

2022 Tier 2 Summary Report Northern Landfill

Carroll County Bureau of Solid Waste
225 North Center Street, Room 221
Westminster, Maryland 21157
410-386-2248

SCS ENGINEERS

02213037.05 | June 29, 2022

11260 Roger Bacon Drive, Suite 300
Reston, VA 20190
703-471-6150

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1 EXECUTIVE SUMMARY

SCS Engineers (SCS) presents this summary report of the Tier 2 sampling, analysis, and emission estimate of landfill gas (LFG) non-methane organic compounds (NMOCs) for Northern Landfill (NLF). This report includes sections describing the field sampling activities, the results of laboratory analysis, estimates of annual landfill NMOC emissions, and findings and recommendations.

NMOC emissions estimates were performed in accordance with the EPA's Federal Plan Requirements for municipal solid waste (MSW) landfills of 40 CFR Part 62 Subpart 000 (Subpart 000) and the facility's Title V Operating Permit No. 24-013-0242 (the permit). These estimates indicate that annual NMOC emissions are anticipated to be less than the Subpart 000 threshold of 34 Mg/yr. for the next 5-years.

2 FIELD SAMPLING ACTIVITIES

Field sampling activities were performed on Tuesday May 3rd, 2022, by Sean Sullivan and Amanda Jabri of SCS Engineers. A total of 6 LFG samples were collected, including 2 backup samples. Samples 1 and 2 (one backup) were composite samples collected from 5 geoprobes in various locations within the active fill area of cell 3 and samples 3 through 6 (one backup) were collected in 4 Summa canisters from the LFG header line before the condensate knockout.

The sampling was conducted in accordance with the U.S. Environmental Protection Agency's (EPA's) Method 25C, and was approved through correspondence with Mr. Enobong Umoh of the Maryland Department of the Environment (MDE). A copy of the SCS sampling protocol is included in **Appendix A**. A copy of the SCS field notes taken during sampling activities is included in **Appendix B**.

3 LABORATORY ANALYSIS RESULTS

Following collection, each sample was delivered by to Enthalpy Analytical, where samples were analyzed for total gaseous NMOCs, percent nitrogen, and percent oxygen.

Total NMOC concentration was measured following the procedures outlined in EPA Method 25C. Percent nitrogen and oxygen were measured following the procedures outlined in EPA Method 3C.

Table 1 presents a summary of the laboratory NMOC results with NMOC concentration in parts per million by volume (ppmv) as both methane and hexane. In accordance with Subpart 000, NMOC concentration is reported by Enthalpy as ppm methane, and converted to ppm as hexane for the emissions calculations by dividing the concentrations (ppm as methane) by a factor of six.

Table 1. Summary of Laboratory NMOC Results

Canister ID	Sample Location	Cell Sampled/Area		Total NMOCs as Methane (ppm)	Total NMOCs as Hexane (ppm)
		Cell(s)	Waste Footprint		
N-2	Geoprobe	Cell 3	10 acres (26%)	1620	270
N-3	Main Header	Cell 1 & Cell 2	29 acres (74%)	1660	276.7
N-4				1370	228.3
N-5				1510	251.7

Site-Specific NMOC Concentration	256.8
----------------------------------	-------

Composite samples N-1 and N-2 (N-1 taken as a backup sample) were collected from temporary geoprobes and they represent the NMOC concentration for Cell 3. Approximately 10 acres of Cell 3 has received waste (26% of the total landfill area). Samples N-3, N-4, N-5, and N-6 (N-6 taken as a backup sample) were collected at the main header line and represent the NMOC concentration for Cells 1 and 2. These cells have a waste footprint of approximately 29 acres (74% of the total landfill area).

Based on the laboratory results and waste footprint, the site-specific concentration of NMOC is calculated on a weighted average to be 255.1 as hexane. The calculation is as follows:

$$\begin{aligned} \text{Calculated NMOC} &= \frac{\left(\left(\frac{276.7 + 228.3 + 251.7}{3} \right) * 0.74 \right) + \left(\left(\frac{270}{1} \right) * 0.26 \right)}{1} \\ &= 256.8 \text{ ppm as Hexane} \end{aligned}$$

A copy of the laboratory analysis results provided by Enthalpy Analytical is included in **Appendix C**.

4 ESTIMATE OF NMOC EMISSIONS

Using the average site-specific Tier 2 NMOC concentration of 256.8, the annual NMOC emission estimates for Northern Landfill were calculated following the procedures outlined in Subpart 000.

The following parameters were utilized in estimating the landfill's NMOC emission:

- Quantity of waste disposed on an annual basis (megagrams, Mg)
- Methane generation potential, Lo (cubic meters methane per Mg waste, m³/Mg)
- Methane generation rate constant, k (yr⁻¹)
- NMOC concentration (ppm) as hexane

The quantity of waste disposed and the NMOC concentration are site-specific values for the landfill. The methane generation potential and the methane generation rate constant are default values provided in Subpart 000, and are equal to 170 m³/Mg and 0.05 yr⁻¹, respectively.

Table 2 presents a summary of the projected NMOC emissions of the landfill for the next five years.


Table 2. Summary of Estimated NMOC Emissions

Year	Estimated NMOC Emissions (Mg/yr)
2022	6.6
2023	8.3
2024	10.0
2025	11.6
2026	13.1
2027	14.6

The complete history of NMOC emissions estimates for the Landfill as calculated by the LandGEM, along with estimates of annual waste fill history at Northern Landfill, is provided in **Appendix D**.

5 FINDINGS AND RECOMMENDATIONS

The results of the emission estimates indicate that the landfill's annual NMOC emission rate is currently less than the Subpart 000 applicability threshold of 34 Mg/yr and will remain less than 34 Mg/yr for the next 5-year period. As such, the Northern Landfill is not subject to the applicable operational standards of Subpart 000.



Appendix A
Tier 2 Sampling Protocol

April 26, 2022
File No. 02213037.05

Enobong Umoh
Air Quality Compliance Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 715
Baltimore, Maryland 21230

Subject: Tier 2 NMOC Emissions Evaluation
Method 25C Sampling Protocol
Northern Landfill – Carroll County, Maryland

Dear Enobong:

On behalf of Carroll County, SCS Engineers (SCS) submits this protocol to conduct Method 25C sampling activities (Tier 2 testing) at the Northern Landfill, located in Westminster, Maryland, for your review and approval. Testing will be completed in accordance with the Federal Plan requirements for municipal solid waste (MSW) landfills of 40 CFR Subpart 000 (Subpart 000) and Part 70 / Title V Operating Permit No. 24-013-0242 (permit).

Background

Northern landfill consists of two closed waste cells, Cells 1 and 2, and one active waste cell, Cell 3. Cells 1 and 2 are approximately 15.2 acres and 13.8 acres respectively. Overall, Cell 3 is approximately 18.4 acres and currently has around 10± acres of waste placed.

The landfill operates a voluntary comprehensive gas collection and control system (GCCS), which incorporates 19 vertical extraction wells and 3 horizontal trench collectors. The GCCS provides gas collection coverage throughout Cells 1 and 2 and has not yet been expanded into Cell 3.

Tier 2 testing measures the concentrations of non-methane organic compounds (NMOC) in the landfill gas (LFG) in accordance with the requirements of Subpart 000. In accordance with Subpart 000 and the permit, the landfill uses a site-specific NMOC concentration to estimate NMOC emissions. Regular sampling is required at least every five years.

Tier 2 Sampling Locations

Tier 2 requires that a minimum of two samples per hectare be collected, up to a maximum of 50 probes per site. Samples must be collected from areas of the landfill which contain waste which is 2 years or older at the time of sampling.

Northern Landfill has an existing GCCS covering Cells 1 & 2. Therefore, in accordance with Subpart 000 guidelines, composite gas sampling can be conducted from the main gas header pipe rather than separate gas probes installed on the landfill. Cell 3 contains approximately 10± acres (4 hectares) of MSW. Approximately half of the Cell 3 disposal area is comprised of active filling operations, and we propose to not collect samples from the active area for safety concerns.



Based on this, SCS will collect a minimum of 3 samples directly from the LFG header (covering Cells 1 & 2) and 5 samples collected from geoprobes (covering Cell 3 areas which are outside of the active landfilling operations area).

Tier 2 Sampling Procedures

Sampling will be conducted in accordance with Method 25C and as generally described herein. Gas samples will be drawn from the main header line of the GCCS by vacuum into stainless steel SUMMA canisters. There will be 3 sequential gas samples in individual canisters collected from a port located prior to the condensate knockout, the blower, and the flare. These 3 samples collected from the header line will be representative of the degradable waste in Cells 1 and 2. One spare canister will be collected from this location to serve as a backup sample.

There will be 5 geoprobe samples collected into 1 SUMMA canisters covering the filled area of Cell 3. One spare canister will be filled from Cell 3 to serve as a backup sample.

Gas quality will be measured and recorded using a calibrated LandTec GEM 5000 infrared gas analyzer prior to collecting each gas sample. The purpose of this is to purge the sampling equipment and to verify there are no leaks present in the sampling train and that oxygen or nitrogen concentrations in the gas are less than 5 percent and 20 percent respectively per Method 25C.

A total of 6 canisters, including the backups, will be collected for laboratory analysis using EPA Method 25C as well as a Permanent Gasses analysis. The backup samples will only be analyzed if a primary sample is damaged through shipping or laboratory examination. Upon completion of the laboratory analysis results, SCS will prepare and submit an updated NMOC Emission Rate Report for Northern Landfill. The final NMOC concentration estimated for the site will be a weighted average proportional to the areas covered by the GCCS and Cell 3.

We plan to perform this sampling before May 12 and will provide notice of the exact date. Should you have any questions, please contact either of the undersigned at (703) 471-6150.

Sincerely,



Sean Sullivan, PE
Senior Project Professional
SCS Engineers



Josh Roth, PE
Vice President
SCS Engineers

SRS/JGR

From: [Enobong Umoh -MDE-](#)
To: [Sullivan, Sean](#)
Subject: Re: Northern and Quarantine Tier 2 Sampling
Date: Wednesday, April 27, 2022 9:15:28 AM

This email originated from outside of SCS Engineers. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Sean,

This is to notify that the Tier 2 sampling protocols for Northern Landfill and Quarantine Road Landfill are approved. Sampling locations should be determined to give the best representative results and maps showing sampling locations should be made available upon request. Please inform me of the exact date of the sampling when that is determined, and please note that the reports for the sampling results are due within 60 days after sampling.

Thanks,



Enobong Umoh
Regulatory & Compliance Engineer
Air Quality Compliance Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 715
Baltimore, MD 21230
Phone:410-537-3282
Fax:410-537-3202
New Email Address: Enobong.Umoh@Maryland.gov

On Tue, Apr 26, 2022 at 11:43 AM Sullivan, Sean <SSullivan@scsengineers.com> wrote:

Eno,

Attached are the Tier 2 sampling protocols for Northern Landfill and Quarantine Road Landfill. Please let me know if you have any questions with the protocols. I plan to perform the sampling for both sites next week.

Thanks,

Sean Sullivan, PE
Senior Project Professional
SCS ENGINEERS

11260 Roger Bacon Drive, Suite 300

Reston, VA 20190

571-353-2005 (W)


508-843-0530 (C)

ssullivan@scsengineers.com

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Appendix B
LFG Field Sampling Data

PROJECT/CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
NORTHERN LANDFILL	NORTHERN LANDFILL	5/3/2022	FOG	SEAN SULLIVAN AND AMANDA JABRI	PAGE 1 OF 3


SUMMA CANISTER ID	39979 (backup)	39979	39979	39979	39979	
SAMPLE NO.	N-1 (backup)	N-1	N-1	N-1	N-1	
TOTAL CANISTER VACUUM (in. HG)	28	28	28	28	28	
CANISTER VOLUME (L)	6	6	6	6	6	
CANISTER VACUUM/VOL (in. HG/L)	4.67	4.67	4.67	4.67	4.67	
AMBIENT TEMPERATURE	56° F	56° F	56° F	56° F	56° F	
GEM 500: % METHANE	65.1	61.3	65.5	60.9	62.0	
GEM 500: % CO2	34.9	38.7	33.4	39.1	38.0	
GEM 500: % O2	0.0	0.0	0.6	0.0	0.0	
GEM 500: % NITROGEN (calc)	0.0	0.0	0.5	0.0	0.0	
CANISTER VAC: INITIAL	28	26	24	22	20	
CANISTER VAC: FINAL	26	24	22	20	18	
TIME: BEGIN FILL	8:43 AM	9:02 AM	9:33 AM	9:56 AM	10:05 PM	
TIME: END FILL	8:44 AM	9:03 AM	9:34 AM	9:57 AM	10:06 PM	

PROJECT/CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
NORTHERN LANDFILL	NORTHERN LANDFILL	5/3/2022	FOG	SEAN SULLIVAN AND AMANDA JABRI	PAGE 2 OF 3

SUMMA CANISTER ID	36978	36978	36978	36978	36978	
SAMPLE NO.	N-2	N-2	N-2	N-2	N-2	
TOTAL CANISTER VACUUM (in. HG)	28	28	28	28	28	
CANISTER VOLUME (L)	6	6	6	6	6	
CANISTER VACUUM/VOL (in. HG/L)	4.67	4.67	4.67	4.67	4.67	
AMBIENT TEMPERATURE	56° F	56° F	56° F	56° F	56° F	
GEM 500: % METHANE	64.8	61.2	65.0	61.5	61.9	
GEM 500: % CO2	35.2	38.8	33.3	38.5	38.1	
GEM 500: % O2	0.0	0.0	0.6	0.0	0.0	
GEM 500: % NITROGEN (calc)	0.0	0.0	1.1	0.0	0.0	
CANISTER VAC: INITIAL	28	26	24	22	20	
CANISTER VAC: FINAL	26	24	22	20	18	
TIME: BEGIN FILL	8:47 AM	8:57 AM	9:35 AM	9:53 AM	10:09 PM	
TIME: END FILL	8:48 AM	8:58 AM	9:36 AM	9:54 AM	10:10 PM	

PROJECT/CLIENT	PROJECT LOCATION	DATE	WEATHER	PERSONNEL	
NORTHERN LANDFILL	NORTHERN LANDFILL	5/3/2022	FOG	SEAN SULLIVAN AND AMANDA JABRI	PAGE 3 OF 3

SUMMA CANISTER ID	18163	36456	36971	20667 (backup)		
SAMPLE NO.	N-3	N-4	N-5	N-6 (backup)		
TOTAL CANISTER VACUUM (in. HG)	28	28	28	28		
CANISTER VOLUME (L)	6	6	6	6		
CANISTER VACUUM/VOL (in. HG/L)	4.67	4.67	4.67	4.67		
AMBIENT TEMPERATURE	61° F	61° F	61° F	61° F		
GEM 500: % METHANE	48.5	46.6	47.3	47.8		
GEM 500: % CO2	29.4	28.4	28.8	29.0		
GEM 500: % O2	0.9	1.4	1.2	1.0		
GEM 500: % NITROGEN (calc)	21.2	23.6	22.7	22.2		
CANISTER VAC: INITIAL	28	28	28	28		
CANISTER VAC: FINAL	5	5	5	5		
TIME: BEGIN FILL	10:35 AM	10:52 AM	11:08 AM	11:22 AM		
TIME: END FILL	10:47 AM	11:02 AM	11:19 AM	11:34 AM		



Appendix C
Results of Laboratory Analysis



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Certificate of Analysis

Final Report

Laboratory Order ID 22E0594

Client Name:	SCS Engineers-Reston	Date Received:	May 11, 2022 10:10
	11260 Roger Bacon Drive Suite 300	Date Issued:	May 24, 2022 16:19
	Reston, VA 20190	Project Number:	[none]
Submitted To:	Jacob Shepherd	Purchase Order:	
Client Site I.D.:	Northern Landfill		

Enclosed are the results of analyses for samples received by the laboratory on 05/11/2022 10:10. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

A handwritten signature in black ink that reads 'Ted Soyars'.

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.

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Final Report

Laboratory Order ID 22E0594

Client Name: SCS Engineers-Reston Date Received: May 11, 2022 10:10
11260 Roger Bacon Drive Suite 300 Date Issued: May 24, 2022 16:19
Reston, VA 20190 Project Number: [none]
Submitted To: Jacob Shepherd Purchase Order:
Client Site I.D.: Northern Landfill

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
N-2	22E0594-02	Air	05/03/2022 10:10	05/11/2022 10:10
N-3	22E0594-03	Air	05/03/2022 10:47	05/11/2022 10:10
N-4	22E0594-04	Air	05/03/2022 11:02	05/11/2022 10:10
N-5	22E0594-05	Air	05/03/2022 11:19	05/11/2022 10:10



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Certificate of Analysis

Final Report

Laboratory Order ID 22E0594

Client Name: SCS Engineers-Reston
 11260 Roger Bacon Drive Suite 300
 Reston, VA 20190

Date Received: May 11, 2022 10:10
 Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
 Client Site I.D.: Northern Landfill

Project Number: [none]
 Purchase Order:

ANALYTICAL RESULTS

Project Location:
Field Sample #: N-2
Sample ID: 22E0594-02
 Sample Matrix: Air
 Sampled: 5/3/2022 10:10
 Sample Type: Composite

Sample Description/Location:
 Sub Description/Location:
 Canister ID: 063-00202: 36978
 Canister Size: 6

Initial Vacuum(in Hg): 30
 Final Vacuum(in Hg): 19
 Receipt Vacuum(in Hg): 19.0
 Flow Controller Type: passive
 Flow Controller ID:

Volatile Organic Compounds by GC/FID

Analyte	ppmv-C			Flag/Qual	ppmv-C6			Dilution	PF	Date/Time Analyzed	Analyst
	Results	MDL	LOQ		Results	MDL	LOQ				
TNMOC as Carbon (Mean), N2 corrected	1620	102	102		270.0	17.0	17.0	3	1	5/16/22 16:41	DFH
TNMOC as Carbon (1), N2 corrected	1690	102	102		281.7	17.0	17.0	3	1	5/16/22 16:41	DFH
TNMOC as Carbon (2), N2 corrected	1620	102	102		270.0	17.0	17.0	3	1	5/16/22 16:41	DFH
TNMOC as Carbon (3), N2 corrected	1570	102	102		261.7	17.0	17.0	3	1	5/16/22 16:41	DFH
TNMOC as Carbon (Mean), O2 corrected	1610	102	102		268.3	17.0	17.0	3	1	5/16/22 16:41	DFH
TNMOC as Carbon (1), O2 corrected	1670	102	102		278.3	17.0	17.0	3	1	5/16/22 16:41	DFH
TNMOC as Carbon (2), O2 corrected	1600	102	102		266.7	17.0	17.0	3	1	5/16/22 16:41	DFH
TNMOC as Carbon (3), O2 corrected	1550	102	102		258.3	17.0	17.0	3	1	5/16/22 16:41	DFH

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

Analyte	Vol%			Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
	Result	MDL	LOQ					
Methane, as received	53.9	0.45	0.45		9	1	5/18/22 13:28	DFH
Carbon dioxide, as received	34.9	0.45	0.45		9	1	5/18/22 13:28	DFH
Oxygen (O2), as received	0.46	0.45	0.45		9	1	5/18/22 13:28	DFH
Hydrogen (H2), as received	ND	0.18	0.18		9	1	5/18/22 13:28	DFH
Nitrogen (N2), as received	2.38	0.45	0.45		9	1	5/18/22 13:28	DFH
Carbon Monoxide, as received	ND	0.009	0.009		9	1	5/18/22 13:28	DFH



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Final Report

Laboratory Order ID 22E0594

Client Name: SCS Engineers-Reston
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Date Received: May 11, 2022 10:10
 Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
 Client Site I.D.: Northern Landfill

Project Number: [none]
 Purchase Order:

ANALYTICAL RESULTS

Project Location:
Field Sample #: N-3
Sample ID: 22E0594-03
 Sample Matrix: Air
 Sampled: 5/3/2022 10:47
 Sample Type: Composite

Sample Description/Location:
 Sub Description/Location:
 Canister ID: 063-00292: 18163
 Canister Size: 6

Initial Vacuum(in Hg): 30
 Final Vacuum(in Hg): 5.4
 Receipt Vacuum(in Hg): 5.4
 Flow Controller Type: passive
 Flow Controller ID:

Volatile Organic Compounds by GC/FID

Analyte	ppmv-C			Flag/Qual	ppmv-C6			Dilution	PF	Date/Time Analyzed	Analyst
	Results	MDL	LOQ		Results	MDL	LOQ				
TNMOC as Carbon (Mean), N2 corrected	1660	85.0	85.0		276.7	14.2	14.2	2.5	1	5/16/22 18:58	DFH
TNMOC as Carbon (1), N2 corrected	1570	85.0	85.0		261.7	14.2	14.2	2.5	1	5/16/22 18:58	DFH
TNMOC as Carbon (2), N2 corrected	1630	85.0	85.0		271.7	14.2	14.2	2.5	1	5/16/22 18:58	DFH
TNMOC as Carbon (3), N2 corrected	1790	85.0	85.0		298.3	14.2	14.2	2.5	1	5/16/22 18:58	DFH
TNMOC as Carbon (Mean), O2 corrected	1350	85.0	85.0		225.0	14.2	14.2	2.5	1	5/16/22 18:58	DFH
TNMOC as Carbon (1), O2 corrected	1280	85.0	85.0		213.3	14.2	14.2	2.5	1	5/16/22 18:58	DFH
TNMOC as Carbon (2), O2 corrected	1330	85.0	85.0		221.7	14.2	14.2	2.5	1	5/16/22 18:58	DFH
TNMOC as Carbon (3), O2 corrected	1450	85.0	85.0		241.7	14.2	14.2	2.5	1	5/16/22 18:58	DFH

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

Analyte	Vol%			Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
	Result	MDL	LOQ					
Methane, as received	44.7	0.45	0.45		9	1	5/18/22 14:34	DFH
Carbon dioxide, as received	29.3	0.45	0.45		9	1	5/18/22 14:34	DFH
Oxygen (O2), as received	1.41	0.45	0.45		9	1	5/18/22 14:34	DFH
Hydrogen (H2), as received	ND	0.18	0.18		9	1	5/18/22 14:34	DFH
Nitrogen (N2), as received	18.7	0.45	0.45		9	1	5/18/22 14:34	DFH
Carbon Monoxide, as received	ND	0.009	0.009		9	1	5/18/22 14:34	DFH



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Certificate of Analysis

Final Report

Laboratory Order ID 22E0594

Client Name: SCS Engineers-Reston
 11260 Roger Bacon Drive Suite 300
 Reston, VA 20190

Date Received: May 11, 2022 10:10
 Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
 Client Site I.D.: Northern Landfill

Project Number: [none]
 Purchase Order:

ANALYTICAL RESULTS

Project Location:
Field Sample #: N-4
Sample ID: 22E0594-04
 Sample Matrix: Air
 Sampled: 5/3/2022 11:02
 Sample Type: Composite

Sample Description/Location:
 Sub Description/Location:
 Canister ID: 063-00293: 36456
 Canister Size: 6

Initial Vacuum(in Hg): 30
 Final Vacuum(in Hg): 5.4
 Receipt Vacuum(in Hg): 5.4
 Flow Controller Type: passive
 Flow Controller ID:

Volatile Organic Compounds by GC/FID

Analyte	ppmv-C			EPA Method 25C			ppmv-C6			Dilution	PF	Date/Time Analyzed	Analyst
	Results	MDL	LOQ	Flag/Qual	Results	MDL	LOQ						
TNMOC as Carbon (Mean), N2 corrected	1700	85.0	85.0		283.3	14.2	14.2	2.5	1	5/18/22 9:06	DFH		
TNMOC as Carbon (1), N2 corrected	1670	85.0	85.0		278.3	14.2	14.2	2.5	1	5/18/22 9:06	DFH		
TNMOC as Carbon (2), N2 corrected	1720	85.0	85.0		286.7	14.2	14.2	2.5	1	5/18/22 9:06	DFH		
TNMOC as Carbon (3), N2 corrected	1710	85.0	85.0		285.0	14.2	14.2	2.5	1	5/18/22 9:06	DFH		
TNMOC as Carbon (Mean), O2 corrected	1370	85.0	85.0		228.3	14.2	14.2	2.5	1	5/18/22 9:06	DFH		
TNMOC as Carbon (1), O2 corrected	1340	85.0	85.0		223.3	14.2	14.2	2.5	1	5/18/22 9:06	DFH		
TNMOC as Carbon (2), O2 corrected	1380	85.0	85.0		230.0	14.2	14.2	2.5	1	5/18/22 9:06	DFH		
TNMOC as Carbon (3), O2 corrected	1380	85.0	85.0		230.0	14.2	14.2	2.5	1	5/18/22 9:06	DFH		

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

Analyte	Vol%			Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
	Result	MDL	LOQ					
Methane, as received	45.1	0.45	0.45		9	1	5/19/22 13:02	DFH
Carbon dioxide, as received	29.6	0.45	0.45		9	1	5/19/22 13:02	DFH
Oxygen (O2), as received	1.72	0.45	0.45		9	1	5/19/22 13:02	DFH
Hydrogen (H2), as received	ND	0.18	0.18		9	1	5/19/22 13:02	DFH
Nitrogen (N2), as received	20.3	0.45	0.45		9	1	5/19/22 13:02	DFH
Carbon Monoxide, as received	ND	0.009	0.009		9	1	5/19/22 13:02	DFH



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Certificate of Analysis

Final Report

Laboratory Order ID 22E0594

Client Name: SCS Engineers-Reston
11260 Roger Bacon Drive Suite 300

Reston, VA 20190

Date Received: May 11, 2022 10:10
Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
Client Site I.D.: Northern Landfill

Project Number: [none]
Purchase Order:

ANALYTICAL RESULTS

Project Location:
Field Sample #: N-5
Sample ID: 22E0594-05
Sample Matrix: Air
Sampled: 5/3/2022 11:19

Sample Type: Composite

Sample Description/Location:
Sub Description/Location:
Canister ID: 063-00294: 36971
Canister Size: 6

Initial Vacuum(in Hg): 30
Final Vacuum(in Hg): 5.4
Receipt Vacuum(in Hg): 5.4
Flow Controller Type: passive
Flow Controller ID:

Volatile Organic Compounds by GC/FID

Analyte	ppmv-C			Flag/Qual	ppmv-C6			Dilution	PF	Date/Time Analyzed	Analyst
	Results	MDL	LOQ		Results	MDL	LOQ				
TNMOC as Carbon (Mean), N2 corrected	1510	85.0	85.0		251.7	14.2	14.2	2.5	1	5/18/22 13:51	DFH
TNMOC as Carbon (1), N2 corrected	1540	85.0	85.0		256.7	14.2	14.2	2.5	1	5/18/22 13:51	DFH
TNMOC as Carbon (2), N2 corrected	1480	85.0	85.0		246.7	14.2	14.2	2.5	1	5/18/22 13:51	DFH
TNMOC as Carbon (3), N2 corrected	1530	85.0	85.0		255.0	14.2	14.2	2.5	1	5/18/22 13:51	DFH
TNMOC as Carbon (Mean), O2 corrected	1230	85.0	85.0		205.0	14.2	14.2	2.5	1	5/18/22 13:51	DFH
TNMOC as Carbon (1), O2 corrected	1240	85.0	85.0		206.7	14.2	14.2	2.5	1	5/18/22 13:51	DFH
TNMOC as Carbon (2), O2 corrected	1200	85.0	85.0		200.0	14.2	14.2	2.5	1	5/18/22 13:51	DFH
TNMOC as Carbon (3), O2 corrected	1240	85.0	85.0		206.7	14.2	14.2	2.5	1	5/18/22 13:51	DFH

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

Analyte	Vol%			Flag/Qual	Dilution	PF	Date/Time Analyzed	Analyst
	Result	MDL	LOQ					
Methane, as received	45.0	0.45	0.45		9	1	5/19/22 14:06	DFH
Carbon dioxide, as received	29.7	0.45	0.45		9	1	5/19/22 14:06	DFH
Oxygen (O2), as received	1.46	0.45	0.45		9	1	5/19/22 14:06	DFH
Hydrogen (H2), as received	ND	0.18	0.18		9	1	5/19/22 14:06	DFH
Nitrogen (N2), as received	19.1	0.45	0.45		9	1	5/19/22 14:06	DFH
Carbon Monoxide, as received	ND	0.009	0.009		9	1	5/19/22 14:06	DFH



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 Reston, VA 20190

Date Received: May 11, 2022 10:10
 Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
 Client Site I.D.: Northern Landfill

Project Number: [none]
 Purchase Order:

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GC/FID			Preparation Method: No Prep VOC GC Air		
22E0594-02	1.00 mL / 1.00 mL	EPA Method 25C	BFE0668	SFE0597	AF10074
22E0594-03	1.00 mL / 1.00 mL	EPA Method 25C	BFE0668	SFE0597	AF10074
22E0594-04	1.00 mL / 1.00 mL	EPA Method 25C	BFE0717	SFE0643	AF10074
22E0594-05	1.00 mL / 1.00 mL	EPA Method 25C	BFE0717	SFE0643	AF10074
Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Organic Compounds by GC/TCD - Unadjusted, as received basis			Preparation Method: No Prep VOC GC Air		
22E0594-02	1.00 mL / 1.00 mL	EPA 3C	BFE0664	SFE0623	AG00026
22E0594-03	1.00 mL / 1.00 mL	EPA 3C	BFE0664	SFE0623	AG00026
22E0594-04	1.00 mL / 1.00 mL	EPA 3C	BFE0765	SFE0700	AG00026
22E0594-05	1.00 mL / 1.00 mL	EPA 3C	BFE0765	SFE0700	AG00026



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Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
Client Site I.D.: Northern Landfill

Project Number: [none]
Purchase Order:

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

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

Batch BFE0664 - No Prep VOC GC Air

Blank (BFE0664-BLK1)

Prepared & Analyzed: 05/17/2022

Methane	<	0.05	Vol%							
Carbon dioxide	<	0.05	Vol%							
Oxygen (O2)	<	0.05	Vol%							
Hydrogen (H2)	<	0.02	Vol%							
Nitrogen (N2)	<	0.05	Vol%							
Carbon Monoxide	<	0.001	Vol%							

LCS (BFE0664-BS1)

Prepared & Analyzed: 05/17/2022

Methane	4530	0.05	ppmv	5000	90.6	70-130				
Carbon dioxide	4110	0.05	ppmv	5000	82.3	70-130				
Oxygen (O2)	5130	0.05	ppmv	5000	103	70-130				
Hydrogen (H2)	5280	0.02	ppmv	5100	104	70-130				
Nitrogen (N2)	5960	0.05	ppmv	5000	119	70-130				
Carbon Monoxide	4640	0.001	ppmv	5000	92.8	70-130				

Duplicate (BFE0664-DUP1)

Source: 22E0826-01

Prepared & Analyzed: 05/17/2022

Methane	38.8	0.45	Vol%		39.0		0.567	5		
Carbon dioxide	41.8	0.45	Vol%		41.7		0.376	5		
Oxygen (O2)	1.54	0.45	Vol%		1.58		2.63	5		
Nitrogen (N2)	7.37	0.45	Vol%		7.59		2.93	5		
Carbon Monoxide	<	0.009	Vol%		<0.009		NA	5		

Duplicate (BFE0664-DUP2)

Source: 22E0826-02

Prepared & Analyzed: 05/17/2022

Methane	33.0	0.45	Vol%		33.1		0.401	5		
Carbon dioxide	45.4	0.45	Vol%		45.9		1.27	5		
Oxygen (O2)	<	0.45	Vol%		<0.45		NA	5		
Nitrogen (N2)	1.27	0.45	Vol%		0.89		35.6	5		P
Carbon Monoxide	<	0.009	Vol%		<0.009		NA	5		



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Certificate of Analysis
Final Report

Laboratory Order ID 22E0594

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Reston, VA 20190

Date Received: May 11, 2022 10:10
Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
Client Site I.D.: Northern Landfill

Project Number: [none]
Purchase Order:

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

Analyte	Reporting			Spike Level	Source		%REC		RPD Limit	Qual
	Result	Limit	Units		Result	%REC	Limits	RPD		
Batch BFE0664 - No Prep VOC GC Air										
Duplicate (BFE0664-DUP3)			Source: 22E0826-03			Prepared & Analyzed: 05/17/2022				
Methane	24.7	0.45	Vol%		24.8		0.706		5	
Carbon dioxide	22.9	0.45	Vol%		23.0		0.476		5	
Oxygen (O2)	6.19	0.45	Vol%		6.23		0.651		5	
Hydrogen (H2)	2.07	0.18	Vol%		2.10		1.33		5	
Nitrogen (N2)	22.9	0.45	Vol%		23.1		0.655		5	
Carbon Monoxide	<	0.009	Vol%		<0.009		NA		5	
Duplicate (BFE0664-DUP4)			Source: 22E0594-01			Prepared: 05/17/2022 Analyzed: 05/18/2022				
Methane	51.5	0.45	Vol%		51.4		0.0418		5	
Carbon dioxide	34.6	0.45	Vol%		34.5		0.371		5	
Oxygen (O2)	1.22	0.45	Vol%		1.21		0.364		5	
Nitrogen (N2)	4.35	0.45	Vol%		4.34		0.0847		5	
Hydrogen (H2)	<	0.18	Vol%		<0.18		NA		5	
Carbon Monoxide	<	0.009	Vol%		<0.009		NA		5	
Duplicate (BFE0664-DUP5)			Source: 22E0594-02			Prepared: 05/17/2022 Analyzed: 05/18/2022				
Methane	53.7	0.45	Vol%		53.9		0.305		5	
Carbon dioxide	34.8	0.45	Vol%		34.9		0.258		5	
Oxygen (O2)	0.45	0.45	Vol%		0.46		0.715		5	
Hydrogen (H2)	<	0.18	Vol%		<0.18		NA		5	
Nitrogen (N2)	2.37	0.45	Vol%		2.38		0.526		5	
Carbon Monoxide	<	0.009	Vol%		<0.009		NA		5	
Duplicate (BFE0664-DUP6)			Source: 22E0594-03			Prepared: 05/17/2022 Analyzed: 05/18/2022				
Methane	44.8	0.45	Vol%		44.7		0.195		5	
Carbon dioxide	29.4	0.45	Vol%		29.3		0.162		5	
Oxygen (O2)	1.41	0.45	Vol%		1.41		0.112		5	
Nitrogen (N2)	18.7	0.45	Vol%		18.7		0.110		5	
Hydrogen (H2)	<	0.18	Vol%		<0.18		NA		5	
Carbon Monoxide	<	0.009	Vol%		<0.009		NA		5	



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Submitted To: Jacob Shepherd
Client Site I.D.: Northern Landfill

Project Number: [none]
Purchase Order:

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

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

Batch BFE0765 - No Prep VOC GC Air

Blank (BFE0765-BLK1)

Prepared & Analyzed: 05/19/2022

Methane	<	0.05	Vol%
Carbon dioxide	<	0.05	Vol%
Oxygen (O2)	<	0.05	Vol%
Hydrogen (H2)	<	0.02	Vol%
Nitrogen (N2)	<	0.05	Vol%
Carbon Monoxide	<	0.001	Vol%

LCS (BFE0765-BS1)

Prepared & Analyzed: 05/19/2022

Methane	4510	0.05	ppmv	5000	90.2	70-130
Carbon dioxide	4140	0.05	ppmv	5000	82.7	70-130
Oxygen (O2)	4790	0.05	ppmv	5000	95.9	70-130
Nitrogen (N2)	4990	0.05	ppmv	5000	99.7	70-130
Hydrogen (H2)	5330	0.02	ppmv	5100	104	70-130
Carbon Monoxide	4650	0.001	ppmv	5000	93.1	70-130

Duplicate (BFE0765-DUP1)

Source: 22E0594-04

Prepared & Analyzed: 05/19/2022

Methane	45.1	0.45	Vol%	45.1	0.0100	5
Carbon dioxide	29.7	0.45	Vol%	29.6	0.321	5
Oxygen (O2)	1.72	0.45	Vol%	1.72	0.133	5
Nitrogen (N2)	20.2	0.45	Vol%	20.3	0.195	5
Hydrogen (H2)	<	0.18	Vol%	<0.18	NA	5
Carbon Monoxide	<	0.009	Vol%	<0.009	NA	5

Duplicate (BFE0765-DUP2)

Source: 22E0594-05

Prepared & Analyzed: 05/19/2022

Methane	45.2	0.45	Vol%	45.0	0.266	5
Carbon dioxide	29.7	0.45	Vol%	29.7	0.124	5
Oxygen (O2)	1.46	0.45	Vol%	1.46	0.113	5
Nitrogen (N2)	19.1	0.45	Vol%	19.1	0.130	5
Hydrogen (H2)	<	0.18	Vol%	<0.18	NA	5
Carbon Monoxide	<	0.009	Vol%	<0.009	NA	5



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Certificate of Analysis
Final Report

Laboratory Order ID 22E0594

Client Name: SCS Engineers-Reston
11260 Roger Bacon Drive Suite 300
Reston, VA 20190

Date Received: May 11, 2022 10:10
Date Issued: May 24, 2022 16:19

Submitted To: Jacob Shepherd
Client Site I.D.: Northern Landfill

Project Number: [none]
Purchase Order:

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

Analyte	Reporting		Spike Level	Source		%REC		RPD	Limit	Qual
	Result	Limit		Units	Result	%REC	Limits			
Batch BFE0765 - No Prep VOC GC Air										
Duplicate (BFE0765-DUP3)			Source: 22E1017-01			Prepared & Analyzed: 05/19/2022				
Methane	7.21	0.45	Vol%		7.15		0.750		5	
Carbon dioxide	61.3	0.45	Vol%		60.9		0.666		5	
Oxygen (O2)	<	0.45	Vol%		<0.45		NA		5	
Nitrogen (N2)	1.14	0.45	Vol%		1.13		0.851		5	
Carbon Monoxide	0.12	0.009	Vol%		0.12		0.935		5	
Duplicate (BFE0765-DUP5)			Source: 22E1021-01RE1			Prepared: 05/19/2022 Analyzed: 05/20/2022				
Methane	<	0.45	Vol%		<0.45		NA		5	
Carbon dioxide	<	0.45	Vol%		<0.45		NA		5	
Oxygen (O2)	18.3	0.45	Vol%		18.3		0.176		5	
Hydrogen (H2)	<	0.18	Vol%		<0.18		NA		5	
Carbon Monoxide	<	0.009	Vol%		<0.009		NA		5	
Duplicate (BFE0765-DUP6)			Source: 22E0893-01			Prepared: 05/19/2022 Analyzed: 05/20/2022				
Methane	40.0	0.45	Vol%		40.0		0.247		5	
Carbon dioxide	28.1	0.45	Vol%		28.1		0.0422		5	
Oxygen (O2)	4.15	0.45	Vol%		4.14		0.334		5	
Nitrogen (N2)	19.3	0.45	Vol%		19.2		0.333		5	
Hydrogen (H2)	<	0.18	Vol%		<0.18		NA		5	
Carbon Monoxide	<	0.009	Vol%		<0.009		NA		5	



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Client Site I.D.: Northern Landfill

Project Number: [none]
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Volatile Organic Compounds by GC/FID - Quality Control
Enthalpy Analytical

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

Batch BFE0668 - No Prep VOC GC Air

Blank (BFE0668-BLK1)

Prepared & Analyzed: 05/16/2022

TNMOC as Carbon (Mean), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (1), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (2), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (3), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (Mean), O2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (1), O2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (2), O2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (3), O2 corrected	<	34.0	ppmv-C							

Batch BFE0717 - No Prep VOC GC Air

Blank (BFE0717-BLK1)

Prepared & Analyzed: 05/18/2022

TNMOC as Carbon (Mean), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (1), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (2), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (3), N2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (Mean), O2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (1), O2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (2), O2 corrected	<	34.0	ppmv-C							
TNMOC as Carbon (3), O2 corrected	<	34.0	ppmv-C							



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Certificate of Analysis

Final Report

Laboratory Order ID 22E0594

Client Name: SCS Engineers-Reston 11260 Roger Bacon Drive Suite 300 Reston, VA 20190	Date Received: May 11, 2022 10:10 Date Issued: May 24, 2022 16:19
Submitted To: Jacob Shepherd	Project Number: [none]
Client Site I.D.: Northern Landfill	Purchase Order:

Certified Analytes included in this Report

Analyte	Certifications	Analyte	Certifications
<i>EPA 3C in Air</i>			
Methane	VELAP		
Oxygen (O2)	VELAP		
Nitrogen (N2)	VELAP		

Code	Description	Laboratory ID	Expires
MADEP	Massachusetts DEP	M-VA913	06/30/2022
MdDOE	Maryland DE Drinking Water	341	12/31/2022
NC	North Carolina DENR	495	07/31/2022
NCDEQ	North Carolina DEQ	495	12/31/2022
NCDOH	North Carolina Department of Health	51714	07/31/2022
NJDEP	NELAP-New Jersey DEP	VA015	06/30/2022
NYDOH	New York DOH Drinking Water	12096	04/01/2023
PADEP	NELAP-Pennsylvania Certificate #007	68-03503	10/31/2022
VELAP	NELAP-Virginia Certificate #11821	460021	06/14/2022
WVDEP	West Virginia DEP	350	11/30/2022

Qualifiers and Definitions

P Duplicate analysis does not meet the acceptance criteria for precision

RPD Relative Percent Difference

Qual Qualifiers

-RE Denotes sample was re-analyzed

PF Preparation Factor

MDL Method Detection Limit

LOQ Limit of Quantitation

ppbv parts per billion by volume

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

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

**AIR ANALYSIS
CHAIN OF CUSTODY**

COMPANY NAME: **SCS Engineers - Reston** INVOICE TO: **SCS Engineers** PROJECT NAME/Quote #: **Northern Landfill**
 CONTACT: **Sean Sullivan** INVOICE CONTACT: **Jacob Shepherd** SITE NAME:
 ADDRESS: **11260 Roger Bacon Drive, Suite 300, Reston VA 20190** INVOICE ADDRESS:
 PHONE #: **703-471-6150** INVOICE PHONE #:
 FAX #: **703-471-6676** EMAIL: **SSullivan@scsengineers.com** P.O. #:

SAMPLER NAME (PRINT): **Sean Sullivan** SAMPLER SIGNATURE: *[Signature]* Turn Around Time: **10 Day(s)**
 Matrix Codes: AA=Indoor/Ambient Air SG=Soil Gas LV=Landfill/Vent Gas OT=Other **LV** AWS WORK ORDER: **21F0968**

CLIENT SAMPLE I.D.	Regulator Info		Canister Information		Sampling Start Information				Sampling Stop Information				ANALYSIS			
	Flow Controller ID	Cal Flow (mL/min)	Canister ID	Cleaning Batch ID	LAB Outgoing Canister Vacuum (in Hg)	LAB Receiving Canister Vacuum (in Hg)	Barometric Pres. (in Hg): Start Date	Start Time (24hr clock)	Initial Canister Vacuum (in Hg)	Starting Sample Temp °F	Barometric Pres. (in Hg): Stop Date	Stop Time (24hr clock)	Final Canister Vacuum (in Hg)	Ending Sample Temp °F	EPA 3C	NMOCs 25C
1) <i>(Backup)</i> <i>N-1</i>			36861 <i>39979</i>	IC220325-02	30	18.6	5/3	8:42 AM	28	55	5/3	10:06 AM	20	55	X	X
2) <i>N-2</i>			37844 <i>36978</i>	IC220325-02	30	19.0	5/3	8:47 AM	28	55	5/3	10:10 AM	20	65	X	X
3)																
4)																

703-471-6150 Notice of Seal

RELINQUISHED: *[Signature]* DATE / TIME: **5/10 12:08 PM** RECEIVED: *[Signature]* DATE / TIME: **5/11/22 10:10**
 UNQUISHED: *[Signature]* DATE / TIME: **5/11/22 10:10** RECEIVED: *[Signature]* DATE / TIME: **5/11/22 10:10**
 UNQUISHED: *[Signature]* DATE / TIME: **5/11/22 10:10** RECEIVED: *[Signature]* DATE / TIME: **5/11/22 10:10**

QC Data Package LAB USE ONLY
 Level I Level II Level III Level IV

SCS-R **22E0594**
 Northern Landfill
 Recd: **05/11/2022** Due: **05/25/2022**

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AIR ANALYSIS
CHAIN OF CUSTODY

Equipment Returned by 5/31/22

COMPANY NAME: SCS Engineers - Reston INVOICE TO: SCS Engineers PROJECT NAME/Quote #: Northern Landfill
 CONTACT: Sean Sullivan INVOICE CONTACT: Jacob Shepherd SITE NAME:
 ADDRESS: 11280 Roger Bacon Drive, Suite 300, Reston VA 20190 INVOICE ADDRESS:
 PHONE #: 703-471-6150 INVOICE PHONE #:
 FAX #: 703-471-6676 EMAIL: SSullivan@scsengineers.com

SAMPLER NAME (PRINT): Sean Sullivan Turn Around Time: 10 Day(s)
 Matrix Codes: AA=Indoor/Ambient Air SG=Soil Gas LV=Landfill/Vent Gas OT=Other LV AWS WORK ORDER: 21F0968

CLIENT SAMPLE I.D.	Regulator Info		Canister Information		Sampling Start Information			Sampling Stop Information			ANALYSIS							
	Flow Controller ID	Cal Flow (mL/min)	Cleaning Batch ID	LAB Outgoing Canister Vacuum (in Hg)	LAB Receiving Canister Vacuum (in Hg)	Barometric Pres. (in Hg):		Start Date	Start Time (24hr clock)	Initial Canister Vacuum (in Hg)	Starting Sample Temp °F	Stop Date	Stop Time (24hr clock)	Final Canister Vacuum (in Hg)	Ending Sample Temp °F	Matrix (See Codes)	EPA 3C	MOCs 25C
						Start Date	Start Time (24hr clock)											
1) N-3			6	30	5.4	5/3	10:35 AM	28	55°	5/3	10:47 AM	5	55°	X				
2) N-4			6	30	5.4	5/3	10:52 AM	28	55°	5/3	11:02 AM	5	55°	X				
3) N-5			6	30	5.4	5/3	11:08 AM	28	55°	5/3	11:19 AM	5	55°	X				
4) (Backup) N-6			6	30	5.4	5/3	11:32 AM	28	55°	5/3	11:34 AM	5	55°	X				

RELINQUISHED: Sean Sullivan DATE / TIME: 5/10 12:08 PM RECEIVED: PAEXE DATE / TIME: 5/11/22 10:10

INQUIRED: PAEXE DATE / TIME: 5/11/22 10:10 RECEIVED: Sean Sullivan DATE / TIME: 5/11/22 10:10

INQUIRED: DATE / TIME: RECEIVED: DATE / TIME: LAB USE ONLY

20.4°C 310 NOISE MONITOR

063-22D-0048

SCS-R Northern Landfill 22E0594

22E0594

Recd: 05/11/2022 Due: 05/25/2022



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

Certificate of Analysis Final Report

Laboratory Order ID 22E0594


Client Name:	SCS Engineers-Reston 11260 Roger Bacon Drive Suite 300 Reston, VA 20190	Date Received:	May 11, 2022 10:10
		Date Issued:	May 24, 2022 16:19
Submitted To:	Jacob Shepherd	Project Number:	[none]
Client Site I.D.:	Northern Landfill	Purchase Order:	

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

Samples for "back-up" logged per COC, Sean Sullivan called on 5/18/22 to confirm if analysis was needed. Voicemail left. SE 5/18/22 1648



Appendix D
NMOC Calculation Results

Appendix D - LFG Model
Northern Landfill, Westminster, MD

Year	Disposal	Refuse	Disposal	Refuse	LFG Generation				NMOC	NMOC
	Rate	In-Place	Rate	In-Place				Generation	Generation	
	(tons/yr)	(tons)	(Mg/yr)	(Mg)	(scfm)	(m ³ /min)	(Million ft ³ /yr)	(m ³ /yr)	Rates	Rates
1989	82,513	0	74,855	0	0	0.0	0	0	0.0	0.0
1990	82,513	82,513	74,855	74,855	84	2.4	44	623,485	1.3	1.1
1991	109,826	165,026	99,632	149,709	163	4.6	86	1,216,562	2.5	2.2
1992	102,720	274,852	93,186	249,342	267	7.6	140	1,987,097	4.0	3.7
1993	71,035	377,572	64,442	342,528	358	10.1	188	2,666,358	5.4	4.9
1994	73,250	448,607	66,451	406,969	413	11.7	217	3,073,073	6.2	5.7
1995	107,310	521,857	97,350	473,421	467	13.2	246	3,476,689	7.1	6.4
1996	100,200	629,167	90,900	570,771	553	15.7	291	4,117,984	8.4	7.6
1997	52,539	729,367	47,663	661,671	628	17.8	330	4,674,279	9.5	8.6
1998	14,635	781,906	13,277	709,333	651	18.4	342	4,843,307	9.8	8.9
1999	10,600	796,541	9,616	722,610	634	18.0	333	4,717,681	9.6	8.7
2000	13,773	807,141	12,495	732,226	614	17.4	323	4,567,693	9.3	8.4
2001	16,820	820,914	15,259	744,721	598	16.9	314	4,448,995	9.0	8.2
2002	19,214	837,734	17,431	759,979	586	16.6	308	4,359,111	8.8	8.0
2003	18,587	856,948	16,862	777,410	577	16.3	303	4,291,699	8.7	7.9
2004	16,113	875,535	14,617	794,272	567	16.1	298	4,222,838	8.6	7.8
2005	13,428	891,648	12,182	808,889	556	15.7	292	4,138,640	8.4	7.6
2006	10,569	905,076	9,588	821,071	543	15.4	285	4,038,261	8.2	7.4
2007	8,695	915,645	7,888	830,659	527	14.9	277	3,921,174	8.0	7.2
2008	17,219	924,340	15,621	838,547	510	14.4	268	3,795,638	7.7	7.0
2009	9,145	941,559	8,296	854,168	503	14.2	264	3,740,632	7.6	6.9
2010	14,066	950,704	12,760	862,464	487	13.8	256	3,627,301	7.4	6.7
2011	14,043	964,770	12,740	875,224	478	13.5	251	3,556,678	7.2	6.5
2012	12,850	978,813	11,657	887,964	469	13.3	246	3,489,331	7.08	6.4
2013	14,422	991,663	13,083	899,621	459	13.0	241	3,416,252	6.93	6.3
2014	15,912	1,006,085	14,435	912,705	451	12.8	237	3,358,615	6.82	6.2
2015	7,052	1,021,997	6,397	927,140	445	12.6	234	3,315,046	6.73	6.1
2016	15,494	1,029,049	14,056	933,537	431	12.2	226	3,206,656	6.51	5.9
2017	44,006	1,044,543	39,921	947,593	426	12.1	224	3,167,341	6.4	5.8
2018	33,691	1,088,549	30,564	987,515	450	12.7	236	3,345,385	6.8	6.2
2019	41,604	1,122,240	37,743	1,018,079	462	13.1	243	3,436,805	7.0	6.3
2020	28,411	1,163,844	25,774	1,055,821	482	13.6	253	3,583,558	7.3	6.6
2021	15,767	1,192,255	14,303	1,081,596	487	13.8	256	3,623,469	7.4	6.7
2022	150,000	1,208,022	136,078	1,095,899	479	13.6	252	3,565,887	7.2	6.6
2023	150,000	1,358,022	136,078	1,231,977	608	17.2	320	4,525,407	9.2	8.3
2024	150,000	1,508,022	136,078	1,368,054	731	20.7	384	5,438,130	11.0	10.0
2025	150,000	1,658,022	136,078	1,504,132	847	24.0	445	6,306,339	12.8	11.6
2026	150,000	1,808,022	136,078	1,640,210	958	27.1	504	7,132,206	14.5	13.1
2027	150,000	1,958,022	136,078	1,776,288	1,064	30.1	559	7,917,794	16.1	14.6

Methane Content of LFG Adjusted to: 50%
Selected Decay Rate Constant (k): 0.050
Selected Ultimate Methane Recovery Rate (Lo): 170 m³/Mg = 5,446 cu ft/ton
NMOC Concentration in LFG: 256.8 ppmv as Hexane