch LFG Butterfly Isolation Valve (belowgrade)	9	EA	\$	\$		
13	2-inch Airline Isolation Valve (abovegrade)	9	EA	\$	\$		
14	4-inch Forcemain Isolation Valve (abovegrade)	9	EA	\$	\$		
15	Liquid Forcemain Air Release Valve (abovegrade)	4	EA	\$	\$		
16	2-inch Airline and 4-inch Forcemain Stub-Ups	34	EA	\$	\$		
17	Leachate Forcemain Cleanouts	5	EA				
18	One Pump or QED Dewatering Pneumatic Pump w/ Standard Tubing and Accessories	6	EA	\$	\$		
19	Blackhawk Dewatering Pneumatic Pump w/ High Temp Tubing and Accessories	6	EA	\$	\$		
20	Jeneer Dewatering Pneumatic Pump w/ High Temp Tubing and Accessories	6	EA	\$	\$		
21	Lorentz Dewatering Solar-Powered Electrical Pump w/ High Temp Tubing and Accessories	4	EA	\$	\$		
22	Blackhawk Dewatering Solar-Powered Electrical Pump w/ High Temp Tubing and Accessories	4	EA	\$	\$		

#	Description	Estimated Quantity	Unit	Unit Price	Subtotal
		Base Bid I	lems		
23	4-inch Tie-In to Existing 4-inch LFG Lateral	18	EA	\$	\$
24	8-inch Tie-In to Existing 8-inch LFG Header	7	EA	\$	\$
25	2-inch Tie-In to Existing 2-inch Airline and 4-inch Tie-In to Existing 4-inch Liquids Forcemain	25	EA	\$	\$
26	8-inch Access Riser	10	EA	\$	\$
27	Road Crossing	6	EA	\$	\$

# B. Total Bid Price

Total Base Bid Price (Items #1 through #27)	\$
---	----

# C. Alternate Bid Items - Unit Price

#	Description	Estimated Quantity	Unit	Unit Price	Subtotal
		Alternate Bio	d Items		
28	Introduction of Drilling Polymer into Borehole	1	Gallon	\$	\$
29	Hourly Drilling Rate for Drill Rig w/ Crew using Muck Bucket	1	Hour	\$	\$
30	Sonic Drill Rig Mobilization/Demobilization	1	Lump Sum	\$	\$
31	6-inch CPVC LFG Extraction Well w/ 12-inch Borehole (less than or equal to 150 feet deep)	1,200	VF	\$	\$
32	6-inch CPVC LFG Extraction Well w/ 12-inch Borehole (greater than 150 feet deep)	400	VF	\$	\$

# 4.0 TIME OF COMPLETION

# 4.1

Bidder agrees that the Work will be substantially complete within the durations associated with the Milestone Dates outlined below, as measured after the date when the Contract Times commence to run, and will be completed and ready for final payment within the durations associated with the Milestone Dates outlined below, as measured after the date when the Contract Times commence to run.

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Milestone Schedule Governing Contract Times					
#	Description	Times			
1	Installation and Activation of Perimeter LFG Extraction Wells	Substantial Completion w/in 50 Calendar Days			
2	Installation and Activation of Deep Dual-Extraction Interior LFG Extraction Wells	Substantial Completion w/in 75 Calendar Days			
3	Installation of All Dewatering Pumps and Air LFG/Dewatering System Components Fully Functional	Substantial Completion w/in 90 Calendar Days			
4	Final Completion	w/in 15 Calendar Days of Achieving #3			

4.2

Bidder accepts the provisions of the Agreement as to liquidated damages.

# 5.0 BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

# 5.1 BID ACCEPTANCE PERIOD

This Bid will remain subject to acceptance for 30 calendar days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner. At the end of the 30 calendar days, the bid/proposal may be withdrawn at the written request of the bidder/proposer. If the bid/proposal is not withdrawn at that time, it remains in effect until an award is made or the solicitation is cancelled

# 5.2 INSTRUCTIONS TO BIDDERS

Bidder accepts all of the terms and conditions of the Instructions to Bidders.

# 5.3 RECEIPT OF ADDENDA

Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

# 6.0 BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

# 6.1 BIDDER'S REPRESENTATIONS

In submitting this Bid, Bidder represents the following:

A. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

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- B. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
- E. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
- F. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- G. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
- H. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- I. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.
- J. The Bid/Proposal price shall be an all-inclusive price to deliver the specified goods and/or services FOB Destination to the address specified per the specifications. Invoices must be itemized and will be paid at the unit price in the Bid. The City will not accept or pay for additional line items such as freight, shipping and handling, delivery, downtime, equipment, lost time due to inclement weather or any other charges additional to the unit prices quoted in the Bid/Proposal.
- K. By submitting their bids/proposals, all bidders/proposers certify andwarrant that the price offered for FOB destination includes only the actual freight rate costs at the lowest and best rate and is based upon the actual weight of the goods to be shipped. Except as otherwisespecified herein, standard commercial packaging, packing and shipping containers shall be used. All shipping containers shall be legibly marked or labeled on the outside with purchase order number, commodity description, and quantity.



L. The bid price shall be for complete delivery of equipment, ready for use by the City of Bristol Virginia, and shall include all applicable freight and installation charges; extra charges will not be allowed.

# 6.2 BIDDER'S CERTIFICATIONS

The Bidder certifies the following:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding.
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 6.2.D:
  - Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
  - 2. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
  - 3. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
  - 4. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

Bidder:	
	(typed or printed name of organization)
By:	
	(individual's signature)
Name:	(typed or printed)
Title:	
	(typed or printed)
Date:	(typed or printed)
If Bidder is	(typed or printed) s a corporation, a partnership, or a joint venture, attach evidence of authority to sign.
Attest:	(individual's signature)
Name:	
	(typed or printed)
Title:	(typed or printed)
Date:	
Date.	(typed or printed)
Addross f	for diving nations
Address i	or giving notices:
Bidder's (	Contact:
Name:	Somact.
	(typed or printed)
Title:	(typed or printed)
Dhana	(typea or printea)
Phone:	
Email:	
Address:	
Bidder's (	Contractor License No.: (if applicable)

# END OF SECTION 00 41 13



# **SECTION 00 43 10**

# **BID BOND**

# LANDFILL GAS COLLECTION SYSTEM EXPANSION: STAGE 1 BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

Bids shall be accompanied by a cashier's or bank check or Bid Guarantee Bond in the amount of not less than five percent (5%) of the bid made payable to the City of Bristol, Virginia, Owner, and subject to the conditions provided in the Instruction to Bidders.

The undersigned bidder submits herewith bid guaranty in an amount of not less than five percent

#### **BID GUARANTY**

(5%) of the total amount of the bid offered and agrees and consents that the bid guaranty shall be forfeited to the City as liquidated damages if the required contract bond is not executed within fifteen (15) days from the date of the notice of award and work has not been started as required. The following documents are attached to and made a condition of this bid and constitute required Bid Security:

\_\_\_\_\_\_ Certified Check or Bank Check
\_\_\_\_\_\_ Bid Bond

BID AMOUNT: \$

BIDDER:

PERSON PREPARING BID:

TELEPHONE NUMBER:

ADDRESS:

Submittal of signed BID Form signifies understanding and acceptance of all stated terms and conditions and acknowledgment of requirement of compliance with all applicable local, state and federal ordinances, laws, rules and regulations whether expressly stated herein or not.



SIGNATURE:		
PRINTED NAME:		
TITLE:		
COMPANY:		
DATE:		



# SECTION 00 45 13 BIDDERS QUALIFICATIONS

# 1.0 GENERAL INFORMATION

1.1

Provide contact information for the Business:

ame of Business:						
Corporate Office						
			Phone number:			
			Email address:			
s address of corpo	rate office:					
Local Office						
			Phone number:			
			Email address:			
Business address of local office:						
	te Office s address of corpo	te Office s address of corporate office:	te Office s address of corporate office: fice	te Office  Phone number:  Email address:  s address of corporate office:  fice  Phone number:  Email address:		

1.2

Provide information on the Business's organizational structure:

Form of Business:	Form of Business:					
☐ Limited Liability Company ☐ Joint Venture comprised of the following companies:						
1.	1.					
2.						
3.						
Provide a separate Qualification Statement for each Joint Venturer.						
Date Business was formed: State in which Business was formed:						
Is this Business authorized to operate in the Project location? ☐ Yes ☐ No ☐ Pending						
SCC Identification N	umber:					

# 1.3

Identify all businesses that own Business in whole or in part (25% or greater), or that are wholly or partly (25% or greater) owned by Business:

Name of business:	Affiliation:	
Address:		
Name of business:	Affiliation:	
Address:		
Name of business:	Affiliation:	
Address:		

# 1.4

Provide information regarding the Business's officers, partners, and limits of authority.

Name:	Title:
Authorized to sign contracts: ☐ Yes ☐ No	Limit of Authority: \$
Name:	Title:
Authorized to sign contracts: ☐ Yes ☐ No	Limit of Authority: \$
Name:	Title:
Authorized to sign contracts: ☐ Yes ☐ No	Limit of Authority: \$
Name:	Title:

# 2.0 LICENSING

Provide information regarding licensure for Business:

Name of License:	
Licensing Agency:	
License No:	Expiration Date:
Name of License:	
Licensing Agency:	
License No:	Expiration Date:

# 3.0 DIVERSE BUSINESS CERTIFICATIONS

Provide information regarding Business's Diverse Business Certification, if any. Provide evidence of current certification.

Certification	Certifying Agency	Certification Date
☐ Disadvantaged Business Enterprise		
☐ Minority Business Enterprise		
☐ Woman-Owned Business Enterprise		
☐ Small Business Enterprise		
☐ Disabled Business Enterprise		
☐ Veteran-Owned Business Enterprise		
☐ Service-Disabled Veteran-Owned Business		
☐ HUBZone Business (Historically Underutilized) Business		
☐ Other		
□ None		

# 4.0 SAFETY

# 4.1

Provide information regarding Business's safety organization and safety performance.

Name of Business's Safety Officer:		
Safety Certifications		
Certification Name	Issuing Agency	Expiration

# 4.2

Provide Worker's Compensation Insurance Experience Modification Rate (EMR), Total Recordable Frequency Rate (TRFR) for incidents, and Total Number of Recorded Manhours (MH) for the last 3 years and the EMR, TRFR, and MH history for the last 3 years of any proposed Subcontractor(s) that will provide Work valued at 10% or more of the Contract Price. Provide documentation of the EMR history for Business and Subcontractor(s).

Year									
Company	EMR	TRFR	МН	EMR	TRFR	МН	EMR	TRFR	МН



# 5.0 FINANCIAL

Provide information regarding the Business's financial stability. Provide the most recent audited financial statement, and if such audited financial statement is not current, also provide the most current financial statement.

Financial Institution:					
Business address:					
Date of Business's mos	☐ Attached				
Date of Business's mos	☐ Attached				
Financial indicators from the most recent financial statement					
Contractor's Current R					
Contractor's Quick Rat Short Term Investmen					

# 6.0 SURETY INFORMATION

Provide information regarding the surety company that will issue required bonds on behalf of the Business, including but not limited to performance and payment bonds.

Surety Name:						
Surety is a corporation organized and existing under the laws of the state of:						
Is surety authorized to provide surety bonds in the Project location? ☐ Yes ☐ No						
Is surety listed in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" published in Department Circular 570 (as amended) by the Bureau of the Fiscal Service, U.S. Department of the Treasury?  □ Yes □ No						
Mailing Address (principal place o	of business):					
Physical Address (principal place o						
Phone (main):	one (main): Phone (claims):					

# 7.0 INSURANCE

Provide information regarding Business's insurance company(s), including but not limited to its Commercial General Liability carrier. Provide information for each provider.

SCS ENGINEERS

	Name of insurance provider, a	and type of policy (C	(CLE, auto, etc.):				
	Insurance Provid	der	Type of Poli	cy (Coverage Provided)			
	Are providers licensed or auth	orized to issue poli	cies in the Project	t location? ☐ Yes ☐ No			
	Does provider have an A.M. B	est Rating of A-VII o	r better?	☐ Yes ☐ No			
	Mailing Address						
	(principal place of business):						
	Physical Address						
	(principal place of business):						
	W 1 1						
	Phone (main):	1	Phone (claims):				
8.1 Provide	e information that will identify th	he overall size and	capacity of the E	Business.			
	Average number of current fu	II-time employees:					
	Estimate of revenue for the cu	urrent year:					
	Estimate of revenue for the pr	revious year:					
8.2							
Provide	e information regarding the Bus	siness's previous co	ontracting experi	ence.			
	Years of experience with proje	acts like the proper	nd project:				
		ects like the propose	<u> </u>				
	As a general contractor:		As a joint vent				
	Has Business, or a predecesso	•		<u> </u>			
	Been disqualified as a bidde	r by any local, state	or federal agenc	y within the last 5 years?			
	☐ Yes ☐ No						
	Been barred from contractin  ☐ Yes ☐ No	ng by any local, state	e, or federal agen	cy within the last 5 years?			
	Been released from a bid in	the past 5 years?	Yes □ No				
	Defaulted on a project or fai			ed to it? ☐ Yes ☐ No			
				he contract documents or in			
	a change order? ☐ Yes ☐ No	•					
	Been a party to any currently pending litigation or arbitration? ☐ Yes ☐ No						

Provide full details in a separate attachment if the response to any of these questions is Yes.

8.3

List all projects currently under contract in Schedule A and provide indicated information.

8.4

List a minimum of three and a maximum of six projects completed in the last 5 years in Schedule B and provide indicated information to demonstrate the Business's experience with projects similar in type and cost of construction.

8.5

In Schedule C, provide information on key individuals whom Business intends to assign to the Project. Provide resumes for those individuals included in Schedule C. Key individuals include the Project Manager, Project Superintendent, Quality Manager, and Safety Manager. Resumes may be provided for Business's key leaders as well.

# 9.0 REQUIRED ATTACHMENTS

#### 9.1

Provide the following information with the Statement of Qualifications:

- A. If Business is a Joint Venture, separate Qualifications Statements for each Joint Venturer, as required in Paragraph 1.2.
- B. Diverse Business Certifications if required by Paragraph 3.1.
- C. Certification of Business's safety performance if required by Paragraph 4.1.
- D. Financial statements as required by Paragraph 5.1.
- E. Attachments providing additional information as required by Paragraph 8.2.
- F. Schedule A (Current Projects) as required by Paragraph 8.3.
- G. Schedule B (Previous Experience with Similar Projects) as required by Paragraph 8.4.
- H. Schedule C (Key Individuals) and resumes for the key individuals listed, as required by Paragraph 8.5.
- I. Additional items as pertinent.

This Staten	nent of Qualifications is offered by:
Business:	
	(typed or printed name of organization)
By:	
	(individual's signature)
Name:	(typed or printed)
Title:	
	(typed or printed)
Date:	(date signed)
(If Rusines	s is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)
(II Dusines	s is a corporation, a partnership, or a joint venture, attach evidence or authority to sign.)
Attest:	
Accoc.	(individual's signature)
Name:	
	(typed or printed)
Title:	
Address for	(typed or printed) r giving notices:
7.0.0	
Designated	Representative:
Name:	
- tarrior	(typed or printed)
Title:	(typed or printed)
	(typea or printea)
Address:	
Di	
Phone:	
Email:	

# Schedule A—Current Projects

Name of Organization						
Project Owner			Project Nam	е		
General Description of Pr	oject		·			
Project Cost	·		Date Project	Completed		
Key Project Personnel	Project Manager	Project Sup	perintendent	Safe	ety Manager	Quality Control Manager
Name						
Reference Contact Inforr	mation (listing names indico	ates approval to contacti	ing the names indi	viduals as a re	eference)	
	Name	Title/Position	Organ	ization	Telephone	Email
Owner						
Designer						
Construction Manager						
Project Owner			Project Nam	е		
General Description of Pr	oject		•			
Project Cost	1		Date Project	Completed		
Key Project Personnel	Project Manager	Project Sup	perintendent	ntendent Safety Manager		Quality Control Manager
Name						
Reference Contact Inforr	mation (listing names indica	ates approval to contacti	ing the names indi	viduals as a re	eference)	
	Name	Title/Position	Organ	ization	Telephone	Email
Owner						
Designer						
Construction Manager						
Project Owner			Project Nam	e		
General Description of Pr	oiect		1.0,00			
Project Cost			Date Project	Completed		
Key Project Personnel	Project Manager	Project Sup	perintendent	Safe	ety Manager	Quality Control Manager
Name						
Reference Contact Inform	nation (listing names indico	ates approval to contacti	ing the names indi	viduals as a re	eference)	
	Name	Title/Position	Organ	ization	Telephone	Email
Owner						
Designer						
Construction Manager						

# Schedule B—Previous Experience with Similar Projects

Name of Organization						
Project Owner			Project Nam	е		
General Description of Pr	oject					
Project Cost			Date Project	Completed		
Key Project Personnel	Project Manager	Project Superi	intendent	Safety	/ Manager	Quality Control Manager
Name						
Reference Contact Inforr	mation (listing names indica		the names indi	ividuals as a refe	rence)	
	Name	Title/Position	Orgo	ınization	Telephone	Email
Owner						
Designer						
Construction Manager						
Project Owner			Project Nam	e		
General Description of Pr	oiect					
Project Cost	,		Date Project	Completed		
Key Project Personnel	Project Manager	Project Superi			/ Manager	Quality Control Manager
Name	,	, ,		,		,
Reference Contact Inforr	nation (listing names indica	tes approval to contacting	the names indi	viduals as a refe	rence)	
	Name	Title/Position		ınization	Telephone	Email
Owner						
Designer						
Construction Manager						
Project Owner			Project Nam	e l		
General Description of Pr	oiect		,	•		
Project Cost			Date Project	Completed		
Key Project Personnel	Project Manager	Project Superi			/ Manager	Quality Control Manager
Name		•		,	•	·
Reference Contact Inforr	nation (listing names indica	tes approval to contacting	the names indi	viduals as a refe	rence)	
	Name	Title/Position		ınization	Telephone	Email
Owner						
Designer						
Construction Manager						

# Schedule B—Previous Experience with Similar Projects

Name of Organization						
Project Owner			Project Nam	е		
General Description of Pr	oject					
Project Cost			Date Project	Completed		
Key Project Personnel	Project Manager	Project Superi	intendent	Safety	/ Manager	Quality Control Manager
Name						
Reference Contact Inforr	mation (listing names indica		the names indi	ividuals as a refe	rence)	
	Name	Title/Position	Orgo	ınization	Telephone	Email
Owner						
Designer						
Construction Manager						
Project Owner			Project Nam	e		
General Description of Pr	oiect					
Project Cost	,		Date Project	Completed		
Key Project Personnel	Project Manager	Project Superi			/ Manager	Quality Control Manager
Name	,	, ,		,		,
Reference Contact Inforr	nation (listing names indica	tes approval to contacting	the names indi	viduals as a refe	rence)	
	Name	Title/Position		ınization	Telephone	Email
Owner						
Designer						
Construction Manager						
Project Owner			Project Nam	e l		
General Description of Pr	oiect		,	•		
Project Cost			Date Project	Completed		
Key Project Personnel	Project Manager	Project Superi			/ Manager	Quality Control Manager
Name		•		,	•	
Reference Contact Inforr	nation (listing names indica	tes approval to contacting	the names indi	viduals as a refe	rence)	
	Name	Title/Position		ınization	Telephone	Email
Owner						
Designer						
Construction Manager						



# Schedule C-Key Individuals

Project Manager				
Name of individu	al			
Years of experien	ce as project manager			
Years of experien	ce with this organization			
Number of similar	projects as project manager			
Number of similar	projects in other positions			
Current Project A	ssignments			
Name of assignm	ent	Percent of time this project	used for	Estimated project completion date
		- <sub>1</sub> <u>1</u>		la la la la la la la la la la la la la l
Reference Conto	act Information (listing names indicate	es approval to co	ntact nar	ned individuals as a
Name		Name		
Title/Position		Title/Position		
Organization		Organization		
Telephone		Telephone		
Email		Email		
Project		Project		
Candidate's		Candidate's		
role on project		role on project		
Project Superinte		T		
Name of individu				
	ce as project superintendent			
	ce with this organization			
	projects as project superintendent projects in other positions			
Current Project A		Developt of times	used for	Fating at a diprain at
Name of assignm	leni	Percent of time used for this project		Estimated project completion date
Reference Conto reference)	act Information (listing names indicate	es approval to co	ntact nar	ned individuals as a
Name		Name		
Title/Position		Title/Position		
Organization		Organization		
Telephone		Telephone		
Email		Email		
Project		Project		
Candidate's		Candidate's		
role on project		role on project		

Safety Manager				
Name of individual				
Years of experience as project manager				
Years of experience with this organization				
Number of similar projects as project manager				
Number of similar projects in other positions				
Current Project A	Assignments			
Name of assignment		Percent of time used for this project		Estimated project completion date
Reference Conto	act Information (listing names indicate	es approval to contac	t name	ed individuals as a
Name		Name		
Title/Position		Title/Position		
Organization		Organization		
Telephone		Telephone		
Email		Email		
Project		Project		
Candidate's		Candidate's		
role on project		role on project		
Quality Control A		1		
Name of individual				
Years of experience as project superintendent				
Years of experience with this organization				
Number of similar projects as project superintendent				
Number of simila				
Current Project A		1		
Name of assignment		Percent of time used for this project		Estimated project completion date
Reference Conto	act Information (listing names indicate	es approval to contac	t name	ed individuals as a
reference)	, 0			
Name		Name		
Title/Position		Title/Position		
Organization		Organization		
Telephone		Telephone		
Email		Email		
Project		Project		
Candidate's		Candidate's		
role on project		role on project		

# **END OF SECTION 00 45 13**

# **SECTION 00 70 00**

# TERMS AND CONDITIONS

The Agreement for Service ("Contract" or "Agreement") with the successful Offeror will contain the following Terms and Conditions. Offerors taking exception to these Terms and Conditions or intending to propose additional or alternative language must (a) identify with specificity the City Terms and Conditions to which they take exception or seek to amend or replace; and (b) include any additional or different language with their bid. Failure to both identify with specificity those terms and conditions Offeror takes exception to or seeks to amend or replace as well as to provide Offeror's additional or alternate terms and conditions may result in rejection of the bid.

#### A. Procedures

The extent and character of the services to be performed by the Offeror shall be subject to the general control and approval of the City and their authorized representative(s). Any change to the Contract must be approved in writing by the City.

# B. Delays and Delivery Failures

The Offeror must keep the City advised at all times of services' status relative to the schedule as agreed upon by the parties. If delay is foreseen, the Offeror shall give immediate written notice to the Purchasing Department and include an expected resolution timeframe. Should the Offeror fail to deliver the proper item(s)/service(s) at the time and place(s) contracted for, or within the resolution timeframe submitted with the delay notification or should the Offeror fail to make a timely replacement of rejected items /services when so required, the City may purchase items/services of comparable quality and quantity in the open market to replace the undelivered or rejected items/services. The Offeror shall reimburse the City for all costs in excess of the Agreement price when purchases are made in the open market; or in the event that there is a balance the City owes to the Offeror from prior transactions, an amount equal to the additional expense incurred by the City as a result of the Offeror's nonperformance shall be deducted from the balance as payment.

# C. Business, Professional, & Occupational License Requirement

All firms or individuals doing business in the City are required to be licensed in accordance with the City Code Section 18-28. - License Requirement.

Questions regarding licensing should be directed to the Office of Commissioner of Revenue, telephone (276) 645-7316.

#### D. Authorization to Conduct Business in the Commonwealth

A contractor organized as a stock or nonstock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law. Any business entity described above that enters into a contract with a public body pursuant to the Virginia Public Procurement Act shall

not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth, if so required under Title 13.1 or Title 50, to be revoked or cancelled at any time during the term of the contract. A public body may void any contract with a business entity if the business entity fails to remain in compliance with the provisions of this section.

#### E. Insurance

- 1. The Offeror shall be responsible for its work and every part thereof, and for all materials, tools, equipment, appliances, and property of any and all description used in connection therewith. The Offeror assumes all risk of direct and indirect damage or injury to the property or persons used or employed on or in connection with the work contracted for, and of all damage or injury to any person or property wherever located, resulting from any action, omission, commission or operation under the Contract.
- 2. The Offeror and all sub-offerors shall, during the continuance of the work under the Contract, provide the following:
  - a. Workers' Compensation and Employer's Liability to protect the Offeror from any liability or damages for any injuries (including death and disability) to any and all of its employees, including any and all liability or damage which may arise by virtue of any statute or law in force within the Commonwealth of Virginia.
  - b. Comprehensive General Liability insurance to protect the Offeror, and the interest of the City, its officers, employees, and agents against any and all injuries to third parties, including bodily injury and personal injury, wherever located, resulting from any action or operation under the Contract or in connection with the contracted work. The General Liability insurance shall also include the Broad Form Property Damage endorsement, in addition to coverage for explosion, collapse, and underground hazards, where required.
  - c. Automobile Liability insurance, covering all owned, non-owned, borrowed, leased, or rented vehicles operated by the Offeror.
  - d. Professional Liability against any and all wrongful acts, errors, or omissions on the part of the Offeror resulting from any action or operation under the Contract or in connection with the contracted work.
- 3. The Offeror agrees to provide the above referenced policies with the following limits. Liability insurance limits may be arranged by General, Automobile and Professional Liability policies for the full limits required, or by a combination of underlying policies for lesser limits with the remaining limits provided by an Excess or Umbrella Liability policy.
  - Workers' Compensation: Statutory requirements and benefits. Coverage is compulsory for employers of three or more employees, to include the employer.
  - b. Employer's Liability:

- i. Each Accident: \$1,000,000
- ii. Disease, Each Employee: \$1,000,000iii. Disease, Policy Limit: \$2,000,000
- c. Commercial General Liability:
  - i. General Aggregate \$2,000,000
  - ii. Each Occurrence \$1,000,000
  - iii. Commercial General Liability shall include bodily injury and property damage, personal injury, advertising injury, products and completed operations coverage. General Aggregate limit shall apply separately to the project. Contractor's insurance coverage shall be primary and noncontributory.
- d. Automobile Liability: Combined Single Limit of \$1,000,000
- e. Professional Liability:
  - i. General Aggregate \$2,000,000
  - ii. Each Occurrence \$1,000,000
- f. Umbrella Liability: \$2,000,000 per occurrence.
- 4. The following provisions shall be agreed to by the Offeror:
  - a. No change, cancellation, or non-renewal shall be made in any insurance coverage without a forty-five (45) day written notice to the City. The Offeror shall furnish a new certificate prior to any change or cancellation date. The failure of the Offeror to deliver a new and valid certificate will result in suspension of all payments until the new certificate is furnished.
  - b. Liability Insurance "Claims Made" basis:
    - If the liability insurance purchased by the Offeror has been issued on a "claims made" basis, the Offeror must comply with the following additional conditions. The limits of liability and the extensions to be included as described previously in these provisions, remain the same. The Offeror must either:
    - i. Agree to provide, prior to commencing work under the Contract, certificates of insurance evidencing the above coverage for a period of two (2) years after final payment for the Contract for General Liability policies and five (5) years for Professional Liability policies. This certificate shall evidence a "retroactive date" no later than the beginning of the Offeror's work under this Contract,

or

- ii. Purchase the extended reporting period endorsement for the policy or policies in force during the term of this Contract and evidence the purchase of this extended reporting period endorsement by means of a certificate of insurance or a copy of the endorsement itself.
- c. The Offeror must disclose the amount of deductible/self-insured retention

applicable to the General Liability, Automobile Liability and Professional Liability policies, if any. The City reserves the right to request additional information to determine if the Offeror has the financial capacity to meet its obligations under a deductible /self-insured plan. If this provision is utilized, the Offeror will be permitted to provide evidence of its ability to fund the deductible /self-insured retention.

# d. Origin of Insurance

- i. The Offeror agrees to provide insurance issued by companies admitted within the Commonwealth of Virginia, with the Best's Key Rating of at least A:VII.
- ii. European markets including those based in London, and the domestic surplus lines market that operate on a non-admitted basis are exempt from this requirement provided that the Offeror's broker can provide financial data to establish that a market's policyholder surpluses are equal to or exceed the surpluses that correspond to Best's A:VII Rating.

# e. Required Certificates

- i. The Offeror will provide an original signed Certificate of Insurance and such endorsements as prescribed herein.
- ii. The Offeror will provide on request certified copies of all insurance coverage related to the Contract within ten (10) business days of request by the City. These certified copies will be sent to the City from the Offeror's insurance agent or representative. Any request made under this provision shall be deemed confidential and proprietary.
- Any certificates provided shall indicate the Contract name and number.
- f. The City, its officers and employees shall be Endorsed to the Offeror's Automobile and General Liability policies as an "additional insured" with the provision that this coverage "is primary to all other coverage the City may possess." (Use "loss payee" where there is an insurable interest). A Certificate of Insurance evidencing the additional insured status must be presented to the City along with a copy of the Endorsement.
- g. Compliance by the Offeror with the foregoing requirements as to carrying insurance shall not relieve the Offeror of their liabilities provisions of the Contract.
- 5. Contractual and other Liability insurance provided under this Contract shall not contain a supervision, inspection or engineering services exclusion that would preclude the City from supervising and/or inspecting the project as to the end result. The Offeror shall assume all on-the-job responsibilities as to the control of persons directly employed by it.
- 6. Precaution shall be exercised at all times for the protection of Persons (including employees) and property.
- 7. The Offeror is to comply with the Occupational Safety and Health Act of 1970,

Public Law 91-956, as it may apply to this Contract.

- 8. If an "ACORD" Insurance Certificate form is used by the Offeror's insurance agent, the words "endeavor to" and "... but failure to mail such notice shall impose no obligation or liability of any kind upon the company" in the "Cancellation" paragraph of the form shall be deleted.
- 9. The Offeror agrees to waive all rights of subrogation against the City, its officers, employees, and agents.

#### F. Hold Harmless

The Offeror shall indemnify and hold harmless the City, including its officials and employees, from all liability, losses, costs, damages, claims, causes of action, and suits of any nature (specifically including reasonable attorney's fees and defense costs incurred with the defense of third party claims) incidental to or brought as a consequence of any negligent act, error, omission, or breach of the applicable professional standard of care by the Offeror and /or its subcontractors. The Offeror agrees that this clause shall include, but is not limited to, claims involving infringement of patent or copyright. This section shall survive completion of the Contract. The City is prohibited from indemnifying Offeror and/or any other third parties.

# G. Safety

All Offerors and sub-offerors performing services for the City are required and shall comply with all Occupational Safety and Health Administration (OSHA), State and City Safety and Occupational Health Standards and any other applicable rules and regulations. Also, all Offerors and sub-offerors shall be held responsible for the safety of their employees and any unsafe acts or conditions that may cause injury or damage to any persons or property within and around the work site area under this Contract.

#### H. Anti-Discrimination

The City of Bristol, VA in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 US.C.§§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

By submitting their bids, offerors certify to the City that they will conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Contracting Act of 1975, as amended, where applicable, the Virginians With Disabilities Act, the Americans With Disabilities Act and § 2.2-4311 of the Virginia Public Procurement Act (VPPA). If the award is made to a faith-based organization, the organization shall not discriminate against any recipient of goods, services, or disbursements made pursuant to the contract on the basis of the recipient's religion, religious belief, refusal to participate in a religious practice, or on the basis of race, age, color, gender sexual orientation, gender identity, or national origin and shall be subject to the same rules as other organizations that contract with public bodies to account for the use of the funds provided; however, if the faith-based organization segregates public

funds into separate accounts, only the accounts and programs funded with public funds shall be subject to audit by the public body. (Code of Virginia, § 2.2-4343.1E).

In every contract over \$10,000 the provisions in 1. and 2. below apply:

- 1. During the performance of this contract, the contractor agrees as follows:
  - a. The contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
  - The contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such contractor is an equal opportunity employer.
  - c. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.
  - d. If the contractor employs more than five employees, the contractor shall (i) provide annual training on the contractor's sexual harassment policy to all supervisors and employees providing services in the Commonwealth, except such supervisors or employees that are required to complete sexual harassment training provided by the Department of Human Resource Management, and (ii) post the contractor's sexual harassment policy in (a) a conspicuous public place in each building located in the Commonwealth that the contractor owns or leases for business purposes and (b) the contractor's employee handbook.
  - e. The requirements of these provisions 1. and 2. are a material part of the contract. If the Contractor violates one of these provisions, the City may terminate the affected part of this contract for breach, or at its option, the whole contract. Violation of one of these provisions may also result in debarment from State contracting regardless of whether the specific contract is terminated.
  - f. In accordance with Executive Order 61 (2017), a prohibition on discrimination by the contractor, in its employment practices, subcontracting practices, and delivery of goods or services, on the basis of race, sex, color, national origin, religion, sexual orientation, gender identity, age, political affiliation, disability, or veteran status, is hereby incorporated in this contract.
- 2. The contractor will include the provisions of 1. above in every subcontract or purchase order over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.

# I. Ethics in Public Contracting

The provisions contained in § 2.2-4367 through § 2.2-4377 of the Virginia Public Procurement Act as set forth in the 1950 Code of Virginia, as amended, shall be applicable to all Contracts solicited or entered into by the City. A copy of these provisions may be obtained from the Purchasing Department upon request.

The above-stated provisions supplement, but do not supersede, other provisions of law including, but not limited to, the Virginia State and Local Government Conflict of Interests Act (§ 2.2-3100 et seq.), the Virginia Governmental Frauds Act (§ 18.2-498.1 et seq.) and Articles 2 and 3 of Chapter 10 of Title 18.2. The provisions apply notwithstanding the fact that the conduct described may not constitute a violation of the Virginia Conflict of Interests Act.

# J. Drug-free Workplace

Every Contract of over \$10,000 shall include the following provisions:

During the performance of this Contract, the Offeror agrees to (i) provide a drug-free workplace for the Offeror's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Offeror's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Offeror that the Offeror maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each sub-offeror or vendor.

For the purposes of this section, "drug-free workplace' means a site for the performance of work done in connection with a specific Contract awarded to an Offeror in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana during the performance of the Contract.

# K. Immigration Reform and Control Act of 1986

By entering this Contract, the Offeror certifies that it does not and will not during the performance of this Contract violate the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens.

# L. Exemption from Taxes

Pursuant to Va. Code § 58.1-609.1, the City is exempt from Virginia State Sales or Use Taxes and Federal Excise Tax, therefore the Offeror shall not charge the City for Virginia State Sales or Use Taxes or Federal Excise Tax on the finished goods or products provided under the Contract. However, this exemption does not apply to the Offeror, and the Offeror shall be responsible for the payment of any sales, use, or excise tax it incurs in providing the goods required by the Contract, including, but not limited to, taxes on materials purchased by an Offeror for incorporation in or use on a construction project. Nothing in this section shall prohibit the Offeror from including its own sales tax expense in connection with the Contract in its Contract price.



# M. Ordering, Invoicing and Payment

All work requested under this Contract shall be placed on a City issued Purchase Order. The Offeror shall not accept credit card orders or payments.

The Offeror shall submit invoices, at the completion of tasks and submission of deliverables; such statement to include a detailed breakdown of all charges for that deliverable.

Payments for services are to be requested as monthly billings submitted by Offeror by the end of the calendar month and payable by the City within 30 days of receipt.

All such invoices will be paid timely by the City unless any items thereon are questioned, in which event payment will be withheld pending verification of the amount claimed and the validity of the claim. The Offeror shall provide complete cooperation during any such investigation.

All invoices shall be forwarded to the following address:

Director of Public Works City of Bristol, Virginia 2515 Valley Drive Bristol, VA 24201

Individual Offerors shall provide their social security numbers and proprietorships, partnerships, and corporations shall provide their federal employer identification number on the pricing form.

Offeror shall provide a current Form W-9 – Request for Taxpayer Identification Number and Certification.

#### N. Payments to Subcontractors

Within seven (7) days after receipt of amounts paid by the City for work performed by a subcontractor under this Contract, the Offeror shall either:

- 1. Pay the subcontractor for the proportionate share of the total payment received from the City attributable to the work performed by the subcontractor under this Contract; or
- 2. Notify the City and subcontractor, in writing, of his/her intention to withhold all or a part of the subcontractor's payment and the reason for non-payment.

The Offeror shall pay interest to the subcontractor on all amounts owed that remain unpaid beyond the seven (7) day period except for amounts withheld as allowed in item 2 above.

Unless otherwise provided under the terms of this Contract interest shall accrue at the rate of one percent (1 %) per month.

The Offeror shall include in each of its subcontracts a provision requiring each subcontractor to include or otherwise be subject to the same payment and

interest requirements as set forth above with respect to each lower-tier subcontractor.

The Offeror's obligation to pay an interest charge to a subcontractor pursuant to this provision may not be construed to be an obligation of the City.

#### O. Substitutions

NO substitutions, additions or cancellations, including those of key personnel are permitted after Contract award without written approval by the Purchasing Department. Where specific employees are proposed by the Offeror for the work, those employees shall perform the work as long as that employee works for the Offeror, either as an employee or subcontractor unless the City agrees to the substitution. Requests for substitutions will be reviewed by the City and approval may be given by the City at its sole discretion. The City shall be notified immediately by the Offeror when the substitution of key personnel or those identified in the bid may be necessary. The substitution process shall be complete within 14 calendar days of the Offerors notification to the City.

# P. Assignment

The Agreement may not be assigned in whole or in part without the prior written consent of the Purchasing Department. The rights and obligations of the Offeror are personal and may be performed only by the Offeror. Any purported assignment that does not comply with this provision is void. This Agreement is binding upon and inures to the benefit of the parties and their respective permitted successors and assigns.

#### O. Termination

Subject to the provisions below, the Contract may be terminated by the City upon thirty (30) days advance written notice to the Offeror; but if any work or service hereunder is in progress, but not completed as of the date of termination, then the Contract may be extended upon written approval of the City until said work or services are completed and accepted.

#### 1. Termination for Convenience

The City may terminate this Contract for convenience at any time in which case the parties shall negotiate reasonable termination costs.

#### 2. Termination for Cause

In the event of Termination for Cause, the thirty (30) days advance notice is waived and the Offeror shall not be entitled to termination costs.

# 3. Termination Due to Unavailability of Funds in Succeeding Fiscal Years

If funds are not appropriated or otherwise made available to support continuation of the performance of this Contract in a subsequent fiscal year, then the Contract shall be canceled and, to the extent permitted by law, the Offeror shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the supplies or services delivered under the Contract.

# 4. Availability of Funds

It is understood and agreed between the parties herein that the City of Bristol Virginia shall be bound hereunder only to the extent of the funds appropriated and available or which may hereafter become available for the purpose of this agreement.

#### R. Contractual Disputes

The Offeror shall give written notice to the City Manager of intent to file a claim for money or other relief within ten (10) calendar days of the occurrence giving rise to the claim or at the beginning of the work upon which the claim is to be based, whichever is earlier.

The Offeror shall submit its invoice for final payment within thirty (30) days after completion or delivery.

The claim, with supporting documentation, shall be submitted to the City Manager by US Mail, return receipt requested, courier, or overnight delivery service, no later than sixty (60) days after final payment. If the claim is not disposed of by agreement, the City Manager shall reduce his decision to writing and mail via U.S. mail or otherwise forward a copy thereof to the Offeror with in thirty (30) days of the City's receipt of the claim.

The City Manager's decision shall be final unless the Offeror appeals within thirty (30) days by submitting a written letter of appeal to the City Manager, or his designee. The City Manager shall render a decision within sixty (60) days of receipt of the appeal.

No Offeror shall institute any legal action until all statutory requirements have been met. Each party shall bear its own costs and expenses resulting from any litigation, including attorney's fees.

#### S. Prime Offeror Responsibilities

The Offeror(s) shall be responsible for completely supervising and directing the work under the resulting Contract(s) and all subcontractors that they may utilize. Subcontractors who perform work under the resulting Contract shall be responsible to the prime Offeror. The Offeror agrees to be fully responsible for the acts and omissions of their subcontractors and of persons employed by them.

# T. Ownership of Documents

Any reports, specifications, drawings, blueprints, negatives, electronic files or other documents prepared by the Offeror in the performance of its obligations under the Contract shall be the exclusive property of the City, and all such materials shall be returned to the City upon completion, termination, or cancellation of this Contract. The Offeror shall not use, willingly allow, or cause such materials to be used for any purpose other than performance of all Offeror's obligations under the resulting Contract without the prior written consent of the City. However, the Offeror may retain file copies which cannot be used without prior written consent of the City. The City agrees that the Offeror shall not be liable for damages, loss, or injury resulting from the future use of the provided documents for other than the project specified when the Offeror is not the firm of record.

#### U. Submissions

All Project correspondence, design/review documents, reports etc., prepared by the Offeror shall be distributed to the City Manager for each major phase and sub phase of the Project in the quantities as directed. Within thirty (30) days of completion of each Project phase, submit a Project phase completion report with phase documents to the City Manager.

# V. Responsibility for Claims and Liabilities

The City's review, approval, or acceptance of, or payment for, any services required shall not be construed to operate as a waiver by the City of any rights or of any cause of action arising out of the Contract. The Offeror shall be and remains liable to the City for the accuracy and competency of plans, specifications, or other documents or work and Offeror is responsible to the City for any costs incurred resulting from any errors, acts or omissions in the performance of any services furnished.

# W. Severability

In the event that any provision shall be adjudged or decreed to be invalid, by a court of competent jurisdiction, such ruling shall not invalidate the entire Agreement but shall pertain only to the provision in question and the remaining provisions shall continue to be valid, binding and in full force and effect.

# X. Governing Law / Forum

This Agreement shall be governed and construed in all respects by its terms and by the laws of the Commonwealth of Virginia, without giving effect to its conflicts of law's provisions. Any judicial action shall be filed in the Circuit Court for the City of Bristol, Virginia. Offeror expressly waives any objection to venue or jurisdiction of the Circuit Court for the City of Bristol, Virginia. Offeror expressly consents to waiver of service of process in an action pending in the Circuit Court for the City of Bristol, Virginia pursuant to Virginia Code § 8.01-286.1.

## Y. Notices

All notices and other communications hereunder shall be deemed to have been given when made in writing and either (a) delivered in person, (b) delivered to an agent, such as an overnight or similar delivery service, or (c) deposited in the United States mail, postage prepaid, certified or registered, addressed as follows:

TO OFFEROR:

TO CITY OF BRISTOL VIRGINIA: City of Bristol Virginia Purchasing Department Attn: Emily Compton 300 Lee Street Bristol, VA 24201

Notice is deemed to have been received: (i) on the date of delivery if delivered in person; (ii) on the first business day after the date of delivery if sent by same day or overnight courier service; or (iii) on the third business day after the date of mailing, if sent by certified or registered United States Mail, return receipt requested, postage and charges

prepaid.

# Z. Counterparts

This Contract and any amendments or renewals hereto may be executed in a number of counterparts, and each counterpart signature, when taken with the other counterpart signatures, is treated as if executed upon one original of this Contract or any amendment or renewal. A signature by any party to this Contract provided by facsimile or electronic mail is binding upon that party as if it were the original.

#### AA. Force Majeure

A party is not liable for failure to perform the party's obligations if such failure is as a result of Acts of God (including fire, flood, earthquake, storm, hurricane or other natural disaster), war, invasion, act of foreign enemies, hostilities (regardless of whether war is declared), civil war, rebellion, revolution, insurrection, military or usurped power or confiscation, terrorist activities, nationalization, government sanction, blockage, embargo, strikes at national level or industrial disputes at a national level, or strike or industrial disputes by labor not employed by the affected party, its subcontractors or its suppliers and which affect an essential portion of the contracted for works but excluding any industrial dispute which is specific to the performance of the works or this contract, interruption or failure of electricity or telephone service.

If a party asserts Force Majeure as an excuse for failure to perform the party's obligation, that party must immediately notify the other party giving full particulars of the event of force majeure and the reasons for the event of force majeure preventing that party from, or delaying that party in performing its obligations under this contract that party must use its reasonable efforts to mitigate the effect of the event of force majeure upon its or their performance of the contract and to fulfill its or their obligations under the contract.

An event of force majeure does not relieve a party from liability for an obligation which arose before the occurrence of that event, nor does that event affect the obligation to pay money in a timely manner which matured prior to the occurrence of that event.

The Offeror has no entitlement and City has no liability for: (1) any costs, losses, expenses, damages or the payment of any part of the contract price during an event of force majeure; and (2) any delay costs in any way incurred by the Offeror due to an event of force majeure.

#### BB. Survival of Terms

Upon discharge of this Agreement, Sections (Notice, Hold Harmless, Warranties, Governing Law/Forum, Contractual Disputes) of these Terms and Conditions continue and survive in full force and effect.

#### CC. Non-Waiver

No waiver of any provision of this Agreement shall constitute a waiver of any other provision nor shall any waiver of this Agreement constitute a continuing waiver unless otherwise expressly provided.

# DD. Workmanship and Inspection

All services provided under this Contract shall be performed in a skillful, workmanlike and professional manner. The Offeror and its employees shall be professional and courteous at all times. The City may, in writing, require the Offeror to remove any employee from work for reasonable cause, as determined by the City. Further, the City may, from time to time, make inspections of the services performed under this Agreement. Any inspection by the City does not relieve the Offeror of any responsibility in meeting the Agreement requirements. Offeror employees that have been removed at the direction of the City shall be replaced within seven calendar days after City notification.

#### EE. Debarment Status

By participating in this procurement, the vendor certifies that they are not currently debarred by the Commonwealth of Virginia or Federal Government from submitting a response for the type of goods and/or services covered by this solicitation. Vendor further certifies that they are not debarred from filling any order or accepting any resulting order, or that they are an agent of any person or entity that is currently debarred by the Commonwealth of Virginia or Federal Government. If a vendor is created or used for the purpose of circumventing a debarment decision against another vendor, the nondebarred vendor will be debarred for the same time period as the debarred vendor.

#### FF. Supremacy Clause

Notwithstanding any provision in the bidder's/proposer's response to the contrary, the bidder/proposer agrees that the terms and conditions contained in the City of Bristol, Virginia's Invitation to Bid or Request for Proposal prevail over contrary terms and conditions contained in the bidder's/proposer's response.

# GG. Equal Employment Opportunity

The offeror hereby agrees that it will incorporate or cause to be incorporated into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained from the Federal Government or borrowed on the credit of the Federal Government pursuant to a grant, contract, loan, insurance, or guarantee, or undertaken pursuant to any Federal program involving such grant, contract, loan, insurance, or guarantee, the following equal opportunity clause:

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment

advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

- 2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- 3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.
- 4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 5. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- 6. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- 7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

8. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

The offeror further agrees that it will be bound by the above equal opportunity clause with respect to its own employment practices when it participates in federally assisted construction work: Provided, that if the offeror so participating is a State or local government, the above equal opportunity clause is not applicable to any agency, instrumentality or subdivision of such government which does not participate in work on or under the contract.

The offeror agrees that it will assist and cooperate actively with the administering agency and the Secretary of Labor in obtaining the compliance of contractors and subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that it will furnish the administering agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that it will otherwise assist the administering agency in the discharge of the agency's primary responsibility for securing compliance.

The offeror further agrees that it will refrain from entering into any contract or contract modification subject to Executive Order 11246 of September 24, 1965, with a contractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order and will carry out such sanctions and penalties for violation of the equal opportunity clause as may be imposed upon contractors and subcontractors by the administering agency or the Secretary of Labor pursuant to Part II, Subpart D of the Executive Order. In addition, the offeror agrees that if it fails or refuses to comply with these undertakings, the administering agency may take any or all of the following actions: Cancel, terminate, or suspend in whole or in part this grant (contract, loan, insurance, guarantee); refrain from extending any further assistance to the offeror under the program with respect to which the failure or refund occurred until satisfactory assurance of future compliance has been received from such offeror; and refer the case to the Department of Justice for appropriate legal proceedings.

## HH. Antitrust

By entering into a contract, the contractor conveys, sells, assigns, and transfers to the City of Bristol Virginia all rights, title and interest in and to all causes of action it may now have or hereafter acquire under the antitrust laws of the United States and the Commonwealth of Virginia, relating to the particular goods or services purchased or

acquired by the City of Bristol Virginia under said contract.

## II. Liquidated Damages

If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step One Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable preestimate of damages the Owner will incur as a result of delayed Substantial Completion of the Work:

One Thousand Dollars (\$1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars (\$2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

If the Contractor fails to achieve Final Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step Two Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following the actual date of Substantial Completion and continuing until the actual date of Final Completion. Such liquidated damages are hereby agreed to be a reasonable preestimate of damages the Owner will incur as a result of delayed Final Completion of the Work:

One Thousand Dollars (\$1,000.00) per consecutive calendar day for up to 15 Calendar Days beyond expiration of the Contract Times; then,

Two Thousand Dollars (\$2,000.00) per consecutive calendar day after 15 Calendar Days beyond expiration of the Contract Times

The Owner may deduct liquidated damages described above from any unpaid amounts then or thereafter due the Contractor under this Agreement. Should the amount of any liquidated damages exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.

## JJ. Good Housekeeping

In accordance with the Clean Water Act, established by the Environmental Protection Agency (EPA) and enforced by the Virginia Department of Environmental Quality (DEQ), the City of Bristol Virginia is required to implement and enforce written procedures as part of the Municipal Separate Storm Sewer System (MS4) permit program requirements to prevent, to the maximum extent practicable, potential pollutants that will lead to a point discharge at a natural drainage way. The City of Bristol Virginia's written procedures are provided in the Good Housekeeping/Pollution Prevention (GH/PP) manual provided to the Contractor. The Contractor shall employ good housekeeping practices outlined in the GH/PP manual and as directed in response to City inspection reports on all City properties and immediately remediate all spills containing potential

pollutants as directed in the manual. If, through an audit or inspection, the EPA or DEQ renders fines to the City on account of poor practices determined to be the fault of Contractor, the City reserves the right to collect compensation from the Contractor. Contractors applying pesticides and herbicides shall provide evidence of appropriate certification in accordance with Virginia Law.

By signing the Contract, the Contractor acknowledges receipt of the GH/PP manual and certifies Contractor's understanding of its roles, responsibilities and liabilities associated with the City's MS4 Program. If the Contractor has any questions during the term of this contract concerning the Good Housekeeping and Pollution Prevention Manual, the Contractor may contact the Landfill Environmental & Safety Compliance Officer.

- KK. Contract Provisions for Non-Federal Entity Contracts Under Federal Awards
  - 1. All contracts awarded in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations, 29 CFR Part 5. Each contactor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. No laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.
  - 2. Contracts in excess of \$150,000 must contain a provision requiring compliance with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Contract Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency.
  - 3. A contract award will not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180.
  - 4. Contractors that apply or bid for an award exceeding \$100,000 must file the required certification per the Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). The contractor certifies that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award will be disclosed.
  - 5. As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cements, and other manufactured products). The requirements of this section

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must be included in all subawards including all contracts and purchase orders for work or products under this award. For purposes of this section:

- a. "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
- b. "Manufactured products" means items and construction materials composed in whole or in part of nonferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.
- 6. Contractor must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximized energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.



## ATTACHMENT A

## **Sample Contract**

(to be completed later)

CONTRACT FOR	
Contract Number:	
This contract entered into thisday of called the "Contractor" and the City of Bristol	•
<b>WITNESSETH</b> that the Contractor and the City, in consideration of mutual covenants, promises and agreementsherein contained, agree as follows:	
<b>SCOPE OF SERVICES</b> : The Contractor shall provide the services to the City as set forth in the Invitation for Bid attached hereto.	
CONTRACT PERIOD: The contract period is from	
COMPENSATION AND METHOD OF PAYMENT: The Contractor shall be paid in accordance with the Contract Documents in the amount of, subject to the Contract Document Section 01 22 00 Measurement and Payment and Section 00 41 13 Bid Form. There shall be no addition(s) or deletion(s) to the Contract without the prior written approval of a Change Order issued by the City.	
<b>CONTRACT DOCUMENTS:</b> The Contract Documents shall consist of the contract, Invitation for Bid and all attachments to the Invitation for Bid.	
CONTRACTOR:	CITY OF BRISTOL VIRGINIA:
By:	By:
Title:	Title:
Date:	Date:

## **END OF SECTION 00 70 00**

## **APPENDIX A**

## Contractor/ Consultant/Supplier Agreement: U.S. DOT 1050.2A -- Appendix A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

- 1. Compliance with Regulations: The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, the Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
- 2. Nondiscrimination: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.
- 3. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Nondiscrimination on the grounds of race, color, or national origin.
- 4. Information and Reports: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
- 5. Sanctions for Noncompliance: In the event of a contractor's noncompliance with the Nondiscrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:
  - a. withholding payments to the contractor under the contract until the contractor complies; and/or
  - b. cancelling, terminating, or suspending a contract, in whole or in part.

6. Incorporation of Provisions: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

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## APPENDIX E

## Contractor/ Consultant/Supplier Agreements: U.S. DOT 1050.2A -- Appendix E

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

## **Pertinent Nondiscrimination Authorities:**

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq.*), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 -- 12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).



## **SECTION 01 11 00** SUMMARY OF WORK

## PART 1 – GENERAL

#### 1.1 PROJECT DESCRIPTION

- Α. Scope: The project work to be performed by the CONTRACTOR consists of furnishing all labor, materials, equipment, tools, transportation, services, incidentals, and performing all work necessary to complete the project, in place and ready for service in accordance with the plans and specifications prepared for the Landfill Gas Collection System Expansion: Stage 1. The work generally involves expansion of the active Landfill Gas Collection and Dewatering System at the Bristol, Virginia ISWMF, including but not limited to the following items:
  - 1. Construction mobilization and demobilization. Also, mobilization and demobilization of a sonic drill rig as a contingency, if necessary to achieve installation of the wells to design depths.
  - 2. Coordinating with ENGINEER and OWNER'S SURVEYOR.
  - 3. Drilling and installation of LFG vertical extraction wells, dual extraction well caps, wellheads, wellbore geomembrane skirt seals, and wellbore reinforcement grates.
  - 4. Installation of new landfill gas collection piping, access risers, road crossings, valves, and fittings to connect the wells to the existing collection piping network.
  - 5. Installation of new pneumatic supply and forcemain piping and valves and fittings to connect this piping to the existing dewatering liquids piping network.
  - 6. Installation of dedicated dewatering pumps and associated appurtenances and connection to the pneumatic supply and forcemain piping.
  - 7. Connection to existing piping infrastructure and condensate management features.
  - 8. Restoration of landfill surface and providing as-built record documentation.

#### 1.2 **WORK SEQUENCE**

Α. The CONTRACTOR shall sequence construction work to accommodate continued installation of remedial measures by other contractors and/or OWNER forces. The CONTRACTOR shall sequence construction work to accommodate continued landfill gas (LFG) system operations by OWNER forces and third-party O&M personnel.



- B. The CONTRACTOR shall sequence construction work so that transport of LFG to the utility flare and/or landfill gas-to-energy (LFGE) Facility (power plant) is continuous and uninterrupted, to the extent practicable. The number and durations of LFG system shutdowns and/or instances of reduced LFG flowrates to the flare and/or power plant shall be minimized. Durations of LFG system shutdowns shall be limited to no more than 6 hours within any 24-hour period.
- C. The CONTRACTOR shall sequence construction work so that installation of perimeter LFG extraction wells along Quarry Sidewall, along with collection piping and wellheads to enable activation of these wells, is prioritized.

## 1.3 CONTRACTOR USE OF PREMISES

- A. Limit use of premises for work, storage, and access to allow work by other contractors, owner occupancy, and normal landfill and LFG system operations.
- B. Facility Hours: The CONTRACTOR shall have equipment and material delivery access to and from the site under the site's normal operating hours from 7:00 A.M. to 4:00 P.M.
- C. Access: No later than 5 days after notice to proceed, the CONTRACTOR shall arrange with the OWNER a sequence of procedures, means of access, space for storage of materials and equipment, and use of approaches and roadways. CONTRACTOR's use of the premises shall be confined to the areas approved by the OWNER.
- D. Odor Mitigation: CONTRACTOR shall not initiate drilling of borehole into waste unless the well can be fully constructed, completed, and capped prior to the end of the workday. Refer to Section 33 23 10.3.1.E for exceptions to this requirement under unique circumstances. Similarly, CONTRACTOR shall not initiate trenching into waste, accomplishing piping connections, or other activity that could potentially contribute to odor emissions or gas venting unless such activity can be fully completed prior to the end of the workday. No exposed wastes in boreholes, trenches or stockpiles shall remain overnight.
- E. CONTRACTOR shall not dispose of waste oils, fuels, cleaners or other potentially hazardous substances on site.

## 1.4 OWNER OCCUPANCY AND LANDFILL OPERATIONS

The OWNER will occupy the site and continue to conduct landfill remedial measures and preclosure construction activities. The CONTRACTOR shall cooperate with the OWNER during construction operations to minimize conflicts and facilitate OWNER usage. The CONTRACTOR shall cooperate with the OWNER during construction operations to minimize duration of LFG and dewatering system shutdown and facilitate continued LFG system operations. Durations of LFG system shutdowns shall be limited to no more than 6 hours within any 24-hour period. The CONTRACTOR shall perform the Work so as not to interfere with the OWNER's landfill remedial measures and pre-closure construction activities, LFG collection and control, maintenance, odor mitigation, environmental monitoring, and other OWNER activities at the site.

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## 1.5 SITE CONDITIONS

- A. Existing Grades: The existing grades may vary from those indicated on the Plans due to landfill settlement and waste filling activities.
- B. Existing Features: The Contract Documents require the CONTRACTOR to field verify the location of existing features.
- C. The CONTRACTOR shall enforce safety procedures to minimize hazards to workers, the public, and the environment.
- D. CONTRACTOR shall be aware that drilling or excavating within the waste, as well as accomplishing connections to existing leachate and LFG collection pipes, will expose workers to hazardous/flammable gases as well as leachate, potentially under high pressure.

## 1.6 SUPERINTENDENT

CONTRACTOR shall provide a single qualified full time English-speaking superintendent for the duration of the project. CONTRACTOR shall not change superintendent without the OWNER's prior written permission. CONTRACTOR's proposal to change personnel must be justifiable to the OWNER, and must demonstrate that the proposed replacement possesses adequate qualifications to the satisfaction of the OWNER.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

**END OF SECTION 01 11 00** 



## **SECTION 01 14 00**

## PROJECT COORDINATION

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. The CONTRACTOR shall prepare schedules, work staging and sequencing plan, odor mitigation procedures and submittals, as well as participate in project meetings necessary to coordinate the Work with construction and operations activities at the site conducted by others. This Section specifies administrative and procedural requirements for project meetings including the Pre-Construction Conference and routine Progress Meetings.
- B. The CONTRACTOR shall coordinate the Work being performed under this contract to recognize and accommodate relevant activities associated with the remedial activities of the landfill, routine operation of the landfill gas (LFG) collection and control system, continuous and uninterrupted delivery of LFG to the landfill gas-to-energy (LFGE) Facility, to the extent practicable, and other associated activities.

## 1.2 DESCRIPTION

- A. The OWNER will schedule and administer a preconstruction conference, construction progress meetings, and specially called meetings throughout the progress of work.

  The ENGINEER or OWNER will be responsible for preparing the agenda, making arrangements, preparing the meeting summaries and presiding at these meetings.
- B. Representatives of CONTRACTOR, Subcontractor(s), and Suppliers attending these meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. The CONTRACTOR shall attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

## 1.3 SCHEDULES

- A. The CONTRACTOR shall submit construction progress schedules to the OWNER and ENGINEER in accordance with Section 01 33 00 as necessary to coordinate site activities.
- B. The CONTRACTOR shall submit the proposed date, time, and anticipated duration of any planned shutdowns or interruptions of the existing LFG collection and control system to the OWNER, ENGINEER, and LFGE Facility Operator at least 48 hours in advance of the proposed event.

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## 1.4 SUBMITTALS

- A. When specified in individual specification sections, submit drawings, product data, samples, and other documentation in accordance with Section 01 33 00. Revise and resubmit as required by the ENGINEER.
- B. Submit applications for payment on approved OWNER forms to ENGINEER for review, and for transmittal to OWNER.
- C. Submit requests for interpretation of Contract Documents, and obtain instructions through the OWNER.
- D. Process requests for substitutions, and change orders, through the OWNER.

## 1.5 PRECONSTRUCTION CONFERENCE

- A. After award of the contract, but prior to the Notice-to-Proceed, a joint meeting shall be held with representatives of the OWNER, ENGINEER, CONTRACTOR and Project Superintendent and other invited parties which may be affected by the project.
- B. This meeting is intended to introduce the various key personnel from each organization and to discuss the Contract Documents, the start of construction, order of work, labor and legal requirements, approved insurance requirements, names of the major subcontractors, method of payment, shop drawing submittal schedule, protection of existing facilities and other pertinent items associated with the Project. The CONTRACTOR shall bring copies of a construction schedule, work sequencing and staging plan, odor mitigation procedures, schedule of values, and shop drawing submittals to this meeting, as specified in Section 01 33 00.

## 1.6 PROGRESS MEETINGS

Progress meetings will be organized and conducted by the OWNER to discuss the progress of the Work on a routine basis. The CONTRACTOR and Project Superintendent shall attend these meetings.

## 1.7 CONTRACT CHANGES

Changes can be made to the contract in any of the following ways:

- A. The parties may agree in writing to modify the scope of the contract. An increase in the price of the contract resulting from such modification shall be agreed to by the parties pending City Council approval as a part of their written agreement to modify the scope of the contract.
- B. The City of Bristol Virginia may order changes within the general scope of the contract at any time by written notice to the contractor. Changes within the scope of the contract include, but are not limited to, things such as services to be performed, the

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method of packing or shipment, and the place of delivery or installation. The contractor shall comply with the notice upon receipt. The contractor shall be compensated for any additional costs incurred as the result of such order and shall give the City of Bristol Virginia a credit for any savings. Said compensation shall be determined by one of the following methods:

- 1. By mutual agreement between the parties in writing; or
- 2. By agreeing upon a unit price or using a unit price set forth in the contract, if the work to be done can be expressed in units, and the contractor accounts for the number of units of work performed, subject to the City of Bristol Virginia's right to audit the contractor's records and/or to determine the correct number of units independently; or
- 3. By ordering the contractor to proceed with the work and keep a record of all costs incurred and savings realized. A markup for overhead and profit may be allowed if provided by the contract. The same markup shall be used for determining a decrease in price as the result of savings realized. The contractor shall present the City of Bristol Virginia with all vouchers and records of expenses incurred and savings realized. The City of Bristol Virginia shall have the right to audit the records of the contractor as it deems necessary to determine costs or savings. Any claim for an adjustment in price under this provision must be asserted by written notice to the City of Bristol Virginia within thirty (30) days from the date of receipt of the written order from the City of Bristol Virginia. If the parties fail to agree on an amount of adjustment, the question of an increase or decrease in the contract price or time for performance shall be resolved in accordance with the procedures for resolving disputes provided by the Disputes Clause of this contract. Neither the existence of a claim nor a dispute resolution process, litigation or any other provision of this contract shall excuse the contractor from promptly complying with the changes ordered by the City of Bristol Virginia or with the performance of the contract generally.

## 1.8 DEFAULT

In case of failure to deliver goods or services in accordance with the contract terms and conditions, the City of Bristol Virginia, after due oral or written notice, may procure them from other sources and hold the contractor responsible for any resulting additional purchase and administrative costs. This remedy shall be in addition to any other remedies which the City of Bristol Virginia may have. In addition, the City of Bristol Virginia reserves the right to cancel any orders placed that are not delivered by the date specified in the Invitation for Bid.

## END OF SECTION 01 14 00

## **SECTION 01 22 00**

## MEASUREMENT AND PAYMENT

## PART 1 – GENERAL

## 1.1 DESCRIPTION

- A. The CONTRACTOR shall receive and accept the compensation provided in the Contract as full payment for furnishing all labor, equipment, and materials and for performing all construction/operations necessary to complete the Work as described in the Contract, and in full payment for all losses or damages incurred during the Work, for any discrepancies between actual and estimated quantities, or from any unanticipated difficulties which may arise during the Work until final acceptance by the OWNER.
- B. The prices included in the Bid Proposal Form shall include all costs for labor, equipment, materials, taxes, freight, permits, handling and tests required to perform the Work as shown on the Contract Documents.
- C. The CONTRACTOR shall field verify all quantities and dimensions shown on the Plans or contained in the Contract Specifications including the Bid Proposal Form.

## PART 2 – PRODUCTS (Not Used)

## PART 3 - EXECUTION

- 3.1 MEASUREMENT AND PAYMENT GENERAL
  - A. Item No. 1: Mobilization/Demobilization
    - 1. Measurement. The Work required for this item will not be measured for payment.
    - 2. Payment. Payment for this item will be at the contract lump sum price, and shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents. Payment shall cover all Work as per Section 01 11 00. This includes, but is not limited to, movement of personnel, equipment, supplies and incidentals to the project site; obtaining all permits, insurance, and bonds; and any other pre-construction expense necessary for the start of the Work. No price adjustments will be made for this item due to changes in the Work. Demobilization includes removal from the site of all materials, resources, equipment, temporary support facilities, utilities, and all remaining construction debris at the completion of the project and includes release of liens and other incidentals as specified as requirements of project closeout.

A partial payment of 50 percent of the contract lump sum price may be made once mobilization is completed. However, the remainder of the contract lump sum price shall not be paid until demobilization is completed at project closeout. The maximum amount allowed to be paid for mobilization/demobilization is 5 percent of the total bid price.

- Item Nos. 2 through 4: Landfill Gas Extraction Wells 8" SCH 80 PVC, 12" SCH 80 CPVC
  - Measurement. Landfill gas wells will be measured on an installed vertical linear foot basis from the existing ground surface to the bottom of the well bore as measured in the field by the ENGINEER.
  - 2. Payment. Payment for this item will be at the contract unit price per foot installed, depending on depth less than or greater than 150 feet. Payment will include all drilling, boring, transport of waste materials, installation of stone, soil, bentonite plug/foam sealant, wellbore geomembrane skirt, wellbore reinforcement grate, piping (slotted and solid-walled), backfilling, health and safety requirements, fittings and connections, and shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- C. Item Nos. 5 and 6: 2" and 3" Landfill Gas Extraction Wellheads
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment will include valves, fittings, piping, connections, gauges, monitoring/access ports, flow measurement devices, testing, and other incidentals. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- D. Item Nos. 7 through 9: 4", 6", and 8" LFG Collection Piping (belowgrade)
  - Measurement. LFG Collection Lateral and Header piping will be measured on a linear foot basis above ground as measured in the field by the OWNER'S Surveyor and confirmed by the ENGINEER.
  - 2. Payment. Payment for this item shall be at the contract unit price per horizontal linear foot. Payment includes excavation, transport of excavated unsuitable materials, pipe bedding, backfilling, soil compaction, fittings, piping, connections, risers for connections to laterals, pipe location markings, restoration of disturbed areas, quality control surveying, testing, and incidentals. Payment shall constitute full compensation for all material, labor, equipment and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.

- E. Item Nos. 10 and 11: 2" Airline Piping and 4" Liquids Forcemain Piping (belowgrade in Dedicated or Common Trench with LFG Piping)
  - Measurement. Measurement for this item shall be on an installed linear foot basis of the pipes as measured in the field by the OWNER'S Surveyor and confirmed by the ENGINEER.
  - 2. Payment. Payment for this item shall be at the contract unit price per horizontal linear foot. Payment includes excavation, pipe bedding, backfilling, soil compaction, fittings, piping, connections to existing piping, pipe location markings, restoration of disturbed areas, quality control surveying, testing, and incidentals. Payment shall constitute full compensation for all material, labor, equipment and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- F. Item No. 12: 8" LFG Isolation Valves
  - 1. Measurement. Landfill gas isolation valves will be installed by the CONTRACTOR and verified and counted in the field by the ENGINEER.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment will include excavation, transport of excavated unsuitable materials, backfilling, valves, fittings, stem extension, gear wheel, and other incidentals. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- G. Item No. 13: 2" Airline Isolation Valve (abovegrade)
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment will include excavation, transport of excavated unsuitable materials, backfilling, valves, fittings, support posts, and other incidentals. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- H. Item No. 14: 4" Forcemain Isolation Valve (abovegrade)
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment will include excavation, transport of excavated unsuitable materials, backfilling, valves, fittings, support posts, and other incidentals. Payment shall constitute full compensation for all material, labor, equipment,

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and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.

- I. Item No. 15: Liquid Forcemain Air Release Valve (abovegrade)
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment will include excavation, transport of excavated unsuitable materials, backfilling, valves, fittings, support posts, and other incidentals. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- J. Item No. 16: 2" Airline and 4" Forcemain Stub-Ups
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment will include connection to existing belowgrade airline and forcemain piping, valves, fittings, and other incidentals. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- K. Item No. 17: Liquid Forcemain Cleanouts
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment will include excavation, transport of waste or excavated unsuitable materials, backfilling, piping, valves, fittings, connections to existing piping, restoration of disturbed areas, quality control surveying, and incidentals. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- L. Item Nos. 18 through 20: Dewatering Pneumatic Pumps (One Pump, QED, Blackhawk, and Jeneer)
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment includes, but is not limited to, pneumatic pump, dual extraction well cap, cycle counter, regulators and controls, valves, piping/hose installation and connections, pneumatic and forcemain piping connections,

testing, and demonstration of the dewatering pump and associated controls. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.

- M. Item Nos. 21 and 22: Dewatering Solar-Powered Electrical Pump (Lorentz and Blackhawk)
  - 1. Measurement. Measurement for this item shall be on a completed and installed unit basis.
  - 2. Payment. Payment for this item will be at the contract unit price per installed unit. Payment includes, but is not limited to, electric pump, photo-voltaic panel, dual extraction well cap, flowmeter, controls, valves, piping/hose installation and connections, forcemain piping connections, testing, and demonstration of the dewatering pump and associated controls. Payment shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- N. Item Nos. 23 through 25: 2", 4", and 8" Tie-Ins to Existing Piping
  - 1. Measurement. Connections to the existing LFG collection piping and air supply and forcemain piping will be installed by the CONTRACTOR and verified and counted by the ENGINEER.
  - 2. Payment. Payment for this item will be at the contract unit price for each connection of new LFG/air/forcemain piping to the existing functional piping. Payment will include all earthwork, installation of all affiliated components to accomplish appropriate connections, and testing necessary to complete this item in accordance with the Contract Documents.
- O. Item Nos. 26 and 27: Access Riser and Road Crossing
  - 1. Measurement. Access risers or road crossings will be installed by the CONTRACTOR and verified and counted by the ENGINEER.
  - 2. Payment. Payment for this item will be at the contract unit price for each access riser or road crossing installed. Payment will include all installation of all affiliated components, excavation and backfilling, and connections incidental thereto, necessary to complete this item in accordance with the Contract Documents.
- P. Alternate Bid Item No. 28: Drilling Polymer Into Borehole
  - 1. Measurement. Quantity of drilling polymer installed by the CONTRACTOR will be verified and counted by the ENGINEER.
  - 2. Payment. Payment for this item will be at the contract unit price for each unit of drilling polymer introduced and applied into the borehole.

- Q. Alternate Bid Item No. 29: Hourly Drilling Rate for Muck Bucket
  - Measurement. The time during which the CONTRACTOR is drilling the boreholes utilizing a muck bucket shall be verified and recorded by the ENGINEER.
  - 2. Payment. Payment for this item will be at the contract unit price for time that advancement of the borehole to achieve design depths necessitates the use of a muck bucket.
- R. Alternate Bid Item No. 30: Sonic Drill Rig Mobilization/Demobilization
  - Measurement. The Work required for this item will not be measured for payment.
  - 2. Payment. Payment for this item will be at the contract lump sum price, and shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents. Payment shall cover all Work as per Section 01 11 00. This includes, but is not limited to, movement of personnel, equipment, supplies and incidentals to the project site; obtaining all permits, insurance, and bonds; and any other pre-construction expense necessary for the start of the Work. No price adjustments will be made for this item due to changes in the Work. Demobilization includes removal from the site of all materials, resources, equipment, temporary support facilities, utilities, and all remaining construction debris at the completion of the project and includes release of liens and other incidentals as specified as requirements of project closeout. A partial payment of 50 percent of the contract lump sum price may be made once mobilization is completed. However, the remainder of the contract lump sum price shall not be paid until demobilization is completed at project closeout. The maximum amount allowed to be paid for mobilization/demobilization is 5 percent of the total bid price.
- S. Alternate Bid Item Nos. 31 and 32: Landfill Gas Extraction Wells 6" SCH 80 CPVC
  - Measurement. Landfill gas wells will be measured on an installed vertical linear foot basis from the existing ground surface to the bottom of the well bore as measured in the field by the ENGINEER.
  - 2. Payment. Payment for this item will be at the contract unit price per foot installed, depending on depth less than or greater than 150 feet. Payment will include all drilling, boring, transport of waste materials, installation of stone, soil, bentonite plug/foam sealant, wellbore geomembrane skirt, wellbore reinforcement grate, piping (slotted and solid-walled), backfilling, health and safety requirements, fittings and connections, and shall constitute full compensation for all material, labor, equipment, and work incidental thereto, necessary to complete this item in accordance with the Contract Documents.

## END OF SECTION 01 22 00

## **SECTION 01 33 00**

## **SUBMITTALS**

## PART 1 – GENERAL

## 1.1 DESCRIPTION

- A. Scope of Work: The CONTRACTOR shall develop and distribute project submittals in accordance with procedures specified herein. The required submittals include, but are not limited to the following:
  - 1. Construction progress schedules
  - 2. Work Staging and Sequence Plan
  - 3. Odor Mitigation Procedures
  - 4. Proposed products list
  - 5. Product data
  - 6. Shop drawings
  - 7. Design data
  - 8. Test reports
  - 9. Certificates
  - 10. Manufacturer's instructions, Maintenance Manuals, and Warranty
  - 11. Health and Safety Plan
  - 12. Record Drawings
  - 13. Project Photographs
  - 14. Survey data
- B. Related Work Described Elsewhere
  - 1. All Sections.

## 1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with ENGINEER accepted form.
- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, CONTRACTOR, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

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- E. Schedule submittals to expedite the Project, and deliver to ENGINEER at their business address. Coordinate submission of related items.
- F. For each submittal, allow 3 days for review excluding delivery time to and from the CONTRACTOR.
- G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- Н. When revised for resubmission, identify all changes made since previous submission.
- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- J. Submittals not requested will not be recognized or processed.

#### 1.3 CONSTRUCTION PROGRESS SCHEDULES

- Submit initial schedule in duplicate within 5 days after date of OWNER-CONTRACTOR A. Agreement.
- B. Revise and resubmit as required by the OWNER or ENGINEER.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Submit a chart with separate line for each major portion of Work, identifying first workday of each week.
- E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities.
- F. Indicate estimated percentage of completion for each item of Work at each submission.

#### 1.4 WORK STAGING AND SEQUENCING PLAN

- A. Submit proposed Work staging and sequencing plan within 3 days after issuance of Notice-to-Proceed.
- B. Revise and resubmit plan if field conditions change or as required by OWNER to accommodate landfill or landfill gas-to-energy Facility operations.

#### 1.5 **ODOR MITIGATION PROCEDURES**

A. Submit proposed odor mitigation procedures within 3 days after issuance of Noticeto-Proceed.

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В. Introduce additional procedures if field conditions warrant or as required by OWNER to accommodate odor abatement measures.

#### 1.6 PROPOSED PRODUCTS LIST

- A. Within 5 days after date of OWNER-CONTRACTOR Agreement, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- В. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
- C. Unless otherwise provided in this solicitation, the name of a certain brand, make or manufacturer does not restrict proposers to the specific brand, make or manufacturer named, but conveys the general style, type, character, and quality of the article desired. Any article which the public body, in its sole discretion, determines to be the equivalent of that specified, considering quality, workmanship, economy of operation, and suitability for the purpose intended, shall be accepted. The bidder/proposer is responsible to clearly and specifically identify the product being offered and to provide sufficient descriptive literature, catalog cuts and technical detail to enable the City to determine if the product offered meets the requirements of the solicitation. This is required even if offering the exact brand, make or manufacturer specified. Normally in competitive sealed bids only the information furnished with the bids will be considered in the evaluation. Failure to furnish adequate data for evaluation purposes may result in declaring a bid/proposal nonresponsive. Unless the bidder/proposer clearly indicates in its bid/proposal that the product offered is an equivalent product, such bid/proposal will be considered to offer the brand name product referenced in the solicitation.

#### 1.7 PRODUCT DATA

- A. Product Data for Review:
  - 1. Submitted to ENGINEER for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
  - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 70 00.
- B. Product Data for Information:

Submitted for the ENGINEER'S knowledge as contract administrator or for the OWNER.

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- C. Product Data for Project Closeout:
  - Submitted for the OWNER'S benefit during and after project completion.
- D. Submit the number of copies required by the CONTRACTOR, plus two copies which will be retained by the ENGINEER.
- E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- F. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- G. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01 70 00.

## 1.8 SHOP DRAWINGS

- A. Shop Drawings for Review:
  - 1. Submitted to ENGINEER for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
  - 2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01 70 00.
- B. Shop Drawings for Information to be submitted for the ENGINEER'S knowledge as contract administrator or for the OWNER.
- C. Shop Drawings for Project Closeout to be submitted for the OWNER'S benefit during and after project completion.
- D. Submit the Shop Drawings to ENGINEER in suitable electronic file format, such as Adobe (pdf), or similar.

## 1.9 DESIGN DATA

- Submit for the ENGINEER'S knowledge as contract administrator or for the OWNER.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.



## 1.10 TEST REPORTS

- Submit for the ENGINEER'S knowledge as contract administrator or for the OWNER.
- B. Submit test reports for information for the limited purpose of assessing conformance with the design concept expressed in the contract documents.

## 1.11 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the CONTRACTOR to ENGINEER, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to ENGINEER.

## 1.12 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to ENGINEER for delivery to OWNER in quantities specified for Product Data.
- B. Indicate special procedures, parts list, spare parts to be kept on hand, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

## 1.13 HEALTH AND SAFETY PLAN

- A. The CONTRACTOR shall develop a Health and Safety Plan, which specifically addresses the Work to be performed, in accordance with OSHA requirements, SWANA Compilation of Landfill Gas Field Practices and Procedures (August 2011), and other health and safety reference materials published by solid waste management industry organizations such as NWRA. The CONTRACTOR is directed particularly in Section H of the SWANA document with regard to drilling procedures, if applicable. The Health and Safety Plan shall include provisions which anticipate possible exposure to waste materials, landfill gas, condensate, leachate, and other related conditions during installation of the wells, collection piping, pumps, tie-in connections, and other aspects of the Work as outlined in Section 01 35 29.
- B. The CONTRACTOR shall submit a complete Health and Safety Plan to the OWNER and ENGINEER prior to commencing the Work for informational purposes. The CONTRACTOR will not be allowed to commence the Work until a Health and Safety Plan has been submitted and reviewed. The CONTRACTOR and Subcontractor shall be solely responsible for the health and safety of their employees.

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## 1.14 RECORD DRAWINGS

Submit record drawings in accordance with Section 01 70 00.

**END OF SECTION 01 33 00** 

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## **SECTION 01 35 29**

## **HEALTH AND SAFETY PLAN**

## PART 1 - GENERAL

## 1.1 GENERAL

- A. In the event that the ENGINEER or OWNER identify an exclusion zone, the CONTRACTOR will use only site crew members in the identified area that are trained in accordance with the United States Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910.120. The workers also need to have completed the minimum 40-hour Hazardous Materials training course and necessary refresher courses. This applies to both the CONTRACTOR's workers and any Subcontractor site workers.
- B. All site workers that work in the identified exclusion zone must be under a Medical Monitoring Program as outlined in 29 CFR 1910.120, and be physically capable of wearing a respirator, if necessary.
- C. Actions that potentially endanger workers shall be stopped immediately and brought to the OWNER's attention. Health and Safety is the responsibility of the CONTRACTOR.

## 1.2 SITE-SPECIFIC HEALTH AND SAFETY PLAN

- A. The CONTRACTOR shall prepare a written site-specific Health and Safety Plan (Plan) for use by the CONTRACTOR and Subcontractor site workers. This plan must be prepared to meet the 29 CFR 1910.120 OSHA regulations and shall include as a minimum, the following:
  - 1. Organizational Structure: to include general supervision, Health and Safety officer, lines of authority, and responsibility and communication. The Health and Safety Officer shall be a worker who will be present at all times during site construction, in addition to his/her other site duties.
  - Comprehensive Work Plan: to include the work tasks and objectives, resources needed, and training requirements for workers (health and safety, machine operations license, etc.). This shall also include a section on safety procedures to be followed for excavation and well drilling in landfill waste and work in areas where exposure to landfill gas, condensate, and/or leachate is likely.
  - 3. Health and Safety: to include identification of possible site hazards (e.g., solid waste, landfill gas, and leachate), training levels for each category of site

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- workers, personal protective equipment and medical surveillance needed, site control measures, and confined space entry procedures.
- 4. Emergency Response Plans: to include all emergency telephone numbers, a highlighted map showing the quickest route to the nearest emergency care facility and written directions to such facility.
- 5. Air Monitoring Procedures: to include frequency and type of air monitoring of exposed refuse, landfill surfaces, boreholes and excavations, and site worker areas, calibration of air monitoring equipment, and action levels of air contaminants for site worker protection. All equipment calibration and field gas measurements shall be recorded with the date and time of sample, and the sampler's name. Sampling shall be done by a CONTRACTOR's worker trained in the use of the gas sampling equipment. These trained workers shall be designated in the CONTRACTOR's Plan.
- 6. Respiratory Protection Program: to include written documentation of the CONTRACTOR's respiratory program, including respirator fit testing demonstration for site workers.
- 7. Well Drilling Installation and Excavation Safety Procedures: to include prevention of fall hazards and controlled access zones, positive ventilation equipment to reduce demonstrations of emissions from boreholes and trenches, and prevention of exposure to artesian leachate conditions.
- 8. A signature page for all site workers covered by the Plan (CONTRACTOR and Subcontractor site workers).
- B. Acceptance of the CONTRACTOR's Plan by the OWNER is necessary prior to the start of site operations. The Plan should incorporate and be consistent with the OWNER's and the LANDFILL OPERATOR's health and safety policies and procedures.
- C. The CONTRACTOR shall consider the various materials disposed of (municipal solid waste, construction and demolition debris) that may be encountered, as well as the various constituents that may be present in the landfill gas and leachate, during excavation in preparing the Health and Safety Plan.
- D. The Health and Safety Plan should reflect information contained in "A Compilation of Landfill Gas Field Practices and Procedures, Solid Waste Association of North America (SWANA), August 2011."

## 1.3 SITE OPERATIONS

A. The Plan will be kept on site in an easily accessible spot during all site operating hours. All site workers will be notified of the location of the Plan.



- B. A Safety Meeting will be held by CONTRACTOR and attended by all CONTRACTOR site workers prior to starting construction. At this safety meeting, the Plan will be reviewed with the site workers, and all site workers will sign the Plan indicating that they have been apprised of the Plan's contents. New site workers must review the Plan with the CONTRACTOR's Health and Safety Officer prior to beginning work on site, and must sign that they have been apprised of the Plan's contents.
- C. Site operations will take place in conditions of adequate light only.
- D. Areas of open refuse (i.e., excavations, trenches and boreholes) will be periodically monitored for combustible gases, methane, carbon monoxide, benzene, hydrogen sulfide and oxygen through the use of field gas meters. Respiratory protection for acid gases and organic vapors will be used by the worker while monitoring gas levels, if deemed necessary by the CONTRACTOR. Appropriate respiratory protection will be taken by site workers, as necessary to conform to OSHA, NIOSH, and/or ACGIH exposure limits.
- E. No workers will be allowed in any trench or excavation while excavation of the area is in progress. Entry into the excavation shall be made only after the CONTRACTOR's site worker has monitored the air in the excavation, and determined the appropriate level of personal protection required for entry into the excavation. Site workers in excavations must be supervised at all times.
- F. Site workers will limit their dermal exposure to landfill gas, leachate, condensate, and excavated refuse. Minimal skin protection includes puncture resistant shoes meeting ANSI standards, long pants, long-sleeved shirts, safety glasses, safety vests, hard hats, and rubber gloves to be used when handling refuse.
- G. Start-up and shutdown of engines will not be done in areas of excavated refuse or where elevated landfill gas emissions have been documented.

## **END OF SECTION 01 35 29**

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# SECTION 01 70 00 CONTRACT CLOSEOUT

## PART 1 - GENERAL

## 1.1 DESCRIPTION

- A. Scope of Work: The CONTRACTOR shall provide all labor, materials, equipment and incidentals necessary to closeout the project as specified herein. Activities may include, but are not limited to final cleaning, preparation of record documents, operations and maintenance documents, delivery of spare parts, and transfer of warranties.
- B. Related Work Described Elsewhere
  - 1. All Sections.

## 1.2 CLOSEOUT PROCEDURES

- A. The CONTRACTOR shall submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for ENGINEER'S review.
- B. Provide submittals to OWNER that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. The City of Bristol Virginia reserves the right to conduct any test/inspection it may deem advisable to assure goods and services conform to the specifications.

## 1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean equipment and fixtures with cleaning materials appropriate to the surface and material being cleaned. Clean filters of operating equipment, clean debris from manholes, and other areas of the site. CONTRACTOR shall remove all dirt, stones and other debris from the roadways, parking lot and other paved surfaces.
- C. Remove from the site all waste and surplus materials, rubbish, and construction facilities installed by the CONTRACTOR.
- D. Verify that grading, seeding, mulching, landscaping replacement, landfill surface restoration, access road restoration, and repair of all disturbed areas have been

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accomplished to the satisfaction of OWNER and ENGINEER. Verify that temporary erosion and sediment control structures and features installed by the CONTRACTOR have been removed and that permanent structures and features have been repaired as necessary and left in place.

#### 1.4 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents and record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
  - 7. Well Boring Logs, as specified in Section 33 23 10.
  - 8. Pressure Test Reports, as specified in Section 33 51 10.
- B. Ensure entries are complete and accurate, enabling future reference by OWNER.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications. Legibly mark and record for each Product section a description of actual Products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. As-built drawings shall include the following:
  - 1. Title Sheet (includes project name and number, site location map, site address and phone number, and names, addresses and phone numbers of design engineer and CONTRACTOR).
  - 2. Well, Collector, Collection Piping, and Valves Layout (as-built and drawn using surveyed horizontal and vertical coordinates).
  - 3. Condensate Management System layout, including sumps, forcemain, pneumatic supply lines, and valves.
  - 4. Wellfield liquid dewatering system layout, including pumps, forcemain, pneumatic supply lines, and valves.

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- 5. Record Construction Well and Pipe Survey showing coordinates and elevations of surveyed top of pipe, fittings, tie-ins and appurtenances, length of pipe segments, pipe slope between each surveyed station, and ground surface elevation. Each pipe segment shall be given a unique description as approved in advance by the ENGINEER. Well and Pipe Survey data shall be provided in a tabular format, which shall be approved by the ENGINEER.
- 6. As-Built Typical Details.
- G. Submit documents to ENGINEER with claim for final Application for Payment.

## 1.5 OPERATION AND MAINTENANCE DATA

- A. The Contractor shall provide with each piece of equipment an operations and maintenance manual with diagrams, parts list, and a copy of all warranties when applicable.
- B. Submit data in suitable electronic file format, such as Adobe (pdf), or similar.
- C. Contents. Prepare a Table of Contents for each volume, with each Product or system description identified, typed in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of ENGINEER, CONTRACTOR, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged and subdivided by subsystem. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Certificates.
    - c. Photocopies of warranties.
- D. Submit a draft copy of completed volumes 5 days prior to final inspection. This copy will be reviewed and returned, with ENGINEER comments. Revise content of all document sets as required prior to final submission.

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E. Submit documentation in suitable electronic file format, such as Adobe (pdf), or similar, within 10 days after final inspection.

## 1.6 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.
- B. Deliver to OWNER'S office and place in location as directed; obtain receipt prior to final payment.

## 1.7 WARRANTIES AND BONDS

- A. The Contractor agrees that the supplies or services furnished under any award resulting from this solicitation shall be covered by the most favorable commercial warranties the contractor gives any customer for such supplies or services and that the rights and remedies of those available to the City of Bristol Virginia by any other clause of this solicitation. A copy of this warranty must be furnished with the Closeout Documentation. Provide two notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers. Clearly distinguish between manufacturer's and installer's warranties.
- C. Provide Table of Contents and assemble in suitable electronic file format, such as Adobe (pdf), or similar.
- D. Submit prior to final Application for Payment.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

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## **SECTION 31 23 10**

## **EARTHWORK**

## PART 1 – GENERAL

## 1.1 DESCRIPTION

- A. Scope of Work: The CONTRACTOR shall provide all labor, materials, equipment and, incidentals required to perform all clearing, excavating, trenching, and backfilling as specified herein, and indicated for the purpose of constructing and installing the landfill gas (LFG) collection system and dewatering system expansion, including but not limited to the LFG wellheads, LFG collection piping, road crossings, isolation valves, air release valves, condensate management features, forcemain and pneumatic supply piping, forcemain cleanouts, and associated facilities required to complete the work.
- B. The CONTRACTOR shall provide all temporary means needed to maintain excavations in a continuously dewatered condition.
- C. The CONTRACTOR shall stockpile suitable existing cover material during earthwork activities and use the material as backfill. Suitable existing soils shall be removed and stockpiled separately for use as topsoil.
- D. The CONTRACTOR shall perform all earthwork in such a manner as to minimize the disturbed area. The disturbed area along LFG pipelines shall be limited to within 20 feet of the centerline of piping.
- E. The CONTRACTOR shall exercise caution during excavation of cover soils within the waste footprint and in the vicinity of the anchor trench for the bottom liner system.
- F. Work under this Section may include trenching activities within municipal solid waste (MSW).
- G. Related Work Described Elsewhere
  - 1. Section 33 23 10: Landfill Gas Extraction Wells and Wellheads
  - 2. Section 33 51 10: Pipe, Pipe Fittings, and Valves

## 1.2 PROJECT CONDITIONS

Existing Structures: Shown on the Drawings may be certain surface and underground structures adjacent to the work. Such structures may include, but are not limited to, leachate management features and forcemain piping, LFG extraction wells and piping, condensate sumps and forcemain piping, temperature monitoring probes, settlement plates, sidewall odor mitigation system, monitoring well locations, utilities, and drainage culverts. This information has been obtained from existing records. It is not guaranteed to be correct or

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Earthwork 31 23 10-1

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complete and is shown for the convenience of the CONTRACTOR. The CONTRACTOR shall explore ahead of the required excavation to determine the exact location of all structures. They shall be supported and protected from damage by the CONTRACTOR. If they are broken or damaged, they shall be restored to their original condition by the CONTRACTOR at no cost to the OWNER.

#### 1.3 **EXCAVATION CLASSIFICATION**

All excavation shall be considered unclassified. The expense of excavating, removal, hauling, dewatering and disposal of all materials including waste, hard materials, rock materials and other materials specified herein shall be included in the contract pricing. No additional compensation will be made for excavation of waste or rock material.

## PART 2 – PRODUCTS

#### 2.1 SOIL MATERIALS

- A. If applicable, pipe bedding material used in LFG collection pipe trenches and/or condensate and dewatering liquids pipe trenches shall be a clean, dry sand or granular soil, free of clay, muck, organic matter, and other deleterious substances. Material data sheets shall be submitted to the ENGINEER for approval prior to use on-site.
- B. Soil backfill material shall be clean structural fill free of stones larger than 2 inches, construction debris, refuse, muck, soft clay, loam, sponge material, vegetation/organic matter, or angular rock. Suitable excavation material may be used for backfilling around installed pipe, subject to approval by ENGINEER.

#### 2.2 STONE MATERIALS

Coarse aggregate used in LFG extraction wells shall be VDOT No. 3 or other washed crushed stone between 1 inch and 2 inches in diameter, and shall be composed of clean, hard and durable fragments, free of silt, clay, dirt, vegetation, and other objectionable matter. Sieve analysis shall be performed at the source at least weekly by ASTM 6913/2487 or other acceptable test method. Stone backfill shall be non-calcareous rock with a minimum of 90 percent non-calcium-carbonate material. Calcium carbonate content shall be measured by ASTM D4373 test method at a frequency of at least one test per 500 tons. Additional testing shall be performed upon a change of source.

## PART 3 – EXECUTION

#### **GENERAL** 3.1

A. Excavations for structures and pipelines shall be open excavations, shored and braced where necessary to prevent possible injury to workmen and to new and existing structures or pipelines.

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- B. Stability of Excavations: Slope sides of excavations, when necessary, to comply with codes and ordinances of agencies having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
- C. Stockpile excavated materials to be reused as backfill on the up-gradient side of the excavation. Segregate differing excavation materials as to type. Provide positive drainage for all existing and newly graded areas and other construction areas, including stockpile locations, during each phase of the work. All necessary temporary controls shall be provided to prevent washout and erosion.
- D. Dry conditions shall be maintained by the CONTRACTOR in all excavations for structures.

#### 3.2 PIPE TRENCH PREPARATION (NON-LANDFILL AND LANDFILL AREAS)

- A. In the event that piping associated with the LFG system is installed belowgrade, no more than 200 feet of trench may be opened in advance of pipe installation unless approved by the ENGINEER.
- B. Trench width shall be minimized to greatest extent practical but shall conform to the following:
  - Sufficient to provide room for installing, jointing, and inspecting piping, but in no case wider at top of pipe than pipe barrel outside diameter plus 2 feet, unless otherwise indicated.
  - 2. Enlargements at pipe joints may be made if required and approved by the ENGINEER.
  - 3. Sufficient for sheeting, bracing, sloping, and dewatering as required.
  - 4. Sufficient to allow thorough compaction of backfill adjacent to bottom half of pipe.
  - 5. Do not use excavating equipment which requires the trench to be excavated to excessive width.
- C. Depth of trench as indicated on the Drawings shall be field-located by the CONTRACTOR with approval of the ENGINEER. If approved by the ENGINEER, depths may be revised provided the minimum slope and cover requirements are maintained.
- D. In the event that piping associated with the LFG system is installed belowgrade, the trench shall be backfilled with materials as indicated on the Drawings and as specified herein. The trench shall be backfilled and compacted to provide a firm, uniform grade. The backfill material shall be compacted using vibrating plate-type equipment. Place backfill materials in horizontal layers not more than 8 inches in

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loose depth. Compact each layer with at least 2 passes by compaction equipment. If the ENGINEER suspects adequate compaction is not being achieved, the CONTRACTOR shall test the backfill material to demonstrate a density of at least 90 percent of the maximum density as determined by ASTM D698 (Standard Proctor).

- E. All trenches shall be constructed in a uniform grade. Excavations of trenches shall be kept in a dry condition. The CONTRACTOR shall be responsible for maintaining the dry conditions.
- F. The CONTRACTOR shall stockpile, handle, transport, spread, and cover waste materials encountered during earthwork activities as specified in 3.6 - DISPOSAL of this Section.
- G. The CONTRACTOR shall not excavate for pipe installation during inclement weather conditions, as determined by the ENGINEER.
- Η. In Landfill areas, CONTRACTOR shall backfill trench so there is no exposed waste at the end of each workday.
- ١. In Landfill areas with existing final cap, the pipe shall be installed within the vegetative soil cover layer at least 6 inches above the existing geosynthetic components of the final cap. CONTRACTOR shall exercise caution during excavation and backfill so as to avoid damage to the final cap integrity. CONTRACTOR shall be responsible for repairing and damage to the final cover system caused by his construction activities.
- J. If a sample from the tests outlined in Part 3.2D fails, the CONTRACTOR shall rework the soil and retest until the sample demonstrates conformance with the standard.

#### 3.3 SHEETING, SHORING, AND BRACING

Excavations requiring sheeting, shoring, and bracing are not anticipated for this work. The CONTRACTOR shall notify the OWNER and ENGINEER if such requirement is encountered in the field. Such work shall proceed upon OWNER and ENGINEER approval per the following:

- A. Excavations for structures and pipelines shall be open excavations, sheeted, shored. and braced where necessary to prevent injury to workmen, structures, or pipe lines.
- В. All municipal, OWNER, state, and federal ordinances, codes, regulations, and laws shall be observed.
- C. Used materials shall be in good condition, not damaged or excessively pitted.
- D. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Move shoring and bracing as excavation progresses.
- E. Unless otherwise shown, specified, or ordered, all materials used for construction shall be removed when work is completed. Such removal shall be made in a manner

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not injurious to the structure or its appearance or to adjacent work. The CONTRACTOR shall place waste materials encountered during earthwork activities in neat piles for disposal in the active landfill cell.

- F. The clearances and types of the temporary structures, insofar as they affect the character of the finished work, and the design of sheeting to be left in place, will be subject to the approval of the ENGINEER; but the CONTRACTOR shall be responsible for the adequacy of all sheeting, shoring, bracing, coffer damming, etc.
- G. Safe and satisfactory sheeting shall be the entire responsibility of the CONTRACTOR.

#### 3.4 **GRADING**

Uniformly grade areas within limits of construction under this Section, including adjacent transition areas. Compact with uniform slopes to provide positive drainage.

#### 3.5 SOIL EROSION OR SEDIMENT CONTROL

- Α. Install erosion and sediment controls as required by field conditions and in compliance with the Solid Waste Permit, the Supplement to the Erosion and Sediment Control Plan, and the Virginia Erosion and Sediment Planning and Design Manual.
- В. Disturbed areas outside of the waste limits are not anticipated for this work. If areas outside of the waste limits are disturbed, these areas shall be seeded and mulched in accordance with the Supplement to the Erosion and Sediment Control Plan and the Virginia Erosion and Sediment Planning and Design Manual. The seed mixture and application rates shall be in accordance with Table 6.11b of the Manual, or as approved by the ENGINEER. Lime and fertilizer shall be applied along with seed and mulch at rates in accordance with the Handbook. Higher application rates may be necessary at the site to establish vegetation adequate to control erosion and sediment transport.
- C. Disturbed areas within the waste limits will be seeded and mulched to re-establish vegetative growth, where it existed at the start of work, as applicable.
- D. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
- E. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
- F. The CONTRACTOR is responsible for obtaining all erosion and sediment permits and licenses that are required to perform the Work.

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#### 3.6 DISPOSAL

The Bristol ISWMF does not have an active landfill waste placement operations ("working face") area and is in the process of installing various remedial measures prior to closure. During this interim period, waste that is excavated during construction activities can be relocated and covered within the landfill.

The CONTRACTOR shall place waste materials encountered during earthwork activities in neat piles adjacent to the work area. Prior to the end of the working day, the CONTRACTOR shall haul the excavated waste materials to a designated area for waste relocation at the site, as directed by the OWNER. The CONTRACTOR shall be responsible for stripping off the existing Intermediate Soil Cover material, unloading and spreading the excavated waste, "tracking it in" with suitable equipment, and replacing and restoring the Intermediate Soil Cover layer.

OWNER shall not require the CONTRACTOR to pay tipping fee for disposal of excavated waste materials encountered during work activities. If odors or emissions from the excavated waste become a nuisance as determined by the OWNER, CONTRACTOR shall increase the frequency of excavated waste removal as directed by the ENGINEER.

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#### **SECTION 33 23 10**

# LANDFILL GAS EXTRACTION WELLS AND WELLHEADS

# PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Scope of Work: The CONTRACTOR shall provide all equipment, materials, and labor needed to install vertical landfill gas (LFG) extraction wells and wellheads as specified herein and as indicated on the Drawings.
- B. It is expected that combustible methane gas, carbon monoxide, hydrogen sulfide, benzene, and other hazardous components will be venting from boreholes drilled to install the wells. It is expected that leachate may be encountered during drilling. Landfill fluids (gases and liquids) may be present under high positive pressures. The CONTRACTOR'S bid price shall include provision for all equipment and procedures necessary to safely install wells under this condition.
- C. All work shall be performed by qualified workers in accordance with the best standards and practices available. The CONTRACTOR shall make provisions for containment of discharged leachate if emitting from borehole.
- D. The CONTRACTOR shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. Upon completion of each day's work, he shall dispose of all drill tailings at the designated area for waste relocation at the landfill, as well as secure all his tools, construction equipment, machinery and surplus materials from the site.
- E. CONTRACTOR shall make every attempt to minimize odors from the wells during construction, by covering borehole between active operations, and as soon as well is completed, by covering or removing any drill tailings and temporarily capping the well riser pipe.
- F. Material requirements vary between wells as shown on the Drawings. Well riser pipes are designated as either PVC or CPVC as shown on the Drawings.
- G. Related Work Described Elsewhere
  - 1. Section 31 23 10: Earthwork
  - 2. Section 33 51 10: Pipe, Pipe Fittings, and Valves

#### 1.2 SUBMITTALS

A. The CONTRACTOR shall prepare and submit to the ENGINEER for review and approval catalog cuts on materials furnished, and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, and inspection of wellhead assemblies and other appurtenances furnished.

- B. The CONTRACTOR shall submit to the ENGINEER for review and approval samples of all backfill materials and the name of the vendor(s) and source of materials furnished.
- C. The CONTRACTOR shall prepare and submit to the ENGINEER for review and approval Shop Drawings showing dimensions, materials, and configuration of the wellhead assembly.
- D. Within 10 days after drilling is complete, the CONTRACTOR shall submit to the ENGINEER well logs (drilling and construction) based on information recorded in the field during construction.

#### 1.3 JOB CONDITIONS

- A. Wells are to be drilled through the existing landfill intermediate cover, which consists of at least 12 inches of soil depth. Some well locations may be on sloped portions of the existing landfill surface grades. The CONTRACTOR shall employ whatever temporary means are necessary to provide access to such locations, and return all areas to existing condition.
- B. Certain areas in the southern and middle portions of the Quarry Landfill have demonstrated atypical temperatures, pressures, and landfill gas composition. CONTRACTOR shall exercise caution and be prepared to invoke contingency measures related to subsurface temperature and pressure when drilling wells.

#### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Backfill Materials:
  - 1. Coarse aggregate backfill shall be as specified in Section 31 23 10.
  - 2. Soil backfill material shall be as specified in Section 31 23 10.
  - 3. If "Plug" is shown on the Drawings, this shall refer to a well seal comprised of either hydrated sodium bentonite pellets or chips or foam sealant of a thickness indicated on the Drawings. Bentonite material shall consist of clay greater than 85% sodium montmorillinite, without additives and shall be placed and wetted in 6-inch layers. Engineered foam sealant shall be EFS 24-005 product (EFS 9.0B) manufactured by FOAM Concepts, LLC or approved equal.
- B. Perforated PVC and CPVC Pipe: The piping shall be as specified in Section 33 51 10. The holes in extraction well piping shall be as shown on the Drawings and may be field-fabricated or supplied by the factory.
- C. Rigid and Flexible PVC and CPVC Pipe: Rigid and flexible PVC pipe shall be as specified in Section 33 51 10.

- D. Wellhead Assembly shall be a pre-fabricated unit consisting of a 2-inch or 3-inch globe valve, 2-inch or 3-inch union disconnect, a quick change orifice plate housing with a collar and set of interchangeable orifice plates suitable for flow measurements, adapter bushing or Fernco reducer fitting, stabilizing well cap with support ring, temperature gauge, multiple barbed hose monitoring ports, and dust caps. Wellhead assembly shall be manufactured by QED Environmental Systems/Landtec, Dexter, MI (800-810-9908) or Colton, CA (800-526-3832) or approved equal.
  - The globe valve shall be constructed of Type 1, Grade 1, PVC with socket fittings stainless steel valve stem and handle. The valve shall meet the requirements of ASTM D-1784 for rigid PVC compounds. The "globe" shall be of a tapered cylindrical plug design made of PVC, thickly lined with Viton material, flanged, stem with position high visibility indicator, or equivalent.
- E. Well caps shall be dual extraction type with flexible couplings and adapter fittings that allow for connection of pneumatic supply and dewatering forcemain lines. Dual extraction well caps shall be manufactured by Pump One or approved equal.
- F. Well Bore Reinforcement Grate shall be constructed of materials and configured to the dimensions as shown on the Drawings.
- G. Wellbore geomembrane skirt seal shall be Landtec/QED WBS wellbore seal, comprised of 30-mil PVC, measuring 10 feet by 10 feet, suitable for attaching to 6-inch, 8-inch, or 12-inch LFG well riser pipe, or approved equivalent. The wellbore geomembrane skirt seal shall be configured as shown on the Drawings.

#### 2.2 SPARE PARTS

No spare parts are included in this work.

#### PART 3 – EXECUTION

#### 3.1 DRILLING

- A. The CONTRACTOR shall coordinate the start of drilling with the ENGINEER.
- B. The CONTRACTOR shall provide at all times a thoroughly experienced, competent driller during all drilling operations.
- C. The OWNER shall survey and stake the proposed well locations prior to drilling. OWNER shall submit survey information to ENGINEER and well locations, boring depths, and slotted pipe lengths will be approved and may be adjusted by the ENGINEER or the OWNER prior to beginning drilling. Following review of the adjusted well schedule, CONTRACTOR shall obtain authorization from OWNER and ENGINEER prior to drilling.
- D. The CONTRACTOR must use dry drilling equipment. Wet rotary drilling equipment may not be used. The CONTRACTOR should anticipate wet waste with poor shear strength will be encountered and must have drilling tools and supplies for such circumstances, such as a "muck" or "sand" bucket and drilling polymer, such as

- SHORE PAC VISCOUS SOIL STABILIZING POLYMER. It is anticipated that drilling will require frequent use of muck bucket and drilling polymer, or other techniques, to enable achieving well design depths in wet, decomposed waste.
- E. In the event that drilling tools (such as muck bucket and/or drilling polymer) mentioned above prove ineffective in achieving well design depths, the OWNER and ENGINEER may instruct CONTRACTOR to mobilize a sonic drilling rig capable of installing a smaller (12-inch-diameter) borehole with a smaller (6-inch-diameter) well riser pipe to attempt to achieve design depths. In this event, extension to the Contract Times will be granted to accommodate sonic rig mobilization, as necessary.
- F. The CONTRACTOR shall not initiate drilling of borehole unless the well can be fully constructed, completed, and capped prior to the end of the workday. However, exceptions to this requirement will be allowed for efforts to install deep (greater than 150 feet) wells or if subsurface conditions exhibit excessive heat, pressures, or liquids that induce a slow drilling pace (less than 2 feet per hour), or if wells require the muck bucket or drilling polymer to be utilized. In the event a well cannot be fully constructed and capped prior to the end of the workday, the borehole shall be covered with a steel plate and a stockpile of soil and the bucket auger placed on top of the soil and plate. No exposed wastes in borehole, trenches, or stockpiles shall remain overnight.
- G. Wells are to be drilled to the depth and diameter as shown on the Drawings. The boring depths shown on the Drawings are estimated and may be adjusted in the field by the ENGINEER. Under no circumstances are the drilling depths from the adjusted well schedule to be exceeded unless approved by the ENGINEER in advance.
- H. Wet Borings: It is likely that liquids will be encountered at some depth during installation of the borings.
  - 1. The CONTRACTOR will likely be directed to drill beyond the point at which liquids are initially encountered. If wet conditions cease (e.g., due to a perched water layer), then drilling will continue to the design depth. If wet conditions remain, the ENGINEER may instruct the DRILLER to utilize a muck bucket and/or drilling polymer in order to continue drilling. Based on subsequent drilling production rate and well depths being achieved, the boring may be terminated (after driller has attempted to advance boring for at least 2 hours) and the length of perforated pipe adjusted by the ENGINEER. Alternatively, the ENGINEER may instruct the DRILLER to abandon the boring and relocate the well.
  - 2. If during the drilling of a hole, an obstruction is reached, the driller must use all reasonable means to advance the drilling. If the drilling rate falls to less than 2 feet per hour and the well cannot be completed as shown on the Drawings, the ENGINEER shall be consulted as to whether the borehole has advanced to a sufficient depth.
- I. Abandoned Borings: If, in the opinion of the ENGINEER, the borehole has not reached a sufficient depth to function as an effective extraction well, the CONTRACTOR shall abandon this borehole by backfilling it with cuttings removed during drilling. If cuttings are unsuitable as backfill (for example, box springs, tires, etc.) the CONTRACTOR shall use soil backfill material. A 2-foot-thick plug (bentonite or foam

- sealant) will be placed in the borehole when the depth is 6 feet below the existing grade. The remaining 4 feet of the borehole will then be filled with soil material and compacted to approximately match the elevation of the existing grade. Compensation for abandoned borings shall be at 1/3 the unit price for this pay item.
- J. If the ENGINEER adds or deletes a well, or adjusts the depth of a well, either less than or greater than the depth shown on the well schedule, the CONTRACTOR will be compensated or will credit the OWNER per foot of variance according to the unit price for this pay item.
- K. The bore for the well shall be straight and the well pipe shall be installed in the center of the borehole. The CONTRACTOR shall take all necessary precautions to maintain the well pipe vertically plumbed during the backfill operation of the bored hole to the satisfaction of the ENGINEER. If the pipe installed is out of plumb, as determined by the ENGINEER, the CONTRACTOR, at his own expense, shall correct the alignment.
- L. The well bore reinforcement grate shall be installed in accordance with the procedures outlined on the Drawings.
- M. The wellbore geomembrane skirt seal shall be installed in accordance with the manufacturer's recommendations and as shown on the Drawings.
- N. The CONTRACTOR shall keep detailed well logs for all wells drilled, including the total depth of well, the static water level, the depth, thickness, description of soil or waste strata, the occurrence of any water bearing zones, and temperature of waste cuttings at 10-foot intervals. The logs shall also include detailed well construction diagrams for all wells installed. These diagrams shall include dimensions that indicate total well depth, length of slotted pipe, length of solid pipe, length of stick-up to the top of the wellhead, thickness of stone, thickness of plug, and thicknesses of soil material. Well logs shall be submitted to the ENGINEER.

#### 3.2 PIPE INSTALLATION

- A. Pipe and pipe fittings shall be prepared, aligned, and joined, in accordance with the Drawings and as specified in Section 33 51 10. If threaded pipe is not used, lag screws shall be installed at each bell end of every 20-foot pipe section. Three lag screws per bell fitting shall be installed. The length of the lag screws shall equal the sum of the pipe and bell fitting wall thickness. Three lag screws shall be installed on the end cap at the bottom of the well.
- B. Pipe shall be left above grade to allow for wellhead installation as shown on drawings. Temporary caps shall be placed on all wells.
- C. The bore for the well shall be straight and the well pipes shall be installed vertically plumb in the center of the bore hole. Derricks, ropes, or other suitable equipment or manual labor shall be used for lowering the pipes into the well borings, subject to the approval of the ENGINEER. Pipe shall be installed with a safety grate installed over the boring.

#### 3.3 BACKFILLING

- A. The CONTRACTOR shall take all necessary precautions to maintain the well pipes vertically plumbed during the backfill operation of the borehole. Care shall be taken during installation of backfill materials to prevent damage to the well piping, the wellbore reinforcement grate, or the wellbore geomembrane skirt seal.
- B. If the bore hole collapses partially or completely during backfill operations, the CONTRACTOR will be required to redrill the bore hole, at no additional cost, upon the direction of the ENGINEER.
- C. Backfilling of the well shall commence immediately after well drilling is completed and the well piping has been installed. Backfill materials shall be placed carefully within the borehole to the dimensions shown on the Drawings and as approved by the ENGINEER. The ENGINEER, on the basis of a visual examination, may reject gravel and soil backfill containing foreign material. Both well piping and backfill shall be installed with a safety grate installed over the boring as outlined in the CONTRACTOR's Health and Safety Plan.
- D. If foam sealant is utilized for the borehole Plug, the product shall be mixed and poured in accordance with the manufacturer's instructions. If bentonite is utilized for the borehole Plug, the bentonite Plug shall be backfilled in 6-inch lifts. The CONTRACTOR shall soak each lift with clean water prior to filling the next one as directed by the ENGINEER.
- E. Soil backfill shall be rodded in the boring to provide even distribution and compaction.
- F. The ENGINEER shall inspect the extraction well boring 4 to 8 weeks after completion. Excessive settlement (6 inches or more below surrounding grade) in the boring shall be repaired by the CONTRACTOR by adding compacted fill around the well casing at no additional cost to the OWNER.
- G. All temporary equipment bench soils and materials shall be removed and the soil cover replaced and re-graded. Suitable erosion control provisions shall be made to prevent erosion of disturbed areas.

#### 3.4 TEMPORARY CAP

The CONTRACTOR shall temporarily cap the riser pipe of the vertical extraction well to prevent direct venting of LFG through the riser pipe. The temporary cap shall be removed during the installation of the wellheads.

#### 3.5 WASTE DISPOSAL

Excavated waste materials, including well cuttings shall be handled as specified in Section 31 23 10.3.6.

#### 3.6 WELLHEAD INSTALLATION

A. Wellhead assembly shall be installed on the vertical wells in accordance with the manufacturer's recommendations. Care shall be taken not to damage the impact

- the orifice plate during installation. If an orifice plate is damaged during installation, CONTRACTOR shall replace it at no cost to the OWNER.
- B. The wellhead shall be connected to the lateral via flexible PVC pipe, as shown on the Drawings. Install flexible PVC pipe with adequate length to anticipate settlement, but so that no sags are formed.

#### **END OF SECTION 33 23 10**

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# **SECTION 33 51 10**

# PIPE, PIPE FITTINGS, AND VALVES

## PART 1 – GENERAL

#### 1.1 DESCRIPTION

- A. Scope of Work: The CONTRACTOR shall supply all materials, equipment, and labor needed to install all pipe, pipe fittings, and valves as specified herein and as indicated on the Drawings. Comply with the latest version of any referenced standard. *Provide*, as used herein means furnish and install.
- B. Related Work Described Elsewhere
  - 1. Section 31 23 10: Earthwork
  - 2. Section 33 23 10: Landfill Gas Extraction Wells and Wellheads

#### 1.2 QUALITY ASSURANCE

- A. Provide only pipe and fittings conforming to the requirements of the referenced ASTM standards, ANSI standards, or PPI standards.
- B. Utilize only factory trained and certified welders, equipment, and installers.
- C. Follow all ASTM practices and standards in the manufacture and fabrication of piping and fittings.
- D. Follow manufacturer's written instructions for handling, storage, and installation.

#### 1.3 QUALITY CONTROL

- A. Provide permanent markings on piping, clearly showing ASTM conformance, size and SDR, pressure rating, cell classification number, and the manufacturer's name.
- B. Provide certification of all welders and installers.
- C. Certify compliance with ASTM practices and standards during manufacture and fabrication.
- D. Remove from site any pipe and fittings damaged during shipment, construction, or rejected during testing and/or inspection. Replace with acceptable products without additional expense to the OWNER.

#### 1.4 SUBMITTALS

- A. The CONTRACTOR shall prepare and submit to the ENGINEER, for review and approval, certificates of compliance on materials furnished and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, inspection, maintenance, and repair of each type of pipe, pipe fitting, and valve furnished.
- B. Submit all certifications listed in the QC section above and as required elsewhere in this Section.
- C. Prepare and submit Shop Drawings to the ENGINEER for review and approval. Shop Drawings shall show all dimensions, slopes, and invert elevations at connections. All tie-ins to the existing system shall be field-verified and shown on the Shop Drawings.

# PART 2 - PRODUCTS

#### 2.1 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. All PVC pipe and pipe fittings shall be Schedule 80 PVC conforming to ASTM D 1784, ASTM D 1785 (for pipe), and ASTM D 2467 (for fittings). Acceptable manufacturers include Nibco Chemtrol (219-295-3000), CertainTeed (610-341-7768), ASAHI/America (800-343-3618), or approved equal.
- B. PVC pipe and pipe fittings shall be manufactured from a compound which meets the requirements of Type 1, Grade 1, Polyvinyl Chloride PVC 1120, Class 12454-B, as outlined in ASTM D 1784. A Type 1, Grade 1 compound is characterized as having the highest requirements for mechanical properties and chemical resistance.
  - 1. Compound from which pipe is produced shall have a design stress rating of 2000 psi at 73 degrees F, listed by the Plastic Piping Institute.
  - 2. Materials from which pipe and pipe fittings are manufactured shall have been tested and approved by NSF International.
  - 3. Pipe shall be homogenous throughout and shall be free from cracks, holes, foreign inclusions, and other defects.

#### 2.2 CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPE

A. The Schedule 80 CPVC pipe shall be manufactured from a compound which meets the requirements of Type IV, Grade 1, Chlorinated Polyvinyl Chloride CPVC, cell classification 23447 per ASTM D 1784, have a compressive strength of 10,000 psi per ASTM D 695, and conform to the requirements of ASTM F441M-20.

#### 2.3 PVC FLANGES

A. Flanges shall be Schedule 80 PVC and shall be plate type, ANSI Class 150 pounds.

- B. The bolts, studs, nuts, and washers for the flanges shall be hot dipped galvanized steel. Below-grade flanges shall be wrapped in 5-mil polyethylene sheeting, just after installation and prior to backfilling, to help prevent corrosion.
- C. Flange gaskets shall be full-face Neoprene. Other elastomers, such as Nitrile or Buna-N may be submitted to the ENGINEER for consideration.

#### 2.4 FLEXIBLE PVC PIPE

- A. Flexible PVC pipe shall be as manufactured by QED Environmental Systems, Dexter, MI, 734-995-2547, Solarguard™ Flex Hose, or approved equal.
- B. Fasteners for flexible PVC pipe shall be QED Environmental Systems Solarguard™ Flex Hose Banding Kits, or approved equal.

#### 2.5 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

#### A. General:

- All HDPE pipe and fittings greater than 4-inch-diameter as indicated on the Drawings shall be Iron Pipe Size (IPS) Standard Dimension Rating (SDR) 17 high density polyethylene pipe using a 4710 type resin, or approved equal. HDPE pipe and fittings that are 4-inch-diameter and less shall be IPS SDR 11 for liquid forcemain piping and IPS SDR 9 for pneumatic supply piping.
- 2. Pipe shall be extruded from a Type III, Class C, Category 5, Grade P47 compound with a hydrostatic design stress of 1000 psi at 73.4°F, as described in ASTM D 1248. It shall be classified as cell 445574C/E according to ASTM D 3350 and have the material designation of PE 4710. The pipe shall be manufactured to meet the requirements of ASTM F 714. Manufacturer's literature shall be adhered to when "manufacturer's recommendations" are specified. All pipe and pipe fittings shall be provided by manufacturer. Acceptable manufacturers include Plexco (630-350-3700), Driscopipe (800-527-0662), or approved equal.
- 3. Provide only manufacturer built molded type fittings unless otherwise approved by the ENGINEER. Provide fittings in matching SDR unless unavailable from manufacturer. No field fabricated fittings will be allowed unless approved by the ENGINEER.

#### 2.6 FLANGES FOR HDPE PIPE

- A. Provide molded HDPE flange adaptors with ANSI B16.5 drilling.
- B. Provide convoluted ductile iron back-up rings with a minimum thickness of 1-inch, as manufactured by Improved Piping Products (925-254-0962), Inc., of Orinda, California or approved equal. Back-up rings shall be finished with red oxide primer.

C. Studs and bolts, nuts, and washers for flanges shall be as specified in Part 2.3 above.

#### 2.7 VALVES

#### A. General:

- All valves shall be complete with all necessary operators, actuators, hand-wheels, chain wheels, extension stems, floor stands, worm and gear operators, operating nuts, chains, wrenches, and other accessories or appurtenances which are required for the proper completion of the work. Valves 6-inch-diameter and larger shall be equipped with a geared operator. Operators, actuators, and other accessories shall be sized and furnished by the valve supplier and factory mounted.
- Valves and operators shall be suitable for the exposure they are subjected to, e.g., above grade or buried, and for conveyance of landfill gas and leachate. Renewable parts including discs, packing, and seats shall be of types recommended by valve manufacturer for intended service, but not of a lower quality than specified herein. Valves shall have all safety features required by OSHA.
- 3. Unless otherwise shown, valves shall be the same size as the adjoining pipe.
- 4. Monitoring ports and hoses shall be provided at each abovegrade and buried LFG isolation valve. Ports threaded into header shall be Swagelock 1/4" SS-420-1-4 x1/4" MPT, or approved equal. Monitoring hose shall be stainless steel teflon-lined hose with Swagelock tube ends, model SS-4BHT-36, or approved equal, of adequate length to extend above grade (above-specified length is for 3-foot-long tubing section). Sampling end shall have a 1/4" female connector SS-420-7-4 with a quick-connect polypropylene monitoring port by Ryan Herco, Part No. 0812-002.

#### B. Butterfly Valves:

1. The LFG Header, condensate forcemain, pneumatic supply isolation valves shall be butterfly bubble tight, wafer design, with a PVC body, nitrile seat, and compatible with a flat face flange, as manufactured by Asahi/America or equal. Stem extensions shall be stainless steel in an epoxy coated steel outer housing with a gear box assembly and visual valve position indicator mounted on top and equipped with a removable manual operating wheel. Monitoring ports at the LFG butterfly valves shall be quick connects. If required, quick connects shall be attached to the pipeline via flexible metal hose connector, Swagelok Part No. SS-4HO-6-L4, or equal.

#### C. Globe Valves:

Refer to Section 332310 for the wellhead globe valves.

#### D. Labcock Valves:

Quick connects used for monitoring ports may be replaced by Labcock valves at all monitoring ports in the system, subject to approval by the ENGINEER. Labcock valves shall be 1/4-inch PVC with EPDM seats and seals. Valves shall have 1/4-inch MPT on one end and hose connection on the other end.

#### 2.8 PIPELINE LOCATOR/WARNING TAPE

If applicable, tape shall be a metallic locator/warning tape imprinted with the words "Caution Gas Line Buried Below," as supplied by Terra Tape (800-231-2417).

# PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Pipe shall be stored or stacked so as to prevent damage by marring, crushing, or piercing. Maximum stacking height shall be limited to 6 feet.
- B. Pipe and pipe fittings shall be handled carefully in loading and unloading. They shall be lifted by hoists and lowered on skidways in such a manner as to avoid shock.

  Derricks, ropes, or other suitable equipment shall be used for lowering the pipe into the extraction well borings. Pipe and pipe fittings shall not be dropped or dumped.
- C. Install pipe straight and true to lines, grades, and elevations indicated on the drawings, within acceptable tolerances.
- D. Maintain pipe interior free of mud, debris, tools, clothing, or other foreign objects. Provide secure closure of pipe ends during construction.
- E. Certify to the ENGINEER a clean pipe interior prior to closure.
- F. Makeup threaded connections with Teflon™ tape and/or paste.
- G. Assemble bolts with anti-galling compound. Wrap buried bolted connections in 5-mil polyethylene sheeting prior to backfilling.
- Install new gaskets when reassembling an existing flanged fitting.

#### 3.2 PVC/CPVC PIPE STORAGE

For storage of PVC and CPVC pipe and fittings over 5 days, a location shall be chosen out of direct sunlight, or the piping and fittings shall be covered.

#### 3.3 PVC/CPVC PIPE INSTALLATION

PVC/CPVC pipe installation shall conform to these specifications, the manufacturer's recommendations, and as outlined in ASTM D 2774.



#### 3.4 JOINING OF PVC/CPVC PIPE

A. Joining of pipe shall be in accordance with ASTM D 2855.

#### B. Preparation:

All pipes shall be inspected for cuts, scratches, or other damage prior to installation. Pipe with imperfections shall not be used. All burrs, chips, etc. shall be removed from pipe interior and exterior. All pipe cuts shall be square, perpendicular to the center line of pipe. Pipe ends shall be beveled prior to applying primer and solvent cement so that the cement does not get wiped off during insertion into the fitting socket.

# C. Solvent Welding:

A coating of primer as recommended by pipe supplier shall be applied to the entire interior surface of the fitting socket and to an equivalent area on the exterior of the pipe prior to applying solvent cement. The solvent cement shall comply with the requirements of ASTM D 2564 and shall be applied in strict accordance with manufacturer's specifications. Pipe shall not be primed or solvent welded during precipitation or when atmospheric temperature is below 40 degrees F or above 90 degrees F.

#### D. Curing:

After solvent welding, the pipe shall remain undisturbed until cement has thoroughly set. As a guideline for joint setting time, use 1 hour for ambient temperatures 60-90 degrees F, or 2 hours when ambient temperature is 40-60 degrees F.

#### E. Alignment:

Pipe and pipe fittings shall be selected so that there will be as small a linear deviation as possible at the joints, and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight fitting will be rejected.

#### 3.5 FLEXIBLE PVC PIPE CONNECTIONS

Connections to pipe shall be made with clamps in accordance with manufacturer's step by step procedures and recommendations.

#### 3.6 HDPE PIPE HANDLING

- A. HDPE pipe shall not be bent more than the minimum radius recommended by the manufacturer for type, grade, and SDR. Care shall be taken to avoid imposing strains that will overstress or buckle the HDPE piping or impose excessive stress on the joints.
- B. Joining HDPE Pipe: Only two methods shall be utilized to joining HDPE pipe: heat fusion and mechanical joining.

- Mechanical Joining shall be accomplished with HDPE flange adapters, neoprene, or other Engineer-approved gaskets, and ductile iron back-up flanges, and shall be used only where shown on the Drawings.
- 2. Heat Fusion joints shall be made in accordance with manufacturer's step by step procedures and recommendations. Fusion equipment and a trained operator shall be provided by the CONTRACTOR. Pipe fusion equipment shall be of the size and nature to adequately weld all pipe sizes and fittings necessary to complete the project. Heat fusion shall be performed outside of the trench whenever practical. Before heat fusing pipe, each length shall be inspected for the presence of dirt, sand, mud, shavings, and other debris. Any foreign material shall be completely removed. At the end of each day, all open ends of fused pipe shall be capped or otherwise covered to prevent entry by animals or debris.
- 3. The use of electrofusion branch saddles to connect pipes is prohibited.

  Different pipes shall be connected using either molded tee fittings, factoryfabricated branch saddle fittings, or field-fabricated branch saddles installed via traditional fusion techniques made in accordance with manufacturer's recommendations and step by step procedures. Branch saddle fusion equipment will be of the size to facilitate saddle fusion within the pipe trench.
- 4. As per the manufacturer's instructions, no fusion shall be performed in precipitation unless a shelter is provided.

#### 3.7 HDPE PIPE INSTALLATION

- A. Pipe installation shall comply with the requirements of ASTM D 2321, PPI TR-31/9-79, and the manufacturer's recommendations.
- B. Lengths of fused pipe to be handled as one segment shall not exceed 400 feet.
- C. The ENGINEER shall be notified prior to any pipe being installed in the trench in order to inspect the following items:
  - 1. All butt and saddle fusions.
  - 2. Pipe integrity.
  - 3. Trench excavation for rocks and foreign material.
  - 4. Proper trench slope.
  - 5. Trench contour to ensure the pipe will have uniform and continuous support.
  - 6. Pipe locating tape.
- D. Any irregularities found by the ENGINEER during this inspection must be corrected before lowering the pipe into the trench. Pipe shall be allowed sufficient time to adjust to trench temperature prior to any testing, segment tie-ins, and/or backfilling.

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- E. Tie-ins shall be made out of the trench whenever possible. When tie-ins are to be made only in the trench, a bell hole shall be excavated large enough to ensure an adequate and safe work area.
- F. Below grade piping shall be marked with metallic locator/warning tape to be buried in the trench approximately 1 foot above the pipe.

#### 3.8 VALVES

- A. Valves shall be installed in accordance with the manufacturer's recommendations and the following:
  - 1. Butterfly valves shall be installed between two flanges. Care shall be taken to avoid stripping bolts when tightening.
  - 2. Flanges shall be joined with hot dipped galvanized steel studs and nuts. Stud and nut diameters shall be sized as recommended by the manufacturer for each size valve. Stud lengths shall accommodate the required distance between flanges including spacers, if necessary.
- B. The CONTRACTOR shall wrap and tape belowgrade valve, flanges, and bolts in 5-mil polyethylene sheeting prior to backfilling to help protect the valve assembly from corrosion.
- C. Flanged butterfly valves may require spacers between the flange adapters and the valve body in order to allow full travel of the internal disk. If spacers are necessary for any butterfly valve, the CONTRACTOR will install valve spacers subject to the approval by the ENGINEER.

#### 3.9 SEGMENT TESTING

- A. The HDPE pipeline shall be subjected to an air test per ASTM F-1417 and as described herein to detect any leaks in the piping. Testing shall be performed abovegrade. The CONTRACTOR shall accept the responsibility for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing.
- B. Like sizes of polyethylene piping shall be butt welded together into testing segment not to exceed 1000 feet. Segments shall be connected to a testing apparatus on one end and fitted with fusion-welded caps on all openings. The segment to be tested should be allowed time to achieve constant and/or ambient temperature before initiating the test.
- C. The test should be performed during a period when the pipe segment will be out of direct sunlight when possible; i.e., early morning, late evening, or cloudy days. This will minimize the pressure changes which will occur during temperature fluctuations.
- D. The test pressure shall be 5 psig for LFG collection piping and 10 psig for pneumatic supply and liquids forcemain piping.

- E. Pressure drop during the test shall not exceed one percent of the testing gauge pressure over a period of one hour. This pressure drop shall be corrected for temperature changes before determining pass or failure. (See Section 3.10 for test failures). The ENGINEER shall sign off on a test form to indicate test compliance.
- F. The ENGINEER shall be notified prior to commencement of the testing procedure and shall be present during the test.
- G. Equipment for this testing procedure will be furnished by the CONTRACTOR. This shall consist of a polyethylene flange adaptor with a PVC blind flange. Polyethylene reducers shall be utilized to adapt test flange to size of pipe being tested. Tapped and threaded into the blind flange shall be a temperature gauge 0 to 100 degrees C, a "Schraeder tire valve" to accommodate an air compressor hose, a ball valve to release pipe pressure at completion of test, and a pressure measuring device. The pressure measuring device shall be a digital manometer capable of measuring positive pressures of air and other non-corrosive gases over a range of 0 to 199.9 in-w.c. Model No. 475-3 as manufactured by Dwyer Instruments, Inc. (770-427-9406), or approved equal.

#### 3.10 TEST FAILURE

- A. The following steps shall be performed when a pipe segment fails the one percent 1 hour test described in this Section.
  - 1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.
  - 2. All blocked risers and capped ends shall be inspected for leaks.
  - 3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.
- B. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and refusing the pipe.
- C. After all leaks are repaired, a retest shall be performed in accordance with this Section.

#### **END OF SECTION 33 51 10**

#### **SECTION 43 21 50**

# LANDFILL GAS WELL DEWATERING PUMPS

## PART 1 – GENERAL

#### 1.1 DESCRIPTION

- A. Scope of Work: The CONTRACTOR shall provide all materials, equipment, and labor needed to install the landfill gas dewatering pumps and appurtenances in accordance with the Contract Drawings.
- B. Related Work Described Elsewhere:
  - 1. Section 33 51 10: Pipe, Pipe Fittings, and Valves

#### 1.2 SUBMITTALS

A. The CONTRACTOR shall prepare and submit to the ENGINEER for review and approval manufacturer's literature, shop drawings, or other information pertaining to the assembly, operation, lubrication, adjustments, and other maintenance and repairs of equipment installed under this Section, together with detailed parts lists, plans, and/or photographs.

# PART 2 - PRODUCTS

#### 2.1 PNEUMATIC WELL DEWATERING PUMPS

- A. The unit shall be a stand alone device with all components rated for service in harsh and explosive environments.
- B. The well pumps shall be capable of handling a minimum liquid discharge rate at a depth within the well when supplied with air pressure to the pump according to the values specified in Table 1.
- C. The pumps shall be of controllerless pneumatic displacement design, unless a controller is designated in Table 1. The pumps shall function properly over an operating pressure range of 5 psig to 150 psig.
- D. The internal components, pump ends, hose fittings, and other components that come into contact with the leachate being transferred shall have stainless steel materials of construction.
- E. Pneumatic pump hoses shall be standard or high temperature rating as presented in Table 1 and shall be manufactured by the respective manufacturer, or approved equal. Hoses shall be bundled together within an outer wrap. Materials of construction shall be as follows:

- 1. Liquid Discharge Hose Size: 1-inch inner diameter
- 2. Air Supply Hose Size: 3/8-inch inner diameter; Jeneer shall be ½-inch
- 3. Air Exhaust Hose Size: ½-inch inner diameter
- F. Submersible pneumatic pumps shall be suspended in well using a stainless steel cable, and shall not be suspended using pump hoses.
- G. Above-well drive motor shall be mounted according to manufacturer's recommendations.
- H. A pump cycle counter (or in-line flowmeter) and air inlet supply gauge shall be provided with each pump.

#### 2.2 SOLAR-POWERED ELECTRIC WELL DEWATERING PUMPS

- A. The unit shall be a stand alone device with all components rated for service in harsh and explosive environments.
- B. The well pumps shall be capable of handling a minimum liquid discharge rate at a depth within the well when supplied with suitable electric power according to the values specified in Table 1.
- C. The pumps shall be equipped with controller and photovoltaic panel of appropriate design with appurtenances necessary to provide a functional system.
- D. The internal components, pump ends, hose fittings, and other components that come into contact with the leachate being transferred shall have stainless steel materials of construction.
- E. Liquid discharge hoses shall be standard or high temperature rating as presented in Table 1 and shall be manufactured by the respective manufacturer, or approved equal. Hoses shall be bundled together within an outer wrap.
- F. Submersible electric pumps shall be suspended in well using a stainless steel cable, and shall not be suspended using pump hoses.
- G. An in-line flowmeter shall be provided with each pump.

Table 1. LFG Well Dewatering Pump Properties

Drawing/ Bid Form ID	Make	Model	Min. Flow at Depth	Depth	Air Pressure	Pump Hose Rating/ Size
One Pump	PumpOne	One Pump Bottom Loading,	4 gpm	80 ft	70 psi	Standard
Pneumatic		#2000454				1-inch ID
QED Pneumatic	QED	AP 4.5 Ultra Auto Pump®	4 gpm	100 ft	70 psi	Standard
		Bottom Loading, Short				1-inch ID
Blackhawk	Blackhawk	V-2 Elevated Temperature	5 gpm	243 ft	100 psi	High-Temp
Pneumatic		Piston Pump™, Model 102				1-inch ID

Bristol ISWMF – LFG Collection System Expansion: Stage 1 LFG Well Dewatering Pumps 43 21 50-2



Drawing/ Bid Form ID	Make	Model	Min. Flow at Depth	Depth	Air Pressure	Pump Hose Rating/ Size
Jeneer Pneumatic	Jeneer	Float LES HD with Auto Bump				High-Temp
Lorentz Solar- Powered Electric	Lorentz	PS2-600 HRE-07 Energy-1	6 gpm	300 ft	NA	High-Temp
Blackhawk Solar- Powered Electric	Blackhawk	Apollo Solar Piston Pump™, Model 101	1.1 gpm	400 ft	NA	High-Temp 1-inch ID

# **PART 3 - EXECUTION**

#### 3.1 INSTALLATION

A. Submersible pneumatic, top-mounted pneumatic, and solar-powered electric pump, hoses, photovoltaic panels, controllers, and accessories shall be installed in accordance with the manufacturer's instructions and recommendations.

#### 3.2 TESTING

A. Upon completion of the installation, tests shall be performed by the CONTRACTOR with the assistance of the manufacturer's representative, in the presence of the ENGINEER. These tests shall demonstrate startup, shutdown, operation, and maintenance of the LFG well pumps. Equipment and other requirements necessary to perform the tests shall be furnished by the CONTRACTOR.

**END OF SECTION 43 21 50** 

# CITY OF BRISTOL, VIRGINIA VIRGINIA INTEGRATED SOLID WASTE MANAGEMENT FACILITY SOLID WASTE PERMIT #588 LANDFILL GAS COLLECTION SYSTEM EXPANSION - STAGE 1

**BRISTOL, VIRGINIA** 

#### **INDEX OF DRAWINGS**

SHEET	DRAWING	NO. SHEET TITLE				
1	0	COVER SHEET				
2	1	LFG SYSTEM EXISTING CONDITIONS				
3	2	PROPOSED STAGE 1 LFG SYSTEM EXPANSION LAYOUT				
4	3	LFG WELL DETAILS				
5	4	DEWATERING DETAILS				
6	5	LFG SYSTEM DETAILS - 1				
7	6	LFG SYSTEM DETAILS - 2				



#### PREPARED FOR:

CITY OF BRISTOL, VIRGINIA 300 LEE STREET BRISTOL, VIRGINIA 24201

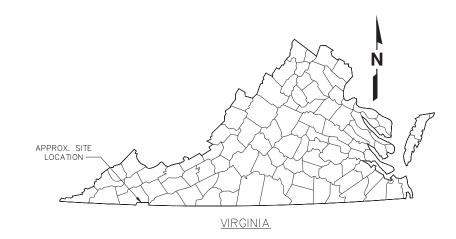
INTEGRATED SOLID WASTE MANAGEMENT FACILITY 2655 VALLEY DRIVE BRISTOL, VIRGINIA 24201

#### **SCS ENGINEERS**

STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC. 15521 MIDLOTHIAN TURNPIKE, SUITE 305 MIDLOTHIAN, VIRGINIA 23113-7313 PH. (804) 378-7440 FAX. (703) 471-6676

SCS PROJECT NO. 02218208.14

**DECEMBER 9, 2022** 



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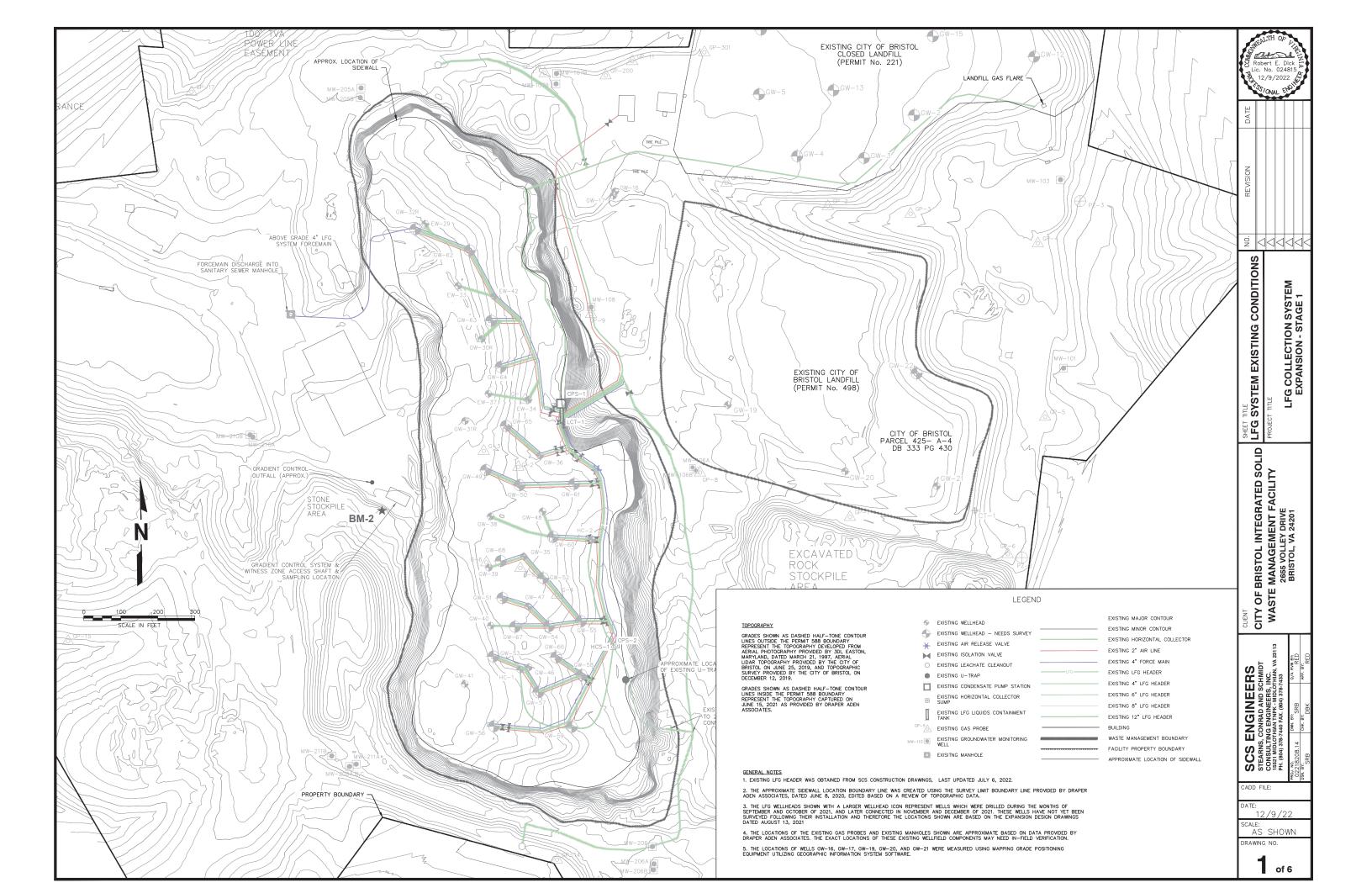
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15821 MIDCHINA TRPK - MID
PH, (804) 378-7440 FAX, (804) 378-7440

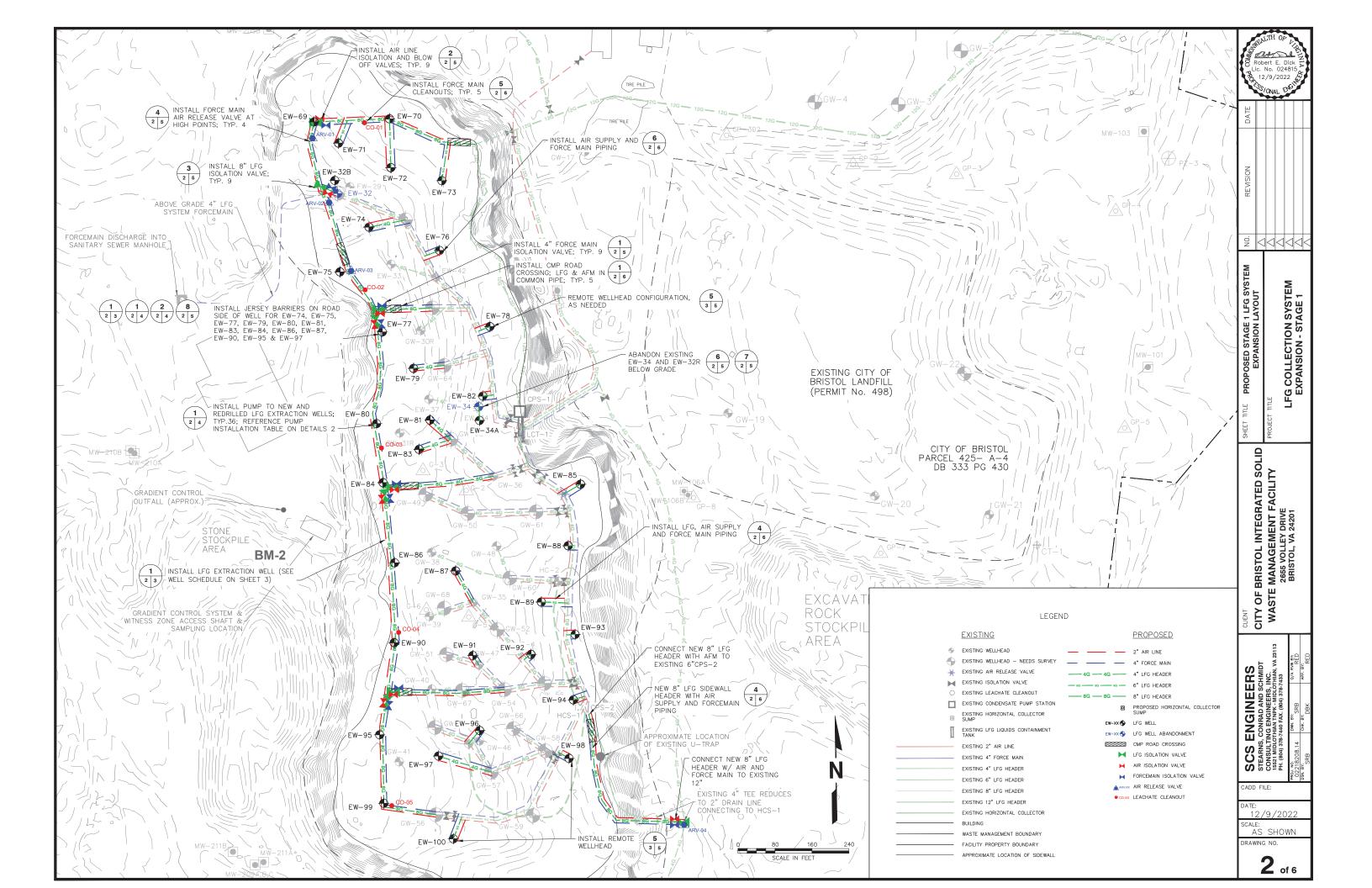
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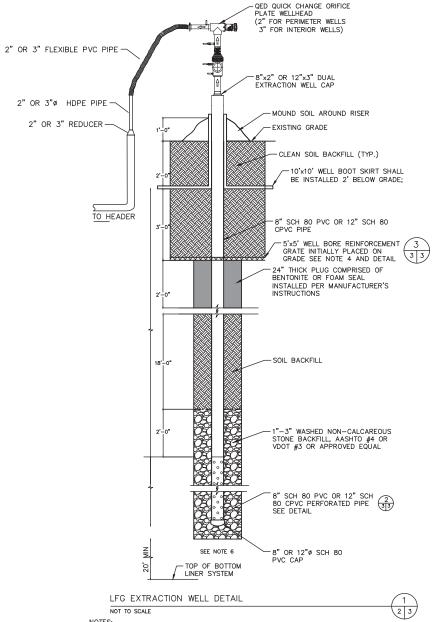
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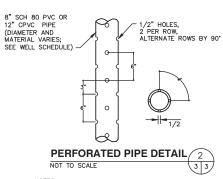
#### NOTES:

- 1. OWNER SHALL SURVEY THE PROPOSED WELL LOCATIONS AND PROVIDE THE EXISTING GROUND SURFACE ELEVATION AT EACH LOCATION TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WELL DRILLING.
- 2. ENGINEER SHALL ADJUST WELL SCHEDULE AS NECESSARY BASED ON THE PRE-CONSTRUCTION SURVEY.
- 3. ALL SIGNATURES REQUIRED ON THE FINAL WELL SCHEDULE PRIOR TO COMMENCEMENT OF DRILLING.
- 4. WELL BORE REINFORCEMENT GRATE SHALL BE 100% WELDED AND CONFIGURED WITH 3/8" REBAR WITH 6"X6" SPACING. GRATE SHALL HAVE A 12"X12" SQUARE CENTER SPACED CUTOUT FOR WELL CASING. A 5'X5' HOLE SHALL BE EXCAVATED 5' DEEP TO INSTALL GRATE.
- 5. INSTALL WELL BORE REINFORCEMENT GRATE ON GRADE AROUND WELL IMMEDIATELY AFTER COMPLETING WELL. DURING INSTALLATION OF LATERAL RISER, GRATE SHALL BE BURIED.
- 6. SMALLER BOREHOLE DIAMETER MAY BE UTILIZED IF SONIC DRILLING IS EMPLOYED (REFER TO

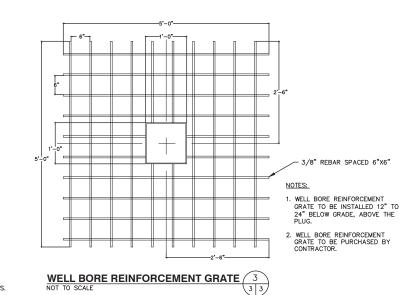
#### BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY

				LFG	EXTRACTIO	N WELL SCH	EDULE				
			APPROX. EL	EVATION (FT)					PIPE LENGTH (FT)		
WELL ID	NORTHING (FT)	EASTING (FT)	ASSUMED SURFACE ELEVATION (MSL)	TOP OF LINER (PROTECTIVE COVER) (MSL)	BOREHOLE DEPTH (FT)	PIPE DIAMETER (IN)	PIPE MATERIAL	SOLID PIPE LENGTH (BELOW GRADE)	PERFORATED PIPE LENGTH	ABOVE GRADE RISER LENGTH	DEPTH OF GRAVEL PAG (FT)
EW-69	3,399,342.81	10,411,994.08	1,817.0	1,702.0	95.0	8	PVC	25	70.00	5	77.00
EW-70	3,399,349.31	10,412,157.16	1,797.0	1,720.0	57.0	8	PVC	25	32.00	5	39.00
EW-71	3,399,296.74	10,412,046.91	1,816.5	1,575.0	222.0	12	CPVC	25	197.00	5	204.00
EW-72	3,399,243.88	10,412,160.05	1,807.5	1,572.7	215.0	12	CPVC	25	190.00	5	197.00
EW-73	3,399,215.60	10,412,270.31	1,800.4	1,666.0	115.0	8	PVC	25	90.00	5	97.00
EW-74	3,399,115.13	10,412,112.87	1,835.5	1,569.8	246.0	12	CPVC	25	221.00	5	228.00
EW-75	3,399,018.44	10,412,050.04	1,836.5	1,694.0	123.0	8	PVC	25	98.00	5	105.00
EW-76	3,399,064.62	10,412,265.24	1,803.6	1,658.0	126.0	8	PVC	25	101.00	5	108.00
EW-77	3,398,888.55	10,412,141.61	1,827.5	1,688.0	120.0	8	PVC	25	95.00	5	102.00
EW-78	3,398,900.14	10,412,374.31	1,787.0	1,710.1	57.0	8	PVC	25	32.00	5	39.00
EW-79	3,398,809.76	10,412,209.18	1,826.5	1,566.0	241.0	12	CPVC	25	216.00	5	223.00
EW-80	3,398,690.38	10,412,129.10	1,820.0	1,670.0	130.0	8	PVC	25	105.00	5	112.00
EW-81	3,398,698.13	10,412,244.80	1,815.0	1,560.0	235.0	12	CPVC	25	210.00	5	217.00
EW-82	3,398,749.88	10,412,358.96	1,782.0	1,565.0	197.0	12	CPVC	25	172.00	5	179.00
EW-83	3,398,634.70	10,412,221.19	1,811.5	1,559.2	233.0	12	CPVC	25	208.00	5	215.00
EW-84	3,398,562.71	10,412,143.22	1,811.0	1,680.0	111.0	8	PVC	25	86.00	5	93.00
EW-85	3,398,559.37	10,412,570.42	1,783.5	1,672.7	91.0	8	PVC	25	66.00	5	73.00
EW-86	3,398,389.56	10,412,168.22	1,802.0	1,678.0	104.0	8	PVC	25	79.00	5	86.00
EW-87	3,398,371.79	10,412,300.24	1,797.0	1,549.0	228.0	12	CPVC	25	203.00	5	210.00
EW-88	3,398,426.37	10,412,543.56	1,779.5	1,660.0	100.0	8	PVC	25	75.00	5	82.00
EW-89	3,398,304.66	10,412,485.49	1,776.0	1,630.0	126.0	8	PVC	25	101.00	5	108.00
EW-90	3,398,216.76	10,412,167.34	1,813.0	1,680.0	113.0	8	PVC	25	88.00	5	95.00
EW-91	3,398,189.05	10,412,337.37	1,796.5	1,546.0	231.0	12	CPVC	25	206.00	5	213.00
EW-92	3,398,191.42	10,412,463.26	1,786.0	1,622.0	144.0	12	CPVC	25	119.00	5	126.00
EW-93	3,398,234.57	10,412,558.67	1,769.0	1,678.0	71.0	8	PVC	25	46.00	5	53.00
EW-94	3,398,093.20	10,412,554.91	1,766.0	1,697.0	49.0	8	PVC	25	24.00	5	31.00
EW-95	3,398,017.63	10,412,135.79	1,823.0	1,735.0	68.0	8	PVC	25	43.00	5	50.00
EW-96	3,398,026.94	10,412,352.11	1,795.0	1,580.1	195.0	12	CPVC	25	170.00	5	177.00
EW-97	3,397,971.65	10,412,262.95	1,817.0	1,576.0	221.0	12	CPVC	25	196.00	5	203.00
EW-98	3,397,966.67	10,412,545.42	1,767.0	1,695.0	52.0	8	PVC	25	27.00	5	34.00
EW-99	3,397,869.45	10,412,144.79	1,827.0	1,740.0	67.0	8	PVC	25	42.00	5	49.00
EW-100	3,397,792.80	10,412,295.24	1,811.0	1,655.0	136.0	8	PVC	25	111.00	5	118.00
GW-32B	3,399,216.12	10,412,038.76	1,826.0	1,580.0	226.0	12	CPVC	25	201.00	5	208.00
EW-34A	3,398,697.21	10,412,351.87	1,783.0	1,564.0	199.0	12	CPVC	25	174.00	5	181.00
34				TOTALS	4944		PVC CPVC		1411 2683	100 70	-

NOTE: THIS WELL SCHEDULE IS PRELIMINARY AND IS INTENDED FOR BIDDING, BUT NOT INTENDED FOR CONSTRUCTION. OWNER SHALL SURVEY PROPOSED WELL LOCATIONS FOR ACTUAL GROUND ELEVATIONS BEFORE CONSTRUCTION. SURVEY INFORMATION SHALL BE SUBMITTED TO ENGINEER FOR POTENTIAL ADJUSTMENTS TO WELL BORING DEPTHS DRILLING SHALL NOT COMMENCE UNTIL WELL LOCATIONS HAVE BEEN STAKED OUT AND SURVEYED AND ALL SIGNATURES ON ADJUSTED WELL SCHEDULE ARE OBTAINED.



- 1. PERFORATIONS SPACED 90° APART HORIZONTALLY.
- 2. PERFORATIONS SPACED 6" APART VERTICALLY.
- 3. 90° AND 270° ROWS STAGGERED 3" BELOW 0° AND 180° ROWS.



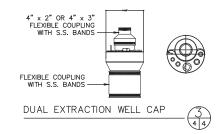
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SHET TITE  LFG WELL DETAILS PROJECT TITE	LFG COLLECTION SYSTEM EXPANSION - STAGE 1
CITY OF BRISTOL INTEGRATED SOLID WASTE MANAGEMENT FACILITY	2655 VOLLEY DRIVE BRISTOL, VA 24201
SCS ENGINEERS STEARNS, CONROL AND STEARNS, CONROLENS, INC. 1827 MIDLOTHAN THRY. MIDLOTHIAN, VA 2313	PH. (804) 378-7440 FAX. (904) 378-7433 PROJ. ND. (802) 280.814 DWK. SRB GARD BSN. BT. GARD BSN. BT. SRB BT. BT. SRB BT. BT. BT. BT. BT. BT. BT. BT. BT. BT
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	DEWATERING PUMP INSTALLATION SCHEDULE						
	WELL ID	WELL DIAMETER (IN)	WELL DEPTH (FT)	PUMP DEPTH (FT)	PUMP TYPE		
	EW-69	8	95.00	87.00	PUMP ONE/QED		
	EW-70	8	57.00	N/A	NONE		
	EW-71	12	222.00	214.00	Jeneer Pneumatic		
	EW-72	12	215.00	207.00	Jeneer Pneumatic		
	EW-73	8	115.00	107.00	PUMP ONE/QED		
	EW-74	12	246.00	238.00	Jeneer Pneumatic		
	EW-75	8	123.00	115.00	Blackhawk Pneumatic		
	EW-76	8	126.00	118.00	Blackhawk Pneumatic		
	EW-77	8	120.00	112.00	Blackhawk Pneumatic		
	EW-78	8	57.00	N/A	NONE		
	EW-79	12	241.00	233.00	Jeneer Pneumatic		
	EW-80	8	130.00	122.00	Blackhawk Pneumatic		
	EW-81	12	235.00	227.00	Lorentz Electric		
	EW-82	12	197.00	189.00	Lorentz Electric		
}	EW-83	12	233.00	225.00	Lorentz Electric		
	EW-84	8	111.00	103.00	PUMP ONE/QED		
	EW-85	8	91.00	N/A	NONE		
	EW-86	8	104.00	96.00	PUMP ONE/QED		
	EW-87	12	228.00	220.00	Lorentz Electric		
	EW-88	8	100.00	92.00	PUMP ONE/QED		
	EW-89	8	126.00	118.00	Blackhawk Pneumatic		
	EW-90	8	113.00	105.00	PUMP ONE/QED		
	EW-91	12	231.00	223.00	Blackhawk Electric		
	EW-92	12	144.00	136.00	Blackhawk Electric		
	EW-93	8	71.00	N/A	NONE		
	EW-94	8	49.00	N/A	NONE		
	EW-95	8	68.00	N/A	NONE		
	EW-96	12	195.00	187.00	Blackhawk Electric		
	EW-97	12	221.00	213.00	Blackhawk Electric		
	EW-98	8	52.00	N/A	NONE		
	EW-99	8	67.00	N/A	NONE		
	EW-100	8	136.00	128.00	Blackhawk Pneumatic		
]	EW-32B	12.00	234	226.00	Jeneer Pneumatic		
	EW-34A	12.00	210	202.00	Jeneer Pneumatic		
	34		·				

#### NOTES:

- 1. PNEUMATIC PUMPS SHALL BE EITHER PUMP ONE "ONE PUMP" OR QED AP-4.5 ULTRA WITH STANDARD TUBING, OR BLACKHAWK V2 PNEUMATIC ELEVATED TEMPERATURE PISTON PUMP MODEL 102, OR JENEER FLOAT-LES HD WITH SMART PUMP HIGH TEMPERATURE UNIT WITH HIGH TEMPERATURE TRI-FLEX TUBING, PER ENGINEER'S DIRECTION
- 2. SOLAR-POWERED ELECTRIC PUMPS SHALL BE EITHER BLACKHAWK APOLLO SOLAR 101 OR LORENTZ PS2-600 HRE-07 ENERGY-1 WITH HIGH-TEMPERATURE TRI-FLEX TUBING.
- 3. PUMPS TO BE INSTALLED IN 26 PROPOSED WELLS. PUMP DEPTH VALUES PRESENTED ABOVE ARE ULTIMATE MAXIMUM DEPTHS FOR PURPOSE OF DEFINING LENGTHS OF HOSES AND PULL CABLE, AND ARE PRELIMINARY AND BASED ON WELL SCHEDULE FOR PROPOSED WELLS.

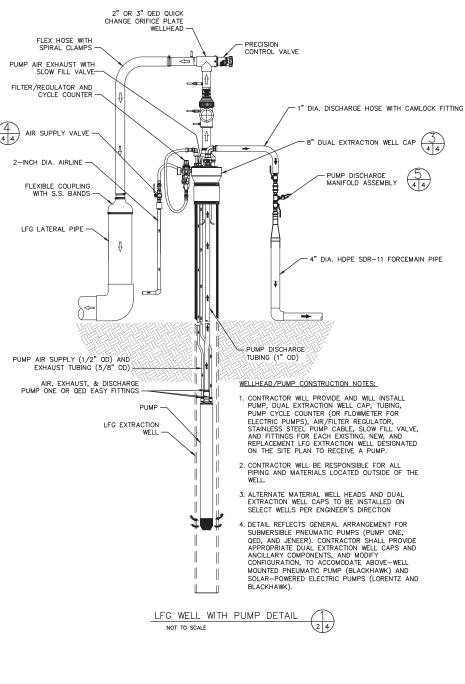
  4. WELL DEPTH AND DEPTH TO BOTTOM OF PUMP MEASURED FROM TOP OF
- CASING.
- 5. INITIAL (AND FINAL) DEPTH TO PUMP BOTTOM IS VARIABLE BASED ON ACTUAL WELL DEPTH AND LIQUID LEVELS. THIS WILL BE DETERMINED BY SOUNDING DATA PRIOR TO PUMP INSTALLATION.

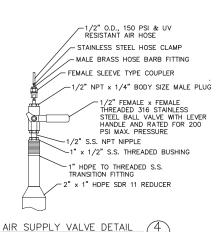


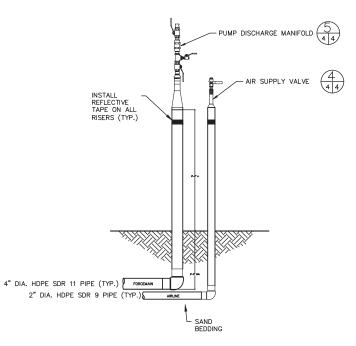
- NUIES:

  1. INSTALL CPVC OR PVC DUAL EXTRACTION WELL CAPS AT WELLS IN QUARRY THAT HAVE CPVC or PVC PIPE.

  2. INSTALL PROPER WELL HEAD SIZE ACCORDING TO WELL SCHEDULE



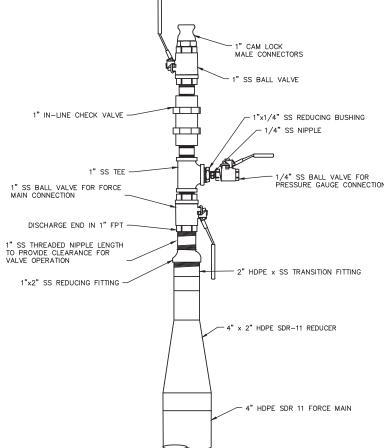


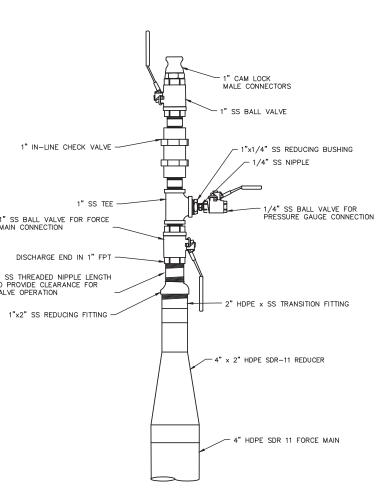


STUB-UP FOR ABOVE GRADE AIR AND FORCEMAIN PIPING DETAIL

#### NOTES:

- ALL 3" AND 4" PIPE AND FITTINGS SHALL BE BUTT WELDED.
  WHERE NEW AIRLINE AND FORCE MAIN PIPING IS INSTALLED TO AN EXISTING WELL
  WITH PUMP, THE OLD AIRLINE AND FORCE MAIN PIPING IS TO BE ABANDONED AND
  NEW PIPING CONNECTED TO THE DUAL EXTRACTION WELL. SEE DETAILS ON SHEET 8.





PUMP DISCHARGE MANIFOLD DETAIL



DRAWING NO. **4** of 6

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S COLLECTION S EXPANION - STA

DETAIL

DEWATERING

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2655 VOLLEY DRIVE
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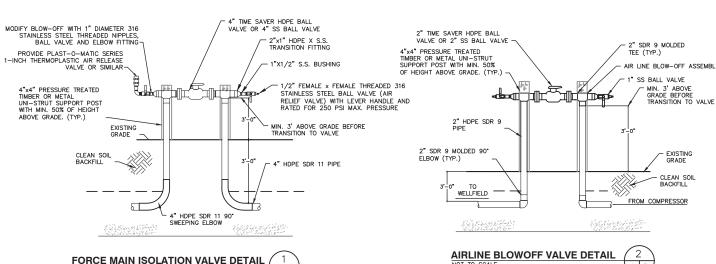
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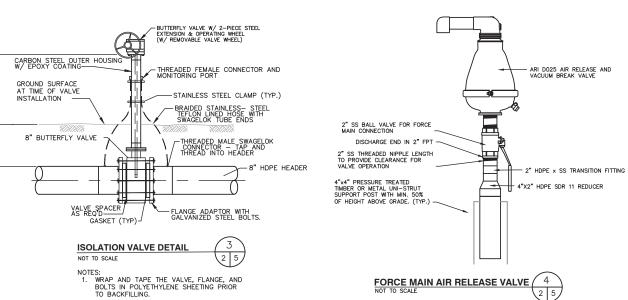
FORCE MAIN ISOLATION VALVE DETAIL

- SECURE WITH AT LEAST 3 WORM GEAR CLAMPS PER POST ABOVE GRADE ALONG LENGTH OF MANIFOLD.



3" SCH 80 PVC

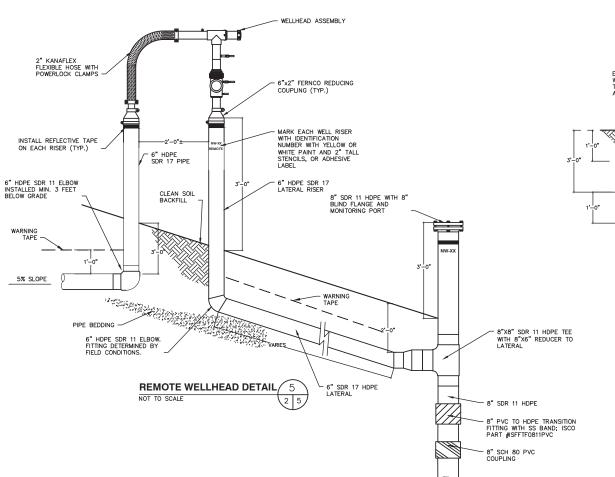
2. INSTALL PLUMB TO GROUND

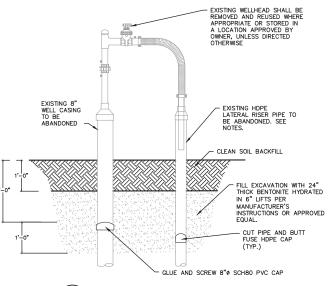


FORCE MAIN AIR RELEASE VALVE

#### NOTES:

- SECURE WITH AT LEAST 3 WORM GEAR CLAMPS ABOVE GRADE ALONG LENGTH OF MANIFOLD.
- INSTALL PLUMB TO GROUND. MANIFOLD IS NOT TO BE SECURED TO VACUUM RISER.





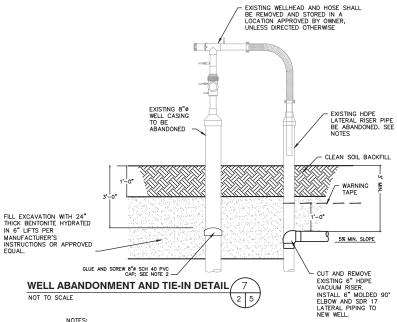
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ALL ABOVE GRADE PIPING SHALL BE REMOVED AND REMAINING BELOW GRADE PIPE CAPPED. EXCAVATION SHALL BE BACKFILLED WITH CLEAN SOIL.

WELL ABANDONMENT DETAIL

- 2. CAPS FOR PVC CASINGS SHALL BE GLUED AND SECURED WITH 3 LAG SCREWS. CAPS FOR HDPE CASINGS SHALL BE BUTT FUSED.
- 3. WELLHEAD SHALL BE REMOVED AND REUSED WHERE POSSIBLE OR STORED IN A LOCATION APPROVED BY OWNER UNLESS DIRECTED OTHERWISE.
- 4. COORDINATE WELL ABANDONMENT TIMING WITH SITE PERSONNEL AND CQA INSPECTOR. DATE AND TIME OF ABANDONMENT SHALL BE RECORDED.





- ALL ABOVE GRADE PIPING SHALL BE REMOVED AND REMAINING BELOW GRADE PIPE SHALL BE CAPPED. EXCAVATION SHALL BE BACKFILLED WITH CLEAN SOIL.
- CAPS FOR PVC CASINGS SHALL BE GLUED AND SECURED WITH 3 LAG SCREWS. CAPS FOR HDPE CASINGS AND PIPING SHALL BE FUSED.
- 4. COORDINATE WELL ABANDONMENT TIMING WITH SITE PERSONNEL AND COA INSPECTOR. DATE AND TIME OF ABANDONMENT SHALL BE RECORDED.



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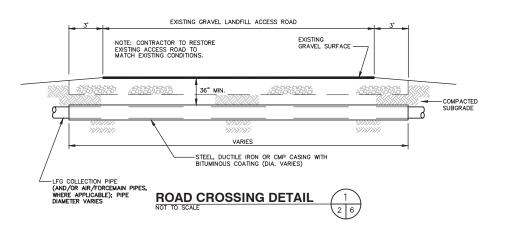
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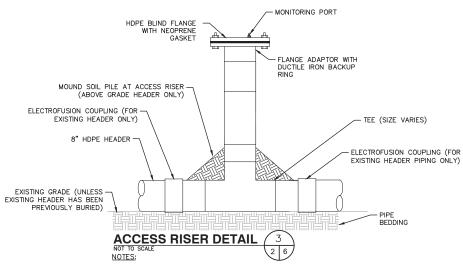
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#### GENERAL NOTES

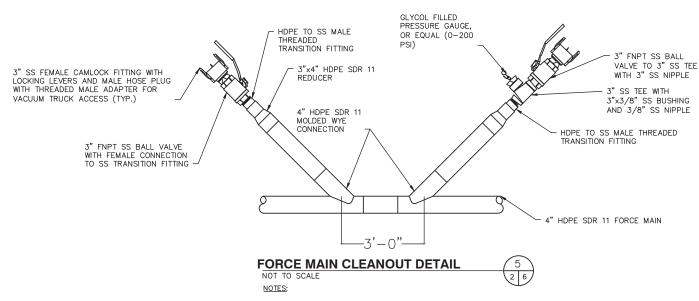
- 1. THE WORK TO BE PERFORMED INVOLVES, BUT IS NOT LIMITED TO, THE CONSTRUCTION AND INSTALLATION OF THE LANDFILL GAS COLLECTION SYSTEM DEPICTED ON THESE CONSTRUCTION DRAWINGS. WORK SHALL INCLUDE THE INSTALLATION OF LANDFILL GAS EXTRACTION WELLS, WELLHEADS, HEADER AND LATERAL PIPING, VALVES, PUMPS, AND ANY OTHER ITEMS NEEDED TO MAKE THE SYSTEM EXPANSION CONNECT TO THE EXISTING LFG SYSTEM AND OPERATE PROPERLY.
- 2. CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, TESTING, TOOLS, EQUIPMENT, SUPERVISION AND INSTALLATION SERVICES REQUIRED TO CONSTRUCT THE LANDFILL GAS COLLECTION SYSTEM DEPICTED ON THESE CONSTRUCTION DRAWINGS.
- 3. CONTRACTOR SHALL RECOGNIZE THAT THE LANDFILL IS UNDERGOING REMEDIAL ACTIVITIES, AND SHALL COORDINATE HIS ACTIVITIES WITH OWNER AND OTHER CONTRACTORS SO AS TO NOT HINDER OR OBSTRUCT THE NORMAL WORKING ACTIVITIES ASSOCIATED WITH CORRECTIVE
- 4. CONTRACTOR SHALL MINIMIZE LAND DISTURBANCE RELATED TO CONSTRUCTION ACTIVITIES TO THE GREATEST EXTENT POSSIBLE. CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS INSIDE AND OUTSIDE THE LANDFILL FOOTPRINT TO ITS ORIGINAL CONDITION.
- 5. CONTRACTOR SHALL PROPERLY STORE ALL MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS IN AREAS DESIGNATED BY OWNER.
- 6. ALL LANDFILL WASTE ENCOUNTERED DURING EXCAVATION ACTIVITIES SHALL BE REMOVED AND HAULED BY THE CONTRACTOR TO THE DESIGNATED AREA FOR WASTE RELOCATION. ALL EXCAVATED TRENCHES MUST BE COVERED AT THE END OF EACH WORKING DAY. NO EXPOSED REFUSE WILL REMAIN OVERNIGHT.
- 7. THE CONTRACTOR SHALL PREPARE A WRITTEN SITE—SPECIFIC HEALTH AND SAFETY PLAN THAT ADDRESSES THE POTENTIAL HAZARDS ASSOCIATED WITH LANDFILL GAS CONSTRUCTION ACTIVITIES AT SOLID WASTE MANAGEMENT FACILITIES AND IMPLEMENT THE PROCEDURES AND PROTOCOLS NECESSARY TO MAINTAIN A SAFE WORK ENVIRONMENT.
- 8. THE CONTRACTOR SHALL INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROLS DOWNSTREAM OF THE DISTURBED AREAS AS REQUIRED BY THE FACILITY'S EROSION AND SEDIMENT CONTROL PLAN.

- 1. ALL LFG SYSTEM HEADER AND LATERAL PIPING SHALL BE HIGH DENSITY POLYETHYLENE (HDPE), SDR-17, PE 4710, UNLESS OTHERWISE NOTED.
- 2. ALL PNEUMATIC SUPPLY PIPING SHALL BE HDPE SDR-9, PE4710.
- 3. ALL LIQUID FORCEMAIN PIPING SHALL BE HDPE SDR-11, PE4710.
- 4. FLANGES FOR THE HDPE SHALL BE CONVOLUTED DUCTILE IRON BACK-UP RINGS FINISHED WITH AN IRON OXIDE PRIMER. FLANGE NUTS AND BOLTS SHALL BE GALVANIZED STEEL AND COATED WITH ANTI-SIEZE COMPOUND. BURIED FLANGES SHALL BE WRAPPED IN 5-MIL POLYETHYLENE SHEETING PRIOR TO BACKFILLING TO HELP PREVENT CORROSION.
- 5. PIPE INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS OF ASTM D-2321, PPI TR-31/9-79, AND THE MANUFACTURER'S RECOMMENDATIONS.
- 6. ALL HEADER AND LATERAL PIPING SHALL BE SUBJECTED TO AN AIR TEST TO DETECT ANY LEAKS. TESTING SHALL BE CONDUCTED WITH THE PIPE IN THE TRENCHES. CONTRACTOR SHALL TEST THE PIPE AT 5 PSIG FOR A PERIOD OF NOT LESS THAN 1 HOUR. PRESSURE DROP DURING THE TEST SHALL NOT EXCEED ONE—PERCENT OF THE TESTING PRESSURE.
- 7. ALL PNEUMATIC SUPPLY AND LIQUID FORCEMAIN PIPING SHALL BE SUBJECTED TO AN AIR TEST TO DETECT ANY LEAKS. TESTING SHALL BE CONDUCTED WITH THE PIPE IN THE TRENCHES. CONTRACTOR SHALL TEST THE PIPE AT 10 PSIG FOR A PERIOD OF NOT LESS THAN 1 HOUR. PRESSURE DROP DURING THE TEST SHALL NOT EXCEED TEN-PERCENT OF
- 8. ALL HEADER AND LATERAL PIPING SHALL BE INSTALLED AT A 5 PERCENT MINIMUM GRADE, UNLESS APPROVED BY ENGINEER.
- 9. LFG WELLHEADS FOR NEW VERTICAL WELLS SHALL BE 2" OR 3" QED QUICK CHANGE ORIFICE WELLHEAD.

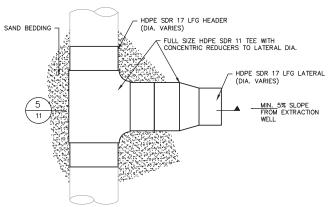




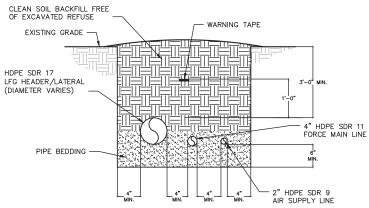
1. CONTRACTOR SHALL INSTALL 10 ACCESS RISERS ON 8 HEADER PIPE AT INTERSECTIONS AND OTHER CRITICAL JUNCTIONS, AS DIRECTED BY ENGINEER. APPROXIMATELY 7 OF THESE WILL BE AFFILIATED WITH NEW HEADER BEING INSTALLED BY CONTRACTOR AND THE REMAINING 3 WILL BE AFFILIATED WITH EXISTING HEADER PIPING



IF CLEANOUT IS INSTALLED GREATER THAN 2 FEET ABOVE GRADE, INSTALL 4"x4" TREATED TIMBER POSTS AND SECURE PIPING AND FITTINGS TO POSTS WITH WORM GEAR CLAMPS.

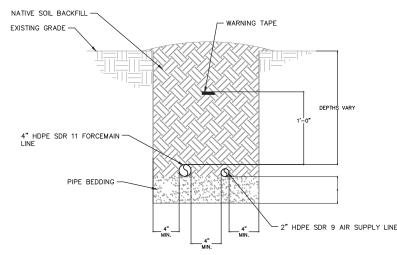






# **HEADER/LATERAL TRENCH DETAIL**

- 1. WARNING TAPE SHALL BE  $\underline{\ \ }$  MIN. 3" WIDE AND IMPRINTED WITH "GAS LINE BURIED BELOW".
- 2. ALL HEADER AND LATERAL SHALL BE INSTALLED AT MIN. 3-FEET BURIAL DEPTH AND 5% SLOPE UNLESS APPROVED IN ADVANCE BY ENGINEER.
- 3. THE NUMBER AND TYPES OF PIPES INSTALLED IN THE TRENCH MAY VARY. SEE SITE PLAN.



#### **DRAIN PIPING TRENCH DETAIL** NOT TO SCALE

- WARNING TAPE SHALL BE MIN. 3" WIDE AND IMPRINTED WITH "GAS LINE BURIED BELOW".
- 2. ALL AIR/FM PIPING SHALL BE INSTALLED AT MINIMUM 3-FEET BURIAL DEPTH.



DETAIL 2	
JT TITLE	Г
LFG COLLECTION SYSTEM EXPANSION STAGE 1	

Y OF BRISTOL INTEGRATED

E MANAGEMENT FACILITY
BRISTOL, VA 24201
2125 SHAKESVILLE RD WASTE CITY

Œ Ш ENGINE

S ö S

CADD FILE:

12/9/22

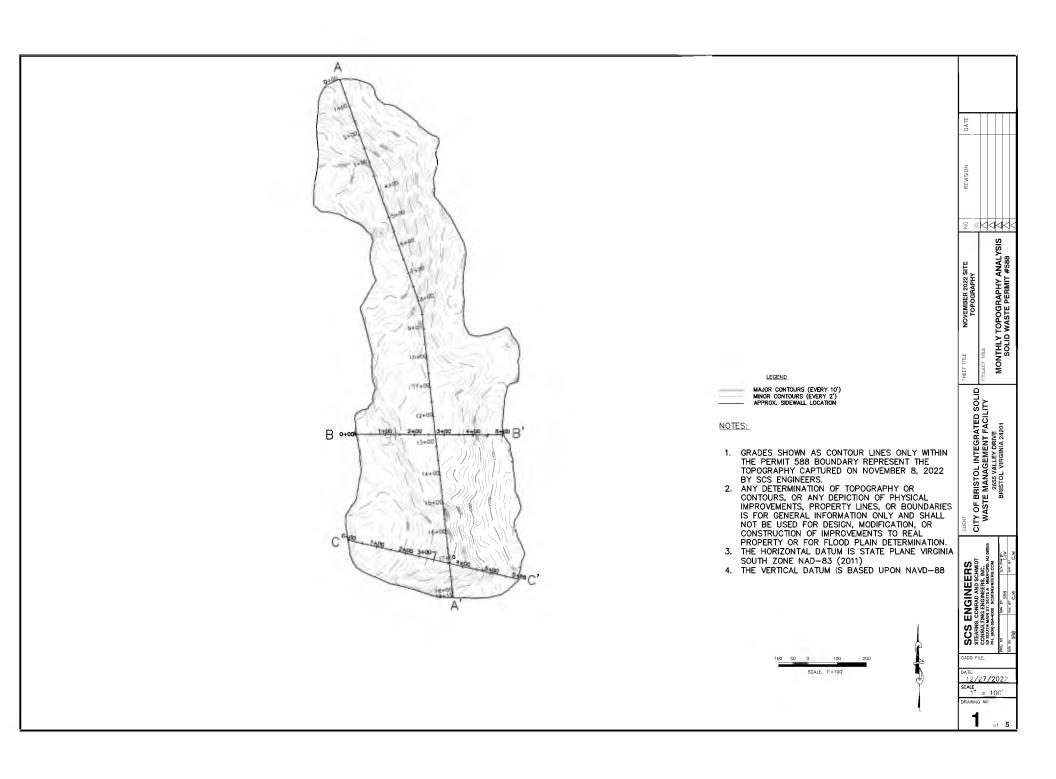
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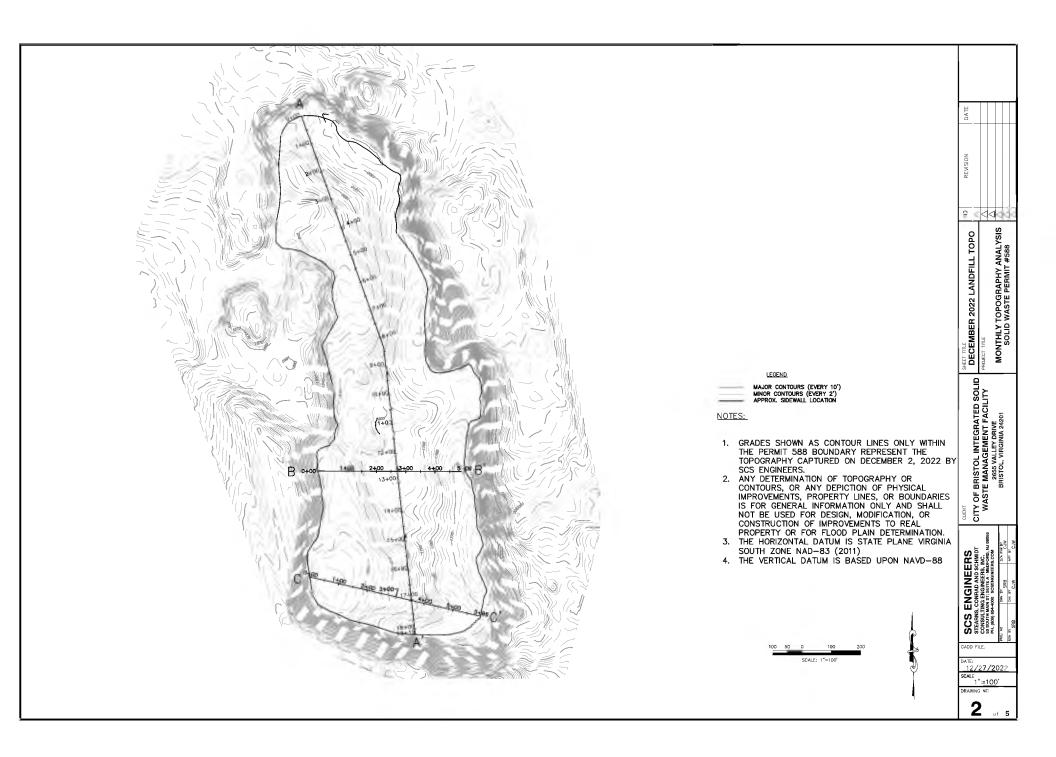
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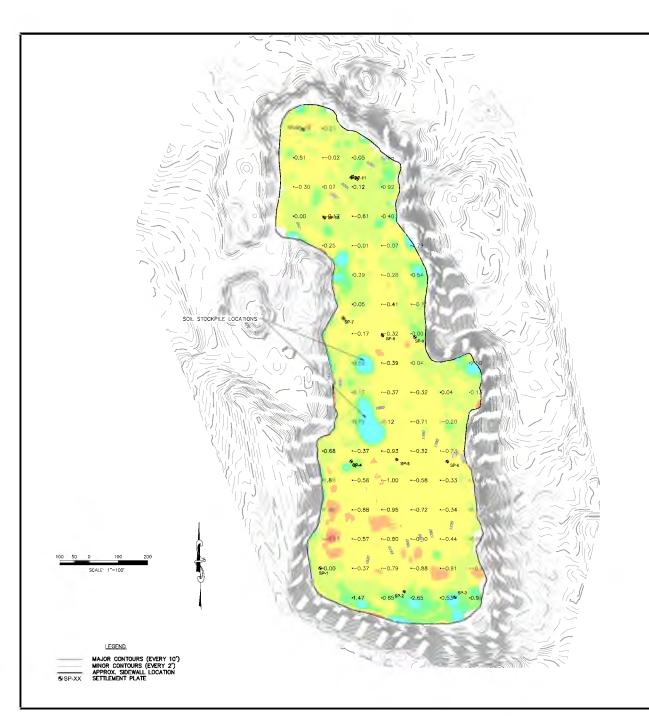


of 6

# Appendix E Monthly Topography Analysis







Settlement Plate ID	Northing	Easting	NOV. 2022 ELEVATIONS	DEC. 2022 ELEVATIONS
SP-1	3,397,887.04	10,412,078.86	1834.41	1834.24
SP-2	3,397,806.57	10,412,363.96	1810.56	1809.88
SP-3	3,397,787.71	10,412,537.90	1783.67	1783.62
SP-4	3,398,251.87	10,412,182.59	1817.49	1816.71
SP-5	3,398,257.67	10,412,340.67	1800.77	1800.11
SP-6	3,398,249.48	10,412,509.89	1777.66	1777.41
SP-7	3,398,738.19	10,412,170.52	1828.63	1828.54
SP-8	3,398,678.64	10,412,291.26	1807.35	1806.99
SP-9	3,398,673.81	10,412,402.27	1785.86	1785.85
SP-10	3,399,081.47	10,412,093.35	1840.20	1840.16
SP-11	3,399,217.81	10,412,184.66	1816.33	1816.32
SP-12	3,399,383.08	10,412,018.34	1810.66	1810.57

Volume

Base Surface 11-8-22 FLYOVER Comparison Surface 12-2-22 FLYOVER

6732,15 Cu. Yd. 10810.29 Cu. Yd. Cut Volume Fill Volume Net Fill 4078.14 Cu. Yd.

	Elevations	
Color	Min Elevation	Max Elevation
	-10.00"	-3.00
	-3.00'	-2.00'
	-2.00'	-1.00'
	-1 00'	0.00*
	0.00°	1.00'
	1.00'	2.00
	2.00"	3.00'
	3.00"	10.00*

#### NOTES:

- THE ELEVATION CHANGES ARE CALCULATED BETWEEN THE AREIAL TOPOGRAPHY DATA CAPTURED ON OCTOBER 7, 2022 BY NV5 (FORMERLY QUANTUM SPATIAL) AND THE AERIAL TOPOGRAPHY DATA CAPTURED ON NOVEMBER 8, 2022 BY SCS ENGINEERS. POSITIVE VALUE (+) INDICATES FILL AND NEGATIVE VALUES (-) INDICATE CUT (SETTLEMENT). VALUES ARE ROUNDED TO THE NEAREST FOOT.
- ANY DETERMINATION OF TOPOGRAPHY OR CONTOURS, OR ANY DEPICTION OF PHYSICAL IMPROVEMENTS, PROPERTY LINES, OR BOUNDARIES IS FOR GENERAL INFORMATION ONLY AND SHALL NOT BE USED FOR DESIGN, MODIFICATION, OR CONSTRUCTION OF IMPROVEMENTS TO REAL PROPERTY OR FOR FLOOD PLAIN DETERMINATION.
- SETTLEMENT PLATE LOCATIONS AND COORDINATES ARE BASED ON A SITE SPECIFIC COORDINATE SYSTEM.
- THE HORIZONTAL DATUM IS STATE PLANE VIRGINIA SOUTH ZONE NAD-83 (2011)
- 5. THE VERTICAL DATUM IS BASED UPON NAVD-88

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REVISION						
DATE						

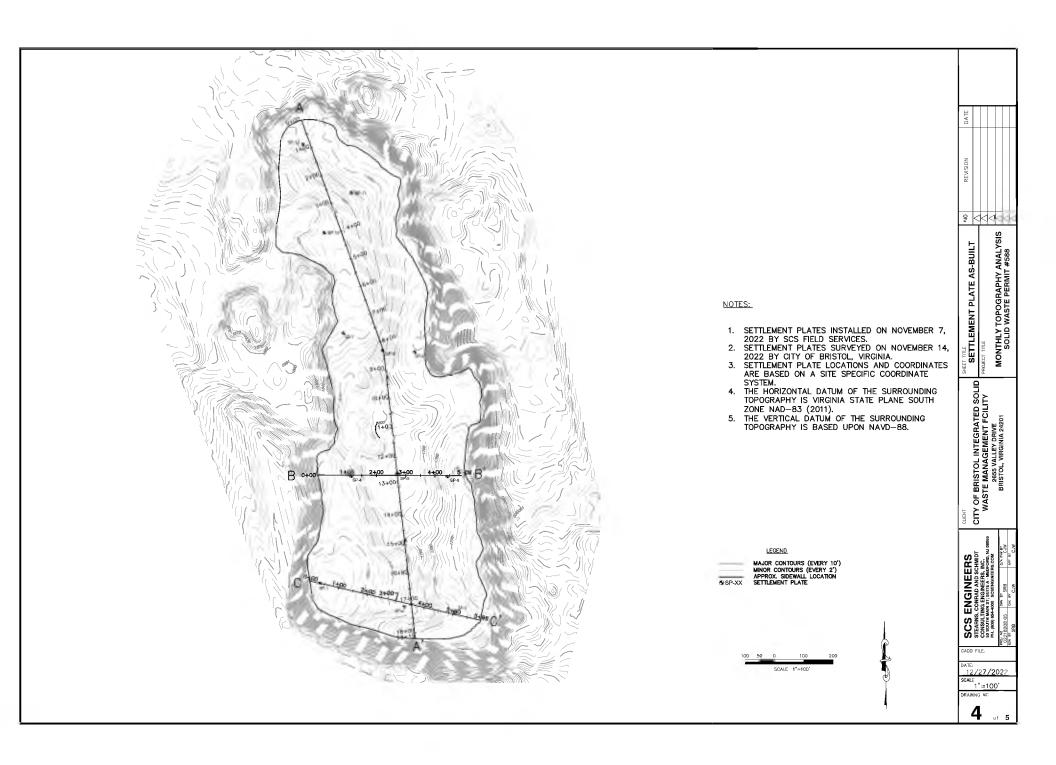
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SHEET TILE VOLLIME CHANGE DECEMBER 2022	VOEDINE OF INTRACE DECEMBER	PROJECT WILE		MONTHLY TOPOGRAPHY ANALYSIS	SOLID WASTE PERMIT #588

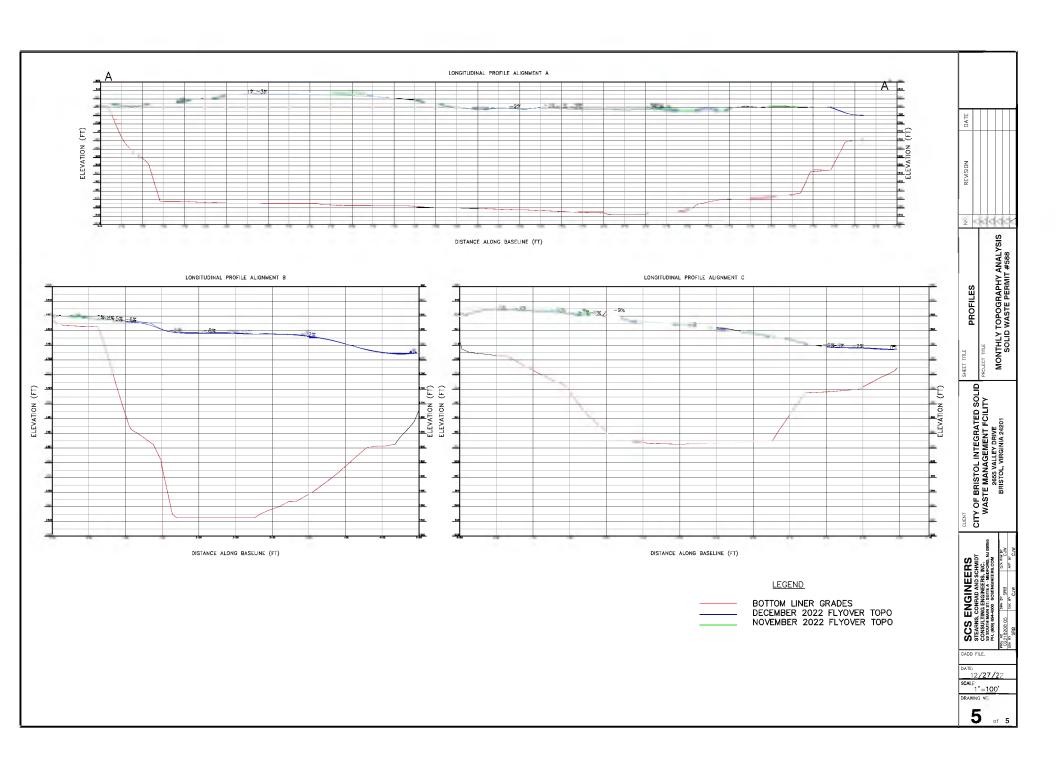
CITY OF BRISTOL INTEGRATED SOLID
WASTE MANAGEMENT FCILITY
2865 VALLEY DRIVE
BRISTOL, VIRGINIA 24201

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## Appendix F Sample Collection Log and Lab Report

## Appendix F

# Sample Collection Log Lab Reports Historical LFG-EW Leachate Monitoring Results Summary

## City of Bristol SWP 588 Landfill Dual Phase LFG-EW Sample Collection Log

Location ID	Sample Date	Sample	Temperature	рН	Specific Conductance	Dissolved Oxygen	ORP	Turbidity	Observations		
ID		Time	(°C)	(s.u.)	(mS/cm)	(mg/L)	(mV)	(NTU)			
EW-49				Not P	umping						
EW-50	12/21/2022	16:05	54.4	7.53	24.25	0.09	-272.4	>1100			
EW-51				Not P	umping				No stroke counter		
EW-52	12/20/2022	10:30	44.7	5.44	41.4	0.13	-47.4	>1100	Stroke counter not working		
EW-53				Not P	umping						
EW-54				Not P	umping						
EW-55	Not Pumping										
EW-56		No Pump									
EW-57	12/21/2022	12:05	60.5	6.98	29.21	0.07	-234.2	>1100	Pump shortened to 71'		
EW-58				Not P	umping						
EW-59	12/20/2022	14:45	48.2	8.12	20.35	0.29	-19.1	>1100			
EW-60	12/20/2022	13:00	51.1	7.79	22.62	1.07	-51.7	>1100	Pump shortened to 70'		
EW-61				Not P	umping				Pump shortened to 66' - No dedicated sample		
EW-62				Not P	umping						
EW-63					Pump disconne	ected					
EW-64											
EW-65	Not Pumping										
EW-67	12/21/2022	9:25 / 12:40	64.9	7.09	26.63	0.44	-208.7	>1100	See Note		
EW-68	12/21/2022	8:30	51.1	7.79	22.62	1.07	-51.7	>1100			

Sampler:

L. Howard, W. Fabrie (SCS)

Samples Shipped By: Courier

Log Checked By:

J. Robb (SCS)

Laboratory: Enthalpy Analytical

Note: EW-67 had to be sampled again at 12:40 as the Nitrate bottle was missed at 9:25.





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

#### **Certificate of Analysis**

DRAFT REPORT

**Laboratory Order ID 22L1183** 

Date Received:

**Project Number:** 

Purchase Order:

Date Issued:

Client Name: SCS Engineers-Winchester

296 Victory Road

Winchester, VA 22602

Submitted To: Jennifer Robb

Client Site I.D.: City of Bristol Landfills

Enclosed are the results of analyses for samples received by the laboratory on 12/22/2022 08:00. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

#### 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.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.

December 22, 2022 8:00

January 6, 2023 8:58

02218208.15 Task 1



Date Issued:

1/6/2023 8:58:55AM

#### **Analysis Detects Report**

Client Name: SCS Engineers-Winchester

Client Site ID: City of Bristol Landfills

Submitted To: Jennifer Robb

**Laboratory Sample ID: Client Sample ID:** EW-52 22L1183-01 Dil. LOQ Parameter Factor Units Samp ID Reference Method Sample Results Qual LOD 01 SW6010D 0.406 0.0200 0.0400 Arsenic 1 mg/L 01 SW6010D 0.803 0.0100 0.0200 Barium 1 mg/L Cadmium 01 SW6010D 0.0104 0.0040 0.0080 1 mg/L SW6010D 1.08 0.0160 0.0200 Chromium 01 1 mg/L Lead 0.0200 01 SW6010D 0.0381 0.0120 mg/L 01 SW6010D 0.5025 0.0140 0.0200 1 Nickel mg/L J Silver 01 SW6010D 0.0187 0.0100 0.0200 1 mg/L Zinc 01 SW6010D 29.7 0.0200 0.0200 1 mg/L 01RE1 SW8260D 26800 300 1000 100 2-Butanone (MEK) ug/L 01RE2 SW8260D 53100 3500 Acetone 5000 500 ug/L Benzene 01 SW8260D 2960 4.00 10.0 10 ug/L Ethylbenzene 01 SW8260D 172 4.00 10.0 10 ug/L Tetrahydrofuran 01RF1 SW8260D 5210 1000 1000 100 ug/L Toluene 01 SW8260D 175 5.00 10.0 10 ug/L SW8260D 222 30.0 Xylenes, Total 01 10.0 10 ug/L 2280 Ammonia as N 01 EPA350.1 R2.0 100 100 1000 mg/L BOD 01 SM22 5210B-2011 12500 0.2 2.0 1 mg/L COD 01 SM22 5220D-2011 86800 10000 10000 1000 mg/L Nitrate+Nitrite as N 01RF3 SM22 4500-NO3F-2011 0.83 0.10 0.10 1 mg/L TKN as N 01 EPA351.2 R2.0 3570 200 500 1000 mg/L Total Recoverable Phenolics 01 54.6 SW9065 1.50 2.50 1 mg/L



Date Issued:

1/6/2023 8:58:55AM

#### **Analysis Detects Report**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site ID:

Laboratory Sample ID: 22L1183-02 Client Sample ID: EW-59

Laboratory Sample ID. ZZL1183-02	Ciletit 3	illible ib. EM-33						
							Dil.	
Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Factor	Units
Arsenic	02	SW6010D	1.69		0.0200	0.0400	1	mg/L
Barium	02	SW6010D	0.438		0.0100	0.0200	1	mg/L
Chromium	02	SW6010D	0.274		0.0160	0.0200	1	mg/L
Nickel	02	SW6010D	0.1299		0.0140	0.0200	1	mg/L
Zinc	02	SW6010D	0.0686		0.0200	0.0200	1	mg/L
2-Butanone (MEK)	02RE1	SW8260D	5670		300	1000	100	ug/L
Acetone	02RE1	SW8260D	15600		700	1000	100	ug/L
Benzene	02	SW8260D	6.30	J	4.00	10.0	10	ug/L
Tetrahydrofuran	02	SW8260D	170		100	100	10	ug/L
Ammonia as N	02	EPA350.1 R2.0	1410		100	100	1000	mg/L
BOD	02	SM22 5210B-2011	9240		0.2	2.0	1	mg/L
COD	02	SM22 5220D-2011	13200		2000	2000	200	mg/L
TKN as N	02	EPA351.2 R2.0	1830		200	500	1000	mg/L
Total Recoverable Phenolics	02	SW9065	32.0		1.50	2.50	1	mg/L



1/6/2023 8:58:55AM

Date Issued:

#### **Analysis Detects Report**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site ID:

Laboratory Sample ID: 22L1183-03	Client Sa	ample ID: EW-60						
							Dil.	
Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Factor	Units
Arsenic	03	SW6010D	0.490		0.0200	0.0400	1	mg/L
Barium	03	SW6010D	0.214		0.0100	0.0200	1	mg/L
Chromium	03	SW6010D	0.319		0.0160	0.0200	1	mg/L
Mercury	03	SW7470A	0.00588		0.00080	0.00080	1	mg/L
Nickel	03	SW6010D	0.2870		0.0140	0.0200	1	mg/L
Zinc	03	SW6010D	0.750		0.0200	0.0200	1	mg/L
2-Butanone (MEK)	03	SW8260D	3390		30.0	100	10	ug/L
Acetone	03RE1	SW8260D	5170		700	1000	100	ug/L
Benzene	03	SW8260D	622		4.00	10.0	10	ug/L
Ethylbenzene	03	SW8260D	48.5		4.00	10.0	10	ug/L
Tetrahydrofuran	03	SW8260D	1120		100	100	10	ug/L
Toluene	03	SW8260D	113		5.00	10.0	10	ug/L
Xylenes, Total	03	SW8260D	112		10.0	30.0	10	ug/L
Ammonia as N	03	EPA350.1 R2.0	1310		100	100	1000	mg/L
BOD	03	SM22 5210B-2011	3330		0.2	2.0	1	mg/L
COD	03	SM22 5220D-2011	8000		2000	2000	200	mg/L
Nitrite as N	03	SM22 4500-NO2B-2011	0.12	J	0.10	0.50	1	mg/L
TKN as N	03	EPA351.2 R2.0	1490		200	500	1000	mg/L
Total Recoverable Phenolics	03	SW9065	8.94		0.300	0.500	1	mg/L



1/6/2023 8:58:55AM

Date Issued:

#### **Analysis Detects Report**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site ID:

Laboratory Sample ID: 221 1183\_04 Client Sample ID: EW-6

Laboratory Sample ID: 22L1183-04	Client Sa	ample ID: EW-68						
							Dil.	
Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Factor	Units
Arsenic	04	SW6010D	0.574		0.0200	0.0400	1	mg/L
Barium	04	SW6010D	0.793		0.0100	0.0200	1	mg/L
Chromium	04	SW6010D	0.822		0.0160	0.0200	1	mg/L
Nickel	04	SW6010D	0.3460		0.0140	0.0200	1	mg/L
Zinc	04	SW6010D	0.286		0.0200	0.0200	1	mg/L
2-Butanone (MEK)	04RE1	SW8260D	7150		300	1000	100	ug/L
Acetone	04RE1	SW8260D	9800		700	1000	100	ug/L
Benzene	04	SW8260D	179		4.00	10.0	10	ug/L
Ethylbenzene	04	SW8260D	27.4		4.00	10.0	10	ug/L
Tetrahydrofuran	04	SW8260D	663		100	100	10	ug/L
Toluene	04	SW8260D	48.3		5.00	10.0	10	ug/L
Xylenes, Total	04	SW8260D	59.9		10.0	30.0	10	ug/L
Ammonia as N	04	EPA350.1 R2.0	1780		100	100	1000	mg/L
BOD	04	SM22 5210B-2011	6770		0.2	2.0	1	mg/L
COD	04	SM22 5220D-2011	14100		2000	2000	200	mg/L
Nitrate+Nitrite as N	04RE1	SM22 4500-NO3F-2011	1.25		0.50	0.50	5	mg/L
TKN as N	04	EPA351.2 R2.0	1940		200	500	1000	mg/L
Total Recoverable Phenolics	04	SW9065	36.0		1.50	2.50	1	mg/L



1/6/2023 8:58:55AM

Date Issued:

#### **Analysis Detects Report**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Jennifer Robb Submitted To:

Client Site ID:

Laboratory Sample ID:	22L1183-05	Client Sa	ample ID: EW-67						
								Dil.	
Parameter		Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Factor	Units
Arsenic		05	SW6010D	0.159		0.0200	0.0400	1	mg/L
Barium		05	SW6010D	0.856		0.0100	0.0200	1	mg/L
Chromium		05	SW6010D	0.499		0.0160	0.0200	1	mg/L
Mercury		05	SW7470A	0.00480		0.00080	0.00080	1	mg/L
Nickel		05	SW6010D	0.1853		0.0140	0.0200	1	mg/L
Zinc		05	SW6010D	0.364		0.0200	0.0200	1	mg/L
2-Butanone (MEK)		05RE1	SW8260D	21700		300	1000	100	ug/L
Acetone		05RE2	SW8260D	45600		3500	5000	500	ug/L
Benzene		05	SW8260D	1750		4.00	10.0	10	ug/L
Ethylbenzene		05	SW8260D	108		4.00	10.0	10	ug/L
Tetrahydrofuran		05RE1	SW8260D	6130		1000	1000	100	ug/L
Toluene		05	SW8260D	113		5.00	10.0	10	ug/L
Xylenes, Total		05	SW8260D	197		10.0	30.0	10	ug/L
Ammonia as N		05	EPA350.1 R2.0	1150		100	100	1000	mg/L
BOD		05	SM22 5210B-2011	8360		0.2	2.0	1	mg/L
COD		05	SM22 5220D-2011	20300		2000	2000	200	mg/L
Nitrate+Nitrite as N		05RE3	SM22 4500-NO3F-2011	0.15		0.10	0.10	1	mg/L
TKN as N		05	EPA351.2 R2.0	1340		200	500	1000	mg/L
Total Recoverable Phenolics	3	05	SW9065	20.2		1.50	2.50	1	mg/L
	3								



1/6/2023 8:58:55AM

Date Issued:

#### **Analysis Detects Report**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Jennifer Robb Submitted To:

Client Site ID:

Laboratory Sample ID: 22L1183-07	Client Sa	mple ID: EW-57						
							Dil.	
Parameter	Samp ID	Reference Method	Sample Results	Qual	LOD	LOQ	Factor	Units
Arsenic	07	SW6010D	0.174		0.0200	0.0400	1	mg/L
Barium	07	SW6010D	0.978		0.0100	0.0200	1	mg/L
Chromium	07	SW6010D	1.76		0.0160	0.0200	1	mg/L
Mercury	07	SW7470A	0.00118		0.00080	0.00080	1	mg/L
Nickel	07	SW6010D	0.2989		0.0140	0.0200	1	mg/L
Zinc	07	SW6010D	0.162		0.0200	0.0200	1	mg/L
2-Butanone (MEK)	07RE1	SW8260D	27700		300	1000	100	ug/L
Acetone	07RE2	SW8260D	49900		3500	5000	500	ug/L
Benzene	07RE1	SW8260D	6550		40.0	100	100	ug/L
Ethylbenzene	07	SW8260D	287		4.00	10.0	10	ug/L
Tetrahydrofuran	07RE1	SW8260D	19800		1000	1000	100	ug/L
Toluene	07	SW8260D	195		5.00	10.0	10	ug/L
Xylenes, Total	07	SW8260D	186		10.0	30.0	10	ug/L
Ammonia as N	07	EPA350.1 R2.0	2110		100	100	1000	mg/L
BOD	07	SM22 5210B-2011	11400		0.2	2.0	1	mg/L
COD	07	SM22 5220D-2011	22400		5000	5000	500	mg/L
TKN as N	07	EPA351.2 R2.0	1790		200	500	1000	mg/L
Total Recoverable Phenolics	07	SW9065	28.3		1.50	2.50	1	mg/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the "Certificate of Analysis".



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

## ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EW-52	22L1183-01	Non-Potable Water	12/20/2022 10:30	12/22/2022 08:00
EW-59	22L1183-02	Non-Potable Water	12/20/2022 14:45	12/22/2022 08:00
EW-60	22L1183-03	Non-Potable Water	12/20/2022 15:00	12/22/2022 08:00
EW-68	22L1183-04	Non-Potable Water	12/21/2022 08:30	12/22/2022 08:00
EW-67	22L1183-05	Non-Potable Water	12/21/2022 09:25	12/22/2022 08:00
EW-67	22L1183-06	Non-Potable Water	12/21/2022 12:40	12/22/2022 08:00
EW-57	22L1183-07	Non-Potable Water	12/21/2022 12:05	12/22/2022 08:00
Trip Blank	22L1183-08	Non-Potable Water	11/29/2022 11:00	12/22/2022 08:00



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-52 Laboratory Sample ID: 22L1183-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Metals (Total) by EPA 6000/7000 Serie	s Methods											
Silver	01	7440-22-4	SW6010D	12/27/2022 10:00	12/28/2022 14:53	0.0187	J	0.0100	0.0200	1	mg/L	AB
Arsenic	01	7440-38-2	SW6010D	12/27/2022 10:00	12/28/2022 14:53	0.406		0.0200	0.0400	1	mg/L	AB
Barium	01	7440-39-3	SW6010D	12/27/2022 10:00	12/28/2022 14:53	0.803		0.0100	0.0200	1	mg/L	AB
Cadmium	01	7440-43-9	SW6010D	12/27/2022 10:00	12/28/2022 14:53	0.0104		0.0040	0.0080	1	mg/L	AB
Chromium	01	7440-47-3	SW6010D	12/27/2022 10:00	12/28/2022 14:53	1.08		0.0160	0.0200	1	mg/L	AB
Copper	01	7440-50-8	SW6010D	12/27/2022 10:00	12/28/2022 14:53	BLOD		0.0160	0.0200	1	mg/L	AB
Mercury	01	7439-97-6	SW7470A	12/28/2022 08:53	12/28/2022 15:20	BLOD		0.00400	0.00400	1	mg/L	ACM
Nickel	01	7440-02-0	SW6010D	12/27/2022 10:00	12/28/2022 14:53	0.5025		0.0140	0.0200	1	mg/L	AB
Lead	01	7439-92-1	SW6010D	12/27/2022 10:00	12/28/2022 14:53	0.0381		0.0120	0.0200	1	mg/L	AB
Selenium	01	7782-49-2	SW6010D	12/27/2022 10:00	12/28/2022 14:53	BLOD		0.0800	0.100	1	mg/L	AB
Zinc	01	7440-66-6	SW6010D	12/27/2022 10:00	12/28/2022 14:53	29.7		0.0200	0.0200	1	mg/L	AB
Volatile Organic Compounds by GCM	s											
2-Butanone (MEK)	01RE1	78-93-3	SW8260D	12/22/2022 15:26	12/22/2022 15:26	26800		300	1000	100	ug/L	RJB
Acetone	01RE2	67-64-1	SW8260D	12/23/2022 15:53	12/23/2022 15:53	53100		3500	5000	500	ug/L	RJB
Benzene	01	71-43-2	SW8260D	12/22/2022 15:01	12/22/2022 15:01	2960		4.00	10.0	10	ug/L	RJB
Ethylbenzene	01	100-41-4	SW8260D	12/22/2022 15:01	12/22/2022 15:01	172		4.00	10.0	10	ug/L	RJB
Toluene	01	108-88-3	SW8260D	12/22/2022 15:01	12/22/2022 15:01	175		5.00	10.0	10	ug/L	RJB
Xylenes, Total	01	1330-20-7	SW8260D	12/22/2022 15:01	12/22/2022 15:01	222		10.0	30.0	10	ug/L	RJB
Tetrahydrofuran	01RE1	109-99-9	SW8260D	12/22/2022 15:26	12/22/2022 15:26	5210		1000	1000	100	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	01	88.8	% 70-120	12/22/2022 1	5:01 12/22/2022 15:	01						
Surr: 4-Bromofluorobenzene (Surr)	01	94.9	% 75-120	12/22/2022 1	5:01 12/22/2022 15:	01						
Surr: Dibromofluoromethane (Surr)	01	85.0	% 70-130	12/22/2022 1	5:01 12/22/2022 15:	01						
Surr: Toluene-d8 (Surr)	01	98.0	% 70-130	12/22/2022 1	5:01 12/22/2022 15:	01						
Surr: 1,2-Dichloroethane-d4 (Surr)	01RE1	88.1	% 70-120	12/22/2022 1	5:26 12/22/2022 15:	26						
Surr: 4-Bromofluorobenzene (Surr)	01RE1	96.3	% 75-120	12/22/2022 1	5:26 12/22/2022 15:	26						



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-52 Laboratory Sample ID: 22L1183-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
- arameter	- Camp ID		Wicthod	Date/ Hille	Date/Time	TCSuits						7
Volatile Organic Compounds by GCMS	5											
Surr: Dibromofluoromethane (Surr)	01RE1	85.1	% 70-130	12/22/2022 15:26	5 12/22/2022 15:20	5						
Surr: Toluene-d8 (Surr)	01RE1	98.1	% 70-130	12/22/2022 15:26	5 12/22/2022 15:20	5						
Surr: 1,2-Dichloroethane-d4 (Surr)	01RE2	83.5	% 70-120	12/23/2022 15:53	12/23/2022 15:53	3						
Surr: 4-Bromofluorobenzene (Surr)	01RE2	96.6	% 75-120	12/23/2022 15:53	12/23/2022 15:53	3						
Surr: Dibromofluoromethane (Surr)	01RE2	82.5	% 70-130	12/23/2022 15:53	12/23/2022 15:53	3						
Surr: Toluene-d8 (Surr)	01RE2	97.5	% 70-130	12/23/2022 15:53	12/23/2022 15:53	3						
Semivolatile Organic Compounds by	GCMS											
Anthracene	01	120-12-7	SW8270E	12/23/2022 09:40	2/23/2022 22:11	BLOD		23.4	23.4	50	ug/L	MGG
Surr: 2,4,6-Tribromophenol (Surr)	01		% 5-136	12/23/2022 09:40	12/23/2022 22:1	1						DS
Surr: 2-Fluorobiphenyl (Surr)	01	60.0	% 9-117	12/23/2022 09:40	12/23/2022 22:1	1						
Surr: 2-Fluorophenol (Surr)	01	50.0	% 5-60	12/23/2022 09:40	12/23/2022 22:1	1						
Surr: Nitrobenzene-d5 (Surr)	01	110	% 5-151	12/23/2022 09:40	12/23/2022 22:1	1						
Surr: Phenol-d5 (Surr)	01		% 5-60	12/23/2022 09:40	12/23/2022 22:1	1						DS
Surr: p-Terphenyl-d14 (Surr)	01	20.0	% 5-141	12/23/2022 09:40	12/23/2022 22:1	1						



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-52 Laboratory Sample ID: 22L1183-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Ammonia as N	01	7664-41-7	EPA350.1 R2.0	12/27/2022 13:12	12/28/2022 10:37	2280		100	100	1000	mg/L	MKS
BOD	01	E1640606	SM22 5210B-2011	12/22/2022 10:03	12/22/2022 10:03	12500		0.2	2.0	1	mg/L	LAM
COD	01	NA	SM22 5220D-2011	12/23/2022 10:00	12/23/2022 10:00	86800		10000	10000	1000	mg/L	MGC
Nitrate as N	01	14797-55-8	Calc.	12/28/2022 13:56	12/28/2022 13:56	BLOD		1.10	5.10	100	mg/L	MGC
Nitrate+Nitrite as N	01RE3	E701177	SM22 4500-NO3F- 2011	12/28/2022 13:56	12/28/2022 13:56	0.83		0.10	0.10	1	mg/L	MGC
Nitrite as N	01	14797-65-0	SM22 4500-NO2B- 2011	12/22/2022 08:56	12/23/2022 08:56	BLOD		1.00	5.00	100	mg/L	FIR
Total Recoverable Phenolics	01	NA	SW9065	12/29/2022 09:30	12/29/2022 13:30	54.6		1.50	2.50	1	mg/L	MKS
TKN as N	01	E17148461	EPA351.2 R2.0	12/29/2022 10:01	12/29/2022 10:01	3570		200	500	1000	mg/L	MJRL



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-59 Laboratory Sample ID: 22L1183-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Metals (Total) by EPA 6000/7000 Series	Methods											
Silver	02	7440-22-4	SW6010D	12/27/2022 10:00	12/28/2022 14:58	BLOD		0.0100	0.0200	1	mg/L	AB
Arsenic	02	7440-38-2	SW6010D	12/27/2022 10:00	12/28/2022 14:58	1.69		0.0200	0.0400	1	mg/L	AB
Barium	02	7440-39-3	SW6010D	12/27/2022 10:00	12/28/2022 14:58	0.438		0.0100	0.0200	1	mg/L	AB
Cadmium	02	7440-43-9	SW6010D	12/27/2022 10:00	12/28/2022 14:58	BLOD		0.0040	0.0080	1	mg/L	AB
Chromium	02	7440-47-3	SW6010D	12/27/2022 10:00	12/28/2022 14:58	0.274		0.0160	0.0200	1	mg/L	AB
Copper	02	7440-50-8	SW6010D	12/27/2022 10:00	12/28/2022 14:58	BLOD		0.0160	0.0200	1	mg/L	AB
Mercury	02	7439-97-6	SW7470A	12/28/2022 08:53	12/28/2022 15:23	BLOD		0.00080	0.00080	1	mg/L	ACM
Nickel	02	7440-02-0	SW6010D	12/27/2022 10:00	12/28/2022 14:58	0.1299		0.0140	0.0200	1	mg/L	AB
Lead	02	7439-92-1	SW6010D	12/27/2022 10:00	12/28/2022 14:58	BLOD		0.0120	0.0200	1	mg/L	AB
Selenium	02	7782-49-2	SW6010D	12/27/2022 10:00	12/28/2022 14:58	BLOD		0.0800	0.100	1	mg/L	AB
Zinc	02	7440-66-6	SW6010D	12/27/2022 10:00	12/28/2022 14:58	0.0686		0.0200	0.0200	1	mg/L	AB
Volatile Organic Compounds by GCMS												
2-Butanone (MEK)	02RE1	78-93-3	SW8260D	12/22/2022 16:15	12/22/2022 16:15	5670		300	1000	100	ug/L	RJB
Acetone	02RE1	67-64-1	SW8260D	12/22/2022 16:15	12/22/2022 16:15	15600		700	1000	100	ug/L	RJB
Benzene	02	71-43-2	SW8260D	12/22/2022 15:50	12/22/2022 15:50	6.30	J	4.00	10.0	10	ug/L	RJB
Ethylbenzene	02	100-41-4	SW8260D	12/22/2022 15:50	12/22/2022 15:50	BLOD		4.00	10.0	10	ug/L	RJB
Toluene	02	108-88-3	SW8260D	12/22/2022 15:50	12/22/2022 15:50	BLOD		5.00	10.0	10	ug/L	RJB
Xylenes, Total	02	1330-20-7	SW8260D	12/22/2022 15:50	12/22/2022 15:50	BLOD		10.0	30.0	10	ug/L	RJB
Tetrahydrofuran	02	109-99-9	SW8260D	12/22/2022 15:50	12/22/2022 15:50	170		100	100	10	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	02	84.6	% 70-120	12/22/2022 15	5:50 12/22/2022 15:	:50						
Surr: 4-Bromofluorobenzene (Surr)	02	94.7	% 75-120	12/22/2022 15	5:50 12/22/2022 15:	:50						
Surr: Dibromofluoromethane (Surr)	02	83.3	% 70-130	12/22/2022 15	5:50 12/22/2022 15:	:50						
Surr: Toluene-d8 (Surr)	02	95.5	% 70-130	12/22/2022 1	5:50 12/22/2022 15:	:50						
Surr: 1,2-Dichloroethane-d4 (Surr)	02RE1	87.8	% 70-120	12/22/2022 16	5:15       12/22/2022 16:	:15						
Surr: 4-Bromofluorobenzene (Surr)	02RE1	97.1	% 75-120	12/22/2022 16	5:15 12/22/2022 16:	:15						



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-59 Laboratory Sample ID: 22L1183-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS	3											
Surr: Dibromofluoromethane (Surr) Surr: Toluene-d8 (Surr)	02RE1 02RE1	85.6 % 101 %		12/22/2022 16:1 12/22/2022 16:1								
Semivolatile Organic Compounds by C	GCMS											
Anthracene	02	120-12-7	SW8270E	12/23/2022 09:40	12/23/2022 22:45	BLOD		9.35	9.35	50	ug/L	MGG
Surr: 2,4,6-Tribromophenol (Surr)	02	149 %	6 5-136	12/23/2022 09:4	10 12/23/2022 22:45	5						DS
Surr: 2-Fluorobiphenyl (Surr)	02	63.0 %	6 9-117	12/23/2022 09:4	10 12/23/2022 22:45	5						
Surr: 2-Fluorophenol (Surr)	02	38.0 %	6 5-60	12/23/2022 09:4	10 12/23/2022 22:45	5						
Surr: Nitrobenzene-d5 (Surr)	02	85.0 %	6 5-151	12/23/2022 09:4	10 12/23/2022 22:45	5						
Surr: Phenol-d5 (Surr)	02	36.5 %	6 5-60	12/23/2022 09:4	10 12/23/2022 22:45	5						
Surr: p-Terphenyl-d14 (Surr)	02	12.0 %	6 5-141	12/23/2022 09:4	10 12/23/2022 22:45	5						



## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Date Issued: 1/6/2023 8:58:55AM

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-59 Laboratory Sample ID: 22L1183-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Ammonia as N	02	7664-41-7	EPA350.1 R2.0	12/27/2022 13:12	12/28/2022 10:37	1410		100	100	1000	mg/L	MKS
BOD	02	E1640606	SM22 5210B-2011	12/22/2022 11:09	12/22/2022 11:09	9240		0.2	2.0	1	mg/L	LAM
COD	02	NA	SM22 5220D-2011	12/23/2022 10:00	12/23/2022 10:00	13200		2000	2000	200	mg/L	MGC
Nitrate as N	02	14797-55-8	Calc.	12/28/2022 13:56	12/28/2022 13:56	BLOD		1.10	5.10	100	mg/L	MGC
Nitrate+Nitrite as N	02RE3	E701177	SM22 4500-NO3F- 2011	12/28/2022 13:56	12/28/2022 13:56	BLOD		0.10	0.10	1	mg/L	MGC
Nitrite as N	02	14797-65-0	SM22 4500-NO2B- 2011	12/22/2022 08:56	12/23/2022 08:56	BLOD		1.00	5.00	100	mg/L	FIR
Total Recoverable Phenolics	02	NA	SW9065	12/29/2022 09:30	12/29/2022 13:30	32.0		1.50	2.50	1	mg/L	MKS
TKN as N	02	E17148461	EPA351.2 R2.0	12/29/2022 10:02	12/29/2022 10:02	1830		200	500	1000	mg/L	MJRL



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-60 Laboratory Sample ID: 22L1183-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Metals (Total) by EPA 6000	7000 Series Methods											
Silver	03	7440-22-4	SW6010D	12/27/2022 10:00	12/28/2022 15:03	BLOD		0.0100	0.0200	1	mg/L	AB
Arsenic	03	7440-38-2	SW6010D	12/27/2022 10:00	12/28/2022 15:03	0.490		0.0200	0.0400	1	mg/L	AB
Barium	03	7440-39-3	SW6010D	12/27/2022 10:00	12/28/2022 15:03	0.214		0.0100	0.0200	1	mg/L	AB
Cadmium	03	7440-43-9	SW6010D	12/27/2022 10:00	12/28/2022 15:03	BLOD		0.0040	0.0080	1	mg/L	AB
Chromium	03	7440-47-3	SW6010D	12/27/2022 10:00	12/28/2022 15:03	0.319		0.0160	0.0200	1	mg/L	AB
Copper	03	7440-50-8	SW6010D	12/27/2022 10:00	12/28/2022 15:03	BLOD		0.0160	0.0200	1	mg/L	AB
Mercury	03	7439-97-6	SW7470A	12/28/2022 08:53	12/28/2022 15:25	0.00588		0.00080	0.00080	1	mg/L	ACM
Nickel	03	7440-02-0	SW6010D	12/27/2022 10:00	12/28/2022 15:03	0.2870		0.0140	0.0200	1	mg/L	AB
Lead	03	7439-92-1	SW6010D	12/27/2022 10:00	12/28/2022 15:03	BLOD		0.0120	0.0200	1	mg/L	AB
Selenium	03	7782-49-2	SW6010D	12/27/2022 10:00	12/28/2022 15:03	BLOD		0.0800	0.100	1	mg/L	AB
Zinc	03	7440-66-6	SW6010D	12/27/2022 10:00	12/28/2022 15:03	0.750		0.0200	0.0200	1	mg/L	AB



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-60 Laboratory Sample ID: 22L1183-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS												
2-Butanone (MEK)	03	78-93-3	SW8260D	12/22/2022 16:39	12/22/2022 16:39	3390		30.0	100	10	ug/L	RJB
Acetone	03RE1	67-64-1	SW8260D	12/22/2022 17:04	12/22/2022 17:04	5170		700	1000	100	ug/L	RJB
Benzene	03	71-43-2	SW8260D	12/22/2022 16:39	12/22/2022 16:39	622		4.00	10.0	10	ug/L	RJB
Ethylbenzene	03	100-41-4	SW8260D	12/22/2022 16:39	12/22/2022 16:39	48.5		4.00	10.0	10	ug/L	RJB
Toluene	03	108-88-3	SW8260D	12/22/2022 16:39	12/22/2022 16:39	113		5.00	10.0	10	ug/L	RJB
Xylenes, Total	03	1330-20-7	SW8260D	12/22/2022 16:39	12/22/2022 16:39	112		10.0	30.0	10	ug/L	RJB
Tetrahydrofuran	03	109-99-9	SW8260D	12/22/2022 16:39	12/22/2022 16:39	1120		100	100	10	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	03	88.0	% 70-120	12/22/2022 16	5:39 12/22/2022 16:	39						
Surr: 4-Bromofluorobenzene (Surr)	03	96.6	% 75-120	12/22/2022 16	5:39 12/22/2022 16:	39						
Surr: Dibromofluoromethane (Surr)	03	84.8	% 70-130	12/22/2022 16	5:39 12/22/2022 16:	39						
Surr: Toluene-d8 (Surr)	03	98.5	% 70-130	12/22/2022 16	5:39 12/22/2022 16:	39						
Surr: 1,2-Dichloroethane-d4 (Surr)	03RE1	84.6	% 70-120	12/22/2022 17	7:04 12/22/2022 17:	04						
Surr: 4-Bromofluorobenzene (Surr)	03RE1	96.6	% 75-120	12/22/2022 17	7:04 12/22/2022 17:	04						
Surr: Dibromofluoromethane (Surr)	03RE1	85.4	% 70-130	12/22/2022 17	7:04 12/22/2022 17:	04						
Surr: Toluene-d8 (Surr)	03RE1	98.1	% 70-130	12/22/2022 17	7:04 12/22/2022 17:	04						
Semivolatile Organic Compounds by G	CMS											
Anthracene	03	120-12-7	SW8270E	12/23/2022 09:40	12/23/2022 23:18	BLOD		9.35	9.35	50	ug/L	MGG
Surr: 2,4,6-Tribromophenol (Surr)	03	178	% 5-136	12/23/2022 09	9:40 12/23/2022 23:	18						DS
Surr: 2-Fluorobiphenyl (Surr)	03	65.0	% 9-117	12/23/2022 09	9:40 12/23/2022 23:	18						
Surr: 2-Fluorophenol (Surr)	03	52.0	% 5-60	12/23/2022 09	9:40 12/23/2022 23:	18						
Surr: Nitrobenzene-d5 (Surr)	03	102	% 5-151	12/23/2022 09	9:40 12/23/2022 23:	18						
Surr: Phenol-d5 (Surr)	03	57.0	% 5-60	12/23/2022 09	9:40 12/23/2022 23:	18						
Surr: p-Terphenyl-d14 (Surr)	03	10.0	% 5-141	12/23/2022 09	9:40 12/23/2022 23:	18						



## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Engineers-Winchester Date Issued: 1/6/2023 8:58:55AM

Client Site I.D.: City of Bristol Landfills
Submitted To: Jennifer Robb

Client Sample ID: EW-60 Laboratory Sample ID: 22L1183-03

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Ammonia as N	03	7664-41-7	EPA350.1 R2.0	12/27/2022 13:12	12/28/2022 10:38	1310		100	100	1000	mg/L	MKS
BOD	03	E1640606	SM22 5210B-2011	12/22/2022 11:16	12/22/2022 11:16	3330		0.2	2.0	1	mg/L	LAM
COD	03	NA	SM22 5220D-2011	12/23/2022 10:00	12/23/2022 10:00	8000		2000	2000	200	mg/L	MGC
Nitrate as N	03	14797-55-8	Calc.	12/28/2022 13:56	12/28/2022 13:56	BLOD		0.200	0.600	1	mg/L	MGC
Nitrate+Nitrite as N	03RE3	E701177	SM22 4500-NO3F- 2011	12/28/2022 13:56	12/28/2022 13:56	BLOD		0.10	0.10	1	mg/L	MGC
Nitrite as N	03	14797-65-0	SM22 4500-NO2B- 2011	12/22/2022 08:56	12/23/2022 08:56	0.12	J	0.10	0.50	1	mg/L	FIR
Total Recoverable Phenolics	03	NA	SW9065	12/29/2022 09:30	12/29/2022 13:30	8.94		0.300	0.500	1	mg/L	MKS
TKN as N	03	E17148461	EPA351.2 R2.0	12/29/2022 10:03	12/29/2022 10:03	1490		200	500	1000	mg/L	MJRL



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-68 Laboratory Sample ID: 22L1183-04

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Metals (Total) by EPA 6000/7000 Serie	s Methods											
Silver	04	7440-22-4	SW6010D	12/27/2022 10:00	12/28/2022 15:08	BLOD		0.0100	0.0200	1	mg/L	AB
Arsenic	04	7440-38-2	SW6010D	12/27/2022 10:00	12/28/2022 15:08	0.574		0.0200	0.0400	1	mg/L	AB
Barium	04	7440-39-3	SW6010D	12/27/2022 10:00	12/28/2022 15:08	0.793		0.0100	0.0200	1	mg/L	AB
Cadmium	04	7440-43-9	SW6010D	12/27/2022 10:00	12/28/2022 15:08	BLOD		0.0040	0.0080	1	mg/L	AB
Chromium	04	7440-47-3	SW6010D	12/27/2022 10:00	12/28/2022 15:08	0.822		0.0160	0.0200	1	mg/L	AB
Copper	04	7440-50-8	SW6010D	12/27/2022 10:00	12/28/2022 15:08	BLOD		0.0160	0.0200	1	mg/L	AB
Mercury	04	7439-97-6	SW7470A	12/28/2022 08:53	12/28/2022 15:28	BLOD		0.00080	0.00080	1	mg/L	ACM
Nickel	04	7440-02-0	SW6010D	12/27/2022 10:00	12/28/2022 15:08	0.3460		0.0140	0.0200	1	mg/L	AB
Lead	04	7439-92-1	SW6010D	12/27/2022 10:00	12/28/2022 15:08	BLOD		0.0120	0.0200	1	mg/L	AB
Selenium	04	7782-49-2	SW6010D	12/27/2022 10:00	12/28/2022 15:08	BLOD		0.0800	0.100	1	mg/L	AB
Zinc	04	7440-66-6	SW6010D	12/27/2022 10:00	12/28/2022 15:08	0.286		0.0200	0.0200	1	mg/L	AB
Volatile Organic Compounds by GCM	S											
2-Butanone (MEK)	04RE1	78-93-3	SW8260D	12/22/2022 14:37	12/22/2022 14:37	7150		300	1000	100	ug/L	RJB
Acetone	04RE1	67-64-1	SW8260D	12/22/2022 14:37	12/22/2022 14:37	9800		700	1000	100	ug/L	RJB
Benzene	04	71-43-2	SW8260D	12/22/2022 14:12	12/22/2022 14:12	179		4.00	10.0	10	ug/L	RJB
Ethylbenzene	04	100-41-4	SW8260D	12/22/2022 14:12	12/22/2022 14:12	27.4		4.00	10.0	10	ug/L	RJB
Toluene	04	108-88-3	SW8260D	12/22/2022 14:12	12/22/2022 14:12	48.3		5.00	10.0	10	ug/L	RJB
Xylenes, Total	04	1330-20-7	SW8260D	12/22/2022 14:12	12/22/2022 14:12	59.9		10.0	30.0	10	ug/L	RJB
Tetrahydrofuran	04	109-99-9	SW8260D	12/22/2022 14:12	12/22/2022 14:12	663		100	100	10	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	04	87.5	% 70-120	12/22/2022 14	1:12 12/22/2022 14:	12					<u> </u>	
Surr: 4-Bromofluorobenzene (Surr)	04	95.2		12/22/2022 14								
Surr: Dibromofluoromethane (Surr)	04	86.0	% 70-130	12/22/2022 14	1:12 12/22/2022 14:	12						
Surr: Toluene-d8 (Surr)	04	98.8	% 70-130	12/22/2022 14	1:12 12/22/2022 14:	12						
Surr: 1,2-Dichloroethane-d4 (Surr)	04RE1	85.5	% 70-120	12/22/2022 14	1:37 12/22/2022 14:	37						
Surr: 4-Bromofluorobenzene (Surr)	04RE1	95.5	% 75-120	12/22/2022 14	1:37 12/22/2022 14:	37						



Date Issued:

1/6/2023 8:58:55AM

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-68 Laboratory Sample ID: 22L1183-04

Parameter  Volatile Organic Compounds by GCMS	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Surr: Dibromofluoromethane (Surr)	04RE1	85.4 9	% 70-130	12/22/2022 14:3	7 12/22/2022 14:37	,						
Surr: Toluene-d8 (Surr)	04RE1	99.1 9	-	12/22/2022 14:3								
Semivolatile Organic Compounds by 0	GCMS											
Anthracene	04	120-12-7	SW8270E	12/23/2022 09:40	12/23/2022 23:52	BLOD		9.35	9.35	50	ug/L	MGG
Surr: 2,4,6-Tribromophenol (Surr)	04	156 9	% 5-136	12/23/2022 09:4	0 12/23/2022 23:52	)						DS
Surr: 2-Fluorobiphenyl (Surr)	04	53.0 9	% 9-117	12/23/2022 09:4	0 12/23/2022 23:52	)						
Surr: 2-Fluorophenol (Surr)	04	33.0 9	% 5-60	12/23/2022 09:4	0 12/23/2022 23:52	)						
Surr: Nitrobenzene-d5 (Surr)	04	77.0 9	% 5-151	12/23/2022 09:4	0 12/23/2022 23:52	)						
Surr: Phenol-d5 (Surr)	04	38.0 9	% 5-60	12/23/2022 09:4	0 12/23/2022 23:52	)						
Surr: p-Terphenyl-d14 (Surr)	04	9.00 9	% 5-141	12/23/2022 09:4	0 12/23/2022 23:52	)						



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-68 Laboratory Sample ID: 22L1183-04

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Ammonia as N	04	7664-41-7	EPA350.1 R2.0	12/27/2022 13:12	12/28/2022 10:39	1780		100	100	1000	mg/L	MKS
BOD	04	E1640606	SM22 5210B-2011	12/22/2022 11:06	12/22/2022 11:06	6770		0.2	2.0	1	mg/L	LAM
COD	04	NA	SM22 5220D-2011	12/23/2022 10:00	12/23/2022 10:00	14100		2000	2000	200	mg/L	MGC
Nitrate as N	04	14797-55-8	Calc.	12/28/2022 13:56	12/28/2022 13:56	BLOD		1.50	5.50	100	mg/L	MGC
Nitrate+Nitrite as N	04RE1	E701177	SM22 4500-NO3F- 2011	12/28/2022 13:56	12/28/2022 13:56	1.25		0.50	0.50	5	mg/L	MGC
Nitrite as N	04	14797-65-0	SM22 4500-NO2B- 2011	12/22/2022 08:56	12/23/2022 08:56	BLOD		1.00	5.00	100	mg/L	FIR
Total Recoverable Phenolics	04	NA	SW9065	12/29/2022 09:30	12/29/2022 13:30	36.0		1.50	2.50	1	mg/L	MKS
TKN as N	04	E17148461	EPA351.2 R2.0	12/29/2022 10:04	12/29/2022 10:04	1940		200	500	1000	mg/L	MJRL



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-67 Laboratory Sample ID: 22L1183-05

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Metals (Total) by EPA 6000/7000 Serie	s Methods											
Silver	05	7440-22-4	SW6010D	12/27/2022 10:00	12/28/2022 15:35	BLOD		0.0100	0.0200	1	mg/L	AB
Arsenic	05	7440-38-2	SW6010D	12/27/2022 10:00	12/28/2022 15:35	0.159		0.0200	0.0400	1	mg/L	AB
Barium	05	7440-39-3	SW6010D	12/27/2022 10:00	12/28/2022 15:35	0.856		0.0100	0.0200	1	mg/L	AB
Cadmium	05	7440-43-9	SW6010D	12/27/2022 10:00	12/28/2022 15:35	BLOD		0.0040	0.0080	1	mg/L	AB
Chromium	05	7440-47-3	SW6010D	12/27/2022 10:00	12/28/2022 15:35	0.499		0.0160	0.0200	1	mg/L	AB
Copper	05	7440-50-8	SW6010D	12/27/2022 10:00	12/28/2022 15:35	BLOD		0.0160	0.0200	1	mg/L	AB
Mercury	05	7439-97-6	SW7470A	12/28/2022 08:53	12/28/2022 15:31	0.00480		0.00080	0.00080	1	mg/L	ACM
Nickel	05	7440-02-0	SW6010D	12/27/2022 10:00	12/28/2022 15:35	0.1853		0.0140	0.0200	1	mg/L	AB
Lead	05	7439-92-1	SW6010D	12/27/2022 10:00	12/28/2022 15:35	BLOD		0.0120	0.0200	1	mg/L	AB
Selenium	05	7782-49-2	SW6010D	12/27/2022 10:00	12/28/2022 15:35	BLOD		0.0800	0.100	1	mg/L	AB
Zinc	05	7440-66-6	SW6010D	12/27/2022 10:00	12/28/2022 15:35	0.364		0.0200	0.0200	1	mg/L	AB
Volatile Organic Compounds by GCM	s											
2-Butanone (MEK)	05RE1	78-93-3	SW8260D	12/22/2022 17:52	12/22/2022 17:52	21700		300	1000	100	ug/L	RJB
Acetone	05RE2	67-64-1	SW8260D	12/23/2022 16:17	12/23/2022 16:17	45600		3500	5000	500	ug/L	RJB
Benzene	05	71-43-2	SW8260D	12/22/2022 17:28	12/22/2022 17:28	1750		4.00	10.0	10	ug/L	RJB
Ethylbenzene	05	100-41-4	SW8260D	12/22/2022 17:28	12/22/2022 17:28	108		4.00	10.0	10	ug/L	RJB
Toluene	05	108-88-3	SW8260D	12/22/2022 17:28	12/22/2022 17:28	113		5.00	10.0	10	ug/L	RJB
Xylenes, Total	05	1330-20-7	SW8260D	12/22/2022 17:28	12/22/2022 17:28	197		10.0	30.0	10	ug/L	RJB
Tetrahydrofuran	05RE1	109-99-9	SW8260D	12/22/2022 17:52	12/22/2022 17:52	6130		1000	1000	100	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	05	86.1	% 70-120	12/22/2022 17	7:28 12/22/2022 17	::28						
Surr: 4-Bromofluorobenzene (Surr)	05	93.1	% 75-120	12/22/2022 17	7:28 12/22/2022 17	:28						
Surr: Dibromofluoromethane (Surr)	05	82.3	% 70-130	12/22/2022 17	7:28 12/22/2022 17	:28						
Surr: Toluene-d8 (Surr)	05	101	% 70-130	12/22/2022 17	7:28 12/22/2022 17	::28						
Surr: 1,2-Dichloroethane-d4 (Surr)	05RE1	84.6	% 70-120	12/22/2022 17	7:52 12/22/2022 17	:52						
Surr: 4-Bromofluorobenzene (Surr)	05RE1	95.1	% 75-120	12/22/2022 17	7:52 12/22/2022 17	:52						



Date Issued:

1/6/2023 8:58:55AM

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-67 Laboratory Sample ID: 22L1183-05

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS	8											
Surr: Dibromofluoromethane (Surr)	05RE1	84.7 %	% 70-130	12/22/2022 17:52	12/22/2022 17:52	2						
Surr: Toluene-d8 (Surr)	05RE1	99.3 %	% 70-130	12/22/2022 17:52	12/22/2022 17:52	2						
Surr: 1,2-Dichloroethane-d4 (Surr)	05RE2	84.3 %	% 70-120	12/23/2022 16:17	12/23/2022 16:17	7						
Surr: 4-Bromofluorobenzene (Surr)	05RE2	95.0 %	% 75-120	12/23/2022 16:17	12/23/2022 16:17	7						
Surr: Dibromofluoromethane (Surr)	05RE2	84.1 %	% 70-130	12/23/2022 16:17	12/23/2022 16:17	7						
Surr: Toluene-d8 (Surr)	05RE2	100 %	% 70-130	12/23/2022 16:17	12/23/2022 16:17	7						
Semivolatile Organic Compounds by 0	GCMS											
Anthracene	05	120-12-7	SW8270E	12/23/2022 09:40 1	2/24/2022 00:26	BLOD		11.7	11.7	50	ug/L	MGG
Surr: 2,4,6-Tribromophenol (Surr)	05	9	% 5-136	12/23/2022 09:40	12/24/2022 00:26	5						DS
Surr: 2-Fluorobiphenyl (Surr)	05	100 %	% 9-117	12/23/2022 09:40	12/24/2022 00:26	5						
Surr: 2-Fluorophenol (Surr)	05	72.5 %	% 5-60	12/23/2022 09:40	12/24/2022 00:26	5						DS
Surr: Nitrobenzene-d5 (Surr)	05	155 %	% 5-151	12/23/2022 09:40	12/24/2022 00:26	5						DS
Surr: Phenol-d5 (Surr)	05	82.5 %	% 5-60	12/23/2022 09:40	12/24/2022 00:26	5						DS
Surr: p-Terphenyl-d14 (Surr)	05	15.0 %	% 5-141	12/23/2022 09:40	12/24/2022 00:26	5						



## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Date Issued: 1/6/2023 8:58:55AM

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-67 Laboratory Sample ID: 22L1183-05

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Ammonia as N	05	7664-41-7	EPA350.1 R2.0	12/27/2022 13:12	12/28/2022 10:40	1150		100	100	1000	mg/L	MKS
BOD	05	E1640606	SM22 5210B-2011	12/22/2022 11:07	12/22/2022 11:07	8360		0.2	2.0	1	mg/L	LAM
COD	05	NA	SM22 5220D-2011	12/23/2022 10:00	12/23/2022 10:00	20300		2000	2000	200	mg/L	MGC
Nitrate as N	05	14797-55-8	Calc	12/30/2022 13:51	12/30/2022 13:51	BLOD		0.20	0.20	1	mg/L	EWS
Nitrate+Nitrite as N	05RE3	E701177	SM22 4500-NO3F- 2011	12/28/2022 13:56	12/28/2022 13:56	0.15		0.10	0.10	1	mg/L	MGC
Total Recoverable Phenolics	05	NA	SW9065	12/29/2022 09:30	12/29/2022 13:30	20.2		1.50	2.50	1	mg/L	MKS
TKN as N	05	E17148461	EPA351.2 R2.0	12/29/2022 10:05	12/29/2022 10:05	1340		200	500	1000	mg/L	MJRL



**Certificate of Analysis** 

Client Name: SCS Engineers-Winchester

Jennifer Robb

Date Issued: 1/6/2023 8:58:55AM

Client Site I.D.: City of Bristol Landfills

Submitted To:

Client Sample ID: EW-67 Laboratory Sample ID: 22L1183-06

Reference Sample Prep Analyzed Sample Samp ID CAS Qual LOD LOQ DF Units Analyst Method Date/Time Date/Time Results **Parameter Wet Chemistry Analysis** 06 12/23/2022 08:56 **BLOD** Nitrite as N 14797-65-0 SM22 12/23/2022 08:56 1.00 100 mg/L FIR 5.00 4500-NO2B-

2011



1/6/2023 8:58:55AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-57 Laboratory Sample ID: 22L1183-07

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Metals (Total) by EPA 6000/7000 Serie	s Methods											
Silver	07	7440-22-4	SW6010D	12/27/2022 10:00	12/28/2022 15:41	BLOD		0.0100	0.0200	1	mg/L	AB
Arsenic	07	7440-38-2	SW6010D	12/27/2022 10:00	12/28/2022 15:41	0.174		0.0200	0.0400	1	mg/L	AB
Barium	07	7440-39-3	SW6010D	12/27/2022 10:00	12/28/2022 15:41	0.978		0.0100	0.0200	1	mg/L	AB
Cadmium	07	7440-43-9	SW6010D	12/27/2022 10:00	12/28/2022 15:41	BLOD		0.0040	0.0080	1	mg/L	AB
Chromium	07	7440-47-3	SW6010D	12/27/2022 10:00	12/28/2022 15:41	1.76		0.0160	0.0200	1	mg/L	AB
Copper	07	7440-50-8	SW6010D	12/27/2022 10:00	12/28/2022 15:41	BLOD		0.0160	0.0200	1	mg/L	AB
Mercury	07	7439-97-6	SW7470A	12/28/2022 08:53	12/28/2022 15:33	0.00118		0.00080	0.00080	1	mg/L	ACM
Nickel	07	7440-02-0	SW6010D	12/27/2022 10:00	12/28/2022 15:41	0.2989		0.0140	0.0200	1	mg/L	AB
Lead	07	7439-92-1	SW6010D	12/27/2022 10:00	12/28/2022 15:41	BLOD		0.0120	0.0200	1	mg/L	AB
Selenium	07	7782-49-2	SW6010D	12/27/2022 10:00	12/28/2022 15:41	BLOD		0.0800	0.100	1	mg/L	AB
Zinc	07	7440-66-6	SW6010D	12/27/2022 10:00	12/28/2022 15:41	0.162		0.0200	0.0200	1	mg/L	AB
Volatile Organic Compounds by GCM	s											
2-Butanone (MEK)	07RE1	78-93-3	SW8260D	12/22/2022 18:41	12/22/2022 18:41	27700		300	1000	100	ug/L	RJB
Acetone	07RE2	67-64-1	SW8260D	12/23/2022 16:42	12/23/2022 16:42	49900		3500	5000	500	ug/L	RJB
Benzene	07RE1	71-43-2	SW8260D	12/22/2022 18:41	12/22/2022 18:41	6550		40.0	100	100	ug/L	RJB
Ethylbenzene	07	100-41-4	SW8260D	12/22/2022 18:17	12/22/2022 18:17	287		4.00	10.0	10	ug/L	RJB
Toluene	07	108-88-3	SW8260D	12/22/2022 18:17	12/22/2022 18:17	195		5.00	10.0	10	ug/L	RJB
Xylenes, Total	07	1330-20-7	SW8260D	12/22/2022 18:17	12/22/2022 18:17	186		10.0	30.0	10	ug/L	RJB
Tetrahydrofuran	07RE1	109-99-9	SW8260D	12/22/2022 18:41	12/22/2022 18:41	19800		1000	1000	100	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	07	83.8	% 70-120	12/22/2022 18	3:17 12/22/2022 1	8:17						
Surr: 4-Bromofluorobenzene (Surr)	07	94.0	% 75-120	12/22/2022 18	3:17 12/22/2022 1	8:17						
Surr: Dibromofluoromethane (Surr)	07	81.3	% 70-130	12/22/2022 18	3:17 12/22/2022 1	8:17						
Surr: Toluene-d8 (Surr)	07	98.8	% 70-130	12/22/2022 18	3:17 12/22/2022 1	8:17						
Surr: 1,2-Dichloroethane-d4 (Surr)	07RE1	85.5	% 70-120	12/22/2022 18	3:41 12/22/2022 1	8:41						
Surr: 4-Bromofluorobenzene (Surr)	07RE1	94.8	% 75-120	12/22/2022 18	3:41 12/22/2022 1	8:41						



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## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

07

35.0 %

5-141

Submitted To: Jennifer Robb

Client Site I.D.:

Surr: p-Terphenyl-d14 (Surr)

Client Sample ID: EW-57 Laboratory Sample ID: 22L1183-07

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCM	S											
Surr: Dibromofluoromethane (Surr)	07RE1	84.5	% 70-130	12/22/2022 18:4	1 12/22/2022 18:4	1						
Surr: Toluene-d8 (Surr)	07RE1	96.6	% 70-130	12/22/2022 18:4	1 12/22/2022 18:4	1						
Surr: 1,2-Dichloroethane-d4 (Surr)	07RE2	86.3	% 70-120	12/23/2022 16:4	2 12/23/2022 16:4:	2						
Surr: 4-Bromofluorobenzene (Surr)	07RE2	95.3	% 75-120	12/23/2022 16:4	2 12/23/2022 16:4:	2						
Surr: Dibromofluoromethane (Surr)	07RE2	81.8	% 70-130	12/23/2022 16:4	2 12/23/2022 16:4:	2						
Surr: Toluene-d8 (Surr)	07RE2	98.7	% 70-130	12/23/2022 16:4	2 12/23/2022 16:4	2						
Semivolatile Organic Compounds by	GCMS											
Anthracene	07	120-12-7	SW8270E	12/23/2022 09:40	12/24/2022 00:59	BLOD		11.7	11.7	50	ug/L	MGG
Surr: 2,4,6-Tribromophenol (Surr)	07		% 5-136	12/23/2022 09:4	0 12/24/2022 00:5	9						DS
Surr: 2-Fluorobiphenyl (Surr)	07	65.0	% 9-117	12/23/2022 09:4	0 12/24/2022 00:5	9						
Surr: 2-Fluorophenol (Surr)	07	37.5	% 5-60	12/23/2022 09:4	0 12/24/2022 00:5	9						
Surr: Nitrobenzene-d5 (Surr)	07	140	% 5-151	12/23/2022 09:4	0 12/24/2022 00:5	9						
Surr: Phenol-d5 (Surr)	07	57.5	% 5-60	12/23/2022 09:4	0 12/24/2022 00:5	9						

12/23/2022 09:40

12/24/2022 00:59



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## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-57 Laboratory Sample ID: 22L1183-07

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Ammonia as N	07	7664-41-7	EPA350.1 R2.0	12/27/2022 13:12	12/28/2022 10:41	2110		100	100	1000	mg/L	MKS
BOD	07	E1640606	SM22 5210B-2011	12/22/2022 11:16	12/22/2022 11:16	11400		0.2	2.0	1	mg/L	LAM
COD	07	NA	SM22 5220D-2011	12/23/2022 10:00	12/23/2022 10:00	22400		5000	5000	500	mg/L	MGC
Nitrate as N	07	14797-55-8	Calc.	12/28/2022 13:56	12/28/2022 13:56	BLOD		1.10	5.10	100	mg/L	MGC
Nitrate+Nitrite as N	07RE3	E701177	SM22 4500-NO3F- 2011	12/28/2022 13:56	12/28/2022 13:56	BLOD		0.10	0.10	1	mg/L	MGC
Nitrite as N	07	14797-65-0	SM22 4500-NO2B- 2011	12/23/2022 08:56	12/23/2022 08:56	BLOD		1.00	5.00	100	mg/L	FIR
Total Recoverable Phenolics	07	NA	SW9065	12/29/2022 09:30	12/29/2022 13:30	28.3		1.50	2.50	1	mg/L	MKS
TKN as N	07	E17148461	EPA351.2 R2.0	12/29/2022 10:06	12/29/2022 10:06	1790		200	500	1000	mg/L	MJRL



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## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

08

100 %

Submitted To: Jennifer Robb

Client Site I.D.:

Surr: Toluene-d8 (Surr)

Client Sample ID: Trip Blank Laboratory Sample ID: 22L1183-08

70-130

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCM	S											
2-Butanone (MEK)	08	78-93-3	SW8260D	12/22/2022 13:48	12/22/2022 13:48	BLOD		3.00	10.0	1	ug/L	RJB
Acetone	80	67-64-1	SW8260D	12/22/2022 13:48	12/22/2022 13:48	BLOD		7.00	10.0	1	ug/L	RJB
Benzene	80	71-43-2	SW8260D	12/22/2022 13:48	12/22/2022 13:48	BLOD		0.40	1.00	1	ug/L	RJB
Ethylbenzene	80	100-41-4	SW8260D	12/22/2022 13:48	12/22/2022 13:48	BLOD		0.40	1.00	1	ug/L	RJB
Toluene	80	108-88-3	SW8260D	12/22/2022 13:48	12/22/2022 13:48	BLOD		0.50	1.00	1	ug/L	RJB
Xylenes, Total	80	1330-20-7	SW8260D	12/22/2022 13:48	12/22/2022 13:48	BLOD		1.00	3.00	1	ug/L	RJB
Tetrahydrofuran	80	109-99-9	SW8260D	12/22/2022 13:48	12/22/2022 13:48	BLOD		10.0	10.0	1	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	08	86.7	% 70-120	12/22/2022 13	3:48 12/22/2022 13:4	8						
Surr: 4-Bromofluorobenzene (Surr)	08	95.5	% 75-120	12/22/2022 13	3:48 12/22/2022 13:4	8						
Surr: Dibromofluoromethane (Surr)	08	86.7	% 70-130	12/22/2022 13	3:48 12/22/2022 13:4	8						

12/22/2022 13:48

12/22/2022 13:48



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## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Metals (Total) by EPA 6000/7000 Series Methods - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Bat	ch BFL0966 - EPA20	0.2/R2.8								
Blank (BFL0966-BLK1)				Prepared: 12/27/	2022 Analyzed:	12/28/2022				
Arsenic	ND	0.0400	mg/L							
Barium	ND	0.0200	mg/L							
Cadmium	ND	0.0080	mg/L							
Chromium	ND	0.0200	mg/L							
Copper	ND	0.0200	mg/L							
Lead	ND	0.0200	mg/L							
Nickel	ND	0.0200	mg/L							
Selenium	ND	0.100	mg/L							
Silver	ND	0.0200	mg/L							
Zinc	ND	0.0200	mg/L							
LCS (BFL0966-BS1)				Prepared: 12/27/	2022 Analyzed:	12/28/2022				
Arsenic	1.06	0.0400	mg/L	1.00		106	80-120			
Barium	1.05	0.0200	mg/L	1.00		105	80-120			
Cadmium	1.09	0.0080	mg/L	1.00		109	80-120			
Chromium	1.08	0.0200	mg/L	1.00		108	80-120			
Copper	1.06	0.0200	mg/L	1.00		106	80-120			
Lead	1.03	0.0200	mg/L	1.00		103	80-120			
Nickel	1.083	0.0200	mg/L	1.00		108	80-120			
Selenium	1.02	0.100	mg/L	1.00		102	80-120			
Silver	0.192	0.0200	mg/L	0.200		96.1	80-120			
Zinc	1.08	0.0200	mg/L	1.00		108	80-120			
Matrix Spike (BFL0966-MS1)	Sour	ce: 22L1183-04	<u> </u>	Prepared: 12/27/	2022 Analyzed:	12/28/2022				
Arsenic	1.80	0.0400	mg/L	1.00	0.574	122	75-125			
Barium	1.83	0.0200	mg/L	1.00	0.793	104	75-125			



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Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Metals (Total) by EPA 6000/7000 Series Methods - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch I	BFL0966 - EPA2	00.2/R2.8								
Matrix Spike (BFL0966-MS1)	Sou	rce: 22L1183-0	4	Prepared: 12/27	/2022 Analyzed: ′	12/28/2022				
Cadmium	1.12	0.0080	mg/L	1.00	BLOD	112	75-125			
Chromium	1.90	0.0200	mg/L	1.00	0.822	108	75-125			
Copper	1.06	0.0200	mg/L	1.00	BLOD	106	75-125			
Lead	1.01	0.0200	mg/L	1.00	BLOD	101	75-125			
Nickel	1.439	0.0200	mg/L	1.00	0.3460	109	75-125			
Selenium	0.551	0.100	mg/L	1.00	BLOD	55.1	75-125			M
Silver	0.0329	0.0200	mg/L	0.200	BLOD	16.4	75-125			M
Zinc	1.42	0.0200	mg/L	1.00	0.286	114	75-125			
Matrix Spike Dup (BFL0966-MSD1)	Sou	rce: 22L1183-0	4	Prepared: 12/27	/2022 Analyzed: ′	12/28/2022				
Arsenic	1.77	0.0400	mg/L	1.00	0.574	119	75-125	1.64	20	
Barium	1.86	0.0200	mg/L	1.00	0.793	107	75-125	1.81	20	
Cadmium	1.09	0.0080	mg/L	1.00	BLOD	109	75-125	2.61	20	
Chromium	1.95	0.0200	mg/L	1.00	0.822	113	75-125	2.65	20	
Copper	1.04	0.0200	mg/L	1.00	BLOD	104	75-125	2.20	20	
Lead	0.994	0.0200	mg/L	1.00	BLOD	99.4	75-125	2.00	20	
Nickel	1.424	0.0200	mg/L	1.00	0.3460	108	75-125	1.02	20	
Selenium	0.969	0.100	mg/L	1.00	BLOD	96.9	75-125	55.1	20	Р
Silver	0.196	0.0200	mg/L	0.200	BLOD	97.8	75-125	142	20	Р
Zinc	1.40	0.0200	mg/L	1.00	0.286	112	75-125	1.28	20	
Batch I	BFL1015 - SW74	70A								
Blank (BFL1015-BLK1)				Prepared & Anal	yzed: 12/28/2022	2				
Mercury	ND	0.00020	mg/L							
LCS (BFL1015-BS1)				Prepared & Anal	vzed: 12/28/2022	2				



## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

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Metals (Total) by EPA 6000/7000 Series Methods - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	BFL1015 - SW74	70A								
LCS (BFL1015-BS1)				Prepared & Analy	zed: 12/28/2022					
Mercury	0.00242	0.00020	mg/L	0.00250		96.8	80-120			
Matrix Spike (BFL1015-MS1)	Sou	rce: 22L0979-0	4	Prepared & Analy	zed: 12/28/2022					
Mercury	0.00259	0.00020	mg/L	0.00250	BLOD	104	80-120			
Matrix Spike Dup (BFL1015-MSD1)	Sou	rce: 22L0979-0	4	Prepared & Analy	zed: 12/28/2022					
Mercury	0.00245	0.00020	mg/L	0.00250	BLOD	98.0	80-120	5.56	20	



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## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

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Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0892 - SW503	0B-MS								
Blank (BFL0892-BLK1)			F	Prepared & Anal	yzed: 12/22/2022	2				
2-Butanone (MEK)	ND	10.0	ug/L							
Acetone	ND	10.0	ug/L							
Benzene	ND	1.00	ug/L							
Ethylbenzene	ND	1.00	ug/L							
Toluene	ND	1.00	ug/L							
Xylenes, Total	ND	3.00	ug/L							
Surr: 1,2-Dichloroethane-d4 (Surr)	41.8		ug/L	50.0		83.6	70-120			
Surr: 4-Bromofluorobenzene (Surr)	47.5		ug/L	50.0		95.0	75-120			
Surr: Dibromofluoromethane (Surr)	42.3		ug/L	50.0		84.6	70-130			
Surr: Toluene-d8 (Surr)	49.0		ug/L	50.0		98.1	70-130			
LCS (BFL0892-BS1)			F	Prepared & Anal	yzed: 12/22/2022	2				
1,1,1,2-Tetrachloroethane	48.8	0.4	ug/L	50.0		97.7	80-130			
1,1,1-Trichloroethane	46.5	1	ug/L	50.0		93.1	65-130			
1,1,2,2-Tetrachloroethane	44.2	0.4	ug/L	50.0		88.3	65-130			
1,1,2-Trichloroethane	47.6	1	ug/L	50.0		95.3	75-125			
1,1-Dichloroethane	45.2	1	ug/L	50.0		90.4	70-135			
1,1-Dichloroethylene	39.5	1	ug/L	50.0		78.9	70-130			
1,1-Dichloropropene	44.5	1	ug/L	50.0		89.0	75-135			
1,2,3-Trichlorobenzene	47.1	1	ug/L	50.0		94.2	55-140			
1,2,3-Trichloropropane	46.6	1	ug/L	50.0		93.1	75-125			
1,2,4-Trichlorobenzene	50.2	1	ug/L	50.0		100	65-135			
1,2,4-Trimethylbenzene	46.8	1	ug/L	50.0		93.7	75-130			
1,2-Dibromo-3-chloropropane (DBCP)	51.6	1	ug/L	50.0		103	50-130			
1,2-Dibromoethane (EDB)	47.6	1	ug/L	50.0		95.3	80-120			



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## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batc	h BFL0892 - SW503	0B-MS								
LCS (BFL0892-BS1)			F	repared & Anal	yzed: 12/22/2022					
1,2-Dichlorobenzene	46.8	0.5	ug/L	50.0		93.7	70-120			
1,2-Dichloroethane	38.8	1	ug/L	50.0		77.7	70-130			
1,2-Dichloropropane	47.7	0.5	ug/L	50.0		95.5	75-125			
1,3,5-Trimethylbenzene	46.7	1	ug/L	50.0		93.3	75-125			
1,3-Dichlorobenzene	47.0	1	ug/L	50.0		94.0	75-125			
1,3-Dichloropropane	45.3	1	ug/L	50.0		90.6	75-125			
1,4-Dichlorobenzene	47.6	1	ug/L	50.0		95.2	75-125			
2,2-Dichloropropane	46.1	1	ug/L	50.0		92.1	70-135			
2-Butanone (MEK)	62.1	10	ug/L	50.0		124	30-150			
2-Chlorotoluene	51.1	1	ug/L	50.0		102	75-125			
2-Hexanone (MBK)	51.5	5	ug/L	50.0		103	55-130			
4-Chlorotoluene	49.9	1	ug/L	50.0		99.8	75-130			
4-Isopropyltoluene	45.7	1	ug/L	50.0		91.4	75-130			
4-Methyl-2-pentanone (MIBK)	53.0	5	ug/L	50.0		106	60-135			
Acetone	54.3	10	ug/L	50.0		109	40-140			
Benzene	48.9	1	ug/L	50.0		97.8	80-120			
Bromobenzene	48.1	1	ug/L	50.0		96.3	75-125			
Bromochloromethane	45.3	1	ug/L	50.0		90.6	65-130			
Bromodichloromethane	51.0	0.5	ug/L	50.0		102	75-120			
Bromoform	47.2	1	ug/L	50.0		94.4	70-130			
Bromomethane	28.8	1	ug/L	50.0		57.6	30-145			
Carbon disulfide	47.2	10	ug/L	50.0		94.5	35-160			
Carbon tetrachloride	50.2	1	ug/L	50.0		100	65-140			
Chlorobenzene	50.3	1	ug/L	50.0		101	80-120			
Chloroethane	47.7	1	ug/L	50.0		95.4	60-135			



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Bate	ch BFL0892 - SW5030	B-MS								
LCS (BFL0892-BS1)			F	Prepared & Analy	yzed: 12/22/2022					
Chloroform	42.5	0.5	ug/L	50.0		85.0	65-135			
Chloromethane	46.9	1	ug/L	50.0		93.8	40-125			
cis-1,2-Dichloroethylene	43.7	1	ug/L	50.0		87.3	70-125			
cis-1,3-Dichloropropene	39.7	1	ug/L	50.0		79.4	70-130			
Dibromochloromethane	49.3	0.5	ug/L	50.0		98.5	60-135			
Dibromomethane	50.0	1	ug/L	50.0		99.9	75-125			
Dichlorodifluoromethane	59.1	1	ug/L	50.0		118	30-155			
Ethylbenzene	49.9	1	ug/L	50.0		99.8	75-125			
Hexachlorobutadiene	49.5	0.8	ug/L	50.0		99.0	50-140			
Isopropylbenzene	46.4	1	ug/L	50.0		92.7	75-125			
m+p-Xylenes	97.3	2	ug/L	100		97.3	75-130			
Methylene chloride	44.2	4	ug/L	50.0		88.3	55-140			
Methyl-t-butyl ether (MTBE)	42.9	1	ug/L	50.0		85.9	65-125			
Naphthalene	46.1	1	ug/L	50.0		92.2	55-140			
n-Butylbenzene	48.8	1	ug/L	50.0		97.7	70-135			
n-Propylbenzene	50.6	1	ug/L	50.0		101	70-130			
o-Xylene	49.0	1	ug/L	50.0		98.0	80-120			
sec-Butylbenzene	49.8	1	ug/L	50.0		99.6	70-125			
Styrene	45.0	1	ug/L	50.0		90.0	65-135			
tert-Butylbenzene	46.5	1	ug/L	50.0		93.0	70-130			
Tetrachloroethylene (PCE)	53.2	1	ug/L	50.0		106	45-150			
Toluene	49.0	1	ug/L	50.0		98.1	75-120			
trans-1,2-Dichloroethylene	43.7	1	ug/L	50.0		87.5	60-140			
trans-1,3-Dichloropropene	42.7	1	ug/L	50.0		85.4	55-140			
Trichloroethylene	49.3	1	ug/L	50.0		98.6	70-125			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0892 - SW503	0B-MS								
LCS (BFL0892-BS1)				Prepared & Anal	yzed: 12/22/2022					
Trichlorofluoromethane	49.3	1	ug/L	50.0		98.6	60-145			
Vinyl chloride	51.7	0.5	ug/L	50.0		103	50-145			
Surr: 1,2-Dichloroethane-d4 (Surr)	41.5		ug/L	50.0		82.9	70-120			
Surr: 4-Bromofluorobenzene (Surr)	47.7		ug/L	50.0		95.3	75-120			
Surr: Dibromofluoromethane (Surr)	41.9		ug/L	50.0		83.8	70-130			
Surr: Toluene-d8 (Surr)	48.1		ug/L	50.0		96.2	70-130			
Matrix Spike (BFL0892-MS1)	Sourc	e: 22L1178-03		Prepared & Anal	yzed: 12/22/2022					
1,1,1,2-Tetrachloroethane	52.5	0.4	ug/L	50.0	BLOD	105	80-130			
1,1,1-Trichloroethane	45.9	1	ug/L	50.0	BLOD	91.8	65-130			
1,1,2,2-Tetrachloroethane	48.9	0.4	ug/L	50.0	BLOD	97.9	65-130			
1,1,2-Trichloroethane	54.0	1	ug/L	50.0	BLOD	108	75-125			
1,1-Dichloroethane	45.4	1	ug/L	50.0	BLOD	90.7	70-135			
1,1-Dichloroethylene	38.7	1	ug/L	50.0	BLOD	77.4	50-145			
1,1-Dichloropropene	42.6	1	ug/L	50.0	BLOD	85.3	75-135			
1,2,3-Trichlorobenzene	49.2	1	ug/L	50.0	BLOD	98.3	55-140			
1,2,3-Trichloropropane	49.7	1	ug/L	50.0	BLOD	99.4	75-125			
1,2,4-Trichlorobenzene	52.8	1	ug/L	50.0	BLOD	106	65-135			
1,2,4-Trimethylbenzene	47.4	1	ug/L	50.0	BLOD	94.7	75-130			
1,2-Dibromo-3-chloropropane (DBCP)	51.6	1	ug/L	50.0	BLOD	103	50-130			
1,2-Dibromoethane (EDB)	51.3	1	ug/L	50.0	BLOD	103	80-120			
1,2-Dichlorobenzene	48.6	0.5	ug/L	50.0	BLOD	97.3	70-120			
1,2-Dichloroethane	40.2	1	ug/L	50.0	BLOD	80.3	70-130			
1,2-Dichloropropane	51.2	0.5	ug/L	50.0	BLOD	102	75-125			
1,3,5-Trimethylbenzene	46.1	1	ug/L	50.0	BLOD	92.1	75-124			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	n BFL0892 - SW5030	B-MS								
Matrix Spike (BFL0892-MS1)	Sourc	e: 22L1178-0	3	Prepared & Anal	yzed: 12/22/2022					
1,3-Dichlorobenzene	48.6	1	ug/L	50.0	BLOD	97.1	75-125			
1,3-Dichloropropane	50.3	1	ug/L	50.0	BLOD	101	75-125			
1,4-Dichlorobenzene	47.5	1	ug/L	50.0	BLOD	95.0	75-125			
2,2-Dichloropropane	45.4	1	ug/L	50.0	BLOD	90.8	70-135			
2-Butanone (MEK)	56.0	10	ug/L	50.0	BLOD	112	30-150			
2-Chlorotoluene	50.7	1	ug/L	50.0	BLOD	101	75-125			
2-Hexanone (MBK)	48.6	5	ug/L	50.0	BLOD	97.2	55-130			
4-Chlorotoluene	48.9	1	ug/L	50.0	BLOD	97.8	75-130			
4-Isopropyltoluene	45.3	1	ug/L	50.0	BLOD	90.7	75-130			
4-Methyl-2-pentanone (MIBK)	52.8	5	ug/L	50.0	BLOD	106	60-135			
Acetone	49.5	10	ug/L	50.0	BLOD	99.0	40-140			
Benzene	50.1	1	ug/L	50.0	BLOD	100	80-120			
Bromobenzene	51.7	1	ug/L	50.0	BLOD	103	75-125			
Bromochloromethane	47.8	1	ug/L	50.0	BLOD	95.5	65-130			
Bromodichloromethane	55.2	0.5	ug/L	50.0	BLOD	110	75-136			
Bromoform	55.0	1	ug/L	50.0	BLOD	110	70-130			
Bromomethane	30.3	1	ug/L	50.0	BLOD	60.5	30-145			
Carbon disulfide	38.2	10	ug/L	50.0	BLOD	76.4	35-160			
Carbon tetrachloride	50.1	1	ug/L	50.0	BLOD	100	65-140			
Chlorobenzene	51.9	1	ug/L	50.0	BLOD	104	80-120			
Chloroethane	44.8	1	ug/L	50.0	BLOD	89.5	60-135			
Chloroform	42.1	0.5	ug/L	50.0	BLOD	84.3	65-135			
Chloromethane	45.4	1	ug/L	50.0	BLOD	90.8	40-125			
cis-1,2-Dichloroethylene	43.8	1	ug/L	50.0	BLOD	87.6	70-125			
cis-1,3-Dichloropropene	42.3	1	ug/L	50.0	BLOD	84.6	47-136			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch E	3FL0892 - SW503	0B-MS								
Matrix Spike (BFL0892-MS1)	Sourc	e: 22L1178-0	3	Prepared & Anal	yzed: 12/22/2022					
Dibromochloromethane	54.7	0.5	ug/L	50.0	BLOD	109	60-135			
Dibromomethane	54.0	1	ug/L	50.0	BLOD	108	75-125			
Dichlorodifluoromethane	55.3	1	ug/L	50.0	BLOD	111	30-155			
Ethylbenzene	51.2	1	ug/L	50.0	BLOD	102	75-125			
Hexachlorobutadiene	48.6	8.0	ug/L	50.0	BLOD	97.1	50-140			
Isopropylbenzene	48.0	1	ug/L	50.0	BLOD	96.1	75-125			
m+p-Xylenes	100	2	ug/L	100	BLOD	100	75-130			
Methylene chloride	44.7	4	ug/L	50.0	BLOD	89.3	55-140			
Methyl-t-butyl ether (MTBE)	47.7	1	ug/L	50.0	BLOD	95.3	65-125			
Naphthalene	49.7	1	ug/L	50.0	BLOD	99.1	55-140			
n-Butylbenzene	48.5	1	ug/L	50.0	BLOD	96.9	70-135			
n-Propylbenzene	47.2	1	ug/L	50.0	BLOD	94.4	70-130			
o-Xylene	52.4	1	ug/L	50.0	BLOD	105	80-120			
sec-Butylbenzene	50.3	1	ug/L	50.0	BLOD	101	70-125			
Styrene	48.4	1	ug/L	50.0	BLOD	96.7	65-135			
tert-Butylbenzene	46.5	1	ug/L	50.0	BLOD	93.0	70-130			
Tetrachloroethylene (PCE)	52.8	1	ug/L	50.0	BLOD	106	51-231			
Toluene	49.7	1	ug/L	50.0	BLOD	99.3	75-120			
trans-1,2-Dichloroethylene	43.3	1	ug/L	50.0	BLOD	86.7	60-140			
trans-1,3-Dichloropropene	46.4	1	ug/L	50.0	BLOD	92.8	55-140			
Trichloroethylene	48.8	1	ug/L	50.0	BLOD	97.6	70-125			
Trichlorofluoromethane	46.7	1	ug/L	50.0	BLOD	93.4	60-145			
Vinyl chloride	50.0	0.5	ug/L	50.0	BLOD	100	50-145			
Surr: 1,2-Dichloroethane-d4 (Surr)	42.7		ug/L	50.0		85.5	70-120			
Surr: 4-Bromofluorobenzene (Surr)	51.2		ug/L	50.0		102	75-120			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0892 - SW5030	B-MS								
Matrix Spike (BFL0892-MS1)	Sourc	e: 22L1178-03		Prepared & Anal	yzed: 12/22/2022					
Surr: Dibromofluoromethane (Surr)	43.0		ug/L	50.0		86.0	70-130			
Surr: Toluene-d8 (Surr)	49.6		ug/L	50.0		99.2	70-130			
Matrix Spike Dup (BFL0892-MSD1)	Sourc	e: 22L1178-03	;	Prepared & Anal	yzed: 12/22/2022					
1,1,1,2-Tetrachloroethane	48.7	0.4	ug/L	50.0	BLOD	97.4	80-130	7.51	30	
1,1,1-Trichloroethane	43.0	1	ug/L	50.0	BLOD	85.9	65-130	6.68	30	
1,1,2,2-Tetrachloroethane	46.3	0.4	ug/L	50.0	BLOD	92.6	65-130	5.52	30	
1,1,2-Trichloroethane	50.2	1	ug/L	50.0	BLOD	100	75-125	7.35	30	
1,1-Dichloroethane	41.2	1	ug/L	50.0	BLOD	82.3	70-135	9.73	30	
1,1-Dichloroethylene	35.4	1	ug/L	50.0	BLOD	70.9	50-145	8.77	30	
1,1-Dichloropropene	39.9	1	ug/L	50.0	BLOD	79.8	75-135	6.64	30	
1,2,3-Trichlorobenzene	47.1	1	ug/L	50.0	BLOD	94.2	55-140	4.30	30	
1,2,3-Trichloropropane	46.7	1	ug/L	50.0	BLOD	93.5	75-125	6.10	30	
1,2,4-Trichlorobenzene	50.6	1	ug/L	50.0	BLOD	101	65-135	4.33	30	
1,2,4-Trimethylbenzene	44.1	1	ug/L	50.0	BLOD	88.2	75-130	7.06	30	
1,2-Dibromo-3-chloropropane (DBCP)	50.9	1	ug/L	50.0	BLOD	102	50-130	1.35	30	
1,2-Dibromoethane (EDB)	49.1	1	ug/L	50.0	BLOD	98.2	80-120	4.40	30	
1,2-Dichlorobenzene	46.1	0.5	ug/L	50.0	BLOD	92.3	70-120	5.30	30	
1,2-Dichloroethane	39.0	1	ug/L	50.0	BLOD	78.0	70-130	2.96	30	
1,2-Dichloropropane	47.6	0.5	ug/L	50.0	BLOD	95.2	75-125	7.32	30	
1,3,5-Trimethylbenzene	43.5	1	ug/L	50.0	BLOD	87.1	75-124	5.65	30	
1,3-Dichlorobenzene	45.7	1	ug/L	50.0	BLOD	91.5	75-125	5.96	30	
1,3-Dichloropropane	47.8	1	ug/L	50.0	BLOD	95.6	75-125	5.20	30	
1,4-Dichlorobenzene	45.2	1	ug/L	50.0	BLOD	90.4	75-125	5.01	30	
2,2-Dichloropropane	41.6	1	ug/L	50.0	BLOD	83.2	70-135	8.71	30	



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	BFL0892 - SW5030	B-MS								
Matrix Spike Dup (BFL0892-MSD1)	Source	e: 22L1178-0	3	Prepared & Anal	yzed: 12/22/2022					
2-Butanone (MEK)	48.7	10	ug/L	50.0	BLOD	97.4	30-150	13.9	30	
2-Chlorotoluene	47.4	1	ug/L	50.0	BLOD	94.9	75-125	6.62	30	
2-Hexanone (MBK)	50.0	5	ug/L	50.0	BLOD	100	55-130	2.90	30	
4-Chlorotoluene	46.6	1	ug/L	50.0	BLOD	93.2	75-130	4.75	30	
4-Isopropyltoluene	41.8	1	ug/L	50.0	BLOD	83.6	75-130	8.17	30	
4-Methyl-2-pentanone (MIBK)	53.9	5	ug/L	50.0	BLOD	108	60-135	2.10	30	
Acetone	48.1	10	ug/L	50.0	BLOD	96.3	40-140	2.79	30	
Benzene	46.0	1	ug/L	50.0	BLOD	91.9	80-120	8.60	30	
Bromobenzene	47.6	1	ug/L	50.0	BLOD	95.1	75-125	8.38	30	
Bromochloromethane	46.1	1	ug/L	50.0	BLOD	92.1	65-130	3.62	30	
Bromodichloromethane	51.4	0.5	ug/L	50.0	BLOD	103	75-136	7.00	30	
Bromoform	49.2	1	ug/L	50.0	BLOD	98.4	70-130	11.0	30	
Bromomethane	28.5	1	ug/L	50.0	BLOD	56.9	30-145	6.13	30	
Carbon disulfide	38.9	10	ug/L	50.0	BLOD	77.7	35-160	1.69	30	
Carbon tetrachloride	46.0	1	ug/L	50.0	BLOD	91.9	65-140	8.56	30	
Chlorobenzene	48.1	1	ug/L	50.0	BLOD	96.3	80-120	7.44	30	
Chloroethane	41.0	1	ug/L	50.0	BLOD	82.0	60-135	8.72	30	
Chloroform	40.3	0.5	ug/L	50.0	BLOD	80.6	65-135	4.49	30	
Chloromethane	42.7	1	ug/L	50.0	BLOD	85.3	40-125	6.20	30	
cis-1,2-Dichloroethylene	41.6	1	ug/L	50.0	BLOD	83.2	70-125	5.15	30	
cis-1,3-Dichloropropene	39.9	1	ug/L	50.0	BLOD	79.8	47-136	5.87	30	
Dibromochloromethane	51.3	0.5	ug/L	50.0	BLOD	103	60-135	6.53	30	
Dibromomethane	50.7	1	ug/L	50.0	BLOD	101	75-125	6.31	30	
Dichlorodifluoromethane	52.6	1	ug/L	50.0	BLOD	105	30-155	5.04	30	
Ethylbenzene	47.3	1	ug/L	50.0	BLOD	94.6	75-125	8.04	30	



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch E	3FL0892 - SW503	OB-MS								
Matrix Spike Dup (BFL0892-MSD1)	Sourc	e: 22L1178-0	3	Prepared & Anal	yzed: 12/22/2022					
Hexachlorobutadiene	46.4	0.8	ug/L	50.0	BLOD	92.8	50-140	4.51	30	
Isopropylbenzene	44.0	1	ug/L	50.0	BLOD	88.1	75-125	8.73	30	
m+p-Xylenes	93.0	2	ug/L	100	BLOD	93.0	75-130	7.46	30	
Methylene chloride	41.5	4	ug/L	50.0	BLOD	82.9	55-140	7.43	30	
Methyl-t-butyl ether (MTBE)	46.4	1	ug/L	50.0	BLOD	92.9	65-125	2.57	30	
Naphthalene	48.6	1	ug/L	50.0	BLOD	97.0	55-140	2.16	30	
n-Butylbenzene	45.0	1	ug/L	50.0	BLOD	90.0	70-135	7.36	30	
n-Propylbenzene	45.0	1	ug/L	50.0	BLOD	90.0	70-130	4.75	30	
o-Xylene	47.5	1	ug/L	50.0	BLOD	95.1	80-120	9.82	30	
sec-Butylbenzene	46.3	1	ug/L	50.0	BLOD	92.5	70-125	8.43	30	
Styrene	43.8	1	ug/L	50.0	BLOD	87.6	65-135	9.94	30	
tert-Butylbenzene	43.2	1	ug/L	50.0	BLOD	86.4	70-130	7.40	30	
Tetrachloroethylene (PCE)	48.8	1	ug/L	50.0	BLOD	97.6	51-231	7.99	30	
Toluene	46.5	1	ug/L	50.0	BLOD	93.0	75-120	6.53	30	
trans-1,2-Dichloroethylene	40.3	1	ug/L	50.0	BLOD	80.7	60-140	7.19	30	
trans-1,3-Dichloropropene	43.6	1	ug/L	50.0	BLOD	87.1	55-140	6.36	30	
Trichloroethylene	45.3	1	ug/L	50.0	BLOD	90.6	70-125	7.37	30	
Trichlorofluoromethane	43.7	1	ug/L	50.0	BLOD	87.5	60-145	6.59	30	
Vinyl chloride	47.4	0.5	ug/L	50.0	BLOD	94.8	50-145	5.44	30	
Surr: 1,2-Dichloroethane-d4 (Surr)	43.9		ug/L	50.0		87.8	70-120			
Surr: 4-Bromofluorobenzene (Surr)	50.2		ug/L	50.0		100	75-120			
Surr: Dibromofluoromethane (Surr)	42.9		ug/L	50.0		85.8	70-130			
Surr: Toluene-d8 (Surr)	49.4		ug/L	50.0		98.7	70-130			
Batch E	3FL0941 - SW503	OB-MS								



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0941 - SW503	0B-MS								
Blank (BFL0941-BLK1)				Prepared & Analy	yzed: 12/23/2022					
2-Butanone (MEK)	ND	10.0	ug/L							
Acetone	ND	10.0	ug/L							
Benzene	ND	1.00	ug/L							
Ethylbenzene	ND	1.00	ug/L							
Toluene	ND	1.00	ug/L							
Xylenes, Total	ND	3.00	ug/L							
Surr: 1,2-Dichloroethane-d4 (Surr)	44.0		ug/L	50.0		87.9	70-120			
Surr: 4-Bromofluorobenzene (Surr)	47.7		ug/L	50.0		95. <i>4</i>	75-120			
Surr: Dibromofluoromethane (Surr)	42.2		ug/L	50.0		84.3	70-130			
Surr: Toluene-d8 (Surr)	48.2		ug/L	50.0		96. <i>4</i>	70-130			
LCS (BFL0941-BS1)				Prepared & Analy	yzed: 12/23/2022	) :				
1,1,1,2-Tetrachloroethane	48.6	0.4	ug/L	50.0		97.1	80-130			
1,1,1-Trichloroethane	42.7	1	ug/L	50.0		85.4	65-130			
1,1,2,2-Tetrachloroethane	45.0	0.4	ug/L	50.0		89.9	65-130			
1,1,2-Trichloroethane	49.6	1	ug/L	50.0		99.2	75-125			
1,1-Dichloroethane	42.3	1	ug/L	50.0		84.5	70-135			
1,1-Dichloroethylene	36.8	1	ug/L	50.0		73.6	70-130			
1,1-Dichloropropene	40.4	1	ug/L	50.0		80.8	75-135			
1,2,3-Trichlorobenzene	46.1	1	ug/L	50.0		92.2	55-140			
1,2,3-Trichloropropane	45.8	1	ug/L	50.0		91.6	75-125			
1,2,4-Trichlorobenzene	49.6	1	ug/L	50.0		99.3	65-135			
1,2,4-Trimethylbenzene	44.2	1	ug/L	50.0		88.5	75-130			
1,2-Dibromo-3-chloropropane (DBCP)	49.6	1	ug/L	50.0		99.2	50-130			
1,2-Dibromoethane (EDB)	46.9	1	ug/L	50.0		93.9	80-120			



1/6/2023 8:58:55AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batc	h BFL0941 - SW503	DB-MS								
LCS (BFL0941-BS1)			F	repared & Anal	zed: 12/23/2022					
1,2-Dichlorobenzene	45.6	0.5	ug/L	50.0		91.3	70-120			
1,2-Dichloroethane	37.6	1	ug/L	50.0		75.3	70-130			
1,2-Dichloropropane	48.1	0.5	ug/L	50.0		96.2	75-125			
1,3,5-Trimethylbenzene	44.5	1	ug/L	50.0		89.0	75-125			
1,3-Dichlorobenzene	45.6	1	ug/L	50.0		91.2	75-125			
1,3-Dichloropropane	46.4	1	ug/L	50.0		92.7	75-125			
1,4-Dichlorobenzene	45.7	1	ug/L	50.0		91.4	75-125			
2,2-Dichloropropane	42.2	1	ug/L	50.0		84.4	70-135			
2-Butanone (MEK)	44.0	10	ug/L	50.0		88.0	30-150			
2-Chlorotoluene	48.4	1	ug/L	50.0		96.8	75-125			
2-Hexanone (MBK)	45.3	5	ug/L	50.0		90.5	55-130			
4-Chlorotoluene	46.1	1	ug/L	50.0		92.2	75-130			
4-Isopropyltoluene	43.6	1	ug/L	50.0		87.2	75-130			
4-Methyl-2-pentanone (MIBK)	49.3	5	ug/L	50.0		98.6	60-135			
Acetone	45.9	10	ug/L	50.0		91.8	40-140			
Benzene	47.4	1	ug/L	50.0		94.8	80-120			
Bromobenzene	47.0	1	ug/L	50.0		94.1	75-125			
Bromochloromethane	44.2	1	ug/L	50.0		88.5	65-130			
Bromodichloromethane	52.3	0.5	ug/L	50.0		105	75-120			
Bromoform	49.4	1	ug/L	50.0		98.9	70-130			
Bromomethane	28.0	1	ug/L	50.0		55.9	30-145			
Carbon disulfide	34.8	10	ug/L	50.0		69.6	35-160			
Carbon tetrachloride	48.0	1	ug/L	50.0		95.9	65-140			
Chlorobenzene	48.5	1	ug/L	50.0		97.0	80-120			
Chloroethane	41.7	1	ug/L	50.0		83.5	60-135			



1/6/2023 8:58:55AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Bat	ch BFL0941 - SW5030	B-MS								
LCS (BFL0941-BS1)			F	Prepared & Analy	yzed: 12/23/2022					
Chloroform	40.2	0.5	ug/L	50.0		80.5	65-135			
Chloromethane	43.5	1	ug/L	50.0		86.9	40-125			
cis-1,2-Dichloroethylene	41.0	1	ug/L	50.0		82.1	70-125			
cis-1,3-Dichloropropene	41.2	1	ug/L	50.0		82.4	70-130			
Dibromochloromethane	51.0	0.5	ug/L	50.0		102	60-135			
Dibromomethane	50.2	1	ug/L	50.0		100	75-125			
Dichlorodifluoromethane	51.2	1	ug/L	50.0		102	30-155			
Ethylbenzene	47.7	1	ug/L	50.0		95.3	75-125			
Hexachlorobutadiene	47.1	0.8	ug/L	50.0		94.2	50-140			
Isopropylbenzene	44.7	1	ug/L	50.0		89.3	75-125			
m+p-Xylenes	92.6	2	ug/L	100		92.6	75-130			
Methylene chloride	41.1	4	ug/L	50.0		82.3	55-140			
Methyl-t-butyl ether (MTBE)	43.8	1	ug/L	50.0		87.5	65-125			
Naphthalene	45.9	1	ug/L	50.0		91.7	55-140			
n-Butylbenzene	45.9	1	ug/L	50.0		91.9	70-135			
n-Propylbenzene	45.2	1	ug/L	50.0		90.3	70-130			
o-Xylene	47.8	1	ug/L	50.0		95.6	80-120			
sec-Butylbenzene	47.3	1	ug/L	50.0		94.7	70-125			
Styrene	44.0	1	ug/L	50.0		88.0	65-135			
tert-Butylbenzene	44.1	1	ug/L	50.0		88.2	70-130			
Tetrachloroethylene (PCE)	51.0	1	ug/L	50.0		102	45-150			
Toluene	47.1	1	ug/L	50.0		94.2	75-120			
trans-1,2-Dichloroethylene	39.8	1	ug/L	50.0		79.7	60-140			
trans-1,3-Dichloropropene	44.2	1	ug/L	50.0		88.3	55-140			
Trichloroethylene	47.2	1	ug/L	50.0		94.3	70-125			



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0941 - SW503	0B-MS								
LCS (BFL0941-BS1)				Prepared & Anal	yzed: 12/23/2022					
Trichlorofluoromethane	44.6	1	ug/L	50.0		89.1	60-145			
Vinyl chloride	46.7	0.5	ug/L	50.0		93.4	50-145			
Surr: 1,2-Dichloroethane-d4 (Surr)	39.8		ug/L	50.0		79.5	70-120			
Surr: 4-Bromofluorobenzene (Surr)	49.2		ug/L	50.0		98.4	75-120			
Surr: Dibromofluoromethane (Surr)	41.3		ug/L	50.0		82.6	70-130			
Surr: Toluene-d8 (Surr)	49.4		ug/L	50.0		98.8	70-130			
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022					
1,1,1,2-Tetrachloroethane	47.8	0.4	ug/L	50.0	BLOD	95.6	80-130			
1,1,1-Trichloroethane	42.4	1	ug/L	50.0	BLOD	84.9	65-130			
1,1,2,2-Tetrachloroethane	43.0	0.4	ug/L	50.0	BLOD	85.9	65-130			
1,1,2-Trichloroethane	48.7	1	ug/L	50.0	BLOD	97.3	75-125			
1,1-Dichloroethane	41.7	1	ug/L	50.0	BLOD	83.4	70-135			
1,1-Dichloroethylene	36.1	1	ug/L	50.0	BLOD	72.2	50-145			
1,1-Dichloropropene	39.5	1	ug/L	50.0	BLOD	79.0	75-135			
1,2,3-Trichlorobenzene	47.3	1	ug/L	50.0	BLOD	94.5	55-140			
1,2,3-Trichloropropane	43.6	1	ug/L	50.0	BLOD	87.3	75-125			
1,2,4-Trichlorobenzene	49.5	1	ug/L	50.0	BLOD	99.0	65-135			
1,2,4-Trimethylbenzene	44.3	1	ug/L	50.0	BLOD	88.6	75-130			
1,2-Dibromo-3-chloropropane (DBCP)	49.4	1	ug/L	50.0	BLOD	98.8	50-130			
1,2-Dibromoethane (EDB)	46.9	1	ug/L	50.0	BLOD	93.8	80-120			
1,2-Dichlorobenzene	45.9	0.5	ug/L	50.0	BLOD	91.7	70-120			
1,2-Dichloroethane	36.9	1	ug/L	50.0	BLOD	73.7	70-130			
1,2-Dichloropropane	47.9	0.5	ug/L	50.0	BLOD	95.8	75-125			
1,3,5-Trimethylbenzene	43.4	1	ug/L	50.0	BLOD	86.8	75-124			



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	n BFL0941 - SW5030	B-MS								
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-01	1	Prepared & Analy	yzed: 12/23/2022					
1,3-Dichlorobenzene	45.7	1	ug/L	50.0	BLOD	91.5	75-125			
1,3-Dichloropropane	45.4	1	ug/L	50.0	BLOD	90.8	75-125			
1,4-Dichlorobenzene	45.9	1	ug/L	50.0	BLOD	91.8	75-125			
2,2-Dichloropropane	41.6	1	ug/L	50.0	BLOD	83.3	70-135			
2-Butanone (MEK)	52.6	10	ug/L	50.0	BLOD	105	30-150			
2-Chlorotoluene	47.9	1	ug/L	50.0	BLOD	95.8	75-125			
2-Hexanone (MBK)	43.4	5	ug/L	50.0	BLOD	86.8	55-130			
4-Chlorotoluene	45.7	1	ug/L	50.0	BLOD	91.4	75-130			
4-Isopropyltoluene	43.3	1	ug/L	50.0	BLOD	86.7	75-130			
4-Methyl-2-pentanone (MIBK)	46.6	5	ug/L	50.0	BLOD	93.1	60-135			
Acetone	40.8	10	ug/L	50.0	BLOD	81.6	40-140			
Benzene	46.4	1	ug/L	50.0	BLOD	92.8	80-120			
Bromobenzene	47.0	1	ug/L	50.0	BLOD	93.9	75-125			
Bromochloromethane	44.5	1	ug/L	50.0	BLOD	89.0	65-130			
Bromodichloromethane	51.2	0.5	ug/L	50.0	BLOD	102	75-136			
Bromoform	48.0	1	ug/L	50.0	BLOD	95.9	70-130			
Bromomethane	28.8	1	ug/L	50.0	BLOD	57.7	30-145			
Carbon disulfide	26.9	10	ug/L	50.0	BLOD	53.8	35-160			
Carbon tetrachloride	47.4	1	ug/L	50.0	BLOD	94.8	65-140			
Chlorobenzene	47.3	1	ug/L	50.0	BLOD	94.6	80-120			
Chloroethane	41.0	1	ug/L	50.0	BLOD	81.9	60-135			
Chloroform	39.8	0.5	ug/L	50.0	BLOD	79.5	65-135			
Chloromethane	42.1	1	ug/L	50.0	BLOD	84.2	40-125			
cis-1,2-Dichloroethylene	40.4	1	ug/L	50.0	BLOD	80.9	70-125			
cis-1,3-Dichloropropene	39.4	1	ug/L	50.0	BLOD	78.8	47-136			



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch I	BFL0941 - SW5030	DB-MS								
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-0	1	Prepared & Anal	yzed: 12/23/2022					
Dibromochloromethane	50.2	0.5	ug/L	50.0	BLOD	100	60-135			
Dibromomethane	49.8	1	ug/L	50.0	BLOD	99.7	75-125			
Dichlorodifluoromethane	51.2	1	ug/L	50.0	BLOD	102	30-155			
Ethylbenzene	47.4	1	ug/L	50.0	BLOD	94.7	75-125			
Hexachlorobutadiene	46.8	0.8	ug/L	50.0	BLOD	93.5	50-140			
Isopropylbenzene	44.1	1	ug/L	50.0	BLOD	88.2	75-125			
m+p-Xylenes	90.8	2	ug/L	100	BLOD	90.8	75-130			
Methylene chloride	40.7	4	ug/L	50.0	BLOD	81.3	55-140			
Methyl-t-butyl ether (MTBE)	43.4	1	ug/L	50.0	BLOD	86.7	65-125			
Naphthalene	46.0	1	ug/L	50.0	BLOD	91.9	55-140			
n-Butylbenzene	45.5	1	ug/L	50.0	BLOD	91.0	70-135			
n-Propylbenzene	45.3	1	ug/L	50.0	BLOD	90.6	70-130			
o-Xylene	47.2	1	ug/L	50.0	BLOD	94.3	80-120			
sec-Butylbenzene	46.1	1	ug/L	50.0	BLOD	92.1	70-125			
Styrene	43.8	1	ug/L	50.0	BLOD	87.6	65-135			
tert-Butylbenzene	43.5	1	ug/L	50.0	BLOD	87.1	70-130			
Tetrachloroethylene (PCE)	48.6	1	ug/L	50.0	BLOD	97.3	51-231			
Toluene	47.2	1	ug/L	50.0	BLOD	94.4	75-120			
trans-1,2-Dichloroethylene	39.9	1	ug/L	50.0	BLOD	79.9	60-140			
trans-1,3-Dichloropropene	43.0	1	ug/L	50.0	BLOD	86.0	55-140			
Trichloroethylene	45.9	1	ug/L	50.0	BLOD	91.8	70-125			
Trichlorofluoromethane	43.5	1	ug/L	50.0	BLOD	87.0	60-145			
Vinyl chloride	45.7	0.5	ug/L	50.0	BLOD	91.5	50-145			
Surr: 1,2-Dichloroethane-d4 (Surr)	40.2		ug/L	50.0		80.4	70-120			
Surr: 4-Bromofluorobenzene (Surr)	49.4		ug/L	50.0		98.7	75-120			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0941 - SW503	0B-MS								
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022	2				
Surr: Dibromofluoromethane (Surr)	40.4		ug/L	50.0		80.9	70-130			
Surr: Toluene-d8 (Surr)	48.7		ug/L	50.0		97. <i>4</i>	70-130			
Matrix Spike Dup (BFL0941-MSD1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022	)				
1,1,1,2-Tetrachloroethane	51.4	0.4	ug/L	50.0	BLOD	103	80-130	7.26	30	
1,1,1-Trichloroethane	43.9	1	ug/L	50.0	BLOD	87.7	65-130	3.31	30	
1,1,2,2-Tetrachloroethane	47.4	0.4	ug/L	50.0	BLOD	94.7	65-130	9.74	30	
1,1,2-Trichloroethane	52.9	1	ug/L	50.0	BLOD	106	75-125	8.35	30	
1,1-Dichloroethane	43.4	1	ug/L	50.0	BLOD	86.8	70-135	4.00	30	
1,1-Dichloroethylene	36.4	1	ug/L	50.0	BLOD	72.7	50-145	0.717	30	
1,1-Dichloropropene	40.1	1	ug/L	50.0	BLOD	80.2	75-135	1.51	30	
1,2,3-Trichlorobenzene	50.0	1	ug/L	50.0	BLOD	99.9	55-140	5.55	30	
1,2,3-Trichloropropane	48.3	1	ug/L	50.0	BLOD	96.5	75-125	10.1	30	
1,2,4-Trichlorobenzene	52.6	1	ug/L	50.0	BLOD	105	65-135	6.02	30	
1,2,4-Trimethylbenzene	46.0	1	ug/L	50.0	BLOD	91.9	75-130	3.72	30	
1,2-Dibromo-3-chloropropane (DBCP)	51.8	1	ug/L	50.0	BLOD	104	50-130	4.74	30	
1,2-Dibromoethane (EDB)	51.4	1	ug/L	50.0	BLOD	103	80-120	9.18	30	
1,2-Dichlorobenzene	48.8	0.5	ug/L	50.0	BLOD	97.5	70-120	6.09	30	
1,2-Dichloroethane	39.9	1	ug/L	50.0	BLOD	79.7	70-130	7.79	30	
1,2-Dichloropropane	50.7	0.5	ug/L	50.0	BLOD	101	75-125	5.62	30	
1,3,5-Trimethylbenzene	45.6	1	ug/L	50.0	BLOD	91.1	75-124	4.83	30	
1,3-Dichlorobenzene	48.1	1	ug/L	50.0	BLOD	96.1	75-125	4.99	30	
1,3-Dichloropropane	50.6	1	ug/L	50.0	BLOD	101	75-125	10.8	30	
1,4-Dichlorobenzene	47.6	1	ug/L	50.0	BLOD	95.1	75-125	3.57	30	
2,2-Dichloropropane	42.2	1	ug/L	50.0	BLOD	84.3	70-135	1.27	30	



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	BFL0941 - SW5030	B-MS								
Matrix Spike Dup (BFL0941-MSD1)	Sourc	e: 22L1132-0	1	Prepared & Analy	/zed: 12/23/2022					
2-Butanone (MEK)	43.7	10	ug/L	50.0	BLOD	87.4	30-150		30	
2-Chlorotoluene	49.5	1	ug/L	50.0	BLOD	99.0	75-125	3.33	30	
2-Hexanone (MBK)	42.3	5	ug/L	50.0	BLOD	84.5	55-130		30	
4-Chlorotoluene	48.9	1	ug/L	50.0	BLOD	97.8	75-130	6.72	30	
4-Isopropyltoluene	44.8	1	ug/L	50.0	BLOD	89.7	75-130	3.43	30	
4-Methyl-2-pentanone (MIBK)	46.3	5	ug/L	50.0	BLOD	92.6	60-135	0.603	30	
Acetone	37.7	10	ug/L	50.0	BLOD	75.3	40-140		30	
Benzene	49.1	1	ug/L	50.0	BLOD	98.2	80-120	5.70	30	
Bromobenzene	51.9	1	ug/L	50.0	BLOD	104	75-125	10.1	30	
Bromochloromethane	46.8	1	ug/L	50.0	BLOD	93.6	65-130	5.13	30	
Bromodichloromethane	55.1	0.5	ug/L	50.0	BLOD	110	75-136	7.38	30	
Bromoform	54.0	1	ug/L	50.0	BLOD	108	70-130	11.9	30	
Bromomethane	31.3	1	ug/L	50.0	BLOD	62.6	30-145	8.18	30	
Carbon disulfide	29.1	10	ug/L	50.0	BLOD	58.3	35-160		30	
Carbon tetrachloride	48.1	1	ug/L	50.0	BLOD	96.2	65-140	1.44	30	
Chlorobenzene	50.7	1	ug/L	50.0	BLOD	101	80-120	6.90	30	
Chloroethane	41.9	1	ug/L	50.0	BLOD	83.8	60-135	2.29	30	
Chloroform	41.4	0.5	ug/L	50.0	BLOD	82.8	65-135	4.09	30	
Chloromethane	44.4	1	ug/L	50.0	BLOD	88.9	40-125	5.46	30	
cis-1,2-Dichloroethylene	42.9	1	ug/L	50.0	BLOD	85.8	70-125	5.97	30	
cis-1,3-Dichloropropene	42.9	1	ug/L	50.0	BLOD	85.8	47-136	8.48	30	
Dibromochloromethane	54.1	0.5	ug/L	50.0	BLOD	108	60-135	7.50	30	
Dibromomethane	54.3	1	ug/L	50.0	BLOD	109	75-125	8.62	30	
Dichlorodifluoromethane	52.8	1	ug/L	50.0	BLOD	106	30-155	3.15	30	
Ethylbenzene	50.5	1	ug/L	50.0	BLOD	101	75-125	6.36	30	



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch B	BFL0941 - SW5030	OB-MS								
Matrix Spike Dup (BFL0941-MSD1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022					
Hexachlorobutadiene	49.5	0.8	ug/L	50.0	BLOD	99.0	50-140	5.63	30	
Isopropylbenzene	46.3	1	ug/L	50.0	BLOD	92.6	75-125	4.84	30	
m+p-Xylenes	98.5	2	ug/L	100	BLOD	98.5	75-130	8.15	30	
Methylene chloride	41.9	4	ug/L	50.0	BLOD	83.8	55-140		30	
Methyl-t-butyl ether (MTBE)	46.4	1	ug/L	50.0	BLOD	92.7	65-125	6.66	30	
Naphthalene	50.5	1	ug/L	50.0	BLOD	101	55-140	9.31	30	
n-Butylbenzene	47.0	1	ug/L	50.0	BLOD	94.1	70-135	3.31	30	
n-Propylbenzene	46.8	1	ug/L	50.0	BLOD	93.5	70-130	3.17	30	
o-Xylene	50.6	1	ug/L	50.0	BLOD	101	80-120	7.02	30	
sec-Butylbenzene	48.9	1	ug/L	50.0	BLOD	97.9	70-125	6.02	30	
Styrene	47.2	1	ug/L	50.0	BLOD	94.4	65-135	7.43	30	
tert-Butylbenzene	45.7	1	ug/L	50.0	BLOD	91.4	70-130	4.86	30	
Tetrachloroethylene (PCE)	52.5	1	ug/L	50.0	BLOD	105	51-231	7.73	30	
Toluene	49.4	1	ug/L	50.0	BLOD	98.7	75-120	4.49	30	
trans-1,2-Dichloroethylene	40.1	1	ug/L	50.0	BLOD	80.3	60-140	0.500	30	
trans-1,3-Dichloropropene	45.6	1	ug/L	50.0	BLOD	91.1	55-140	5.85	30	
Trichloroethylene	48.1	1	ug/L	50.0	BLOD	96.3	70-125	4.72	30	
Trichlorofluoromethane	44.2	1	ug/L	50.0	BLOD	88.5	60-145	1.71	30	
Vinyl chloride	45.7	0.5	ug/L	50.0	BLOD	91.4	50-145	0.109	30	
Surr: 1,2-Dichloroethane-d4 (Surr)	40.6		ug/L	50.0		81.3	70-120			
Surr: 4-Bromofluorobenzene (Surr)	50.4		ug/L	50.0		101	75-120			
Surr: Dibromofluoromethane (Surr)	42.0		ug/L	50.0		83.9	70-130			
Surr: Toluene-d8 (Surr)	49.4		ug/L	50.0		98.8	70-130			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Semivolatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch B	3FL0931 - SW351	0C/EPA600-	·MS							
Blank (BFL0931-BLK1)			F	Prepared & Anal	yzed: 12/23/2022					
Anthracene	ND	10.0	ug/L							
Surr: 2,4,6-Tribromophenol (Surr)	65.1		ug/L	100		65.1	5-136			
Surr: 2-Fluorobiphenyl (Surr)	34.9		ug/L	50.0		69.8	9-117			
Surr: 2-Fluorophenol (Surr)	44.8		ug/L	100		44.8	5-60			
Surr: Nitrobenzene-d5 (Surr)	43.2		ug/L	50.0		86.4	5-151			
Surr: Phenol-d5 (Surr)	32.6		ug/L	100		32.6	5-60			
Surr: p-Terphenyl-d14 (Surr)	55.6		ug/L	50.0		111	5-141			
LCS (BFL0931-BS1)			F	Prepared & Anal	yzed: 12/23/2022					
1,2,4-Trichlorobenzene	31.8	10.0	ug/L	50.0		63.7	57-130			
1,2-Dichlorobenzene	34.1	10.0	ug/L	50.0		68.2	22-115			
1,3-Dichlorobenzene	31.6	10.0	ug/L	50.0		63.1	22-112			
1,4-Dichlorobenzene	32.5	10.0	ug/L	50.0		64.9	13-112			
2,4,6-Trichlorophenol	32.4	10.0	ug/L	50.0		64.7	52-129			
2,4-Dichlorophenol	35.7	10.0	ug/L	50.0		71.3	53-122			
2,4-Dimethylphenol	35.1	5.00	ug/L	50.0		70.1	42-120			
2,4-Dinitrophenol	48.4	50.0	ug/L	50.0		96.9	48-127			
2,4-Dinitrotoluene	37.5	10.0	ug/L	50.0		75.0	10-173			
2,6-Dinitrotoluene	39.1	10.0	ug/L	50.0		78.2	68-137			
2-Chloronaphthalene	32.0	10.0	ug/L	50.0		64.0	65-120			L
2-Chlorophenol	36.7	10.0	ug/L	50.0		73.4	36-120			
2-Nitrophenol	43.8	10.0	ug/L	50.0		87.7	45-167			
3,3'-Dichlorobenzidine	22.9	10.0	ug/L	50.0		45.8	10-213			
4,6-Dinitro-2-methylphenol	43.1	50.0	ug/L	50.0		86.2	53-130			
4-Bromophenyl phenyl ether	35.8	10.0	ug/L	50.0		71.6	65-120			



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Semivolatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batc	h BFL0931 - SW3510	0C/EPA600-	MS							
LCS (BFL0931-BS1)			F	repared & Anal	zed: 12/23/2022	2				
4-Chlorophenyl phenyl ether	30.3	10.0	ug/L	50.0		60.6	38-145			
4-Nitrophenol	14.7	50.0	ug/L	50.0		29.5	13-129			
Acenaphthene	33.5	10.0	ug/L	50.0		67.0	60-132			
Acenaphthylene	34.6	10.0	ug/L	50.0		69.1	54-126			
Anthracene	35.1	10.0	ug/L	50.0		70.2	43-120			
Benzo (a) anthracene	39.5	10.0	ug/L	50.0		79.1	42-133			
Benzo (a) pyrene	41.7	10.0	ug/L	50.0		83.4	32-148			
Benzo (b) fluoranthene	41.6	10.0	ug/L	50.0		83.1	42-140			
Benzo (g,h,i) perylene	43.9	10.0	ug/L	50.0		87.7	10-195			
Benzo (k) fluoranthene	33.2	10.0	ug/L	50.0		66.5	25-146			
bis (2-Chloroethoxy) methane	34.6	10.0	ug/L	50.0		69.3	49-165			
bis (2-Chloroethyl) ether	34.6	10.0	ug/L	50.0		69.2	43-126			
2,2'-Oxybis (1-chloropropane)	37.8	10.0	ug/L	50.0		75.5	63-139			
bis (2-Ethylhexyl) phthalate	44.7	10.0	ug/L	50.0		89.4	29-137			
Butyl benzyl phthalate	49.0	10.0	ug/L	50.0		98.0	10-140			
Chrysene	37.4	10.0	ug/L	50.0		74.8	44-140			
Dibenz (a,h) anthracene	47.4	10.0	ug/L	50.0		94.8	10-200			
Diethyl phthalate	34.3	10.0	ug/L	50.0		68.7	10-120			
Dimethyl phthalate	33.6	10.0	ug/L	50.0		67.2	10-120			
Di-n-butyl phthalate	36.5	10.0	ug/L	50.0		73.0	10-120			
Di-n-octyl phthalate	41.9	10.0	ug/L	50.0		83.9	19-132			
Fluoranthene	34.8	10.0	ug/L	50.0		69.5	43-121			
Fluorene	34.2	10.0	ug/L	50.0		68.5	70-120			L
Hexachlorobenzene	32.4	1.00	ug/L	50.0		64.8	10-142			
Hexachlorobutadiene	33.1	10.0	ug/L	50.0		66.2	38-120			



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Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

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Semivolatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
	BFL0931 - SW3510	OC/EPA600-	-MS							
.CS (BFL0931-BS1)			F	Prepared & Analy	yzed: 12/23/2022	!				
Hexachlorocyclopentadiene	24.5	10.0	ug/L	50.0		49.0	10-76			
Hexachloroethane	33.1	10.0	ug/L	50.0		66.2	55-120			
Indeno (1,2,3-cd) pyrene	48.1	10.0	ug/L	50.0		96.2	10-151			
Isophorone	19.8	10.0	ug/L	50.0		39.5	47-180			L
Naphthalene	28.7	5.00	ug/L	50.0		57.4	36-120			
Nitrobenzene	40.1	10.0	ug/L	50.0		80.2	54-158			
n-Nitrosodimethylamine	28.2	10.0	ug/L	50.0		56.3	10-85			
n-Nitrosodi-n-propylamine	36.5	10.0	ug/L	50.0		73.1	14-198			
n-Nitrosodiphenylamine	28.0	10.0	ug/L	50.0		56.0	12-97			
p-Chloro-m-cresol	35.0	10.0	ug/L	50.0		69.9	10-142			
Pentachlorophenol	33.9	20.0	ug/L	50.0		67.9	38-152			
Phenanthrene	36.0	10.0	ug/L	50.0		72.1	65-120			
Phenol	17.2	10.0	ug/L	50.5		34.0	17-120			
Pyrene	40.6	10.0	ug/L	50.0		81.2	70-120			
Pyridine	28.0	10.0	ug/L	50.0		55.9	10-103			
Surr: 2,4,6-Tribromophenol (Surr)	71.6		ug/L	100		71.6	5-136			
Surr: 2-Fluorobiphenyl (Surr)	32.0		ug/L	50.0		64.0	9-117			
Surr: 2-Fluorophenol (Surr)	45.5		ug/L	100		45.5	5-60			
Surr: Nitrobenzene-d5 (Surr)	42.3		ug/L	50.0		84.7	5-151			
Surr: Phenol-d5 (Surr)	32.4		ug/L	100		32.4	5-60			
Surr: p-Terphenyl-d14 (Surr)	43.4		ug/L	50.0		86.9	5-141			



# **Certificate of Analysis**

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City of Bristol Landfills

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Wet Chemistry Analysis - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
	:h BFL0881 - No Prep	Wet Chem								
Blank (BFL0881-BLK1)				Prepared & Anal	yzed: 12/22/2022					
BOD	ND	2.0	mg/L							
LCS (BFL0881-BS1)				Prepared & Anal	yzed: 12/22/2022					
BOD	198	2	mg/L	198		100	84.6-115.4			
Duplicate (BFL0881-DUP1)	Source	e: 22L1156-01		Prepared & Anal	yzed: 12/22/2022					
BOD	2.3	2.0	mg/L		3.5			41.0	20	Р
Bato	ch BFL0913 - No Prep	Wet Chem								
Blank (BFL0913-BLK1)				Prepared & Anal	yzed: 12/23/2022					
Nitrite as N	ND	0.05	mg/L							
LCS (BFL0913-BS1)				Prepared & Anal	yzed: 12/23/2022					
Nitrite as N	0.11	0.05	mg/L	0.100		110	80-120			
Matrix Spike (BFL0913-MS1)	Source	e: 22L1113-09	1	Prepared & Anal	yzed: 12/23/2022					
Nitrite as N	0.10	0.05	mg/L	0.100	BLOD	99.0	80-120			
Matrix Spike Dup (BFL0913-MSD1)	Source	e: 22L1113-09	١	Prepared & Anal	yzed: 12/23/2022					
Nitrite as N	0.10	0.05	mg/L	0.100	BLOD	98.0	80-120	1.02	20	
Bato	ch BFL0914 - No Prep	Wet Chem								
Blank (BFL0914-BLK1)				Prepared & Anal	yzed: 12/23/2022					
Nitrite as N	ND	0.05	mg/L							



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Wet Chemistry Analysis - Quality Control

			Spike	Source		%REC		RPD	
Result	LOQ	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
FL0914 - No Prep	Wet Chem								
			Prepared & Analy	/zed: 12/23/2022					
0.11	0.05	mg/L	0.100		111	80-120			
Source	: 22L1154-01		Prepared & Analy	/zed: 12/23/2022					
0.10	0.05	mg/L	0.100	BLOD	98.0	80-120			
Source	: 22L1154-01		Prepared & Analy	/zed: 12/23/2022					
0.10	0.05	mg/L	0.100	BLOD	98.0	80-120	0.00	20	
FL0949 - No Prep	Wet Chem								
			Prepared & Analy	/zed: 12/23/2022					
ND	10.0	mg/L							
			Prepared & Analy	/zed: 12/23/2022					
45.9	10.0	mg/L	50.0		91.7	88-119			
Source	: 22L1150-01		Prepared & Analy	/zed: 12/23/2022					
41.4	10.0	mg/L	50.0	BLOD	82.8	72.4-130			
Source	: 22L1150-01		Prepared & Analy	/zed: 12/23/2022					
41.7	10.0	mg/L	50.0	BLOD	83.5	72.4-130	0.828	20	
FL0977 - No Prep	Wet Chem								
			Prepared: 12/27/	2022 Analyzed: 12	2/28/2022				
ND	0.10	mg/L							
	0.11  Source 0.10  Source 0.10  SFL0949 - No Prep  ND  45.9  Source 41.4  Source 41.7  SFL0977 - No Prep	0.11 0.05  Source: 22L1154-01 0.10 0.05  Source: 22L1154-01 0.10 0.05  Source: 22L1154-01 0.10 0.05  FL0949 - No Prep Wet Chem  ND 10.0  Source: 22L1150-01 41.4 10.0  Source: 22L1150-01 41.7 10.0  FFL0977 - No Prep Wet Chem	0.11 0.05 mg/L  Source: 22L1154-01  0.10 0.05 mg/L  Source: 22L1154-01  0.10 0.05 mg/L  Source: 22L1154-01  0.10 0.05 mg/L  10.0 mg/L	Result   LOQ   Units   Level	Result   LOQ   Units   Level   Result	Result   LOQ   Units   Level   Result   %REC	Result   LOQ   Units   Level   Result   %REC   Limits	Result   LOQ   Units   Level   Result   %REC   Limits   RPD	Result   LOQ   Units   Level   Result   %REC   Limits   RPD   Limit



# **Certificate of Analysis**

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City of Bristol Landfills

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Wet Chemistry Analysis - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
,				Level	Result	701120	Lillits	TH D	LIIIII	Quai
Batch	BFL0977 - No Prep	Wet Chem								
LCS (BFL0977-BS1)				Prepared: 12/27/	/2022 Analyzed: 1	2/28/2022				
Ammonia as N	2.02	0.1	mg/L	2.00		101	90-110			
Matrix Spike (BFL0977-MS1)	Sourc	e: 22L1077-0	5	Prepared: 12/27/	2022 Analyzed: 1	2/28/2022				
Ammonia as N	2.15	0.10	mg/L	2.00	BLOD	108	89.3-131			
Matrix Spike (BFL0977-MS2)	Sourc	e: 22L1154-0	5	Prepared: 12/27/	2022 Analyzed: 1	2/28/2022				
Ammonia as N	2.26	0.10	mg/L	2.00	BLOD	113	89.3-131			
Matrix Spike Dup (BFL0977-MSD1)	Sourc	e: 22L1077-0	5	Prepared: 12/27/	2022 Analyzed: 1	2/28/2022				
Ammonia as N	2.18	0.10	mg/L	2.00	BLOD	109	89.3-131	1.39	20	
Matrix Spike Dup (BFL0977-MSD2)	Sourc	e: 22L1154-0	5	Prepared: 12/27/	2022 Analyzed: 1	2/28/2022				
Ammonia as N	2.16	0.10	mg/L	2.00	BLOD	108	89.3-131	4.52	20	
Batch	BFL1035 - No Prep	Wet Chem								
Blank (BFL1035-BLK1)				Prepared & Anal	yzed: 12/28/2022					
Nitrate+Nitrite as N	ND	0.10	mg/L							
LCS (BFL1035-BS1)				Prepared & Anal	yzed: 12/28/2022					
Nitrate+Nitrite as N	2.65	0.1	mg/L	2.50		106	90-110			
Matrix Spike (BFL1035-MS1)	Sourc	e: 22L1254-0	1	Prepared & Anal	yzed: 12/28/2022					
Nitrate+Nitrite as N	2.93	0.10	mg/L	2.50	0.13	112	90-110			М
Matrix Spike (BFL1035-MS2)	Sourc	e: 22L1290-0	1	Prepared & Anal	yzed: 12/28/2022					
Nitrate+Nitrite as N	3.53	0.10	mg/L	2.50	0.92	104	90-110			



# **Certificate of Analysis**

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Wet Chemistry Analysis - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch I	BFL1035 - No Pre	p Wet Chem								
Matrix Spike Dup (BFL1035-MSD1)	Source	ce: 22L1254-0	1	Prepared & Analy	yzed: 12/28/2022					
Nitrate+Nitrite as N	2.89	0.10	mg/L	2.50	0.13	110	90-110	1.37	20	М
Matrix Spike Dup (BFL1035-MSD2)	Source	e: 22L1290-0	1	Prepared & Analy	yzed: 12/28/2022					
Nitrate+Nitrite as N	3.54	0.10	mg/L	2.50	0.92	105	90-110	0.424	20	
Batch i	BFL1048 - No Pre	p Wet Chem								
Blank (BFL1048-BLK1)				Prepared & Analy	yzed: 12/29/2022					
TKN as N	ND	0.50	mg/L							
_CS (BFL1048-BS1)				Prepared & Analy	yzed: 12/29/2022					
TKN as N	10.3	0.50	mg/L	10.0		103	90-110			
Matrix Spike (BFL1048-MS1)	Source	e: 22L1324-0	1	Prepared & Analy	yzed: 12/29/2022					
TKN as N	9.96	0.50	mg/L	10.0	0.55	94.1	90-110			
Matrix Spike (BFL1048-MS2)	Source	ce: 22L1324-0	2	Prepared & Analy	yzed: 12/29/2022					
TKN as N	9.55	0.50	mg/L	10.0	0.30	92.5	90-110			
Matrix Spike Dup (BFL1048-MSD1)	Source	e: 22L1324-0	1	Prepared & Analy	yzed: 12/29/2022					
TKN as N	10.4	0.50	mg/L	10.0	0.55	98.0	90-110	3.89	20	
Matrix Spike Dup (BFL1048-MSD2)	Source	e: 22L1324-0	2	Prepared & Analy	yzed: 12/29/2022					
TKN as N	9.73	0.50	mg/L	10.0	0.30	94.3	90-110	1.88	20	
Batch I	BFL1068 - No Pre	p Wet Chem								
Blank (BFL1068-BLK1)				Prepared & Analy	yzed: 12/29/2022					
Total Recoverable Phenolics	ND	0.050	mg/L							



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Wet Chemistry Analysis - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	BFL1068 - No Pre	p Wet Chem								
LCS (BFL1068-BS1)				Prepared & Analy	zed: 12/29/2022					
Total Recoverable Phenolics	0.49	0.050	mg/L	0.500		98.0	80-120			
Matrix Spike (BFL1068-MS1)	Source	ce: 22L1381-01		Prepared & Analy	zed: 12/29/2022					
Total Recoverable Phenolics	0.53	0.050	mg/L	0.500	0.05	96.0	70-130			
Matrix Spike Dup (BFL1068-MSD1)	Source	ce: 22L1381-01	I	Prepared & Analy	zed: 12/29/2022					
Total Recoverable Phenolics	0.51	0.050	mg/L	0.500	0.05	92.8	70-130	3.09	20	



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

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Client Site I.D.:

**Analytical Summary** 

 22L1183-01
 Subcontract

 22L1183-02
 Subcontract

 22L1183-03
 Subcontract

 22L1183-04
 Subcontract

 22L1183-05
 Subcontract

 22L1183-07
 Subcontract

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by E	PA 6000/7000 Series Methods		Preparation Method:	EPA200.2/R2.8	
22L1183-01	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
22L1183-02	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
2L1183-03	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
2L1183-04	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
2L1183-05	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
22L1183-07	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Ana	alysis		Preparation Method:	No Prep Wet Chem	
22L1183-01	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
22L1183-02	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
22L1183-03	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
22L1183-04	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
22L1183-05	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
22L1183-07	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
22L1183-01	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
22L1183-02	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
22L1183-03	2.50 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
22L1183-04	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0914	SFL0878	AJ20138



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Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analysis	S		Preparation Method:	No Prep Wet Chem	
22L1183-06	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0914	SFL0878	AJ20138
22L1183-07	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0914	SFL0878	AJ20138
22L1183-01	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
22L1183-02	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
22L1183-03	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
22L1183-04	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
22L1183-05	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
22L1183-07	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
22L1183-01	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
22L1183-02	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
22L1183-03	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
22L1183-04	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
22L1183-05	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
22L1183-07	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
22L1183-01	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-01RE1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-01RE2	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-01RE3	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-02	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-02RE1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-02RE2	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-02RE3	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-03	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-03RE1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-03RE2	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-03RE3	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-04	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-04RE1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-05	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analy	ysis		Preparation Method:	No Prep Wet Chem	
22L1183-05RE1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-05RE2	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-05RE3	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-07	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-07RE1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-07RE2	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-07RE3	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1183-01	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
22L1183-02	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
22L1183-03	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
22L1183-04	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
22L1183-05	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
22L1183-07	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
22L1183-01	0.100 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
22L1183-02	0.100 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
22L1183-03	0.500 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
22L1183-04	0.100 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
22L1183-05	0.100 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
22L1183-07	0.100 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
22L1183-05	1.00 mL / 1.00 mL	Calc	BFL1112		
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Semivolatile Organic	Compounds by GCMS		Preparation Method:	SW3510C/EPA600-MS	
22L1183-01	1070 mL / 10.0 mL	SW8270E	BFL0931	SFL0890	AL20040
22L1183-02	1070 mL / 1.00 mL	SW8270E	BFL0931	SFL0890	AL20040
22L1183-03	1070 mL / 1.00 mL	SW8270E	BFL0931	SFL0890	AL20040
22L1183-04	1070 mL / 1.00 mL	SW8270E	BFL0931	SFL0890	AL20040
22L1183-05	1070 mL / 5.00 mL	SW8270E	BFL0931	SFL0890	AL20040



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Date Issued: 1/6/2023 8:58:55AM

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Semivolatile Organic	Compounds by GCMS		Preparation Method:	SW3510C/EPA600	D-MS
22L1183-07	1070 mL / 5.00 mL	SW8270E	BFL0931	SFL0890	AL20040
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Com	pounds by GCMS		Preparation Method:	SW5030B-MS	
22L1183-01	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-01RE1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-02	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-02RE1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-03	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-03RE1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-04	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-04RE1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-05	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-05RE1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-07	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-07RE1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-08	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
22L1183-01RE2	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
22L1183-05RE2	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
22L1183-07RE2	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by EPA	6000/7000 Series Methods		Preparation Method:	SW7470A	
22L1183-01	1.00 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165
22L1183-02	5.00 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165
22L1183-03	5.00 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165
22L1183-04	5.00 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165
22L1183-05	5.00 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165



**Certificate of Analysis** 

Client Name: SCS Engineers-Winchester

Date Issued: 1/6/2

1/6/2023 8:58:55AM

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by EPA 6000/7000 Series Methods			Preparation Method:	SW7470A	
221 1183-07	5 00 ml / 20 0 ml	SW7470A	BFI 1015	SEI 1003	AI 20165



1/6/2023 8:58:55AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

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**QC Analytical Summary** 

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by EPA	6000/7000 Series Methods		Preparation Method:	EPA200.2/R2.8	
BFL0966-BLK1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
BFL0966-BS1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
BFL0966-MS1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
BFL0966-MSD1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analys	sis		Preparation Method:	No Prep Wet Chem	
BFL0881-BLK1	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
BFL0881-BS1	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
BFL0881-DUP1	300 mL / 300 mL	SM22 5210B-2011	BFL0881	SFL0951	
BFL0913-BLK1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
BFL0913-BS1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
BFL0913-MRL1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
BFL0913-MS1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
BFL0913-MSD1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0913	SFL0878	AJ20138
BFL0914-BLK1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0914	SFL0878	AJ20138
BFL0914-BS1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0914	SFL0878	AJ20138
BFL0914-MS1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0914	SFL0878	AJ20138
BFL0914-MSD1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0914	SFL0878	AJ20138
BFL0949-BLK1	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
BFL0949-BS1	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
BFL0949-MRL1	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
BFL0949-MS1	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Date Issued: 1/6/2023 8:58:55AN
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Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analy	ysis		Preparation Method:	No Prep Wet Chem	
BFL0949-MSD1	2.00 mL / 2.00 mL	SM22 5220D-2011	BFL0949	SFL0915	AL20092
BFL0977-BLK1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
BFL0977-BS1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
BFL0977-MS1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
BFL0977-MS2	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
BFL0977-MSD1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
BFL0977-MSD2	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
BFL1035-BLK1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-BS1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MRL1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MS1	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MS2	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MSD1	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MSD2	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1048-BLK1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-BS1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MRL1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MS1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MS2	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MSD1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MSD2	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1068-BLK1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-BS1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-MRL1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-MS1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-MSD1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Date Issued: 1/6/2023 8:58:55AM

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Semivolatile Organic	Compounds by GCMS		Preparation Method:	SW3510C/EPA600	-MS
BFL0931-BLK1	1000 mL / 1.00 mL	SW8270E	BFL0931	SFL0890	AL20040
BFL0931-BS1	1000 mL / 1.00 mL	SW8270E	BFL0931	SFL0890	AL20040
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Con	npounds by GCMS		Preparation Method:	SW5030B-MS	
BFL0892-BLK1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
BFL0892-BS1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
BFL0892-MS1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
BFL0892-MSD1	5.00 mL / 5.00 mL	SW8260D	BFL0892	SFL0856	AL20010
BFL0941-BLK1	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-BLK2	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-BS1	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-BS2	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-MS1	0.250 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-MSD1	0.250 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by EPA	A 6000/7000 Series Methods		Preparation Method:	SW7470A	
BFL1015-BLK1	20.0 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165
BFL1015-BS1	20.0 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165
BFL1015-MRL1	20.0 mL / 20.0 mL	SW7470A	BFL1015	SGA0135	
BFL1015-MS1	20.0 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165
BFL1015-MSD1	20.0 mL / 20.0 mL	SW7470A	BFL1015	SFL1003	AL20165



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Date Issued: 1/6/2023 8:58:55AM

#### **Certified Analyses included in this Report**

Analyte	Certifications
EPA350.1 R2.0 in Non-Potable Water	
Ammonia as N	VELAP,NCDEQ,PADEP,WVDEP
EPA351.2 R2.0 in Non-Potable Water	
TKN as N	VELAP,NCDEQ,WVDEP
SM22 4500-NO2B-2011 in Non-Potable Water	
Nitrite as N	VELAP,WVDEP
SM22 4500-NO3F-2011 in Non-Potable Water	
Nitrate+Nitrite as N	VELAP,WVDEP
SM22 5210B-2011 in Non-Potable Water	
BOD	VELAP,NCDEQ,WVDEP
SM22 5220D-2011 in Non-Potable Water	
COD	VELAP,NCDEQ,PADEP,WVDEP
SW6010D in Non-Potable Water	
Arsenic	VELAP,WVDEP
Barium	VELAP,WVDEP,PADEP
Cadmium	VELAP,WVDEP,PADEP
Chromium	VELAP,WVDEP
Copper	VELAP,WVDEP
Lead	VELAP,WVDEP
Nickel	VELAP,WVDEP
Selenium	VELAP,WVDEP
Silver	VELAP,WVDEP,PADEP
Zinc	VELAP,WVDEP
SW7470A in Non-Potable Water	
Mercury	VELAP,NCDEQ,WVDEP



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#### **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

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#### **Certified Analyses included in this Report**

Analyte Certifications SW8260D in Non-Potable Water 2-Butanone (MEK) VELAP,NCDEQ,PADEP,WVDEP Acetone VELAP,NCDEQ,PADEP,WVDEP VELAP,NCDEQ,PADEP,WVDEP Benzene Ethylbenzene VELAP,NCDEQ,PADEP,WVDEP Toluene VELAP,NCDEQ,PADEP,WVDEP Xylenes, Total VELAP,NCDEQ,PADEP,WVDEP Tetrahydrofuran **VELAP, PADEP** SW8270E in Non-Potable Water VELAP, PADEP, NCDEQ, WVDEP Anthracene SW9065 in Non-Potable Water

VELAP, WVDEP Total Recoverable Phenolics

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**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

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**Qualifiers and Definitions** 

DS Surrogate concentration reflects a dilution factor.

J The reported result is an estimated value.

LCS recovery is outside of established acceptance limits

M Matrix spike recovery is outside established acceptance limits

P Duplicate analysis does not meet the acceptance criteria for precision

RPD Relative Percent Difference

Qual Qualifers

-RE Denotes sample was re-analyzed

LOD Limit of Detection

BLOD Below Limit of Detection

LOQ Limit of Quantitation

DF Dilution Factor

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.

PCBs, Total Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.



#### 1941 REYMET ROAD RICHMOND, VIRGINIA 23237 (804) 358-8295 PHONE (804)358-8297 FAX

#### **CHAIN OF CUSTODY**

PAGE 1 OF 1

		We-reserve the second of the s		PAGE TOFT
COMPANY NAME: SCS Engineers	INVOICE TO:	SAME	PROJECT NAME/Quote #:	
CONTACT: Jennifer Robb	INVOICE CONTACT:		SITE NAME: City of Bristol Lan	ndfill
ADDRESS: 11260 Roger Bacon Drive,	INVOICE ADDRESS:		PROJECT NUMBER: 02218208.1	5 Task 1
Ste. 300, Reston VA 20190	INVOICE PHONE #:		P.O. #:	
PHONE #: 703-471-6150 EMAIL: iro	bb@scsengineers.com		Pretreatment Program:	
Is sample for compliance reporting? YES NO Regul	atory State: V A Is sample	e from a chlorinated supp	oly? YES NO PWS I.D. #:	
SAMPLER NAME (PRINT): LOGAN HWAR WILL	SAMPLER SIGNA	TURE: Ann Llan	twill for Turn Around Tir	me: 10 Day(s)
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drin	king Water S=Soil/Solids OR=Organic	A=Air WP=Wipe OT=Other	/	COMMENTS
<u>(§</u>		ANAL	YSIS / (PRESERVATIVE)	Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid
Grab Composite Field Filtered (Dissolved Metals)	Stop			H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium
2		3F 11	Zd, Zd, Zn)	Thiosulfate M=Methanol
te se la la la la la la la la la la la la la	osii te	S  2   2   5   5   5   5   5   5   5   5	SM22 450-NO3F- (Anthracene) 8270  Metals (As, Ba, Cd, Pb, Ni, Se, Ag, Zn  ry - 7470  Recoverable lics - 9065  Acids (See List) 8015 (See List) 8260	S comple
CHENT CAMPLETD     SS O	Date Date	es)	SM22 450-NO (Anthracene) 8;  Aetals (As, Ba, Pb, Ni, Se, Ag, ry - 7470 Recoverable lics - 9065 Acids (See List) 80 (See List) 8260	VOLS unpresent
CLIENT SAMPLE I.D.	or Stop I	od PA	122 450 thracen als (As, , Ni, Se, 7470 overabl s - 9065 Is (See List) 8	VOUS UN
		4 2 2 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	1/22 / 1/22 alls over 6 L 6 L 6 L 6 L	
site	ate are ime ime ime	SM SM SI	SN (An Inch Inch Inch Inch Inch Inch Inch Inc	
		ate	S Itt	PLEASE NOTE PRESERVATIVE(S).
Grab Composite Field Filtered (Dissolv Composite Start Date	Grab Date or Composite Stop Date Grab Time or Composite Time	Matrix (See Codes)  Number of Containers  Ammonia - EPA 350.1  BOD - SM22 5210B-2021  COD - SM22 5220D-2011  Nitrate SM22 450-NO3F-2011	Nitrite SM22 450-NO3F-2011 SVOC (Anthracene) 8270 Total Metals (As, Ba, Cd, Cr, Cu, Pb, Ni, Se, Ag, Zn) 6010 Mercury - 7470 Total Recoverable Phenolics - 9065 V. Fatty Acids (See List) 8015 VOCs (See List) 8260	INTERFERENCE CHECKS or PUMP RATE (L/min)
1) EW-82		w 12		TIATE (Emily)
2) EW-59	122022 1445			
3) EW-GO	122022 1560			14-
4) EW-68	122122 830			•
5) Ew-67	10001100	V 11		forgot Noz BARLE
6) Ew-67	1221221240	w 1 ×		
7)				
8)				
9)	(126,43(120)			
10) Trip gland   DATE / TIME   RECEIVED:	129781100 DATE / TIM	P 2	B USE ONLY Therm ID: 277 COO	LER TEMP Orl °C
HELINGUISHED: HELEIVED: 122122 300	LCW	Cus	tody Seals used and intact? ( N )	Received on ice? (Y/N)
RELINCOISHED: LCW DATE //TIME RECEIVED:	953 12/12/22 OBOT	E Level III	SCS-W 22L	1183
RELINQUISHED: DATE / TIME RECEIVED:	DATE / TIM		City of Bristol Landfills Solid	Wast
			Recd: 12/22/2022 Due: 01/09	0/2023 — Page 70 of 75

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# Sample Preservation Log

Order I	D	221	-11	8	3										Dat	e Per	forr	ned: _	12	-1:	12	2	2		_				Ana	alyst	Perfo	rming (	Check:	_	1	2			_			
		T	letal		Г	yani	de	1	Sulf		1	mmo			тк	N	T	Phos,	Tot	N	03+		1	DR		(8) P(	CB DV	8/508) V only	(52	SVC 25/8270	0/625)	CrV	1 * **	5	Pest/F (508 SVOC(	3) /		20	)			lics
Sample ID	Container ID	PH a	ved	Final pH		l as elved Other	Final pH	Г	H as celved Other	inal		H as celved Other	la l		H as celved Other	Final pH	Ri	pH as eceived	Final pH	Re-	H as ceived Other	Final pH	Re <2	pH as eceived	la	Re R	celved es. Cl		Re	elved es. Cl	final + or -	Received pH	Final pH	Re	pH as eceived	lual	Rec	as elved Other	1 =	Rec	as elved Other	Inal
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	B			-							П	5	-2	П	5	22	T				5	=2	T			Τ												5	-2			
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	2	101	qu	10													В	uffer S	ol'n	ID:									<b>-</b> 37													
L ID: _						-		Na	12SO	3 ID:	-	,					1	N NaC	H ID	:_									_ 51	N Na	OH: _											

Metals were received with pH = 9 HNO3 was added at 1124 on 22 December 2022 by YO in the Log-In room to bring pH= <2.

ΓED

12.0



# Sample Preservation Log

Order	ID_2	21	18	3											Dat	te Pe	rforn	ned:	1	1	LL	- 2	-1		_				Ar	alyst	Perf	orming	Check	:		0						
		T	leta		1	Cyani	de	Τ	Sulfi	de	1	Amm	onia		тк		F	Phos,	Tot	Т		NO2	1	DR	o	(8) P(	081/60 CB DV	cide 08/508 V only	) (	SVC 525/827	0/625)	1	/1 * **	T.	(50 SVOC	(525)		50				alss
Sample ID	Container ID	П	lved	la l	Rec	H as selved	Final pH	Re	H as celved	ina	Re	pH as ecelved	inal		pH as ecelved	lna	Re	oH as celved Other	Final pH	Re	Other	Final pH	Re	ocelved Other	la		celved es, Cl		R	es. Cl	fina + or	Received	Final pH	R	pH as eceived	Inal pH	Re 42	pH as ocelved Othe	ina	Rec	H as ceived Other	linal
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OH ID	:							Н	NO3	ID:	ZL	02	57	6				rVI pr											_ /	nalys	st Init	ials:								£		
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1/6/2023 8:58:55AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

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1/6/2023 8:58:55AM

Date Issued:

#### **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Laboratory Order ID: 22L1183

#### **Sample Conditions Checklist**

Samples Received at:	0.10°C
How were samples received?	Logistics Courier
Were Custody Seals used? If so, were they received intact?	Yes
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	No
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?	Yes
Are all volatile organic and TOX containers free of headspace?	Yes
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.	Yes
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	No

The COC indicated the sample matrix for samples as Wastewater. However, the analysis requested are for the Groundwater method. The sample matrix has been logged as Non-potable water.

Sample -04L bottle label name "A-22DD" differs from the COC(EW-68). The sample



#### **Certificate of Analysis**

Client Name: SCS Engineers-Winchester Date Issued: 1/6/2023 8:58:55AM

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

has been logged and labeled as per the COC.

The lab received an extra sample set ("EW-57" 12/21/22 1205) that is not indicated

on the COC. The sample has been logged and labeled.

Samples -01B:EW-52, -01F:EW-52, -02B:EW-59, -02F:EW-59, -03B:EW-60, -03F:EW-60, -04B:EW-68, -04F:EW-68, -01E:EW-67, -01L:EW-67, -07B:EW-57, -07F:EW-57 were received with a pH of 5 and H2SO4 was added to bring the pH to

<2.

Jennifer Robb notified via email

YO 22 DEC 2022 1325





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

#### **Certificate of Analysis**

DRAFT REPORT

Laboratory Order ID 22L1241

Client Name: SCS Engineers-Winchester

296 Victory Road

Winchester, VA 22602

Submitted To: Jennifer Robb

Client Site I.D.: City of Bristol Landfills

Date Received:

December 23, 2022 8:00

Date Issued:

January 6, 2023 9:01

Project Number:

02218208.15 Task 1

Purchase Order:

Enclosed are the results of analyses for samples received by the laboratory on 12/23/2022 08:00. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

#### 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.

This report shall not be reproduced except in full without the expressed and written approval of an authorized representative of Enthalpy Analytical.



Date Issued:

1/6/2023 9:01:22AM

#### **Analysis Detects Report**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site ID:

**Laboratory Sample ID:** Client Sample ID: **EW-50** 22L1241-01 Dil. Parameter LOQ Factor Units Reference Method Sample Results LOD Samp ID Qual 01 SW6010D 1.02 0.0200 0.0400 Arsenic 1 mg/L 01 SW6010D 0.566 0.0100 0.0200 Barium 1 mg/L Chromium 01 SW6010D 0.503 0.0160 0.0200 1 mg/L SW7470A 0.00040 0.00040 Mercury 01 0.00051 1 mg/L 0.1722 Nickel 01 SW6010D 0.0140 0.0200 mg/L 0.208 0.0200 Zinc 01 SW6010D 0.0200 1 mg/L SW8260D 2-Butanone (MEK) 01 3140 30.0 100 10 ug/L 01RE1 SW8260D 8500 1750 2500 250 Acetone ug/L 01 SW8260D 301 4.00 10.0 10 Benzene ug/L Ethylbenzene 01 SW8260D 67.3 4.00 10.0 10 ug/L 01 SW8260D 151 100 100 Tetrahydrofuran 10 ug/L Toluene 01 SW8260D 122 5.00 10.0 10 ug/L Xylenes, Total 01 SW8260D 161 10.0 30.0 10 ug/L Ammonia as N 01 EPA350.1 R2.0 1700 100 100 1000 mg/L 01 0.2 2.0 BOD SM22 5210B-2011 6440 1 mg/L COD 01 SM22 5220D-2011 7440 1000 1000 100 mg/L Nitrate+Nitrite as N 01RE2 SM22 4500-NO3F-2011 0.32 0.10 1 0.10 mg/L TKN as N 01 EPA351.2 R2.0 1510 200 500 1000 mg/L Total Recoverable Phenolics 01 SW9065 24.9 1.50 2.50 1 mg/L

Note that this report is not the "Certificate of Analysis". This report only lists the target analytes that displayed concentrations that exceeded the detection limit specified for that analyte. For a complete listing of all analytes requested and the results of the analysis see the "Certificate of Analysis".



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

# ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
EW-50	22L1241-01	Non-Potable Water	12/21/2022 16:05	12/23/2022 08:00
Trip Blank	22L1241-02	Non-Potable Water	11/14/2022 16:10	12/23/2022 08:00



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: EW-50 Laboratory Sample ID: 22L1241-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Metals (Total) by EPA 6000/7000 Serie	s Methods											
Silver	01	7440-22-4	SW6010D	12/27/2022 10:00	12/28/2022 15:46	BLOD		0.0100	0.0200	1	mg/L	AB
Arsenic	01	7440-38-2	SW6010D	12/27/2022 10:00	12/28/2022 15:46	1.02		0.0200	0.0400	1	mg/L	AB
Barium	01	7440-39-3	SW6010D	12/27/2022 10:00	12/28/2022 15:46	0.566		0.0100	0.0200	1	mg/L	AB
Cadmium	01	7440-43-9	SW6010D	12/27/2022 10:00	12/28/2022 15:46	BLOD		0.0040	0.0080	1	mg/L	AB
Chromium	01	7440-47-3	SW6010D	12/27/2022 10:00	12/28/2022 15:46	0.503		0.0160	0.0200	1	mg/L	AB
Copper	01	7440-50-8	SW6010D	12/27/2022 10:00	12/28/2022 15:46	BLOD		0.0160	0.0200	1	mg/L	AB
Mercury	01	7439-97-6	SW7470A	12/28/2022 08:55	12/28/2022 15:42	0.00051		0.00040	0.00040	1	mg/L	ACM
Nickel	01	7440-02-0	SW6010D	12/27/2022 10:00	12/28/2022 15:46	0.1722		0.0140	0.0200	1	mg/L	AB
Lead	01	7439-92-1	SW6010D	12/27/2022 10:00	12/28/2022 15:46	BLOD		0.0120	0.0200	1	mg/L	AB
Selenium	01	7782-49-2	SW6010D	12/27/2022 10:00	12/28/2022 15:46	BLOD		0.0800	0.100	1	mg/L	AB
Zinc	01	7440-66-6	SW6010D	12/27/2022 10:00	12/28/2022 15:46	0.208		0.0200	0.0200	1	mg/L	AB
Volatile Organic Compounds by GCM	s											
2-Butanone (MEK)	01	78-93-3	SW8260D	12/23/2022 15:04	12/23/2022 15:04	3140		30.0	100	10	ug/L	RJB
Acetone	01RE1	67-64-1	SW8260D	12/23/2022 15:28	12/23/2022 15:28	8500		1750	2500	250	ug/L	RJB
Benzene	01	71-43-2	SW8260D	12/23/2022 15:04	12/23/2022 15:04	301		4.00	10.0	10	ug/L	RJB
Ethylbenzene	01	100-41-4	SW8260D	12/23/2022 15:04	12/23/2022 15:04	67.3		4.00	10.0	10	ug/L	RJB
Toluene	01	108-88-3	SW8260D	12/23/2022 15:04	12/23/2022 15:04	122		5.00	10.0	10	ug/L	RJB
Xylenes, Total	01	1330-20-7	SW8260D	12/23/2022 15:04	12/23/2022 15:04	161		10.0	30.0	10	ug/L	RJB
Tetrahydrofuran	01	109-99-9	SW8260D	12/23/2022 15:04	12/23/2022 15:04	151		100	100	10	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	01	82.9	% 70-120	12/23/2022 1	5:04 12/23/2022 15	5:04						
Surr: 4-Bromofluorobenzene (Surr)	01	94.5	% 75-120	12/23/2022 1	5:04 12/23/2022 15	5:04						
Surr: Dibromofluoromethane (Surr)	01	80.2	% 70-130	12/23/2022 1	5:04 12/23/2022 15	5:04						
Surr: Toluene-d8 (Surr)	01	97.4	% 70-130	12/23/2022 1	5:04 12/23/2022 15	5:04						
Surr: 1,2-Dichloroethane-d4 (Surr)	01RE1	83.5	% 70-120	12/23/2022 1	5:28 12/23/2022 15	5:28						
Surr: 4-Bromofluorobenzene (Surr)	01RE1	94.6	% 75-120	12/23/2022 1	5:28 12/23/2022 15	5:28						



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Date Issued:

1/6/2023 9:01:22AM

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Client Sample ID: EW-50 Laboratory Sample ID: 22L1241-01

Parameter	Samp ID	CAS	Refer Met		Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS	}												
Surr: Dibromofluoromethane (Surr) Surr: Toluene-d8 (Surr)	01RE1 01RE1	81.1 97.7		70-130 70-130	12/23/2022 15:2 12/23/2022 15:2								
Semivolatile Organic Compounds by G	CMS												
Anthracene	01	120-12-7	SW8	270E	12/27/2022 09:30	12/27/2022 23:25	BLOD		485	971	50	ug/L	MGG
Surr: 2,4,6-Tribromophenol (Surr)	01		%	5-136	12/27/2022 09:3	30 12/27/2022 23:	25						
Surr: 2-Fluorobiphenyl (Surr)	01	32.0	%	9-117	12/27/2022 09:3	30 12/27/2022 23:	25						
Surr: 2-Fluorophenol (Surr)	01	22.0	%	5-60	12/27/2022 09:3	30 12/27/2022 23:	25						
Surr: Nitrobenzene-d5 (Surr)	01	50.0	%	5-151	12/27/2022 09:3	30 12/27/2022 23:	25						
Surr: Phenol-d5 (Surr)	01	31.0	%	5-60	12/27/2022 09:3	30 12/27/2022 23:	25						
Surr: p-Terphenyl-d14 (Surr)	01	26.0	%	5-141	12/27/2022 09:3	30 12/27/2022 23:	25						



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Jennifer Robb

-Winchester Date Issued: 1/6/2023 9:01:22AM

Client Site I.D.: City of Bristol Landfills

Submitted To:

Client Sample ID: EW-50 Laboratory Sample ID: 22L1241-01

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Wet Chemistry Analysis												
Ammonia as N	01	7664-41-7	EPA350.1 R2.0	12/27/2022 13:12	12/28/2022 10:42	1700		100	100	1000	mg/L	MKS
BOD	01	E1640606	SM22 5210B-2011	12/23/2022 13:01	12/23/2022 13:01	6440		0.2	2.0	1	mg/L	LAM
COD	01	NA	SM22 5220D-2011	01/03/2023 16:04	01/03/2023 16:04	7440		1000	1000	100	mg/L	MGC
Nitrate as N	01	14797-55-8	Calc.	12/28/2022 13:56	12/28/2022 13:56	BLOD		1.10	5.10	100	mg/L	MGC
Nitrate+Nitrite as N	01RE2	E701177	SM22 4500-NO3F- 2011	12/28/2022 13:56	12/28/2022 13:56	0.32		0.10	0.10	1	mg/L	MGC
Nitrite as N	01	14797-65-0	SM22 4500-NO2B- 2011	12/23/2022 10:45	12/23/2022 16:17	BLOD		1.00	5.00	100	mg/L	LTN
Total Recoverable Phenolics	01	NA	SW9065	12/29/2022 09:30	12/29/2022 13:30	24.9		1.50	2.50	1	mg/L	MKS
TKN as N	01	E17148461	EPA351.2 R2.0	12/29/2022 10:36	12/29/2022 10:36	1510		200	500	1000	mg/L	MJRL



Date Issued:

1/6/2023 9:01:22AM

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Client Sample ID: Trip Blank Laboratory Sample ID: 22L1241-02

Parameter	Samp ID	CAS	Reference Method	Sample Prep Date/Time	Analyzed Date/Time	Sample Results	Qual	LOD	LOQ	DF	Units	Analyst
Volatile Organic Compounds by GCMS	i e											
2-Butanone (MEK)	02	78-93-3	SW8260D	12/23/2022 13:26	12/23/2022 13:26	BLOD		3.00	10.0	1	ug/L	RJB
Acetone	02	67-64-1	SW8260D	12/23/2022 13:26	12/23/2022 13:26	BLOD		7.00	10.0	1	ug/L	RJB
Benzene	02	71-43-2	SW8260D	12/23/2022 13:26	12/23/2022 13:26	BLOD		0.40	1.00	1	ug/L	RJB
Ethylbenzene	02	100-41-4	SW8260D	12/23/2022 13:26	12/23/2022 13:26	BLOD		0.40	1.00	1	ug/L	RJB
Toluene	02	108-88-3	SW8260D	12/23/2022 13:26	12/23/2022 13:26	BLOD		0.50	1.00	1	ug/L	RJB
Xylenes, Total	02	1330-20-7	SW8260D	12/23/2022 13:26	12/23/2022 13:26	BLOD		1.00	3.00	1	ug/L	RJB
Tetrahydrofuran	02	109-99-9	SW8260D	12/23/2022 13:26	12/23/2022 13:26	BLOD		10.0	10.0	1	ug/L	RJB
Surr: 1,2-Dichloroethane-d4 (Surr)	02	84.9	% 70-120	12/23/2022 13	3:26 12/23/2022 13:2	26						
Surr: 4-Bromofluorobenzene (Surr)	02	88.4	% 75-120	12/23/2022 13	3:26 12/23/2022 13:2	26						
Surr: Dibromofluoromethane (Surr)	02	83.6	% 70-130	12/23/2022 13	3:26 12/23/2022 13:2	26						
Surr: Toluene-d8 (Surr)	02	101	% 70-130	12/23/2022 13	3:26 12/23/2022 13:2	26						



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Metals (Total) by EPA 6000/7000 Series Methods - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Bat	ch BFL0966 - EPA20	0.2/R2.8								
Blank (BFL0966-BLK1)				Prepared: 12/27/	/2022 Analyzed:	12/28/2022				
Arsenic	ND	0.0400	mg/L							
Barium	ND	0.0200	mg/L							
Cadmium	ND	0.0080	mg/L							
Chromium	ND	0.0200	mg/L							
Copper	ND	0.0200	mg/L							
Lead	ND	0.0200	mg/L							
Nickel	ND	0.0200	mg/L							
Selenium	ND	0.100	mg/L							
Silver	ND	0.0200	mg/L							
Zinc	ND	0.0200	mg/L							
LCS (BFL0966-BS1)				Prepared: 12/27/	2022 Analyzed:	12/28/2022				
Arsenic	1.06	0.0400	mg/L	1.00		106	80-120			
Barium	1.05	0.0200	mg/L	1.00		105	80-120			
Cadmium	1.09	0.0080	mg/L	1.00		109	80-120			
Chromium	1.08	0.0200	mg/L	1.00		108	80-120			
Copper	1.06	0.0200	mg/L	1.00		106	80-120			
Lead	1.03	0.0200	mg/L	1.00		103	80-120			
Nickel	1.083	0.0200	mg/L	1.00		108	80-120			
Selenium	1.02	0.100	mg/L	1.00		102	80-120			
Silver	0.192	0.0200	mg/L	0.200		96.1	80-120			
Zinc	1.08	0.0200	mg/L	1.00		108	80-120			
Matrix Spike (BFL0966-MS1)	Sour	ce: 22L1183-04	1	Prepared: 12/27/	/2022 Analyzed:	12/28/2022				
Arsenic	1.80	0.0400	mg/L	1.00	0.574	122	75-125			
Barium	1.83	0.0200	mg/L	1.00	0.793	104	75-125			



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Metals (Total) by EPA 6000/7000 Series Methods - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	BFL0966 - EPA2	00.2/R2.8								
Matrix Spike (BFL0966-MS1)	Sou	rce: 22L1183-0	4	Prepared: 12/27	/2022 Analyzed: 1	12/28/2022				
Cadmium	1.12	0.0080	mg/L	1.00	BLOD	112	75-125			
Chromium	1.90	0.0200	mg/L	1.00	0.822	108	75-125			
Copper	1.06	0.0200	mg/L	1.00	BLOD	106	75-125			
Lead	1.01	0.0200	mg/L	1.00	BLOD	101	75-125			
Nickel	1.439	0.0200	mg/L	1.00	0.3460	109	75-125			
Selenium	0.551	0.100	mg/L	1.00	BLOD	55.1	75-125			M
Silver	0.0329	0.0200	mg/L	0.200	BLOD	16.4	75-125			M
Zinc	1.42	0.0200	mg/L	1.00	0.286	114	75-125			
Matrix Spike Dup (BFL0966-MSD1)	Sou	rce: 22L1183-0	4	Prepared: 12/27	/2022 Analyzed: 1	12/28/2022				
Arsenic	1.77	0.0400	mg/L	1.00	0.574	119	75-125	1.64	20	
Barium	1.86	0.0200	mg/L	1.00	0.793	107	75-125	1.81	20	
Cadmium	1.09	0.0080	mg/L	1.00	BLOD	109	75-125	2.61	20	
Chromium	1.95	0.0200	mg/L	1.00	0.822	113	75-125	2.65	20	
Copper	1.04	0.0200	mg/L	1.00	BLOD	104	75-125	2.20	20	
Lead	0.994	0.0200	mg/L	1.00	BLOD	99.4	75-125	2.00	20	
Nickel	1.424	0.0200	mg/L	1.00	0.3460	108	75-125	1.02	20	
Selenium	0.969	0.100	mg/L	1.00	BLOD	96.9	75-125	55.1	20	Р
Silver	0.196	0.0200	mg/L	0.200	BLOD	97.8	75-125	142	20	Р
Zinc	1.40	0.0200	mg/L	1.00	0.286	112	75-125	1.28	20	
Batch	BFL1016 - SW74	70A								
Blank (BFL1016-BLK1)				Prepared & Anal	yzed: 12/28/2022					
Mercury	ND	0.00020	mg/L							
_CS (BFL1016-BS1)				Prepared & Anal	vzed: 12/28/2022					



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Date Issued:

1/6/2023 9:01:22AM

Metals (Total) by EPA 6000/7000 Series Methods - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	n BFL1016 - SW74	70A								
LCS (BFL1016-BS1)				Prepared & Analy	zed: 12/28/2022					
Mercury	0.00233	0.00020	mg/L	0.00250		93.2	80-120			
Matrix Spike (BFL1016-MS1)	Sou	rce: 22L0995-04	4	Prepared & Analy	zed: 12/28/2022					
Mercury	0.00227	0.00020	mg/L	0.00250	BLOD	90.6	80-120			
Matrix Spike Dup (BFL1016-MSD1)	Sou	rce: 22L0995-04	4	Prepared & Analy	zed: 12/28/2022					
Mercury	0.00212	0.00020	mg/L	0.00250	BLOD	85.0	80-120	6.44	20	



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0941 - SW503	0B-MS								
Blank (BFL0941-BLK1)				Prepared & Anal	yzed: 12/23/2022					
2-Butanone (MEK)	ND	10.0	ug/L							
Acetone	ND	10.0	ug/L							
Benzene	ND	1.00	ug/L							
Ethylbenzene	ND	1.00	ug/L							
Toluene	ND	1.00	ug/L							
Xylenes, Total	ND	3.00	ug/L							
Surr: 1,2-Dichloroethane-d4 (Surr)	44.0		ug/L	50.0		87.9	70-120			
Surr: 4-Bromofluorobenzene (Surr)	47.7		ug/L	50.0		95. <i>4</i>	75-120			
Surr: Dibromofluoromethane (Surr)	42.2		ug/L	50.0		84.3	70-130			
Surr: Toluene-d8 (Surr)	48.2		ug/L	50.0		96. <i>4</i>	70-130			
LCS (BFL0941-BS1)				Prepared & Anal	yzed: 12/23/2022	!				
1,1,1,2-Tetrachloroethane	48.6	0.4	ug/L	50.0		97.1	80-130			
1,1,1-Trichloroethane	42.7	1	ug/L	50.0		85.4	65-130			
1,1,2,2-Tetrachloroethane	45.0	0.4	ug/L	50.0		89.9	65-130			
1,1,2-Trichloroethane	49.6	1	ug/L	50.0		99.2	75-125			
1,1-Dichloroethane	42.3	1	ug/L	50.0		84.5	70-135			
1,1-Dichloroethylene	36.8	1	ug/L	50.0		73.6	70-130			
1,1-Dichloropropene	40.4	1	ug/L	50.0		80.8	75-135			
1,2,3-Trichlorobenzene	46.1	1	ug/L	50.0		92.2	55-140			
1,2,3-Trichloropropane	45.8	1	ug/L	50.0		91.6	75-125			
1,2,4-Trichlorobenzene	49.6	1	ug/L	50.0		99.3	65-135			
1,2,4-Trimethylbenzene	44.2	1	ug/L	50.0		88.5	75-130			
1,2-Dibromo-3-chloropropane (DBCP)	49.6	1	ug/L	50.0		99.2	50-130			
1,2-Dibromoethane (EDB)	46.9	1	ug/L	50.0		93.9	80-120			



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batc	h BFL0941 - SW503	DB-MS								
LCS (BFL0941-BS1)			F	repared & Anal	zed: 12/23/2022					
1,2-Dichlorobenzene	45.6	0.5	ug/L	50.0		91.3	70-120			
1,2-Dichloroethane	37.6	1	ug/L	50.0		75.3	70-130			
1,2-Dichloropropane	48.1	0.5	ug/L	50.0		96.2	75-125			
1,3,5-Trimethylbenzene	44.5	1	ug/L	50.0		89.0	75-125			
1,3-Dichlorobenzene	45.6	1	ug/L	50.0		91.2	75-125			
1,3-Dichloropropane	46.4	1	ug/L	50.0		92.7	75-125			
1,4-Dichlorobenzene	45.7	1	ug/L	50.0		91.4	75-125			
2,2-Dichloropropane	42.2	1	ug/L	50.0		84.4	70-135			
2-Butanone (MEK)	44.0	10	ug/L	50.0		88.0	30-150			
2-Chlorotoluene	48.4	1	ug/L	50.0		96.8	75-125			
2-Hexanone (MBK)	45.3	5	ug/L	50.0		90.5	55-130			
4-Chlorotoluene	46.1	1	ug/L	50.0		92.2	75-130			
4-Isopropyltoluene	43.6	1	ug/L	50.0		87.2	75-130			
4-Methyl-2-pentanone (MIBK)	49.3	5	ug/L	50.0		98.6	60-135			
Acetone	45.9	10	ug/L	50.0		91.8	40-140			
Benzene	47.4	1	ug/L	50.0		94.8	80-120			
Bromobenzene	47.0	1	ug/L	50.0		94.1	75-125			
Bromochloromethane	44.2	1	ug/L	50.0		88.5	65-130			
Bromodichloromethane	52.3	0.5	ug/L	50.0		105	75-120			
Bromoform	49.4	1	ug/L	50.0		98.9	70-130			
Bromomethane	28.0	1	ug/L	50.0		55.9	30-145			
Carbon disulfide	34.8	10	ug/L	50.0		69.6	35-160			
Carbon tetrachloride	48.0	1	ug/L	50.0		95.9	65-140			
Chlorobenzene	48.5	1	ug/L	50.0		97.0	80-120			
Chloroethane	41.7	1	ug/L	50.0		83.5	60-135			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Bat	ch BFL0941 - SW5030	B-MS								
LCS (BFL0941-BS1)			F	Prepared & Analy	yzed: 12/23/2022					
Chloroform	40.2	0.5	ug/L	50.0		80.5	65-135			
Chloromethane	43.5	1	ug/L	50.0		86.9	40-125			
cis-1,2-Dichloroethylene	41.0	1	ug/L	50.0		82.1	70-125			
cis-1,3-Dichloropropene	41.2	1	ug/L	50.0		82.4	70-130			
Dibromochloromethane	51.0	0.5	ug/L	50.0		102	60-135			
Dibromomethane	50.2	1	ug/L	50.0		100	75-125			
Dichlorodifluoromethane	51.2	1	ug/L	50.0		102	30-155			
Ethylbenzene	47.7	1	ug/L	50.0		95.3	75-125			
Hexachlorobutadiene	47.1	0.8	ug/L	50.0		94.2	50-140			
Isopropylbenzene	44.7	1	ug/L	50.0		89.3	75-125			
m+p-Xylenes	92.6	2	ug/L	100		92.6	75-130			
Methylene chloride	41.1	4	ug/L	50.0		82.3	55-140			
Methyl-t-butyl ether (MTBE)	43.8	1	ug/L	50.0		87.5	65-125			
Naphthalene	45.9	1	ug/L	50.0		91.7	55-140			
n-Butylbenzene	45.9	1	ug/L	50.0		91.9	70-135			
n-Propylbenzene	45.2	1	ug/L	50.0		90.3	70-130			
o-Xylene	47.8	1	ug/L	50.0		95.6	80-120			
sec-Butylbenzene	47.3	1	ug/L	50.0		94.7	70-125			
Styrene	44.0	1	ug/L	50.0		88.0	65-135			
tert-Butylbenzene	44.1	1	ug/L	50.0		88.2	70-130			
Tetrachloroethylene (PCE)	51.0	1	ug/L	50.0		102	45-150			
Toluene	47.1	1	ug/L	50.0		94.2	75-120			
trans-1,2-Dichloroethylene	39.8	1	ug/L	50.0		79.7	60-140			
trans-1,3-Dichloropropene	44.2	1	ug/L	50.0		88.3	55-140			
Trichloroethylene	47.2	1	ug/L	50.0		94.3	70-125			



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0941 - SW503	0B-MS								
LCS (BFL0941-BS1)				Prepared & Anal	yzed: 12/23/2022					
Trichlorofluoromethane	44.6	1	ug/L	50.0		89.1	60-145			
Vinyl chloride	46.7	0.5	ug/L	50.0		93.4	50-145			
Surr: 1,2-Dichloroethane-d4 (Surr)	39.8		ug/L	50.0		79.5	70-120			
Surr: 4-Bromofluorobenzene (Surr)	49.2		ug/L	50.0		98.4	75-120			
Surr: Dibromofluoromethane (Surr)	41.3		ug/L	50.0		82.6	70-130			
Surr: Toluene-d8 (Surr)	49.4		ug/L	50.0		98.8	70-130			
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022					
1,1,1,2-Tetrachloroethane	47.8	0.4	ug/L	50.0	BLOD	95.6	80-130			
1,1,1-Trichloroethane	42.4	1	ug/L	50.0	BLOD	84.9	65-130			
1,1,2,2-Tetrachloroethane	43.0	0.4	ug/L	50.0	BLOD	85.9	65-130			
1,1,2-Trichloroethane	48.7	1	ug/L	50.0	BLOD	97.3	75-125			
1,1-Dichloroethane	41.7	1	ug/L	50.0	BLOD	83.4	70-135			
1,1-Dichloroethylene	36.1	1	ug/L	50.0	BLOD	72.2	50-145			
1,1-Dichloropropene	39.5	1	ug/L	50.0	BLOD	79.0	75-135			
1,2,3-Trichlorobenzene	47.3	1	ug/L	50.0	BLOD	94.5	55-140			
1,2,3-Trichloropropane	43.6	1	ug/L	50.0	BLOD	87.3	75-125			
1,2,4-Trichlorobenzene	49.5	1	ug/L	50.0	BLOD	99.0	65-135			
1,2,4-Trimethylbenzene	44.3	1	ug/L	50.0	BLOD	88.6	75-130			
1,2-Dibromo-3-chloropropane (DBCP)	49.4	1	ug/L	50.0	BLOD	98.8	50-130			
1,2-Dibromoethane (EDB)	46.9	1	ug/L	50.0	BLOD	93.8	80-120			
1,2-Dichlorobenzene	45.9	0.5	ug/L	50.0	BLOD	91.7	70-120			
1,2-Dichloroethane	36.9	1	ug/L	50.0	BLOD	73.7	70-130			
1,2-Dichloropropane	47.9	0.5	ug/L	50.0	BLOD	95.8	75-125			
1,3,5-Trimethylbenzene	43.4	1	ug/L	50.0	BLOD	86.8	75-124			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	n BFL0941 - SW5030	B-MS								
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-01	1	Prepared & Analy	yzed: 12/23/2022					
1,3-Dichlorobenzene	45.7	1	ug/L	50.0	BLOD	91.5	75-125			
1,3-Dichloropropane	45.4	1	ug/L	50.0	BLOD	90.8	75-125			
1,4-Dichlorobenzene	45.9	1	ug/L	50.0	BLOD	91.8	75-125			
2,2-Dichloropropane	41.6	1	ug/L	50.0	BLOD	83.3	70-135			
2-Butanone (MEK)	52.6	10	ug/L	50.0	BLOD	105	30-150			
2-Chlorotoluene	47.9	1	ug/L	50.0	BLOD	95.8	75-125			
2-Hexanone (MBK)	43.4	5	ug/L	50.0	BLOD	86.8	55-130			
4-Chlorotoluene	45.7	1	ug/L	50.0	BLOD	91.4	75-130			
4-Isopropyltoluene	43.3	1	ug/L	50.0	BLOD	86.7	75-130			
4-Methyl-2-pentanone (MIBK)	46.6	5	ug/L	50.0	BLOD	93.1	60-135			
Acetone	40.8	10	ug/L	50.0	BLOD	81.6	40-140			
Benzene	46.4	1	ug/L	50.0	BLOD	92.8	80-120			
Bromobenzene	47.0	1	ug/L	50.0	BLOD	93.9	75-125			
Bromochloromethane	44.5	1	ug/L	50.0	BLOD	89.0	65-130			
Bromodichloromethane	51.2	0.5	ug/L	50.0	BLOD	102	75-136			
Bromoform	48.0	1	ug/L	50.0	BLOD	95.9	70-130			
Bromomethane	28.8	1	ug/L	50.0	BLOD	57.7	30-145			
Carbon disulfide	26.9	10	ug/L	50.0	BLOD	53.8	35-160			
Carbon tetrachloride	47.4	1	ug/L	50.0	BLOD	94.8	65-140			
Chlorobenzene	47.3	1	ug/L	50.0	BLOD	94.6	80-120			
Chloroethane	41.0	1	ug/L	50.0	BLOD	81.9	60-135			
Chloroform	39.8	0.5	ug/L	50.0	BLOD	79.5	65-135			
Chloromethane	42.1	1	ug/L	50.0	BLOD	84.2	40-125			
cis-1,2-Dichloroethylene	40.4	1	ug/L	50.0	BLOD	80.9	70-125			
cis-1,3-Dichloropropene	39.4	1	ug/L	50.0	BLOD	78.8	47-136			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch I	BFL0941 - SW5030	DB-MS								
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-0	1	Prepared & Anal	yzed: 12/23/2022					
Dibromochloromethane	50.2	0.5	ug/L	50.0	BLOD	100	60-135			
Dibromomethane	49.8	1	ug/L	50.0	BLOD	99.7	75-125			
Dichlorodifluoromethane	51.2	1	ug/L	50.0	BLOD	102	30-155			
Ethylbenzene	47.4	1	ug/L	50.0	BLOD	94.7	75-125			
Hexachlorobutadiene	46.8	0.8	ug/L	50.0	BLOD	93.5	50-140			
Isopropylbenzene	44.1	1	ug/L	50.0	BLOD	88.2	75-125			
m+p-Xylenes	90.8	2	ug/L	100	BLOD	90.8	75-130			
Methylene chloride	40.7	4	ug/L	50.0	BLOD	81.3	55-140			
Methyl-t-butyl ether (MTBE)	43.4	1	ug/L	50.0	BLOD	86.7	65-125			
Naphthalene	46.0	1	ug/L	50.0	BLOD	91.9	55-140			
n-Butylbenzene	45.5	1	ug/L	50.0	BLOD	91.0	70-135			
n-Propylbenzene	45.3	1	ug/L	50.0	BLOD	90.6	70-130			
o-Xylene	47.2	1	ug/L	50.0	BLOD	94.3	80-120			
sec-Butylbenzene	46.1	1	ug/L	50.0	BLOD	92.1	70-125			
Styrene	43.8	1	ug/L	50.0	BLOD	87.6	65-135			
tert-Butylbenzene	43.5	1	ug/L	50.0	BLOD	87.1	70-130			
Tetrachloroethylene (PCE)	48.6	1	ug/L	50.0	BLOD	97.3	51-231			
Toluene	47.2	1	ug/L	50.0	BLOD	94.4	75-120			
trans-1,2-Dichloroethylene	39.9	1	ug/L	50.0	BLOD	79.9	60-140			
trans-1,3-Dichloropropene	43.0	1	ug/L	50.0	BLOD	86.0	55-140			
Trichloroethylene	45.9	1	ug/L	50.0	BLOD	91.8	70-125			
Trichlorofluoromethane	43.5	1	ug/L	50.0	BLOD	87.0	60-145			
Vinyl chloride	45.7	0.5	ug/L	50.0	BLOD	91.5	50-145			
Surr: 1,2-Dichloroethane-d4 (Surr)	40.2		ug/L	50.0		80.4	70-120			
Surr: 4-Bromofluorobenzene (Surr)	49.4		ug/L	50.0		98.7	75-120			



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BF	L0941 - SW5030	OB-MS								
Matrix Spike (BFL0941-MS1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022					
Surr: Dibromofluoromethane (Surr)	40.4		ug/L	50.0		80.9	70-130			
Surr: Toluene-d8 (Surr)	48.7		ug/L	50.0		97.4	70-130			
Matrix Spike Dup (BFL0941-MSD1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022					
1,1,1,2-Tetrachloroethane	51.4	0.4	ug/L	50.0	BLOD	103	80-130	7.26	30	
1,1,1-Trichloroethane	43.9	1	ug/L	50.0	BLOD	87.7	65-130	3.31	30	
1,1,2,2-Tetrachloroethane	47.4	0.4	ug/L	50.0	BLOD	94.7	65-130	9.74	30	
1,1,2-Trichloroethane	52.9	1	ug/L	50.0	BLOD	106	75-125	8.35	30	
1,1-Dichloroethane	43.4	1	ug/L	50.0	BLOD	86.8	70-135	4.00	30	
1,1-Dichloroethylene	36.4	1	ug/L	50.0	BLOD	72.7	50-145	0.717	30	
1,1-Dichloropropene	40.1	1	ug/L	50.0	BLOD	80.2	75-135	1.51	30	
1,2,3-Trichlorobenzene	50.0	1	ug/L	50.0	BLOD	99.9	55-140	5.55	30	
1,2,3-Trichloropropane	48.3	1	ug/L	50.0	BLOD	96.5	75-125	10.1	30	
1,2,4-Trichlorobenzene	52.6	1	ug/L	50.0	BLOD	105	65-135	6.02	30	
1,2,4-Trimethylbenzene	46.0	1	ug/L	50.0	BLOD	91.9	75-130	3.72	30	
1,2-Dibromo-3-chloropropane (DBCP)	51.8	1	ug/L	50.0	BLOD	104	50-130	4.74	30	
1,2-Dibromoethane (EDB)	51.4	1	ug/L	50.0	BLOD	103	80-120	9.18	30	
1,2-Dichlorobenzene	48.8	0.5	ug/L	50.0	BLOD	97.5	70-120	6.09	30	
1,2-Dichloroethane	39.9	1	ug/L	50.0	BLOD	79.7	70-130	7.79	30	
1,2-Dichloropropane	50.7	0.5	ug/L	50.0	BLOD	101	75-125	5.62	30	
1,3,5-Trimethylbenzene	45.6	1	ug/L	50.0	BLOD	91.1	75-124	4.83	30	
1,3-Dichlorobenzene	48.1	1	ug/L	50.0	BLOD	96.1	75-125	4.99	30	
1,3-Dichloropropane	50.6	1	ug/L	50.0	BLOD	101	75-125	10.8	30	
1,4-Dichlorobenzene	47.6	1	ug/L	50.0	BLOD	95.1	75-125	3.57	30	
2,2-Dichloropropane	42.2	1	ug/L	50.0	BLOD	84.3	70-135	1.27	30	



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	BFL0941 - SW5030	B-MS								
Matrix Spike Dup (BFL0941-MSD1)	Sourc	e: 22L1132-0	1	Prepared & Analy	/zed: 12/23/2022					
2-Butanone (MEK)	43.7	10	ug/L	50.0	BLOD	87.4	30-150		30	
2-Chlorotoluene	49.5	1	ug/L	50.0	BLOD	99.0	75-125	3.33	30	
2-Hexanone (MBK)	42.3	5	ug/L	50.0	BLOD	84.5	55-130		30	
4-Chlorotoluene	48.9	1	ug/L	50.0	BLOD	97.8	75-130	6.72	30	
4-Isopropyltoluene	44.8	1	ug/L	50.0	BLOD	89.7	75-130	3.43	30	
4-Methyl-2-pentanone (MIBK)	46.3	5	ug/L	50.0	BLOD	92.6	60-135	0.603	30	
Acetone	37.7	10	ug/L	50.0	BLOD	75.3	40-140		30	
Benzene	49.1	1	ug/L	50.0	BLOD	98.2	80-120	5.70	30	
Bromobenzene	51.9	1	ug/L	50.0	BLOD	104	75-125	10.1	30	
Bromochloromethane	46.8	1	ug/L	50.0	BLOD	93.6	65-130	5.13	30	
Bromodichloromethane	55.1	0.5	ug/L	50.0	BLOD	110	75-136	7.38	30	
Bromoform	54.0	1	ug/L	50.0	BLOD	108	70-130	11.9	30	
Bromomethane	31.3	1	ug/L	50.0	BLOD	62.6	30-145	8.18	30	
Carbon disulfide	29.1	10	ug/L	50.0	BLOD	58.3	35-160		30	
Carbon tetrachloride	48.1	1	ug/L	50.0	BLOD	96.2	65-140	1.44	30	
Chlorobenzene	50.7	1	ug/L	50.0	BLOD	101	80-120	6.90	30	
Chloroethane	41.9	1	ug/L	50.0	BLOD	83.8	60-135	2.29	30	
Chloroform	41.4	0.5	ug/L	50.0	BLOD	82.8	65-135	4.09	30	
Chloromethane	44.4	1	ug/L	50.0	BLOD	88.9	40-125	5.46	30	
cis-1,2-Dichloroethylene	42.9	1	ug/L	50.0	BLOD	85.8	70-125	5.97	30	
cis-1,3-Dichloropropene	42.9	1	ug/L	50.0	BLOD	85.8	47-136	8.48	30	
Dibromochloromethane	54.1	0.5	ug/L	50.0	BLOD	108	60-135	7.50	30	
Dibromomethane	54.3	1	ug/L	50.0	BLOD	109	75-125	8.62	30	
Dichlorodifluoromethane	52.8	1	ug/L	50.0	BLOD	106	30-155	3.15	30	
Ethylbenzene	50.5	1	ug/L	50.0	BLOD	101	75-125	6.36	30	



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Volatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch B	SFL0941 - SW503	DB-MS								
Matrix Spike Dup (BFL0941-MSD1)	Sourc	e: 22L1132-01		Prepared & Anal	yzed: 12/23/2022					
Hexachlorobutadiene	49.5	0.8	ug/L	50.0	BLOD	99.0	50-140	5.63	30	
Isopropylbenzene	46.3	1	ug/L	50.0	BLOD	92.6	75-125	4.84	30	
m+p-Xylenes	98.5	2	ug/L	100	BLOD	98.5	75-130	8.15	30	
Methylene chloride	41.9	4	ug/L	50.0	BLOD	83.8	55-140		30	
Methyl-t-butyl ether (MTBE)	46.4	1	ug/L	50.0	BLOD	92.7	65-125	6.66	30	
Naphthalene	50.5	1	ug/L	50.0	BLOD	101	55-140	9.31	30	
n-Butylbenzene	47.0	1	ug/L	50.0	BLOD	94.1	70-135	3.31	30	
n-Propylbenzene	46.8	1	ug/L	50.0	BLOD	93.5	70-130	3.17	30	
o-Xylene	50.6	1	ug/L	50.0	BLOD	101	80-120	7.02	30	
sec-Butylbenzene	48.9	1	ug/L	50.0	BLOD	97.9	70-125	6.02	30	
Styrene	47.2	1	ug/L	50.0	BLOD	94.4	65-135	7.43	30	
tert-Butylbenzene	45.7	1	ug/L	50.0	BLOD	91.4	70-130	4.86	30	
Tetrachloroethylene (PCE)	52.5	1	ug/L	50.0	BLOD	105	51-231	7.73	30	
Toluene	49.4	1	ug/L	50.0	BLOD	98.7	75-120	4.49	30	
trans-1,2-Dichloroethylene	40.1	1	ug/L	50.0	BLOD	80.3	60-140	0.500	30	
trans-1,3-Dichloropropene	45.6	1	ug/L	50.0	BLOD	91.1	55-140	5.85	30	
Trichloroethylene	48.1	1	ug/L	50.0	BLOD	96.3	70-125	4.72	30	
Trichlorofluoromethane	44.2	1	ug/L	50.0	BLOD	88.5	60-145	1.71	30	
Vinyl chloride	45.7	0.5	ug/L	50.0	BLOD	91.4	50-145	0.109	30	
Surr: 1,2-Dichloroethane-d4 (Surr)	40.6		ug/L	50.0		81.3	70-120			
Surr: 4-Bromofluorobenzene (Surr)	50.4		ug/L	50.0		101	75-120			
Surr: Dibromofluoromethane (Surr)	42.0		ug/L	50.0		83.9	70-130			
Surr: Toluene-d8 (Surr)	49.4		ug/L	50.0		98.8	70-130			



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

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Semivolatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch I	BFL0968 - SW351	0C/EPA600-	MS							
Blank (BFL0968-BLK1)			P	repared & Anal	yzed: 12/27/2022	2				
Anthracene	ND	10.0	ug/L							
Surr: 2,4,6-Tribromophenol (Surr)	55.6		ug/L	100		55.6	5-136			
Surr: 2-Fluorobiphenyl (Surr)	29.9		ug/L	50.0		59.8	9-117			
Surr: 2-Fluorophenol (Surr)	37.4		ug/L	100		37.4	5-60			
Surr: Nitrobenzene-d5 (Surr)	37.8		ug/L	50.0		75.6	5-151			
Surr: Phenol-d5 (Surr)	26.1		ug/L	100		26.1	5-60			
Surr: p-Terphenyl-d14 (Surr)	39.8		ug/L	50.0		79.6	5-141			
LCS (BFL0968-BS1)			P	repared & Anal	yzed: 12/27/2022	2				
1,2,4-Trichlorobenzene	15.0	10.0	ug/L	50.0		30.0	57-130			L
1,2-Dichlorobenzene	14.9	10.0	ug/L	50.0		29.7	22-115			
1,2-Diphenylhydrazine	ND	10.0	ug/L				70-130			
1,3-Dichlorobenzene	14.0	10.0	ug/L	50.0		28.0	22-112			
1,3-Dinitrobenzene	ND	2.50	ug/L				70-130			
1,4-Dichlorobenzene	14.0	10.0	ug/L	50.0		28.0	13-112			
2,3,4,6-Tetrachlorophenol	ND	10.0	ug/L				70-130			
2,4,6-Trichlorophenol	13.3	10.0	ug/L	50.0		26.6	52-129			L
2,4-Dichlorophenol	15.9	10.0	ug/L	50.0		31.9	53-122			L
2,4-Dimethylphenol	17.0	5.00	ug/L	50.0		34.0	42-120			L
2,4-Dinitrophenol	21.3	50.0	ug/L	50.0		42.6	48-127			L
2,4-Dinitrotoluene	18.9	10.0	ug/L	50.0		37.7	10-173			
2,6-Dichlorophenol	ND	10.0	ug/L				70-130			
2,6-Dinitrotoluene	15.4	10.0	ug/L	50.0		30.8	68-137			L
2-Chloronaphthalene	13.9	10.0	ug/L	50.0		27.8	65-120			L
2-Chlorophenol	16.2	10.0	ug/L	50.0		32.5	36-120			L



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

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Client Site I.D.:

Semivolatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	n BFL0968 - SW351	0C/EPA600-	-MS							
LCS (BFL0968-BS1)			F	Prepared & Anal	yzed: 12/27/2022					
2-Methylnaphthalene	ND	10.0	ug/L				25-105			
2-Nitrophenol	19.8	10.0	ug/L	50.0		39.5	45-167			L
3-Methylcholanthrene	ND	10.0	ug/L				70-130			
3-Nitroaniline	ND	20.0	ug/L				70-130			
4,6-Dinitro-2-methylphenol	25.0	50.0	ug/L	50.0		49.9	53-130			L
4-Aminobiphenyl	ND	10.0	ug/L				70-130			
4-Bromophenyl phenyl ether	13.6	10.0	ug/L	50.0		27.1	65-120			L
4-Chlorophenyl phenyl ether	12.1	10.0	ug/L	50.0		24.2	38-145			L
4-Nitrophenol	8.51	50.0	ug/L	50.0		17.0	13-129			
Acenaphthene	13.8	10.0	ug/L	50.0		27.5	60-132			L
Acenaphthylene	14.7	10.0	ug/L	50.0		29.3	54-126			L
Aniline	ND	50.0	ug/L				70-130			
Anthracene	18.2	10.0	ug/L	50.0		36.3	43-120			L
Benzo (a) anthracene	25.7	10.0	ug/L	50.0		51.4	42-133			
Benzo (a) pyrene	26.7	10.0	ug/L	50.0		53.4	32-148			
Benzo (b) fluoranthene	24.3	10.0	ug/L	50.0		48.6	42-140			
Benzo (g,h,i) perylene	24.4	10.0	ug/L	50.0		48.8	10-195			
Benzo (k) fluoranthene	25.6	10.0	ug/L	50.0		51.1	25-146			
Benzyl alcohol	ND	20.0	ug/L				70-130			
bis (2-Chloroethoxy) methane	15.9	10.0	ug/L	50.0		31.7	49-165			L
bis (2-Chloroethyl) ether	16.0	10.0	ug/L	50.0		32.0	43-126			L
2,2'-Oxybis (1-chloropropane)	15.7	10.0	ug/L	50.0		31.5	63-139			L
bis (2-Ethylhexyl) phthalate	30.1	10.0	ug/L	50.0		60.2	29-137			
Butyl benzyl phthalate	33.1	10.0	ug/L	50.0		66.1	10-140			
Chrysene	25.5	10.0	ug/L	50.0		51.0	44-140			



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# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

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Semivolatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Bato	ch BFL0968 - SW351	0C/EPA600-	-MS							
CS (BFL0968-BS1)			F	Prepared & Anal	yzed: 12/27/2022					
Dibenz (a,h) anthracene	27.2	10.0	ug/L	50.0		54.4	10-200			
Dibenzofuran	ND	5.00	ug/L				70-130			
Diethyl phthalate	16.2	10.0	ug/L	50.0		32.4	10-120			
Dimethyl phthalate	14.0	10.0	ug/L	50.0		28.0	10-120			
Di-n-butyl phthalate	23.2	10.0	ug/L	50.0		46.3	10-120			
Di-n-octyl phthalate	28.7	10.0	ug/L	50.0		57.3	19-132			
Ethyl methanesulfonate	ND	20.0	ug/L				70-130			
Fluoranthene	23.5	10.0	ug/L	50.0		47.1	43-121			
Fluorene	14.5	10.0	ug/L	50.0		29.0	70-120			L
Hexachlorobenzene	14.5	1.00	ug/L	50.0		29.0	10-142			
Hexachlorobutadiene	14.6	10.0	ug/L	50.0		29.3	38-120			L
Hexachlorocyclopentadiene	10.2	10.0	ug/L	50.0		20.4	10-76			
Hexachloroethane	14.3	10.0	ug/L	50.0		28.7	55-120			L
Indeno (1,2,3-cd) pyrene	27.2	10.0	ug/L	50.0		54.4	10-151			
Isophorone	8.30	10.0	ug/L	50.0		16.6	47-180			L
m+p-Cresols	ND	10.0	ug/L				40-110			
Methyl methanesulfonate	ND	10.0	ug/L				70-130			
Naphthalene	14.3	5.00	ug/L	50.0		28.6	36-120			L
Nitrobenzene	17.8	10.0	ug/L	50.0		35.5	54-158			
n-Nitrosodimethylamine	13.2	10.0	ug/L	50.0		26.4	10-85			
n-Nitrosodi-n-butylamine	ND	10.0	ug/L				70-130			
n-Nitrosodi-n-propylamine	16.4	10.0	ug/L	50.0		32.8	14-198			
n-Nitrosodiphenylamine	12.6	10.0	ug/L	50.0		25.1	12-97			
o+m+p-Cresols	ND	10.0	ug/L				40-110			
o-Cresol	ND	10.0	ug/L				40-110			



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# **Certificate of Analysis**

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City of Bristol Landfills

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Semivolatile Organic Compounds by GCMS - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch I	BFL0968 - SW351	0C/EPA600-	-MS							
LCS (BFL0968-BS1)			F	repared & Anal	yzed: 12/27/2022	)				
p-(Dimethylamino) azobenzene	ND	2.50	ug/L				70-130			
p-Chloro-m-cresol	14.9	10.0	ug/L	50.0		29.8	10-142			
Phenanthrene	18.4	10.0	ug/L	50.0		36.7	65-120			L
Phenol	7.88	10.0	ug/L	50.5		15.6	17-120			L
Pyrene	25.7	10.0	ug/L	50.0		51.5	70-120			L
Pyridine	13.2	10.0	ug/L	50.0		26.5	10-103			
Surr: 2,4,6-Tribromophenol (Surr)	27.1		ug/L	100		27.1	5-136			
Surr: 2-Fluorobiphenyl (Surr)	14.3		ug/L	50.0		28.7	9-117			
Surr: 2-Fluorophenol (Surr)	21.4		ug/L	100		21.4	5-60			
Surr: Nitrobenzene-d5 (Surr)	18.7		ug/L	50.0		37.4	5-151			
Surr: Phenol-d5 (Surr)	15.2		ug/L	100		15.2	5-60			
Surr: p-Terphenyl-d14 (Surr)	29.2		ug/L	50.0		<i>58.4</i>	5-141			



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

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Wet Chemistry Analysis - Quality Control

				Spike	Source		%REC		RPD	
Analyte	Result	LOQ	Units	Level	Result	%REC	Limits	RPD	Limit	Qual
	Potob PEL 0025 No Bron	Wat Cham								
	Batch BFL0935 - No Prep	wet Chem								
Blank (BFL0935-BLK1)				Prepared & Analy	/zed: 12/23/2022					
BOD	ND	2.0	mg/L							
LCS (BFL0935-BS1)				Prepared & Analy	/zed: 12/23/2022					
BOD	193	2	mg/L	198		97.5	84.6-115.4			
Duplicate (BFL0935-DUP1)	Prepared & Analy	/zed: 12/23/2022								
BOD	ND	2.0	mg/L		2.3			NA	20	
	Batch BFL0948 - No Prep	Wet Chem								
Blank (BFL0948-BLK1)				Prepared & Analy	/zed: 12/23/2022					
Nitrite as N	ND	0.05	mg/L							
LCS (BFL0948-BS1)				Prepared & Analy	/zed: 12/23/2022					
Nitrite as N	0.12	0.05	mg/L	0.100		116	80-120			
Matrix Spike (BFL0948-MS1)	Source	e: 22L1209-07	7	Prepared & Analy	/zed: 12/23/2022					
Nitrite as N	0.09	0.05	mg/L	0.100	BLOD	91.0	80-120			
Matrix Spike Dup (BFL0948-MSI	O1) Source	e: 22L1209-07	7	Prepared & Analy	/zed: 12/23/2022					
Nitrite as N	0.09	0.05	mg/L	0.100	BLOD	91.0	80-120	0.00	20	
	Batch BFL0977 - No Prep	Wet Chem								
Blank (BFL0977-BLK1)				Prepared: 12/27/	2022 Analyzed: 12	2/28/2022				
Ammonia as N	ND	0.10	mg/L							



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Wet Chemistry Analysis - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch	BFL0977 - No Prej	Wet Chem	l							
LCS (BFL0977-BS1)				Prepared: 12/27/	/2022 Analyzed: 1	12/28/2022				
Ammonia as N	2.02	0.1	mg/L	2.00		101	90-110			
Matrix Spike (BFL0977-MS1)	Sourc	e: 22L1077-0	5	Prepared: 12/27/	/2022 Analyzed: 1	12/28/2022				
Ammonia as N	2.15	0.10	mg/L	2.00	BLOD	108	89.3-131			
Matrix Spike (BFL0977-MS2)	Sourc	e: 22L1154-0	5	Prepared: 12/27/	/2022 Analyzed: ′	12/28/2022				
Ammonia as N	2.26	0.10	mg/L	2.00	BLOD	113	89.3-131			
Matrix Spike Dup (BFL0977-MSD1)	rix Spike Dup (BFL0977-MSD1) Source: 22L1077-05				/2022 Analyzed: ′	12/28/2022				
Ammonia as N	2.18	0.10	mg/L	2.00	BLOD	109	89.3-131	1.39	20	
Matrix Spike Dup (BFL0977-MSD2)	Sourc	e: 22L1154-0	5	Prepared: 12/27/2022 Analyzed: 12/28/2022						
Ammonia as N	2.16	0.10	mg/L	2.00	BLOD	108	89.3-131	4.52	20	
Batch	BFL1035 - No Prej	Wet Chem	l							
Blank (BFL1035-BLK1)				Prepared & Anal	yzed: 12/28/2022	)				
Nitrate+Nitrite as N	ND	0.10	mg/L		-					
LCS (BFL1035-BS1)				Prepared & Anal	yzed: 12/28/2022	!				
Nitrate+Nitrite as N	2.65	0.1	mg/L	2.50	-	106	90-110			
Matrix Spike (BFL1035-MS1)	Sourc	e: 22L1254-0	1	Prepared & Anal	yzed: 12/28/2022	!				
Nitrate+Nitrite as N	2.93	0.10	mg/L	2.50	0.13	112	90-110			М
Matrix Spike (BFL1035-MS2)	Sourc	e: 22L1290-0	1	Prepared & Anal	yzed: 12/28/2022	<u>.</u>				
Nitrate+Nitrite as N	3.53	0.10	mg/L	2.50	0.92	104	90-110			



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

Date Issued:

1/6/2023 9:01:22AM

Wet Chemistry Analysis - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch I	BFL1035 - No Pre	p Wet Chem								
Matrix Spike Dup (BFL1035-MSD1)	Source	ce: 22L1254-0	1	Prepared & Analy	yzed: 12/28/2022					
Nitrate+Nitrite as N	2.89	0.10	mg/L	2.50	0.13	110	90-110	1.37	20	M
Matrix Spike Dup (BFL1035-MSD2)	Source	e: 22L1290-0	1	Prepared & Analy	yzed: 12/28/2022					
Nitrate+Nitrite as N	3.54	0.10	mg/L	2.50	0.92	105	90-110	0.424	20	
Batch i	BFL1048 - No Pre	p Wet Chem								
Blank (BFL1048-BLK1)				Prepared & Analy	yzed: 12/29/2022					
TKN as N	ND	0.50	mg/L							
_CS (BFL1048-BS1)				Prepared & Analy	yzed: 12/29/2022					
TKN as N	10.3	0.50	mg/L	10.0		103	90-110			
Matrix Spike (BFL1048-MS1)	Source	e: 22L1324-0	1	Prepared & Analyzed: 12/29/2022						
TKN as N	9.96	0.50	mg/L	10.0	0.55	94.1	90-110			
Matrix Spike (BFL1048-MS2)	Source	ce: 22L1324-0	2	Prepared & Analy	Prepared & Analyzed: 12/29/2022					
TKN as N	9.55	0.50	mg/L	10.0	0.30	92.5	90-110			
Matrix Spike Dup (BFL1048-MSD1)	Source	e: 22L1324-0	1	Prepared & Analy	yzed: 12/29/2022					
TKN as N	10.4	0.50	mg/L	10.0	0.55	98.0	90-110	3.89	20	
Matrix Spike Dup (BFL1048-MSD2)	Source	e: 22L1324-0	2	Prepared & Analy	yzed: 12/29/2022					
TKN as N	9.73	0.50	mg/L	10.0	0.30	94.3	90-110	1.88	20	
Batch I	BFL1068 - No Pre	p Wet Chem								
Blank (BFL1068-BLK1)				Prepared & Analy	yzed: 12/29/2022					
Total Recoverable Phenolics	ND	0.050	mg/L							



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Wet Chemistry Analysis - Quality Control

Analyte	Result	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual	
Batch I	BFL1068 - No Pre	p Wet Chem									
LCS (BFL1068-BS1)				Prepared & Analy	yzed: 12/29/2022						
Total Recoverable Phenolics	0.49	0.050	mg/L	0.500		98.0	80-120				
Matrix Spike (BFL1068-MS1)	Sourc	ce: 22L1381-01		Prepared & Analy	yzed: 12/29/2022						
Total Recoverable Phenolics	0.53	0.050	mg/L	0.500	0.05	96.0	70-130				
latrix Spike Dup (BFL1068-MSD1) Source: 22L1381-01				Prepared & Analy	Prepared & Analyzed: 12/29/2022						
Total Recoverable Phenolics	0.51	0.050	mg/L	0.500	0.05	92.8	70-130	3.09	20		
Batch I	BGA0028 - No Pre	p Wet Chem									
Blank (BGA0028-BLK1)				Prepared & Analy	yzed: 01/03/2023						
COD	ND	10.0	mg/L								
LCS (BGA0028-BS1)				Prepared & Analy	yzed: 01/03/2023						
COD	49.0	10.0	mg/L	50.0		97.9	88-119				
Matrix Spike (BGA0028-MS1)	Sourc	ce: 22L1333-01		Prepared & Analyzed: 01/03/2023							
COD	48.3	10.0	mg/L	50.0	BLOD	96.5	72.4-130				
Matrix Spike Dup (BGA0028-MSD1)	Source	ce: 22L1333-01		Prepared & Analyzed: 01/03/2023							
COD	48.6	10.0	mg/L	50.0	BLOD	97.2	72.4-130	0.710	20		



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Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

**Analytical Summary** 

22L1241-01 Subcontract

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by EPA	A 6000/7000 Series Methods		Preparation Method:	EPA200.2/R2.8	
22L1241-01	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analy	/sis		Preparation Method:	No Prep Wet Chem	
22L1241-01	300 mL / 300 mL	SM22 5210B-2011	BFL0935	SFL0989	
22L1241-01	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0948	SFL0904	AJ20138
22L1241-01	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158
22L1241-01	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1241-01RE1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1241-01RE2	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
22L1241-01	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
22L1241-01	0.100 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
22L1241-01	2.00 mL / 2.00 mL	SM22 5220D-2011	BGA0028	SGA0038	AL20092
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Semivolatile Organic	Compounds by GCMS		Preparation Method:	SW3510C/EPA600-M	S
22L1241-01	1030 mL / 2.00 mL	SW8270E	BFL0968	SFL0965	AL20040
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Com	npounds by GCMS		Preparation Method:	SW5030B-MS	
22L1241-01	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010



1/6/2023 9:01:22AM

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Date Issued: City of Bristol Landfills

Jennifer Robb Submitted To:

Client Site I.D.:

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Con	npounds by GCMS		Preparation Method:	SW5030B-MS	
22L1241-01RE1	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
22L1241-02	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by EPA	A 6000/7000 Series Methods		Preparation Method:	SW7470A	
22L1241-01	10.0 mL / 20.0 mL	SW7470A	BFL1016	SFL1009	AL20166



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

**Preparation Factors** 

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

**QC Analytical Summary** 

			_		
				Date Issued: 1/6/2023	9:01:22AM

Sample ID	initial / Final	Method	Batch ID Sequence ID		Calibration ID	
Metals (Total) by EPA	6000/7000 Series Methods		Preparation Method:	EPA200.2/R2.8		
BFL0966-BLK1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157	
BFL0966-BS1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157	
BFL0966-MS1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157	
BFL0966-MSD1	25.0 mL / 50.0 mL	SW6010D	BFL0966	SFL0985	AL20157	
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID	
Wet Chemistry Analy	sis		Preparation Method:	No Prep Wet Chem		
BFL0935-BLK1	300 mL / 300 mL	SM22 5210B-2011	BFL0935	SFL0989		
BFL0935-BS1	300 mL / 300 mL	SM22 5210B-2011	BFL0935	SFL0989		
BFL0935-DUP1	300 mL / 300 mL	SM22 5210B-2011	BFL0935	SFL0989		
BFL0948-BLK1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0948	SFL0904	AJ20138	
BFL0948-BS1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0948	SFL0904	AJ20138	
BFL0948-MRL1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0948	SFL0904	AJ20138	
BFL0948-MS1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0948	SFL0904	AJ20138	
BFL0948-MSD1	25.0 mL / 25.0 mL	SM22 4500-NO2B-2011	BFL0948	SFL0904	AJ20138	
BFL0977-BLK1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158	
BFL0977-BS1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158	
BFL0977-MS1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158	
BFL0977-MS2	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158	
BFL0977-MSD1	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158	
BFL0977-MSD2	6.00 mL / 6.00 mL	EPA350.1 R2.0	BFL0977	SFL0970	AL20158	
BFL1035-BLK1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163	
BFL1035-BS1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163	



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Wet Chemistry Analy	ysis		Preparation Method:	No Prep Wet Chem	
BFL1035-MRL1	5.00 mL / 5.00 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MS1	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MS2	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MSD1	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1035-MSD2	10.0 mL / 10.0 mL	SM22 4500-NO3F-2011	BFL1035	SFL0996	AL20163
BFL1048-BLK1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-BS1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MRL1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MS1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MS2	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MSD1	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1048-MSD2	25.0 mL / 25.0 mL	EPA351.2 R2.0	BFL1048	SFL1019	AL20168
BFL1068-BLK1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-BS1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-MRL1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-MS1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BFL1068-MSD1	5.00 mL / 10.0 mL	SW9065	BFL1068	SFL1020	AL20103
BGA0028-BLK1	2.00 mL / 2.00 mL	SM22 5220D-2011	BGA0028	SGA0038	AL20092
BGA0028-BS1	2.00 mL / 2.00 mL	SM22 5220D-2011	BGA0028	SGA0038	AL20092
BGA0028-MRL1	2.00 mL / 2.00 mL	SM22 5220D-2011	BGA0028	SGA0038	AL20092
BGA0028-MS1	2.00 mL / 2.00 mL	SM22 5220D-2011	BGA0028	SGA0038	AL20092
BGA0028-MSD1	2.00 mL / 2.00 mL	SM22 5220D-2011	BGA0028	SGA0038	AL20092
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Semivolatile Organic	C Compounds by GCMS		Preparation Method:	SW3510C/EPA600-MS	 S
BFL0968-BLK1	1000 mL / 1.00 mL	SW8270E	BFL0968	SFL0965	AL20040
BFL0968-BS1	1000 mL / 1.00 mL	SW8270E	BFL0968	SFL0965	AL20040



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Date Issued: 1/6/2023 9:01:22AM

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Cor	mpounds by GCMS		Preparation Method:	SW5030B-MS	
BFL0941-BLK1	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-BLK2	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-BS1	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-BS2	5.00 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-MS1	0.250 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
BFL0941-MSD1	0.250 mL / 5.00 mL	SW8260D	BFL0941	SFL0911	AL20010
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Metals (Total) by EP	A 6000/7000 Series Methods		Preparation Method:	SW7470A	
BFL1016-BLK1	20.0 mL / 20.0 mL	SW7470A	BFL1016	SFL1009	AL20166
BFL1016-BS1	20.0 mL / 20.0 mL	SW7470A	BFL1016	SFL1009	AL20166
BFL1016-MS1	20.0 mL / 20.0 mL	SW7470A	BFL1016	SFL1009	AL20166
BFL1016-MSD1	20.0 mL / 20.0 mL	SW7470A	BFL1016	SFL1009	AL20166



# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Jennifer Robb Submitted To:

Date Issued: 1/6/2023 9:01:22AM

#### **Certified Analyses included in this Report**

Analyte	Certifications
EPA350.1 R2.0 in Non-Potable Water	
Ammonia as N	VELAP,NCDEQ,PADEP,WVDEP
EPA351.2 R2.0 in Non-Potable Water	
TKN as N	VELAP,NCDEQ,WVDEP
SM22 4500-NO2B-2011 in Non-Potable Water	
Nitrite as N	VELAP,WVDEP
SM22 4500-NO3F-2011 in Non-Potable Water	
Nitrate+Nitrite as N	VELAP,WVDEP
SM22 5210B-2011 in Non-Potable Water	
BOD	VELAP,NCDEQ,WVDEP
SM22 5220D-2011 in Non-Potable Water	
COD	VELAP,NCDEQ,PADEP,WVDEP
SW6010D in Non-Potable Water	
Arsenic	VELAP,WVDEP
Barium	VELAP,WVDEP,PADEP
Cadmium	VELAP,WVDEP,PADEP
Chromium	VELAP,WVDEP
Copper	VELAP,WVDEP
Lead	VELAP,WVDEP
Nickel	VELAP,WVDEP
Selenium	VELAP,WVDEP
Silver	VELAP,WVDEP,PADEP
Zinc	VELAP,WVDEP
SW7470A in Non-Potable Water	
Mercury	VELAP,NCDEQ,WVDEP



1/6/2023 9:01:22AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

City of Bristol Landfills

Submitted To: Jennifer Robb

Client Site I.D.:

## **Certified Analyses included in this Report**

Analyte Certifications SW8260D in Non-Potable Water 2-Butanone (MEK) VELAP, NCDEQ, PADEP, WVDEP Acetone VELAP,NCDEQ,PADEP,WVDEP VELAP,NCDEQ,PADEP,WVDEP Benzene Ethylbenzene VELAP,NCDEQ,PADEP,WVDEP Toluene VELAP,NCDEQ,PADEP,WVDEP Xylenes, Total VELAP, NCDEQ, PADEP, WVDEP Tetrahydrofuran **VELAP, PADEP** 

SW8270E in Non-Potable Water

Anthracene VELAP,PADEP,NCDEQ,WVDEP

SW9065 in Non-Potable Water

Total Recoverable Phenolics VELAP,WVDEP

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



1/6/2023 9:01:22AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

**Qualifiers and Definitions** 

J The reported result is an estimated value.

L LCS recovery is outside of established acceptance limits

M Matrix spike recovery is outside established acceptance limits

P Duplicate analysis does not meet the acceptance criteria for precision

RPD Relative Percent Difference

Qual Qualifers

-RE Denotes sample was re-analyzed

LOD Limit of Detection

BLOD Below Limit of Detection

LOQ Limit of Quantitation

DF Dilution Factor

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.

PCBs, Total Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.



## 1941 REYMET ROAD **RICHMOND, VIRGINIA 23237** (804) 358-8295 PHONE (804)358-8297 FAX

#### CHAIN OF CUSTODY

		01 0001001		PAGE 1 OF 1
COMPANY NAME: SCS Engineers	INVOICE TO:	SAME	PROJECT NAME/Quote #:	
CONTACT: Jennifer Robb	INVOICE CONTACT:	A	SITE NAME: City of Bristol Lan	ndfill
ADDRESS: 11260 Roger Bacon Drive,	INVOICE ADDRESS:		PROJECT NUMBER: 02218208.1	5 Task 1
Ste. 300, Reston VA 20190	INVOICE PHONE #:	#	P.O. #:	(
PHONE #: 703-471-6150	bb@scsengineers.com		Pretreatment Program:	
Is sample for compliance reporting? (YES) NO Regul	atory State: V A Is	sample from a chlorinated supp	oly? YES NO PWS I.D. #:	
SAMPLER NAME (PRINT): Will Fabric	SAMPLER S	SIGNATURE:	Turn Around Tir	me: 10 Day(s)
Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drin	king Water S=Soil/Solids OR=	Organic A=Air WP=Wipe OT=Other		COMMENTS
<u>(§)</u>		ANAL	YSIS / (PRESERVATIVE)	Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid
leta	Stop			H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium
<u>  2  </u>	9 9	)	3F- 270 Cd, , Zn)	Thiosulfate M=Methanol
	osit e	0.1   S   S   S   S   S   S   S   S   S	SM22 450-NO3F- (Anthracene) 8270  Metals (As, Ba, Cd, Pb, Ni, Se, Ag, Zn  ry - 7470  Recoverable lics - 9065  Acids (See List) 8015 (See List) 8260	sample VOCs unpreserved
OUENT CAMPLE ID	Date	Containers - EPA 350.1 22 5220D-20	SM22 450-NO (Anthracene) 8;  Metals (As, Ba, Pb, Ni, Se, Ag, ry - 7470  Recoverable lics - 9065 Acids (See List) 80 (See List) 8260	Sary
CLIENT SAMPLE I.D.	or Stop	PA Inta	(As Control (As Co	imprescrition
pg   3t   c		12 2 E E E E E E E E E E E E E E E E E E	122   14   15   15   15   15   15   15   15	
site   site   .	ate ate	Single See	SM Ant	
		te   -   -   -   -   -   -   -   -   -	S T T T T T T T T T T T T T T T T T T T	
Grab Composite Field Filtered (Dissolved Metals)	Grab Date or Composite Grab Time or Composite Time or Composite Time	Time Preserved  Matrix (See Codes)  Number of Containers  Ammonia - EPA 350.1  BOD - SM22 5210B-2021  COD - SM22 5220D-2011  Nitrate SM22 450-NO3F-	Nitrite SM22 450-NO3F 2011  SVOC (Anthracene) 827( Total Metals (As, Ba, Co Cr, Cu, Pb, Ni, Se, Ag, Zl 6010  Mercury - 7470  Total Recoverable Phenolics - 9065  V. Fatty Acids (See List) 8015  VOCs (See List) 8260	PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP
1) Ew -50 X	12/21/12 1605	WW 12	2001002113	RATE (L/min)
2) Tre Olank X	11/14/22 1610	DE 2	X	
3)	11/11/00 1010			
4)				
5)				
6)		1 100		277
7)				Sigled
8)				1 Ce
9)				5.4
10)				LER TEMP °C
RELINQUISHED DATE / TIME RECEIVED		Cus	B USE ONLY Therm ID: COO tody Seals used and intact? (Y/N)	Received on ice? (Y/N)
RELINQUISHED! DATE / TIME RECEIVED:	(2/23/22	TE / TIME Level III	CS-W 22L12	41
RELINQUISHED: DATE / TIME RECEIVED:		- 0 6 00	ty of Bristol Landfills Solid Wa	
			ecd: 12/23/2022 Due: 01/10/20	

v130325002

V C V D C



# Sample Preservation Log

Order I			L1				_	** '	~						Da	te Pe	rfon	med:	12	1	23	12	2						Ar	nalys	t Perf	oming	g Chec	k: _		0	+	for	K_ 	- K	_	
		Т	Meta			yanlı	de	s	Sulfic	ie	A	mme	onla		TK		7	Phos		7		NO2	T	DR	10	19	Pest 8081/6 PCB D	08/508 <b>W</b> only	3) (0	525/82	OC 70/525)	C	rVI * *	* .	(5 SVC	it/PCI (08) / (C(52)	5) (	6				ملايح
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Metals were received with pH = 6 HNO3was added at 1010 on 23 December 2022 by KRC in the Log-In room to bring pH=

1 PRINTED



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Page 38 of 40



1/6/2023 9:01:22AM

Date Issued:

## **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

Laboratory Order ID: 22L1241

## **Sample Conditions Checklist**

Samples Received at:	5.40°C
How were samples received?	Logistics Courier
Were Custody Seals used? If so, were they received intact?	Yes
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?	Yes
Are all volatile organic and TOX containers free of headspace?	Yes
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.	Yes
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	No

The COC indicated the sample matrix for samples as Wastewater. However, the analysis requested are for the Groundwater method. The sample matrix has been logged as Non-potable water. Sample -01B:EW-50 was received with a pH of 7 and sample -01F:EW-50 was received with a pH of 6 and H2SO4 was added to both to



1/6/2023 9:01:22AM

Date Issued:

# **Certificate of Analysis**

Client Name: SCS Engineers-Winchester

Client Site I.D.: City of Bristol Landfills

Submitted To: Jennifer Robb

bring the pH to <2. Jennifer Robb notified via email

YO 23 DEC 2022 1108

## Historical LFG-EW Leachate Monitoring Results Summary

Well ID		EW-50	EW-52	EW-57	EW-59	EW-60	EW-61	EW-65	EW-67	EW-68	100	
Parameter	Monitoring Event					Concentratio	n				LOD	LOQ
	November-2022				1560		1400	1380			50	50
Ammonia as N (mg/L)	December-2022	1700	2280	2110	1410	1310			1150	1780	100	100
Biological Oxygen Demand	November-2022				15700		5860	5140			0.2	2
(mg/L)	December-2022	6440	12500	11400	9240	3330			8360	6770	0.2	2
, ,							9790	10800			1000	1000
	November-2022				23500						2000	2000
Chemical Oxygen Demand		7440									1000	1000
(mg/L)					13200	8000			20300	14100	2000	2000
	December-2022			22400							5000	5000
			86800								10000	10000
Nitrate+Nitrite as N (mg/L)	November-2022				2.91		0.16	0.33			0.1	0.1
									ND		0.2	0.2
						ND					0.2	0.6
Nitrate as N (mg/L)	December-2022	ND	ND	ND	ND						1.1	5.1
										ND	1.5	5.5
	D 1 0000					0.12 J					0.1	0.5
Nitrite as N (mg/L)	December-2022	ND	ND	ND	ND				ND	ND	1	5
T 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							1290	1470			20	50
Total Kjeldahl Nitrogen	November-2022				2110						50	125
(mg/L)	December-2022	1510	3570	1790	1830	1490			1340	1940	200	500
	NII0000						5.68	3			0.3	0.5
Total Recoverable Phenolics	November-2022				28.8						0.75	1.25
(mg/L)	D = = = = = = 0000					8.94					0.3	0.5
	December-2022	24.9	54.6	28.3	32				20.2	36	1.5	2.5
SEMI-VOLATILE ORGANIC CO	MPOUND (ug/L)											
	November-2022						ND	ND			46.7	93.5
	November-2022				ND						93.5	187
Anthracene					ND	ND				ND	9.35	9.35
Annidene	December-2022			ND					ND		11.7	11.7
	December-2022		ND								23.4	23.4
		ND									485	971
TOTAL METALS (mg/L)												
Arsenic	November-2022				0.863		0.464	1.3			0.02	0.04
Alseriic	December-2022	1.02	0.406	0.174	1.69	0.49			0.159	0.574	0.02	0.04
Barium	November-2022				0.871		0.485	0.36			0.01	0.02
Danom	December-2022	0.566	0.803	0.978	0.438	0.214			0.856	0.793	0.01	0.02
Cadmium	November-2022				ND		ND	ND			0.004	0.008
CGGITIIOTTI	December-2022	ND	0.0104	ND	ND	ND			ND	ND	0.004	0.008
Chromium	November-2022				0.208		0.112	0.354			0.016	0.02
O O	December-2022	0.503	1.08	1.76	0.274	0.319			0.499	0.822	0.016	0.02

## Historical LFG-EW Leachate Monitoring Results Summary

Well ID		EW-50	EW-52	EW-57	EW-59	EW-60	EW-61	EW-65	EW-67	EW-68	LOD	LOQ
Parameter	Monitoring Event					Concentratio	n				LOD	LOQ
TOTAL METALS (mg/L)												
	November-2022				ND		ND	ND			0.016	0.02
Copper	December-2022	ND	ND	ND	ND	ND			ND	ND	0.016	0.02
Land	November-2022				ND		ND	0.017 J			0.012	0.02
Lead	December-2022	ND	0.0381	ND	ND	ND			ND	ND	0.012	0.02
	NI 0000						0.00169	0.00053			0.0004	0.0004
	November-2022				ND						0.0008	0.0008
Mercury		0.00051									0.0004	0.0004
	December-2022			0.00118	ND	0.00588			0.0048	ND	0.0008	0.0008
			ND								0.004	0.004
Nickel	November-2022				0.0866		0.1344	0.173			0.014	0.02
INICKEI	December-2022	0.1722	0.5025	0.2989	0.1299	0.287			0.1853	0.346	0.014	0.02
Salanium	November-2022				ND		ND	ND			0.08	0.1
Selenium	December-2022	ND	ND	ND	ND	ND			ND	ND	0.08	0.1
Silver	November-2022				ND		ND	ND			0.01	0.02
Slivei	December-2022	ND	0.0187 J	ND	ND	ND			ND	ND	0.01	0.02
Zinc	November-2022				ND		0.032	0.694			0.02	0.02
ZITIC	December-2022	0.208	29.7	0.162	0.0686	0.75			0.364	0.286	0.02	0.02
VOLATILE FATTY ACIDS mg/L												
Acetic Acid	November-2022						1600				25	100
ACETIC ACIO	NOVEITIDEI-2022				3500			150 J			62	250
Butyric Acid	November-2022						430				12	100
Botyfic Acid	NOVEITIBEI-2022				830			ND			29	250
Lactic Acid	November-2022						ND				11	100
Laciic Acia	11076111061-2022				ND			ND			27	250
Duaniania Asial	Navanala au 0000						620				11	100
Propionic Acid	November-2022				1600			73 J			27	250
							46 J				12	100
Pyruvic Acid	November-2022				98 J			ND			30	250
VOLATILE ORGANIC COMPO	JNDS (ug/L)											
					3510			1140			30	100
0.5.1	November-2022						15600				300	1000
2-Butanone (MEK)	D 1 0000	3140				3390					30	100
	December-2022		26800	27700	5670				21700	7150	300	1000
	Name 1 0000							4420			70	100
	November-2022				16100		38300				700	1000
Acetone					15600	5170				9800	700	1000
	December-2022	8500									1750	2500
			53100	49900					45600		3500	5000

## Historical LFG-EW Leachate Monitoring Results Summary

Well ID		EW-50	EW-52	EW-57	EW-59	EW-60	EW-61	EW-65	EW-67	EW-68	LOD	LOQ
Parameter	Monitoring Event					Concentratio	n				LOD	LOQ
<b>VOLATILE ORGANIC COMPOL</b>	JNDS (ug/L)											
	November-2022				7.4 J		2860	50.4			4	10
Benzene	December-2022	301	2960		6.3 J	622			1750	179	4	10
	December-2022			6550							40	100
Ethylbenzene	December-2022	67.3	172	287	ND	48.5			108	27.4	4	10
Littyiberizerie	November-2022				ND		194	16.2			4	10
	November-2022				309			176			100	100
Tetrahydrofuran	NOVEITIDEI-2022						8530				1000	1000
relianyarororan	December-2022	151			170	1120				663	100	100
	December-2022		5210	19800					6130		1000	1000
Toluene	November-2022				ND		214	32.8			5	10
Toloerie	December-2022	122	175	195	ND	113			113	48.3	5	10
Xylenes, Total	November-2022				ND		185	37.8			10	30
Ayleries, Iolai	December-2022	161	222	186	ND	112			197	59.9	10	30

<sup>--- =</sup> not applicable

LOD = laboratory's Limit of Detection

LOQ = laboratory's Limit of Quantitation

mg/L = milligrams per liter

ND = Not Detected

ug/L = micrograms per liter

J = Parameter was detected at a concentration greater than the laboratory's LOD, but less than the laboratory's LOQ. Concentration is considered estimated.

# Appendix G

Monitoring, Maintenance, and Repair Plan

# Monitoring, Maintenance and Repair Plan

Bristol Integrated Solid Waste Management Facility

Solid Waste Permit #588



2655 Valley Drive Bristol, VA 24201

02218208.05 | December 30, 2022

# SCS ENGINEERS

15521 Midlothian Turnpike, Suite 305 Midlothian, VA 23113 804-378-7440

### Signature/Certification Sheet

We certify that we have prepared this Plan, that it has been prepared in accordance with industry standards and practices, and that the information contained herein is truthful and accurate to the best of our knowledge.

Name:	Paul Mandeville, P.E., Senior Vice President/Project Director
	Danla, mardalle
Signature:	
Date:	December 30, 2022
Name:	Charles Warren, PE, Project Manager
Signature:	Glorido Uguan
Date:	December 30, 2022

Charles J. Warren II Lic. No. 053809

Virginia Professional Engineer's Certification:

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Site Background       1         Physical Setting       2         2.0 Landfill Cover Systems       2         Cover System Monitoring       2         Responsibility       3         Surface Emissions Monitoring       3         Responsibility       4         Cover System Maintenance, Repairs and Upgrades       4         Erosion Damaged Areas       4         Correction of Settled or Subsided Areas       4         Interim EVOH Cover System Repairs       4         Run-on and Run-off Control Structures       5         Responsibility       5         3.0 Leachate Collection Systems       5         Leachate Collection System Monitoring       5         Responsibility       5         Leachate Collection System Maintenance, Repairs and Upgrades       6         Responsibility       6         4.0 Landfill Gas Systems Monitoring       7         Landfill Gas Collection System Maintenance, Repairs and Upgrades       8         Responsibility       8         5.0 Sidewall Odor Mitigation System       9         Sidewall Odor System Maintenance, Repairs and Upgrades       9         Sidewall Odor System Maintenance, Repairs and Upgrades       9
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Surface Emissions Monitoring
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Correction of Settled or Subsided Areas
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Figure 1. Topographic Quadrangle Map Figure 2. Details of Temporary and Final Cover Systems
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#### 1.0 INTRODUCTION

This Monitoring, Maintenance, and Repair Plan documents procedures to implement a long-term plan for monitoring, maintaining, and repair/upgrade for the landfill cover, leachate and gas collection system, sidewall odor mitigation system, and the stormwater management controls for the City of Bristol Integrated Solid Waste Management Facility Solid Waste Permit #588 Landfill. This plan was prepared in response to the Expert Panel Report (Virginia Tech, 2022) prepared by the Expert Panel convened by the Virginia Department of Environmental Quality (VDEQ). This document is intended to be a "living" document to be revised as construction is completed and new information becomes available.

## Site Background

The City of Bristol Integrated Solid Waste Management Facility, which includes Solid Waste Permit Landfills #221, 498, and 588, is owned and operated by the City of Bristol. Solid Waste Permit #588 was issued by VDEQ on February 13, 1996.

The Permit #588 Landfill, which is constructed within a former limestone quarry, was permitted by the VDEQ in accordance with the Virginia Solid Waste Management Regulations. The Permit #588 landfill began accepting waste in March 1998 and has a total permitted volume of 7,800,000 cubic yards. The bottom liner for the Permit #588 Landfill consists of the following components, from top to bottom:

- An 18 inch thick leachate collection stone with a hydraulic conductivity of 1 x 10<sup>-2</sup> cm/sec
- A primary composite liner consisting of a 60 mil thick high density polyethylene geomembrane underlain with a 3 foot thick recompacted clay liner with a hydraulic conductivity of 1 x 10-7 cm/sec
- A witness zone consisting of a 12 inch thick layer of sand with a hydraulic conductivity of 1 x 10<sup>-3</sup> cm/sec
- A secondary liner consisting of a 2 foot thick recompacted clay liner with a hydraulic conductivity of 1 x 10<sup>-7</sup> cm/sec underlain with a geotextile filter fabric
- A 12 inch thick crushed stone gradient control layer

Because the base of the quarry is below static groundwater levels, the gradient control layer controls the water level to a maximum elevation of 1,557 feet above mean sea level. The gradient control water discharges to the Bristol Virginia Utilities (BVU) Authority Sewer.

The quarry walls are lined with a 60-mil thick high-density polyethylene geomembrane with an interior geocomposite drainage net keyed into the leachate collection stone and a 16-ounce per square yard geotextile between the geomembrane and the quarry walls for protection.

The quarry landfill is about 5.6 acres at the base and approximately 27 acres at the rim; however, the Permit 588 Landfill is only about half full and well below the rim. The current depth of waste ranges between 250 feet and 275 feet. Leachate emanating from the leachate collection system drains to a sump where it is pumped to a 500,000-gallon on-site leachate storage tank.

The Permit 588 landfill has an active landfill gas collection, and a leachate extraction system as described in Sections 4 and 3 respectively.

## **Physical Setting**

The City of Bristol Integrated Solid Waste Management Facility is located on Valley Road in the southeastern section of the City of Bristol. The location of the Facility is illustrated on a portion of the Bristol, Virginia, United States Geologic Society 7.5-minute topographic quadrangle map presented as **Figure 1**. The land surrounding the Facility is primarily wooded and residential. Residents in the area are served by public water supply.

The Facility encompasses approximately 138 acres. The limits of waste occupied by the Permit #588 Landfill encompasses approximately 20 acres. The base of the limestone quarry covers approximately 5.6 acres. The Permit #588 Landfill is bordered to the east by the Permit #498 Landfill and to the north by intermittent streams that drain into Sinking Creek.

Based on a review of the Bristol, Virginia USGS 7.5-minute topographic quadrangle map, several unnamed tributaries of Sinking Creek are intermittent streams located east of the adjacent Permit No. 498 landfill. Sinking Creek is the nearest permanent water body and is located east/southeast of the adjacent Permit No. 498 facility.

#### 2.0 LANDFILL COVER SYSTEMS

The Virginia Solid Waste Management Regulations 9 VAC20-81-140(B)(1) requires a minimum of six inches of compacted soil cover over exposed waste, plus an intermediate cover of at least six inches of additional compacted soil whenever an additional lift of waste will not be placed within 30 days. The Permit 588 landfill will be covered with a temporary cover over the compacted soil covers consisting of the following from top to bottom:

- Geotextile wind screen (Wind Defender or approved equal) layer
- EVOH geomembrane overlying the daily and intermediate soil cover

The daily and intermediate soil cover has been placed and the required minimum 12 inches has been confirmed from test pits. The design of the interim EVOH cover system is underway.

The Solid Waste Permit #588 Landfill includes a final cover consisting of the following, from top to bottom:

- 6" vegetative support soil cover
- 18" protective soil cover
- Geocomposite drainage net (GDN) with 5 x 10<sup>-3</sup> m<sup>2</sup>/sec transmissivity
- 40 mil textured LLDPE geomembrane
- Geosynthetic clay layer (GCL)
- 12" of daily plus intermediate soil cover

Cross sections of the interim and final covers are provided in Figure 2.

## **Cover System Monitoring**

The Virginia Solid Waste Management Regulations require that the integrity and effectiveness of landfill cover systems be maintained. The regulations specifically require repairs to cover systems to correct the effects of settlement, subsidence, and erosion. Furthermore, the regulations require that run-on and run-off from cover systems must not erode or otherwise damage cover systems. To

monitor the integrity of the Permit 588 landfill cover, the cover will be inspected as outlined in Table 1, which presents a summary of items to be inspected and the recommended frequency.

Table 1. Inspection Schedule

Inspection Category	Specific Items to Check	Types of Problems to Observe	Inspection Frequency
Interim EVOH Cover System	Integrity of wind screen	Worn or damaged wind screen	Quarterly
	Integrity of EVOH geomembrane	Geomembrane tears, punctures, seam separation; settlement	Quarterly
	Integrity of boot penetrations	Boot tears, separation, punctures	Quarterly
Final Cover System	Vegetation	Bare or dead areas and trees	Quarterly
	Integrity	Erosion, burrows, settlement	Quarterly
Stormwater	Stormwater pipes and channels	Erosion/scour, ponding, flow obstructions	Quarterly
	Sediment basins	Sediment level, flow obstructions	Quarterly
General site	NA	Litter, illegal dumping, tree growth on cap	Quarterly

The inspection personnel will walk the extent of the cover system, stormwater management features, and general site during the inspection process. At a minimum, the inspection personnel will follow a path sufficient to provide clear visual observation of the entire cover system and the stormwater management features too.

For the interim EVOH cover system, inspections will primarily include verifying the integrity of the wind screen so that damaged wind screen can be repaired or replaced. The wind screen will obstruct direct visual observation of the underlying EVOH geomembrane. Any apparent damage to the wind screen will also be inspected for possible damage to the underlying EVOH geomembrane.

A field inspection form is provided in Appendix A. Photographs will be taken during inspections to document the condition of the cover system and ancillary features, to document items in need of maintenance, repair, or upgrade, and for recordkeeping purposes.

#### Responsibility

The City intends to complete these inspections using City staff. The Environmental and Safety Compliance Officer or an Environmental Technician will perform these inspections. Inspection forms will be scanned and stored on the landfill computer server in a folder designated for storing environmental records. These inspections will begin once the interim EVOH cover has been installed.

## **Surface Emissions Monitoring**

The facility will continue to perform surface emissions monitoring in accordance with the site-specific GCCS Design Plan, the facility's Title V Permit, the requirements of 40 CFR 63.1960(c) and (d), 40 CFR 60.36f(c) and (d), and 40 CFR 60, Appendix A, Method 21.

Sampling will be conducted with a Thermo Scientific TVA-2020 Flame Ionization Detector (FID) or equivalent instrument at 30-meter intervals throughout the entire waste footprint and where visual observations indicate the potential for elevated concentrations of LFG, such as distressed vegetation and surface cover cracks. In addition, in accordance with 40 CFR 63.1958(d)(ii)(2) and 40 CFR 60.34f(d), monitoring will be conducted at all surface cover penetrations within the waste footprint.

The results of the monitoring will be reviewed to identify pathways for methane emissions that may not be observed during visual inspections. Locations on both the serpentine route and at surface cover penetrations that have methane emissions (which indicate damage to the cover system) will be targeted for repair.

#### Responsibility

The City's designated Engineering Consultant will perform surface emissions monitoring and review monitoring results to identify locations at which repairs are needed. Monitoring will be scheduled in accordance with applicable regulatory requirements.

### Cover System Maintenance, Repairs and Upgrades

Items in need of maintenance, repair, or upgrade will be addressed as described below.

#### **Erosion Damaged Areas**

Eroded areas of the final cover system will be backfilled, seeded and mulched or protected with erosion control matting to deter new erosion. Suitable backfill material, seed, and mulch or erosion control matting will be kept on site for repairs to damaged areas.

#### Correction of Settled or Subsided Areas

Settlement or subsidence of the final cover system will be corrected by backfilling and grading to promote positive surface drainage. Regraded areas will be seeded and mulched as described above for eroded areas.

For the interim EVOH cover system, areas with major settlement or subsidence causing low, non-draining areas will be corrected by first removing the wind screen within the settled area. The existing EVOH geomembrane will be cut out within the extent of the settled area, using appropriate methods to create a clean edge suitable for welding to the replacement EVOH geomembrane patch. The settled area will be backfilled to the original grade or slope using soil and compaction procedures specified in the original EVOH cover system specifications. If continued differential settlement is anticipated in the problem area, backfill soil may be mounded relative to its surroundings to maintain long-term positive drainage.

The replacement EVOH geomembrane patch will be fitted to the repair area and extrusion welded to the existing EVOH geomembrane and covered with replacement wind screen. All regrading and repair procedures will comply with the original EVOH cover system installation specifications.

#### **Interim EVOH Cover System Repairs**

A surplus of wind screen and EVOH geomembrane shall be kept on site so that damage to the EVOH cover system can quickly be repaired. Damaged wind screen will be removed and replaced, and if the underlying EVOH geomembrane is damaged too, it will be repaired with new a new extrusion

welded EVOH geomembrane patch. Damaged boot penetrations will be repaired as soon as practicable.

Qualified personnel will complete all repairs to the EVOH geomembrane in accordance with the EVOH geomembrane specification. This includes conducting trial weld testing as specified.

A field report will be prepared documenting the repair work in accordance with the EVOH geomembrane specification.

#### Run-on and Run-off Control Structures

Eroded channels and pipe entrance/exits will be returned to design conditions as soon as possible by adding soil fill material to the original grades or slopes to promote positive drainage as designed. Erosion issues will be investigated and the underlying causes evaluated and corrected to reduce future erosion problems.

#### Responsibility

The City's designated Operation and Maintenance contractor will be responsible for landfill cap maintenance, repairs and upgrades. For larger repairs, the City may elect to utilize a public bid to identify a contractor to do the work.

#### 3.0 LEACHATE COLLECTION SYSTEMS

The Permit #588 landfill currently consists of 17 pneumatic leachate extraction pumps, the associated force main and air lines, and an air compressor that routes extracted leachate to an onsite sanitary sewer. Monitoring and maintenance of these pneumatic pumps and the associated leachate extraction system is essential to continuous removal of leachate. In addition to the leachate extraction system, the Permit #588 Landfill was designed and constructed with a bottom leachate collection system that drains to a leachate sump. The Permit 588 Leachate Management Plan addresses the leachate collection system and sump so it is not included in this Plan.

## **Leachate Collection System Monitoring**

The City's GCCS Operations, Maintenance & Monitoring (OM&M) contract operator is required to perform LFG monitoring at all vertical extraction components at the landfill on a monthly basis. On a monthly basis (or more frequent), the stroke counter, which documents the amount of times the pump has stroked, will be recorded. The existing pumps currently discharge approximately 0.3 gallons per stroke. Calculations will be done monthly to estimate the amount of liquid removed at each well. If the well is moving less than 10 gallons per day, additional investigations at that pump will be performed as described in the next Section.

In addition to pump stroke counters, force main pressures will be recorded at select locations to verify there is no vapor lock, or other issues with the force main, which would prevent successful leachate extraction.

#### Responsibility

The City's designated Engineering Consultant will perform monitoring of leachate collection systems including stroke counters on behalf of the GCCS OM&M operator as outlined in this plan. Monitoring will begin prior to March 31, 2022.

## Leachate Collection System Maintenance, Repairs and Upgrades

A variety of factors may contribute to low leachate extraction flow rates at each well. The GCCS operator will perform preliminary field investigations once a pump is identified to be stroking fewer than 10 gallons per day. Potential causes are listed below:

- no liquid in well
- no air supplied to the pump
- high force main pressures
- pump is fouled
- mechanical issue with pump

If the issue is likely related to a mechanical issue with the pump or fouling of the pump, the pump will be pulled for cleaning and repair. Due to the nature of the conditions of the pump operation, maintenance and repair of leachate extraction pumps is likely to be a frequent occurrence.

Repairs and maintenance to other components of the leachate extraction system will be made as necessary. This includes the air release valves, the air, and force main lines, and the pumps at the main collection tank on site.

#### Responsibility

The City's designated OM&M contractor will be responsible for leachate collection system maintenance, repairs and upgrades. For larger repairs and pump replacement, the City may elect to utilize a public bid to identify a contractor to do the work.

#### 4.0 LANDFILL GAS SYSTEMS

The Bristol Integrated Solid Waste Management Facility is subject to Virginia Rule 4-43.1, which references the EG Subpart Cf, and the revised NESHAP Rule under Subpart AAAA both of which require the Facility to maintain and operate a Landfill Gas Collection and Control System (GCCS). The GCCS for the Permit 588 landfill is integrated with the GCCS at the adjacent Permit 221 and 498 landfills.

The landfill gas collection and control system (GCCS) at the ISWMF was been installed in phases by several contractors beginning in July 2000. The blower/flare station was installed in conjunction with the Landfill No. 221 initial LFG wellfield and collection system installation in July 2000. The gas moving equipment consists of one 50-hp Parnel 65A blower capable of delivering approximately 1200 scfm at 60 inches-water column vacuum, as rated by the manufacturer. The flare is a 25-foot tall, 8-inch diameter Parnel Biogas, Inc. open (utility-type) flare with a smaller diameter (4-inch) stack and tip (manufactured by Parnel Biogas, Inc.) to allow combustion of lower LFG flows. The flare is equipped with a thermocouple. The piping and valves at the blower/flare station enable LFG to be directed to an electric power generating facility owned and operated by Ingenco.

The Permit 588 LFG collection system currently consists of the components presented below in **Table 2.** 

Table 2. Current Permit 588 LFG Collection System Components

Type of Component	Total No.	No(s).
Vertical Extraction Wells	38	EW-29-42, EW-46-68
Horizontal Collectors	2	HC-1-2
Leachate Cleanouts	19	South End LC-1-9 North End NC-1-10

Five new dual phase extraction wells are scheduled for design and construction no later than June 2023, and additional wells near the landfill sidewalls are to be designed and installed by March 2023.

## **Landfill Gas Systems Monitoring**

In accordance with 40 CFR 63.1960 and 40 CFR 60.36f, the LFG collection and control system must operate such that pressure measured at individual wellheads is negative, and such that each interior wellhead temperature is less than 62.8°C (145°F), unless higher operating values (HOV) have been approved. Monitoring is recorded at the LFG extraction components on a monthly basis.

When neutral or positive pressure or temperatures greater than 145°F are recorded, the landfill initiates corrective actions within 5 days.

Beyond regulatory compliance, additional data analysis and review will be conducted on a monthly basis. Wellhead monitoring data at each individual well will be compared to a set of standard operating procedure (SOP) values to identify if additional action is required at each well. If an SOP Action Limit is exceeded, the well will be flagged for further review. Table 3 below provides several wellhead gas parameters, the standard operating procedure (SOP) action limit, regulatory requirement, and typical field actions that may be appropriate if the wellhead is outside of the typical operating range.

Table 3. Wellfield Monitoring Action Levels

Parameter	Standard Operating Procedure (SOP) Action Limit	Regulatory Requirement?	Potential Actions
Static Pressure (in-wc)	0	Yes	increase vacuum at well, investigate lateral piping at well, investigate system vacuum issues
Temperature (°F)	145	Yes	remove liquids, remove gas characterized as elevated temperature, balance well to verify no over pull at these wells
Oxygen (% by Volume)	5 %	No	reduce vacuum, remove liquids, inspect well casing

Methane (% by Volume)	56	No	increase vacuum, remove liquids
System Pressure (in-wc)	-10	No	investigate lateral and header piping. investigate piping network for low points, potential blockages
Flow (scfm)	5	No	remove liquids, inspect well casing, Increase vacuum

## Landfill Gas Collection System Maintenance, Repairs and Upgrades

As outlined above, the City's GCCS OM&M operator will take a LFG measurement at each LFG component on a monthly basis. While performing this activity, the operator will perform an inspection for the following:

- verify that all hoses are properly connected
- look for audible or visual evidence of a leak
- inspect for damage to the wellhead or well casing
- verify that the well is straight and not leaning
- during the exposed EVOH geomembrane cover period, check the status of boot penetrations

If the operator notices a need for routine repairs to the well casing or wellhead, repairs will be made in an appropriate timeframe.

In addition to inspections of the well riser and well head, the GCCS operator will perform inspections on other components of the LFG system on a monthly basis. If data analysis identifies locations of low system pressure, the operator will investigate the system and look for potential causes such as blocked sumps, low points, pinched or damaged header lines, etc. If high oxygen is observed at individual wells, the operator will decrease vacuum and look for potential sources of oxygen intrusion into the well. This could potentially be caused by elevated liquid levels so maintenance of leachate extraction pumps may be required.

Wellfield sounding will be completed prior to GCCS expansions and modifications to identify wells that have been silted in and/or pinched and may not be performing as designed. If Surface Emission Monitoring (SEM) results indicate certain locations on the landfill have clustered and/or repeat elevated methane concentrations, it may indicate that that portion of the landfill needs additional gas collection components. If system vacuum is low in some portions of the landfill, following routine field maintenance, it may indicate that the gas header pipe to these select wellheads needs to be resized or upgraded. These inspections and monitoring activities will be evaluated during GCCS expansions and modifications.

#### Responsibility

The City's designated OM&M contractor will be responsible, for landfill gas collection system monitoring, maintenance, repairs and upgrades by March 31, 2023. For larger repairs and upgrades, the City may elect to utilize a public bid to identify a contractor to do the work.

#### 5.0 SIDEWALL ODOR MITIGATION SYSTEM

The Facility is currently installing a pilot sidewall odor mitigation system, which collects LFG along the perimeter sidewall of the quarry landfill. The system was designed in response to observed sidewall gas emissions dating back to 2018. The sidewall odor mitigation system design includes two parallel buried horizontal collectors that circle the quarry perimeter, immediately adjacent to the sidewall. One collector is located on either side of the sidewall liner system. The collectors will connect to stubup laterals equipped with wellheads at regular intervals for gas collection.

## **Sidewall Odor Mitigation System Monitoring**

Once the sidewall odor mitigation system becomes functional, SCS plans to incorporate the wellheads into the landfill gas systems monitoring. The procedures described in Section 4 will be applied to the wellheads along the sidewall odor mitigation system horizontal collectors. The GCCS operator will inspect the items listed in Section 4 and check for any apparent visual signs of ongoing sidewall gas leakage.

The sidewall odor mitigation system will occur in two parts: a small pilot system followed by the remainder of the system. Landfill gas systems monitoring will begin for the pilot system once it becomes operational.

#### Sidewall Odor System Maintenance, Repairs and Upgrades

Basic visual inspection by the GCCS OM&M operator will be the starting point for routine repair work of the wellheads and above grade pipes. During the exposed EVOH geomembrane cover period, the geomembrane boot penetrations will also be examined during the monthly wellhead readings. Monitoring data from the sidewall odor system wellheads will guide vacuum adjustment and maintenance decisions.

## Responsibility

The City's designated OM&M contractor will be responsible for sidewall odor mitigation system monitoring, maintenance, repairs and upgrades. For larger repairs and upgrades, the City may elect to utilize a public bid to identify a contractor to do the work.

#### 6.0 STORMWATER MANAGEMENT SYSTEMS

The quarry landfill currently has no on-site stormwater management features. The design of a new stormwater management system is underway, and the existing landfill surface will be graded to direct runoff towards a proposed stormwater management pond in the southeast corner. Once the temporary EVOH geomembrane cover is installed, the pond will collect clean stormwater on top of the liner. A pumping system will be designed and installed to lift the stormwater out of the quarry and discharge it as uncontaminated stormwater to nearby drainage features.

# Stormwater Management Systems Monitoring

Monitoring for the proposed stormwater management system will include assessing the physical condition of the stormwater conveyance features and sampling the stormwater for analysis. Per VDEQ's request, a separate SWM plan will address the stormwater discharged offsite, including monitoring protocols, monitoring parameters, discharge limits, and sampling frequencies.

Once installed, the physical condition of the stormwater conveyance features will be periodically inspected by field personnel. The inspection procedures and frequencies outlined in Section 2 for the cover system are also applicable to the stormwater management system monitoring. Visual inspection of the exposed geomembrane cover is planned so that damaged geomembrane can be repaired. Inspections will also monitor for potential settlement that may create low areas with undesired ponding. Field personnel conducting the inspections will photograph and take notes of any observed problem areas requiring repair. The Appendix A Inspection Form includes provisions for inspecting future cover system stormwater channels, culverts, and basins.

#### Responsibility

The City intends to complete stormwater management monitoring using City staff. The Environmental and Safety Compliance Officer or an Environmental Technician will perform these inspections. Inspection forms will be scanned and stored on the landfill computer server in a folder designated for storing environmental records. These inspections will begin once the interim EVOH cover has been installed.

# Stormwater Management Systems Maintenance, Repairs and Upgrades

Repairs to the stormwater management systems will be completed as soon as practicable but issues that pose a risk of worsening with time will be completed immediately. The goal of any maintenance, repairs or upgrades will be to return the systems to their original constructed condition.

#### Responsibility

The City's designated OM&M contractor will be responsible for stormwater management systems maintenance, repairs and upgrades once the stormwater management system is installed. For larger repairs and upgrades, the City may elect to utilize a public bid to identify a contractor to do the work.

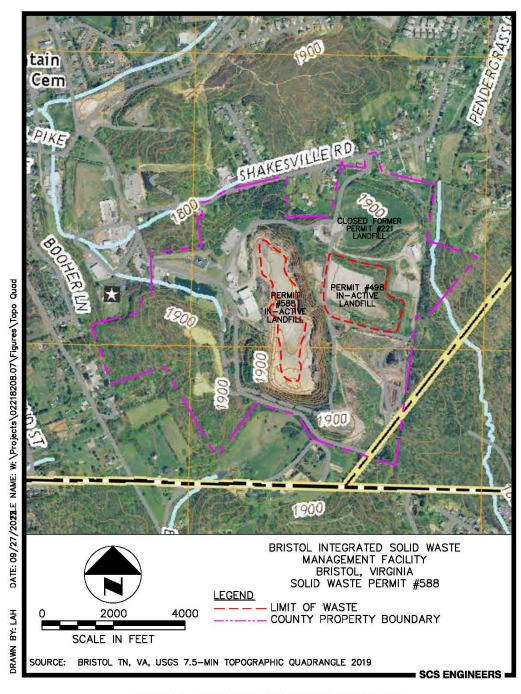


FIGURE 1 - TOPOGRAPHIC QUADRANGLE MAP

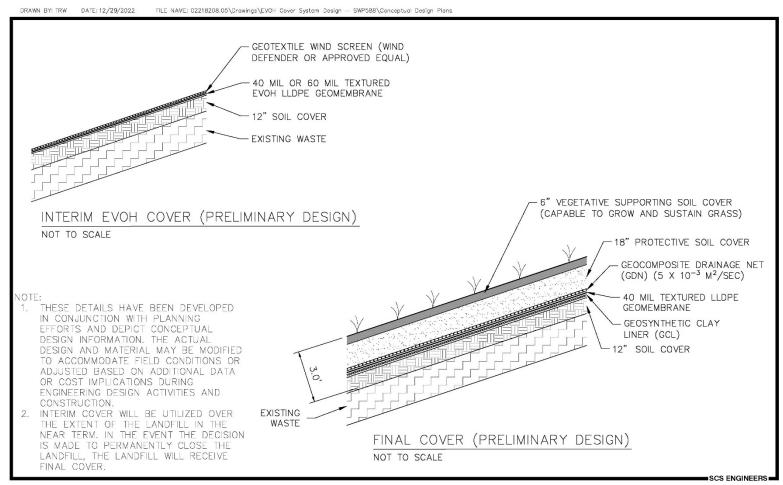


FIGURE 2 - INTERIM & FINAL COVER — PRELIMINARY DETAILS

# Appendix A Inspection Report

#### INSPECTION REPORT

Name of Inspector:	Date:
Weather:	

INSPECTION ITEM	CRITERIA	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Vegetation	Adequate to control soil loss, no or negligible bare areas		
Mowing	Height of grass does not impede inspection		
Woody Vegetation	No trees or shrubs on capped areas		
Final Cap Material	No or minimal erosion rills. Subsurface drainage material/geomembrane protected		
Temporary Geomembrane Cover (if applicable)	No apparent tears, rips, holes, or other damage;		
Boot penetrations	Verify in good shape		
Slope Stability	No slope failures		
Settlement	Positive drainage maintained on landfill		
Stormwater Channels	Adequate to carry flows and surface stable		
Culverts	Properly functioning		
Sediment Basins	Riser and embankment in working order, sediment level below clean-out level		

INSPECTION ITEM	CRITERIA	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Dikes and Downchutes	No ponding, pipes unclogged, no erosion around dikes		
Leachate Seeps	No seeps on landfill or near toe of landfill		
Vectors	No burrowing animals or other animals detrimental to landfill cap observed		

Corrective	M	leasures	F	Require	d	
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**Additional Comments:** 

# SCS ENGINEERS

## **Transmittal**

Midlothian, VA

PROJECT: City Bristol, LF Engineering,

DATE: 1/11/2023

80000

TRANSMITTAL ID:

ISWMF, VA 02218208.05

SUBJECT: Revised Monthly Compliance

Report for SWP #588, SWP

#498, and SWP #221

PURPOSE: For Record VIA: Info Exchange

FROM

NAME	COMPANY	EMAIL	PHONE
Charles Warren Midlothian, VA	SCS Engineers	CWarren@scsengineers.com	+1-804-486-1903

TO

NAME	COMPANY	EMAIL	PHONE
Jonathan Chapman 355-A Deadmore Street Abingdon VA 24210 United States	Virginia Department of Environmental Quality	Jonathan.chapman@deq.virg inia.gov	

REMARKS: Good Morning Jonathan,

I am resending the Monthly Compliance Reports for the Solid Waste Permit #588, #498, and #221 landfills. There was a typographical error in the SWP #498 report that has been revised. Let me know if you have questions or need additional information.

Regards, Charles

#### DESCRIPTION OF CONTENTS

QTY	DATED	TITLE	NOTES
1	1/10/2023	December Compliance Report - SWP 588.pdf	
1	1/11/2023	December Compliance Report - SWP 498_2.0.pdf	
1	1/10/2023	December Compliance Report - SWP 221.pdf	

COPIES:

Bob Dick (SCS Engineers) Charles Warren (SCS Engineers)

Daniel Scott (Virginia Department of Environmental Quality)

Erin Malone (Environmental Protection Agency)

#### **Transmittal**

DATE: 1/11/2023
TRANSMITTAL ID: 00008

Erin Willard (Environmental Protection Agency)

Jacob Chandler (Bristol, VA, City of)

Jeffery Hurst (Virginia Department of Environmental Quality)

Joey Lamie (City of Bristol)
Jimmy Jewett (McGuireWoods LLP)
Jonathan Hayes (Bristol, VA, City of)
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Tom Lock (SCS Field Services)
Tom Lock (SCS Field Services)