Hartland Landfill – Landfill Gas Monitoring

2019 Report

Capital Regional District | Parks & Environmental Services, Environmental Protection

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HARTLAND LANDFILL – LANDFILL GAS MONITORING
2019 REPORT

EXECUTIVE SUMMARY

Hartland landfill provides solid waste disposal services for the Capital Regional District (CRD). The landfill is a multi-purpose facility providing collection services for recyclable materials, household hazardous waste, items covered by product stewardship, and disposal of municipal solid waste and controlled waste. The site operates pursuant to an operational certificate under the *Environmental Management Act*, issued by the BC Ministry of Environment and Climate Change Strategy (ENV); and follows an operating plan required under the operational certificate.

The operating landfill footprint is approximately 33 hectares with an estimated 7,450,000 tonnes of municipal solid waste landfill, as of the end of 2019. Total annual disposal was 159,942 tonnes of residential, commercial and industrial waste. When the landfill reaches planned final filling elevations it will occupy approximately 43 hectares, with a volume of approximately 14,600,000 m^3 of municipal solid waste.

This report fulfills annual reporting requirements set out in the BC *Operational Certificate 12659* and the BC *Landfill Gas Management Regulation*. Landfill gas (LFG) collection/management at Hartland (described below) includes collection and utilization infrastructure, generation modelling and monitoring (utilization, perimeter gas probes, hotspot monitoring and speciation).

LFG collection and/or management at Hartland includes the following components:

- **Gas collection infrastructure**, including cover systems, collection pipes, wells and blowers to facilitate gas collection and utilization.
- **LFG utilization facility** that generates electricity for the BC Hydro grid.
- **LFG monitoring system**, including collection system, hotspot and subsurface monitoring programs.
- **Methane production and gas generation modelling** rates given landfill waste volumes and decomposition rates.

GAS COLLECTION AND UTILIZATION

In 2019, the gas collection system consisted of 60 vertical wells and 86 horizontal wells, for a total of 146 wells. In 2019, four non-productive wells were removed from service, nine new wells were connected to the system (Phase 2, Cell 2 and Cell 3), and seven horizontal wells were installed in completed lifts in Phase 2, Cell 3. The well field was balanced monthly in 2019, as recommended by the BC *Landfill Gas Management Facilities Design Guidelines*.

The CRD continues to implement the *Landfill Gas Management Plan* consistent with the conceptual designs developed by Conestoga-Rovers & Associates (2011). This plan sets out targets for system designs to achieve 75% collection efficiency four years after implementation. The Hartland landfill plan was submitted to the ENV in April 2012, with an implementation target of 2016. While the collection efficiency target has not been reached to date, a recent compliance review conducted by ENV indicated that the landfill is in compliance with the BC *Landfill Gas Management Regulation*.

In 2019, LFG collection efficiency was 65.5%, which is within estimated range according to the *Landfill Gas Management Plan* based on filling plan progression. A well optimization study and LFG quantification assessment is planned for 2020 to support increased gas collection and reduce fugitive emissions.

A summary of LFG production and collection is provided below (based on the LFG generation model). Emissions have been normalized to 50% methane in standard cubic feet per minute (scfm).

Year	Modelled Annual Methane Generated (scfm)	Measured Annual Gas Capture (scfm)	Calculation Collection Efficiency (%)	GHG Emission (tonnes/year CO2e)
2019	1,622	1,062	65.5	68,451

MONITORING

Hartland landfill has several monitoring programs to assess the effectiveness of the LFG collection infrastructure. The following summarizes the components of the program:

1. **Collection and utilization system monitoring** to evaluate changes in gas quality over time and to document data for gas collection and gas utilization to assess collection efficiency and total emissions from the landfill.

2. **Monitoring of subsurface perimeter and building foundation probes** to assess the potential for subsurface LFG migration at the eastern landfill boundary and at on-site buildings for compliance with BC *Landfill Criteria*, and for worker and public health and safety.

3. **Surface emissions and hotspot monitoring** to verify the effectiveness of cover and the LFG collection system in order to identify health and safety risks associated with fugitive LFG emissions.

4. **LFG Speciation** to assess the composition of gas, including volatile organic compounds, sulphur gases and typical LFGs, in order to calculate ambient dilution concentrations for health and safety, and infrastructure integrity purposes.

GAS GENERATION

In 2019, Hartland landfill generated 7,915 tonnes of methane, based on the model provided by ENV. Total fugitive greenhouse gas (GHG) emissions generated from the landfill for 2019 are estimated at 68,451 tonnes CO_2e.

COMPLIANCE SUMMARY

Table ES1 has been prepared to summarize the results of LFG monitoring programs, whether the results comply with requirements, actions taken to address non-compliance, and recommendations.

Table ES1. LFG Compliance Summary 2019

Program	Compliance Location	Criteria	Findings	Mitigation/Actions	Recommendations
Perimeter Probe Monitoring	Probes GP-1A, 1B, 2A, 2B, 3A, 3B, 11A, 11B, 12A and 12B	Methane must not exceed 5% in subsurface soils (BC *Landfill Criteria for Municipal Solid Waste* & BC *Landfill Gas Management Facilities Design Guidelines*)	No exceedances Low risk of sub-surface gas Migration to adjacent properties	None	Continue quarterly monitoring.
Building Foundation Probe Monitoring	Probes GP- 4A, 5A, 6A, 6B, 7A, 7B, 8A, 9A, 13A, 14A, 17A, 18A	Maximum 1% methane in any on-site facility (BC *Landfill Criteria for Municipal Solid Waste* & BC *Landfill Gas Management Facilities Design Guidelines*)	No exceedances Low risk of subsurface gas migration to adjacent building	None	Continue quarterly monitoring.
Ambient Grid Monitoring	N/A	100 ppm total hydrocarbon (THC), as methane (CRD internal guideline)	10 grid locations >100 ppm No cover system failures suspected in the closed area of Phase 1	Investigated hot spots and mitigated, where possible.	Continue annual monitoring.
Hot Spot Monitoring	N/A	1,000 ppm THC (CRD internal guideline)	Seven hot spots (z-points) >1,000 ppm Currently 22 locations for hot spot investigation	Added new locations of hot spots to the monitoring program.	Continue annual monitoring. Investigate mitigation options.
Well Field Monitoring and Balancing	N/A	Monitor monthly. Oxygen 2.5% - gas optimization and reduction of fire potential *(BC Landfill Gas Management Facilities Design Guidelines)*	Monitoring completed monthly; Oxygen did not exceed 2.5%	None	Continue monthly monitoring at minimum.
Gas Speciation	N/A	N/A	Undiluted LFG exceeded WorkSafeBC criteria for carbon dioxide, hydrogen sulfide, vinyl chloride, toluene, benzene, ethylbenzene and n-hexane; however, ambient concentrations are likely well below WorkSafeBC limits, due to dilution with ambient air. Comprehensive sampling of gas identified increasing concentrations in oxygen and siloxanes.	None	Continue speciation sampling in 2021 or sooner to support LFG utilization planning. Continue ambient monitoring program to confirm and implement health and safety protocols for hot spots.
Gas Collection	N/A	75% gas collection efficiency target by the end of 2016, as per *Landfill Gas Management Plan*.	Gas collection efficiency was estimated at 65.5%, based on the ENV gas generation model and is within the estimated efficiency range specified in the *Landfill Gas Management Plan*, based on filling plan progression.	*Landfill Gas Management Plan* submitted to ENV.	Continue to implement the gas management plan. Conduct well field optimization and LFG quantification studies in 2020.

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1.0 INTRODUCTION

Hartland landfill provides solid waste disposal services for the Capital Regional District (CRD). The landfill is a multi-purpose facility providing collection services for recyclable materials, household hazardous waste, extended producer responsibility products, salvageable items, as well as disposal services for municipal solid waste and controlled waste. Landfill operations are guided by the *Hartland Landfill Design, Operations and Closure Plan – Update*, the BC *Operational Certificate 12659* issued by the BC Ministry of Environment and Climate Change Strategy (ENV), and the CRD's *Solid Waste Management Plan*.

Landfill gas (LFG) is primarily composed of methane, carbon dioxide and nitrogen, with small amounts of water vapour, oxygen, and trace gases. Trace gases include hydrogen sulphide, ammonia, nitrous oxide, volatile organic compounds and chlorofluorocarbons. Risks associated with LFG include asphyxiation, flammability (between 5% and 15% methane by volume), toxicity, odour and greenhouse gas (GHG) emissions.

The objective of an LFG collection system is to reduce GHGs through the destruction of collected methane, mitigate fugitive emissions, and reduce the potential for subsurface, lateral gas migration. Ongoing monitoring is conducted at the landfill to assess the effectiveness of these controls, and includes gas generation modelling, gas capture assessment, and ambient and subsurface monitoring.

This report is prepared to assess operational needs and performance, meet regulatory reporting requirements and to inform the public regarding LFG management at Hartland. This report meets the reporting requirements specified in the BC *Operational Certificate 12659* and the BC *Landfill Gas Management Regulation* for annual reporting of gas collection and management.

2.0 SITE DESCRIPTION

The Hartland landfill is situated on 320 hectares within the District of Saanich. Mount Work Regional Park is located to the west, parkland and the Heal's Rifle Range lies to the north, residential properties lie to the east, and undeveloped CRD property is located to the south.

The climate in the area is classified as "Cool Mediterranean", due to warm, dry summers and cool, wet winters. Annual precipitation is around 800-1,000 mm per year. The site is surrounded by bedrock; discontinuous bedrock fractures have been identified.

The CRD took over operation of the landfill site in 1985. Prior to that, it was privately owned and operated. The landfill currently occupies approximately 33 hectares with an estimated 7,500,000 tonnes[1] of municipal solid waste in place, as of the end of 2019. When the landfill reaches final capacity, it will occupy approximately 43 hectares and contain approximately 14,500,000 tonnes[1] of municipal solid waste. The average annual disposal rate for the last five years is approximately 150,000 tonnes, which comprises residential, commercial and industrial wastes.

The landfill has two operational areas: Phase 1 was operational between the 1950s and 1997, and has final cover. Phase 2 comprises the current active area of the landfill, which began in 1997. Phase 1 is unlined and covered with a combination geo-membrane/clay cap. Phase 2 was constructed within a former lake basin (now referred to as the Phase 2 basin); it is partially lined and relies on hydraulic gradients to contain leachate. Development of the Hartland landfill is guided conceptually by the cell development and filling plan that was updated in 2019 (Sperling Hansen Associates, 2020).

[1] Updated engineering estimate 2019

3.0 REGULATORY FRAMEWORK

There are a number of provincial and federal regulations that apply to LFG management, emissions management and reporting. Key regulations are listed below.

3.1 LFG Management Regulation

The BC *Landfill Gas Management Regulation* requires landfills that produce 1,000 tonnes of methane per year have a qualified professional prepare an LFG management plan. According to the regulation, the *Landfill Gas Management Plan* must be prepared in accordance with the BC *Landfill Gas Management Facilities Design Guidelines*, 2010 ('*the Guidelines*') and include:

- a description of existing or planned methods or maintenance practices and processes for LFG management on the site;
- a plan for installation, operation and maintenance of LFG management facilities (including contingencies for planned or emergency shut downs); and
- recommendations for optimizing LFG collection to meet a 75% collection efficiency target four years after implementation.

The Guidelines specify a set of design and performance objectives/standards regarding LFG management and operations, including gas collection and composition; extraction and destruction infrastructure; and gas migration and assessment.

3.2 WorkSafeBC

Many of the compounds in LFG, particularly methane, hydrogen sulphide and individual volatile organic compounds, have worker exposure limits set out within WorkSafeBC regulations. The Hartland landfill must comply with these limits.

3.3 BC Landfill Criteria for Municipal Solid Waste

The BC *Landfill Criteria for Municipal Solid Waste* (2016) stipulates compliance with the *Landfill Gas Management Regulation* and the Guidelines described above. As well, the landfill must be managed to ensure there is no public threat or nuisance/odour. Annual reporting and compliance review is a requirement under Hartland landfill's *Operational Certificate 12659.* A full compliance report for all Operational Certificate (OC) requirements is provided in the Hartland Operations Report, 2019.

3.4 Additional Emissions Reporting

There are additional federal and provincial emissions reporting frameworks requiring Hartland LFG emissions or related data. A summary of these reporting programs is provided in Table 1.

In 2019, third-party audit and review for federal and provincial GHG reporting data was completed and found to be complete. Audits will be voluntarily completed every five years or when substantial changes to infrastructure or the reporting frameworks are made.

Table 1 Summary of Federal and Provincial Emissions Reporting Frameworks Requiring Hartland LFG Emissions or Related Data

Report/Survey	Reported to	Report Frequency	Year reporting began	Required Reporting Elements	Regulatory Framework
CRD LFG Report	ENV Electronic reporting system	Annual	2011	• Quantity and composition of LFG • Quantity LFG (CH_4) collected • Quantity LFG (CH_4) utilized and flared • LFG collection efficiency • LFG well field balancing/issues • Operational issues and gas plant downtime • LFG management plan implementation status	BC *Landfill Gas Management Regulation*
Facility GHG Reporting (Final Emissions Report)*	ECCC Single-Window Reporting System	Annual	2004	• Fugitive emissions (CH_4, N_2O) • Flare emissions (CO_2) • Generator emissions (CO_2)	*Canadian Environmental Protection Act* & annual Canada Gazette publication
BC GHG reporting (Industrial Emissions)*	ENV Single-Window Reporting System	Annual	2010	• Flare emissions (CO_2, CH_4, N_2O) • Vehicle emissions (CO_2, CH_4, N_2O) • Generator emissions (CO_2, CH_4, N_2O)	BC *Greenhouse Gas Emissions Reporting Regulation* under the *Greenhouse Gas Reduction (Cap and Trade) Act*

Electricity Supply and Disposition Survey	Statistics Canada	Monthly	2016	• Energy production and usage summary for LFG utilization facility
				  ○ Electricity production
				  ○ Electricity purchased from the grid
				  ○ Associated revenue/costs
					Statistics Act

Electricity Supply and Disposition Survey	Statistics Canada	Annual	2016	• Energy production and usage summary for LFG utilization facility
				  ○ Electricity production
				  ○ Electricity purchased from the grid
				  ○ Associated revenue/costs
					Statistics Act

National Pollutant Release Inventory (NPRI)*	ECCC	Annual	2017	• Reporting of criteria air contaminants (CO_2, NO_x, $PM_{2.5}$, PM_{10}, sulphur dioxide, total PM, VOC) for emissions from:
				  ○ On-site vehicles
				  ○ Generator
				  ○ Flares
				  ○ Uncontrolled (fugitive)
					Canadian Environmental Protection Act & annual Canada Gazette publication

Table 1, continued

Report/Survey	Reported to	Report Frequency	Year reporting began	Required Reporting Elements	Regulatory Framework
LFG Survey	ECCC	Biennial	2012	• Waste composition and municipal breakdown • Quantity and composition of LFG (%CH_4) • Quantity LFG (CH_4) collected • Quantity LFG (CH_4) utilized and flared • Instrumentation and measurement details • Gas plant downtime • Electricity production	Voluntary: ECCC Pollutant inventories
Survey of Electric Power Thermal Generating Station Fuel Consumption	Statistics Canada	Annual	2016	• Electricity production • Quantity of LFG (CH_4) utilized • Heat content • Quantity and volume of fuel used	*Statistics Act*

Notes:
*Reported data is attached in Appendix G
VOC = volatile organic compounds
ECCC = Environment & Climate Change Canada

4.0 HEALTH AND SAFETY

LFG is flammable, toxic and poses an asphyxiation risk to landfill employees and contractors on site. Specifically:

- LFG can accumulate in confined spaces or low-lying area with poor air circulation, which can pose an asphyxiation risk, due to the displacement of oxygen.
- both trace gases and major gas constituents can result in acute toxicity if exposure occurs at high enough concentrations.
- trace gases, usually associated with sulphur compounds, can create odours.
- methane is explosive at concentrations between 5 and 15%. It is also a GHG with 25 times the global warming potential of carbon dioxide.

There is also potential for gas to laterally migrate off site. When gas pressure builds up in the landfill, gas migrates via cracks, soil pores, and/or fractures to equalize with the surrounding atmosphere. This includes migrating through permeable cover systems or subsurface migration toward adjacent properties. The main objective of an LFG collection system is to mitigate the above risks and reduce the potential for subsurface, lateral gas migration. However, while lateral movement can be mitigated with LFG collection and control, there will still be fugitive LFG emissions on site. A number of factors influence this, such as atmospheric pressure, groundwater level, gas pressure in the refuse mass, and permeability of cover systems. Gas collection system operation and utilization is discussed in sections 5.4 and 7.0, and monitoring programs are discussed in Section 9.0.

5.0 LFG GENERATION

Decomposition of refuse creates LFG; the composition and amount of gas generated varies based on factors, such as amount, type and age of waste, as well as environmental conditions, such as temperature and moisture content. LFG composition and generation rates are discussed in sections 6.0, 7.0 and 9.0.

Peak gas generation occurs during the first one to three years after disposal. Initially, decomposition of waste is an aerobic process and produces mainly carbon dioxide. As oxygen is depleted, the decomposition occurs under anaerobic conditions. The total waste input and waste composition affects overall gas generation rates. For clarity, it is important to note that gas production is the total amount of gas predicted to be produced by the landfill given waste composition, volume of existing waste in place and site-specific meteorological conditions.

5.1 Waste Quantity

The quantity of LFG production is dependent on the amount and type of waste received. In 2019, the Hartland landfill received 163,001 tonnes of waste, which included 147,676 tonnes of general refuse, 11,512 tonnes of controlled waste and 3,813 tonnes of asbestos. Waste volumes have increased by 32% since 2015 when the annual tonnage reached a historical low (123,381 tonnes).

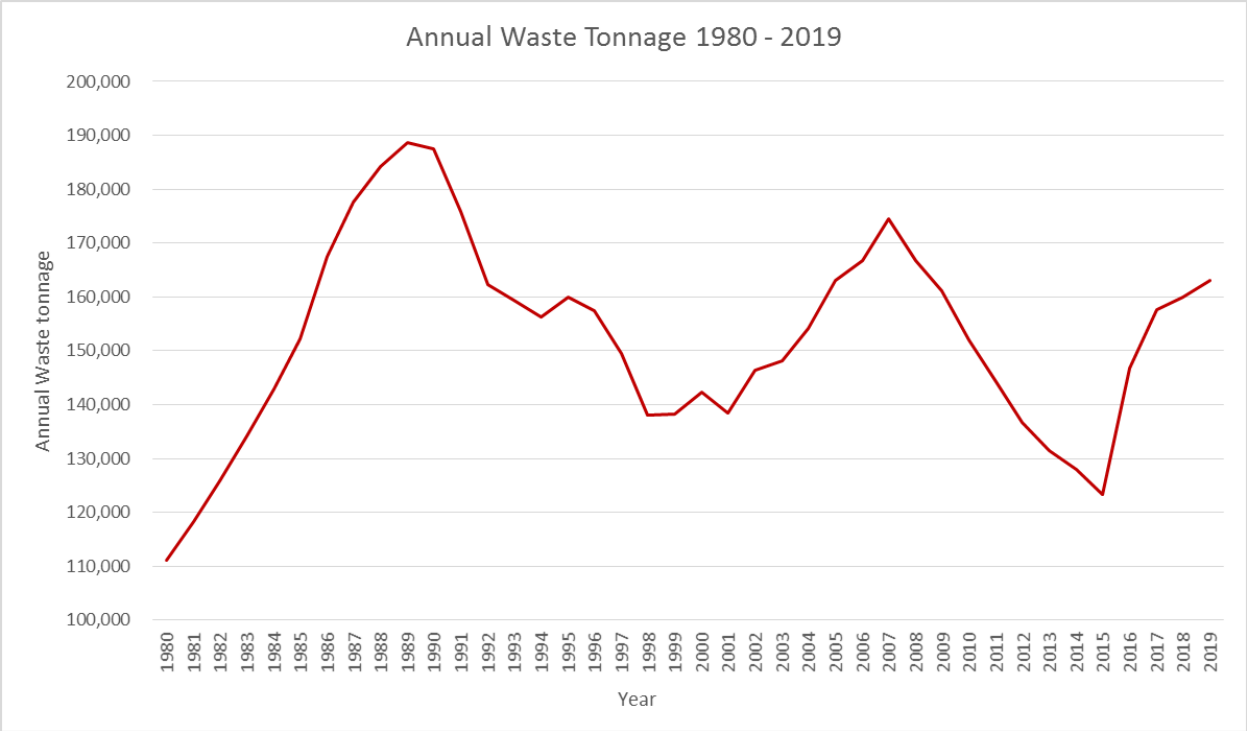


Figure 1 Annual Waste Tonnages Received or Estimated for Hartland Landfill from 1980-2019

5.2 Waste Composition

Waste composition is used to calculate methane generation rates in order to estimate overall LFG generation. Waste composition study results are included in Table 2 and with the gas generation data in Appendix A, including methane generation potential, a summary of waste sources and diversion, as required under the BC *Landfill Gas Management Regulation*.

Waste composition studies do not quantify controlled waste. Controlled waste is classified by the CRD as wastes that, due to environmental or health and safety considerations, require special handling. Controlled waste deposited at the site is measured by scale and classified by type. For the purpose of this report, and on consultant recommendation, controlled waste is considered relatively inert, with the exception of controlled waste classified as 'Miscellaneous', which is considered to be decomposable. Controlled waste totals are incorporated in the quantities for relatively inert and decomposable waste in the model and in Table 2.

Table 2 Waste Composition 1980 to Present

Date Range	Relatively Inert	Moderately Decomposable	Decomposable
1980 to 1995	33.7%	24.9%	41.4%
1996 to 2000	33.9%	40.5%	25.6%
2001 to 2004	26.6%	39.6%	33.8%
2005 to 2009	33.2%	37.0%	29.9%
2010 to 2013	31.5%	39.1%	29.4%
2014 to Present	37.6%	43.2%	19.2%

5.3 Waste Diversion

An organics (kitchen scraps) diversion program and ban was implemented on January 1, 2015. However, incentive programs were implemented in 2013 and 2014 to encourage diversion prior to the implementation of the landfill ban. As a result, more than 5,000 tonnes of organics were diverted from the landfill in 2013 and more than 15,000 tonnes in 2014. A conservative estimate of 20,000 tonnes was used for 2015 through 2018 and 30,000 tonnes was used for 2019, as diversion is assumed to have increased with growing population and waste tonnages.

Diversion of a portion of highly decomposable waste from the landfill will result in a decrease in overall gas production. The 2016 waste composition study indicated organic material now comprises 21.1% of the waste stream, compared to 30% prior to the kitchen scraps ban. The Hartland *Landfill Gas Management Plan* predicted a decrease in gas production within the first one-three years following the implementation of the diversion program. Annual modelled methane production, since the implementation of the diversion program, has confirmed a decline in LFG production since the implementation of the organics ban in 2015.

5.4 Gas Generation Modelling

LFG generation rates are estimated using the ENV model stipulated by the BC *Landfill Gas Management Regulation*. The following section summarizes model inputs, assumptions and results. Protocols require the model to be run from 1980 to present. The Scholl-Canyon model requires input of site-specific data, which is discussed below. The model is run annually to produce current gas generation rates and uses updated waste quantity and composition data. The following input data are required to run the ENV LFG generation model:

- historical tonnage back to 1980
- waste quantity
- waste composition (ratio of relatively inert, moderately decomposable and decomposable wastes in place)
- methane generation rate factor
- methane generation potential factor
- water addition factor
- site rainfall

The methane generation rates and estimates were calculated by using the annual tonnage amounts and the waste composition data from studies completed in 1990, 1996, 2001, 2005, 2010 and 2016, as well as the most recent quantifiable kitchen scraps diversion data/estimates. Detailed waste composition information is provided in appendices A2a, A2b and A4 and percentages of relatively inert, moderately decomposable and decomposable wastes were estimated in accordance with ENV guidance. Prescribed methane generation potentials are shown in Table 3.

Table 3 Methane Generation Potential and Rate Factors Used for the ENV LFG Generation Model

Waste Type	Methane Generation Potential L_0 (m^3 methane/tonne)	Methane Generation Rate (k) Values
Relatively Inert	20	0.02
Moderately Decomposable	120	0.04
Decomposable	160	0.09

Table 3 shows the estimated annual methane production for Hartland landfill since 1998 when LFG collection commenced. According to the *Landfill Gas Management Plan*, gas generation is predicted to have peaked, due to the kitchen scraps ban, and will slowly decline through to landfill closure.

Table 4 Estimated LFG Generation by Year at Hartland Landfill

Year	Annual Methane[1] Production (tonnes/yr)
1998	7,129
1999	7,117
2000	7,112
2001	7,127
2002	7,229
2003	7,360
2004	7,493
2005	7,645
2006	7,760
2007	7,885
2008	8,034
2009	8,145
2010	8,230
2011	8,277
2012	8,293
2013	8,282
2014	8,106
2015	8,032
2016	7,979
2017	7,957
2018	7,909
2019	7,915

Notes: [1]Estimates generated using the ENV model

6.0 LFG COLLECTION AND MONITORING INFRASTRUCTURE

Systems to control and monitor fugitive LFG emissions have been implemented at Hartland landfill. The objective of these controls is to:

- protect employee and public health and safety
- prevent migration of gas off-property or into on-site buildings
- reduce GHG
- capture gas for energy recovery
- control odour

The original LFG management system was installed in 1990 and upgraded in 1996. Under these early LFG systems, collected methane was destroyed via candlestick flare. Since 2004, LFG has been used to generate electricity. The current LFG management system consists of:

- An extraction well network, including vertical and horizontal wells.
- A conveyance system incorporating branch, lateral and header pipes to convey the collected LFG from the extraction network to the LFG utilization facility or flares.
- An LFG destruction facility with moisture separators, centrifugal blowers, flares, piping and electrical service.
- A 1.6-MW generator for LFG utilization.
- An LFG monitoring program.
- A subsurface gas migration monitoring network that includes gas monitoring probes located adjacent to the eastern property boundary and the perimeter of on-site building foundations.

6.1 Gas Extraction Wells

Table 5 shows the number and type of gas wells installed and operating in 2019. A complete summary of all gas wells, including installation and deactivation dates, is included in Appendix B. In 2019, seven new wells were installed and nine were activated. Four wells were removed from the monthly monitoring program in 2019. Automated control valves and routine well balancing mitigate oxygen intrusion into the waste and optimize gas flows and composition.

Table 5 Number and Type of Gas Wells Installed or Operating (2013-2019)

Type of Gas Well	2014	2015	2016	2017	2018	2019
Vertical gas wells operating	74	74	74	67	63	60
Horizontal gas wells operating	34	38	40	62	69	78
Leachate horizontal gas wells operating	12	12	12	12	9	8
Leachate gas trench operating	5	5	5	0	0	0
Wells installed, but not connected[1]	0	16	12	5	15	7
Total	**125**	**129**	**131**	**141**	**141**	**146**

Notes:
[1] number of wells installed, but not connected are not included in the final total.

See Figure 2 for the general location and layout of the LFG infrastructure.

Current vertical well design includes dual zone shallow and deep wells extending approximately 16 m and 30 m into the waste, respectively. Vertical well saturation has complicated gas extraction and, as a result, few have been installed since the implementation of the *Landfill Gas Management Plan*. No vertical wells were installed in 2019. Installation and operation of vertical wells is continually reviewed.

In 2011, the density of horizontal wells has increased from 45-50 m, to 20 m on centre. Wells are placed on each vertical lift, approximately every 4 m, with each offset from the lower trench alignment. All new horizontal wells over 150 m in length are connected to laterals at both ends. By the end of 2019, seven new horizontal wells were activated (installed in the 179 mASL lifts of Cell 2) and seven new wells were installed in the 151 m and 155 m lifts of Cell 3. Well activation is slower in new cells (Cell 3), as sufficient refuse coverage is required to prevent oxygen intrusion.


CRD - Facilities Management & Engineering Services - Jun 12, 2019 - Technologist: jpbezeau - Map Document: HartlandGasCollectionInfrastructureWithAreas2019.mxd
Hartland Landfill
Gas Collection Infrastructure June 2019
CRD
Making a difference...together
Gas Collection Facility
Gas Plant
Power Plant
Gas Collection Well
Buried Well
Well
Well Head Assembly
Gas Collection Node
Cleanout
Condensate Drain
Condensate Drain Cleanout
Condensate Trap
Header Cleanout
Inline Valve
Sampling Port
Trench Riser
Gas Collection Carrier Pipe
Gas Carrier Pipe
Gas Collection Pipe
Header
Lateral
Trench Riser
Horizontal Gas Wells
171, 175 & 179 Lifts
163, 165 & 167 Lifts
151, 155 & 159 Lifts
139, 143 & 147 Lifts
Other Wells
Landfill Designated Areas
Metres
0 20 40 60 80 100
Projection: UTM Zone 10 North, NAD 1983
This map is for general information only and may contain inaccuracies.
FUTURE LANDFILL EXTENT
PHASE 2, CELL 1 NORTH FACE CLOSURE (2012)
PHASE 2, CELL 2 CLOSURE (2016)
PHASE 1 CLOSURE (1997)
PHASE 2, CELL 3 (ACTIVE)
SOUTH WEST PROGRESSIVE CLOSURE (2008)
High Level Road
North Toe Road
Lagoon Road
Perimeter East Road
Main Access Road
Recycle & Public Road
PHASE 2, CELL 2 (ACTIVE)

6.2 Gas Well Field Operation and Monitoring

CRD staff monitor gas wells for methane, carbon dioxide, carbon monoxide, oxygen, balance gas, static pressure, differential pressure, temperature and flow on a monthly basis. The well field must be measured and balanced at least once per month, and more often if there are changes in gas composition, or if there are fluctuations in the system vacuum. There are many factors that impact gas generation, so frequent well adjustments are critical to minimize oxygen, and optimize flow and methane content. Ideally, constant vacuum is applied at a well so that gas is drawn at approximately the same rate that it is being generated (a target of >40% methane and <2.5% oxygen is desirable). A comprehensive summary of gas concentration by well is provided in Appendix C. For 2019, on average, the LFG at the gas plant was comprised of 50% methane and 0.7% oxygen.

Data from the well field, including individual well gas flows, is provided in appendices B2 and B3. The well field was balanced 12 times in 2019 (specific wells are checked more often to optimize gas extraction), as recommended by the BC *Landfill Gas Management Facilities Design Guidelines*. The full data set is included in appendices B4 and B5. Table 6 shows that the 12 most productive wells contribute 36% of the total gas volume. Figure 3 depicts gas collection by well as it contributes to the total gas collected. The most productive wells were installed and activated after 2016 (nine of 12 wells).

In 2020, a well field optimization study is planned to identify current LFG collection system deficiencies or limitations and make recommendations to optimize or increase gas capture and gas quality. This project will support efforts to increase gas collection efficiencies and reduce fugitive emissions. Any changes will be incorporated into an updated *Landfill Gas Management Plan* for Hartland.

Table 6 Gas Wells with the Highest Collection 2019

Name	Refuse Lift (mASL)	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)	Year Activated
HLGW016B	163	52.6	122.6	12	33,890,654	959,682	34,453	8.77%	8.78%	2012
HLGW0052	151 (Cell 3)	53.2	53.9	12	15,060,794	426,476	15,311	3.90%	12.68%	2019
HLGW028A	171	51.9	48.6	12	13,241,357	374,956	13,461	3.42%	16.10%	2017
HLGW021B	165	53.3	39.4	12	11,039,775	312,613	11,223	2.86%	18.96%	2013
HLGW0055	151 (Cell 3)	49.1	35.9	12	9,263,921	262,326	9,418	2.40%	21.36%	2019
HLGW051B	179	48.1	33.7	12	8,523,518	241,360	8,665	2.20%	23.56%	2017
HLGW042B	175	50.6	31.8	12	8,433,840	238,821	8,574	2.18%	25.74%	2017
HLGW049B	179	47.3	33.7	12	8,375,873	237,180	8,515	2.17%	27.91%	2018
HLGW039A	175	50.7	31.3	12	8,350,593	236,464	8,489	2.16%	30.07%	2017
HLGW037B	175	56.0	28.2	12	8,291,612	234,794	8,429	2.14%	32.21%	2017
HLGW032B	171	51.5	30.6	12	8,275,222	234,329	8,412	2.14%	34.35%	2014
HLGW0059	155 (Cell 3)	51.4	39.8	9	8,050,085	227,954	8,184	2.08%	36.44%	2019

If a gas well does not produce enough methane, the valve is often turned down or off. In 2019, four wells were labelled inactive. Well production is reviewed monthly during well field balancing events. Wells with poor quality or no gas may be monitored over time for improvements before being removed from the program. It is recommended that older, non-producing wells be removed from the monitoring program and labelled as ‘inactive’ after 18 months.

HARTLAND LANDFILL

GAS COLLECTION IN 2019 BY INDIVIDUAL WELL

PHASE 2
CELL 2 CLOSURE (2016)

PHASE 2 CELL 3 (ACTIVE)

PHASE 2, CELL 1 NORTH
FACE CLOSURE (2011)

PHASE 1 CLOSURE (1997)

SOUTH WEST PROGRESSIVE
CLOSURE (2008)

HLGW0011 (0%) 139
HLGW0010 (0%) 139
HLGW0009 (0%) 139
HLGW0001 (0.02%) 139
HLGW0003 (0.01%) 139
LHGW0008 (0%) 143
LHGW0007 (0%) 143
LHGW0009 (0%) 143
VLGW0057 (0%)
LHGW0010 (0%) 143
VLGW0060 (0.11%)
HLGW0012 (0.08%) 147
LHGW0003 (0%) 147
LHGW0006 (0%) 143
HLGW0004 (0%) 147
HLGW0013 (0.36%) 147
HLGW0015 (0%) 155
LHGW0013 (0.85%) 151
VLGW0056 (0.13%)
LHGW002B (0%) 147
VLGW0059 (0.08%)
LHGW002A (0%) 147
VLGW034S (0.08%)
VLGW031S (0.04%)
VLGW033S (0.04%)
HLGW0007 (0%)
VLGW028S (0.11%)
LHGW0023 (0.7%) 159
HLGW0014 (0.47%) 155
VLGW030S (0.02%)
HLGW0052 (3.9%) 151
LHGW0022 (0.5%) 159
LHGW0004 (0.15%) 147
VLGW047S (0%)
VLGW032S (0.14%)
VLGW022D (0.06%)
HLGW0057 (0.75%) 155
HLGW0005 (0.51%) 147
LHGW0021 (0%) 159
HLGW0053 (1.1%) 151
HLGW016B (8.77%) 159
VLGW0055 (0.27%)
VLGW0054 (0.37%)
VLGW0051 (0.05%)
VLGW029D (0.54%)
VLGW027D (0.53%)
HLGW0058 (1.3%) 155
LHGW0019 (1.49%)
HLGW0054 (0.03%) 151
HLGW0059 (2.08%) 155
HLGW017B (1.07%) 163
HLGW006B (0%)
VLGW0050 (0.08%)
VLGW022S (0.08%)
VLGW027S (0%)
HLGW0055 (2.4%) 151
HLGW0060 (0.03%) 155
VLGW0053 (0.27%)
HLGW006A (0%) 165
VLGW029S (0.23%)
VLGW014S (0%)
VLGW014D (0%)
LHGW0020 (1.05%) 163
HLGW021B (2.86%) 165
VLGW021S (0.24%)
HLGW0061 (0.35%) 155
HLGW0018 (0.53%) 165
HLGW008B (1.23%) 143
HLGW0056 (0%) 151
HLGW0062 (1.15%) 155
HLGW022B (1.13%) 165
LHGW0017 (0%) 163
VLGW0052 (0.99%)
VLGW0049 (0.8%)
VLGW026S (0.41%)
VLGW021D (0.2%)
HLGW019B (0.62%) 165
HLGW0063 (0.34%) 155
HLGW0023 (1.21%) 165
HLGW0024 (1.09%) 171
HLGW027B (1.58%) 171
HLGW028B (0.93%) 171
HLGW029B (0.51%) 171
HLGW030B (1.6%) 171
HLGW032B (2.14%) 171
VLGW020S (0.06%)
VLGW013S (0.03%)
VLGW013D (0.02%)
HLGW0025 (0.58%) 171
HLGW031B (1.62%) 171
HLGW033B (0%) 171
HLGW0036 (0.4%) 175
HLGW034B (1.49%) 171
VLGW020D (0.2%)
HLGW0037 (2.14%) 175
HLGW0026 (1.93%) 171
VLGW025D (0%) 171
VLGW008D (0.15%)
HLGW038B (1.02%) 175
VLGW008S (0.18%)
HLGW0045 (0.12%) 179
HLGW044B (0.46%) 179
VLGW043S (0.08%)
VLGW019D (0.18%)
HLGW039B (0.45%) 175
HLGW043B (1.48%) 175
VLGW019S (0.36%)
VLGW012S (0.22%)
HLGW0046 (0.15%) 179
HLGW051B (2.2%) 179
HLGW040B (1.21%) 175
HLGW050B (1.37%) 179
VLGW018D (0.21%)
HLGW047B (0.23%) 179
VLGW007D (0.57%)
HLGW042B (2.18%) 175
HLGW041B (1.07%) 175
HLGW044A (1.46%) 179
VLGW007S (0.17%)
HLGW048B (0.19%) 179
HLGW051A (0.06%) 179
VLGW018S (0.22%)
VLGW011S (0.17%)
HLGW049B (2.17%) 179
HLGW043A (0.01%) 175
VLGW017S (0.65%)
VLGW006S (0.12%)
HLGW050A (0.21%) 179
HLGW034A (0.02%) 171
VLGW006D (0.13%)
HLGW049A (0.01%) 179
VLGW017D (0.54%)
HLGW042A (0.05%) 175
HLGW017A (0%) 163
HLGW048A (0.52%) 179
VLGW005S (0.15%)
VLGW010S (0.08%)
HLGW019C (0%) 165
HLGW040A (0.58%) 175
HLGW033A (1.55%) 171
VLGW005D (0.05%)
HLGW047A (1.89%) 179
HLGW032A (0.03%) 171
VLGW016D (0.59%)
VLGW009D (0.11%)
HLGW041A (0.01%) 175
VLGW024D (0.28%)
VLGW016S (0.08%)
HLGW039A (2.16%) 175
VLGW042S (0.38%)
HLGW016A (0%) 169
HLGW031A (0.01%) 171
VLGW024S (0%)
HLGW027A (0.98%) 171
VLGW004D (0%)
VLGW009S (0.23%)
HLGW030A (0.26%) 171
VLGW015D (0.23%)
VLGW004S (0%)
VLGW023D (0.24%)
HLGW029A (1.89%) 171
VLGW023S (0.24%)
VLGW015S (0.13%)
HLGW008A (1.22%) 143
HLGW028A (3.42%) 171
VLGW001D (0.09%)
VLGW002D (0%)
VLGW001S (0%)
VLGW003D (0.32%)
VLGW002S (0%)
VLGW003S (0.31%)

N
W E
S

Gas Well Production 2019

- 0.00%-049%
- 0.5%-1.49%
- 1.5%-3.99%
- >4.00%
- Decomissioned Well or Well with No Production
- Active Gas Lines
- Abandoned or Inactive Gas Lines; HorizontalWell, Inactive

HLGW0012 (4.8%) - Well ID - % of Total Production

VLGW024S (0%) Wells With no Gas Production (Not Read or Turned Off)

LHGW0009 (0%) Decomissioned Wells (no Gas Production)

147 Lift Number

Making a difference...together

0 10 20 40 60 80 100 Metres

Projection: UTM ZONE 10N NAD 83

CRD - Parks & Environmental Services- Jun 04, 2020 - Technologist: sruljancich - Map Document: HartlandGasProduction2019.mxd

7.0 LFG UTILIZATION AND COLLECTION

The volume of collected LFG is measured by flow meters at the LFG plant and recorded on the CRD SCADA system. The data is compiled to determine collection and utilization rates, and then compared to the generation model to estimate the collection efficiency of the system. LFG collection refers to all gas drawn into the gas plant, while LFG utilization refers only to the gas used to generate electricity. Table 7 shows a summary of gas collection, utilization and overall collection efficiency. Figures in the following section illustrate the collection efficiency for the last several years (2004-2019) and the full set of data is provided in Appendix C1.

The LFG utilization facility shown in Figure 4 consists of six major components:

1. **Conditioning Skid:** Receives the LFG from the CRD collection/blower system. The conditioning skid cools the gas and reduces moisture, which drains into the condensate collection system. It also reduces the amount of siloxane, which increases wear and tear on generator components.
2. **Refrigeration Plant:** Provides coolant to the conditioning skid by circulating it, as required, to maintain the LFG at 2°C.
3. **Engine:** 20-cylinder, 2,200-HP Caterpillar. The engine runs a direct drive 1,200-rpm, 1.6-MW generator. Electricity produced is fed into the BC Hydro grid.
4. **Transformer:** The unit converts 600 V to 25 kV.
5. **Switch Gear:** Monitors stability of the line input to the BC Hydro grid.
6. **Master Control Building:** Houses the controls that interconnect the utilization facility with the collection system. It also provides system operation controls, such as continuous quality, flow rate and pressure monitoring. The CRD has upgraded its system controls to communicate with the utilization facility.

Gas is drawn into the facility by the blowers and passed through the conditioning skid. An automated valve maintains the required gas pressure for the generator, while excess gas is fed back to the candlestick flare. Gas is only directed to the groundflare during extended periods of generator downtime, during times of generator maintenance or BC Hydro power outages.

Figure 4 Hartland LFG Plant

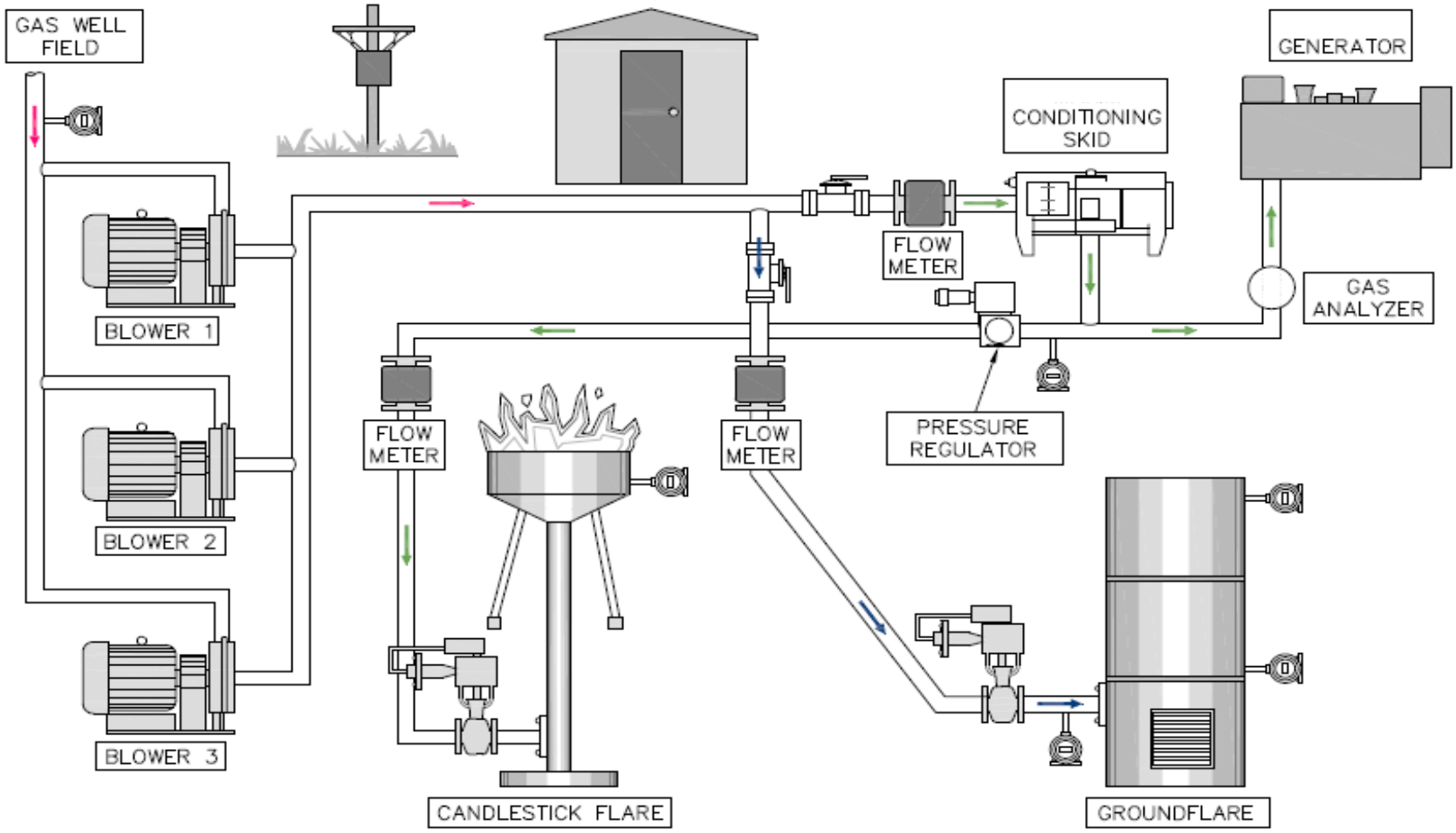


Table 7 LFG System Collection Efficiency 1998-2018

Year	Modelled Annual[1] Methane Generated (scfm)[2]	Measured Annual Gas Capture (scfm)[2]	Calculation Collection Efficiency (%)	GHG Emission (tonnes/year CO2e)
1998	1,461	1,181	80.8	34,151
1999	1,459	937	64.2	63,616
2000	1,457	738	50.6	87,762
2001	1,461	565	38.7	109,251
2002	1,481	499	33.7	119,844
2003	1,508	628	41.6	107,391
2004	1,536	593	38.6	114,990
2005	1,567	517	33.0	128,064
2006	1,590	562	35.3	125,449
2007	1,616	587	36.3	125,520
2008	1,647	504	30.6	139,380
2009	1,669	476	28.5	145,569
2010	1,687	546	32.4	139,133
2011	1,696	581	34.3	136,052
2012	1,700	829	48.8	106,201
2013	1,697	987	58.2	86,624
2014	1,671	942	56.4	89,474
2015	1,646	1,085	65.9	69,330
2016	1,632	1,009	61.8	75,939
2017	1,627	1,102	67.7	64,173
2018	1,621	1,037	64.0	71,219
2019	1,622	1062	65.5	68,451

Notes: 1 Generated using the ENV model; 2 Normalized to 50% methane

Total fugitive GHG emissions generated from the landfill for 2019 are estimated at 68,451 tonnes CO_2e, a 35% decrease from 2012, the year of *Landfill Gas Management Plan* implementation (Figure 5). Collection efficiency varies as a result of refuse age, well installation/operation, and well balancing activity. Collection efficiency has improved since 2018 and may be attributed to gas wells in Cell 3 coming online.

Since 2013, collection efficiency has varied around 60%, with a maximum of 67.7% in 2017 (Figure 6). Since then gas collection efficiency has likely declined, due to a number of factors, including:

- Phase 1 gas production is depleting. Waste in this area of the landfill has been in place for more than 30 years and a decline in gas production is expected.
- Decreased gas production in some high producing wells in Phase 2, which is expected, due to age of refuse and advanced methanogenic processes.
- Phase 2 gas well installation is complete and activation of gas wells in Cell 3 requires sufficient refuse in place to prevent oxygen intrusion. Six new wells in Cell 3 are now producing sufficient gas (up from three in 2018), and more wells will be brought online in 2020.
- The *Landfill Gas Management Plan* anticipated a stall in LFG collection efficiency during the first three years of landfilling in Cell 3. Filling plan changes and reduced waste volumes delayed the commissioning of Cell 3 and, thus, delayed the anticipated low LFG efficiencies associated with the new cell.

As part of the BC *Landfill Gas Management Regulation* inspection and compliance review process, ENV completed a review of Hartland landfill in 2019 and determined that the facility was in compliance with the requirements of the BC *Landfill Gas Management Regulation*. The full compliance review is attached in Appendix H.

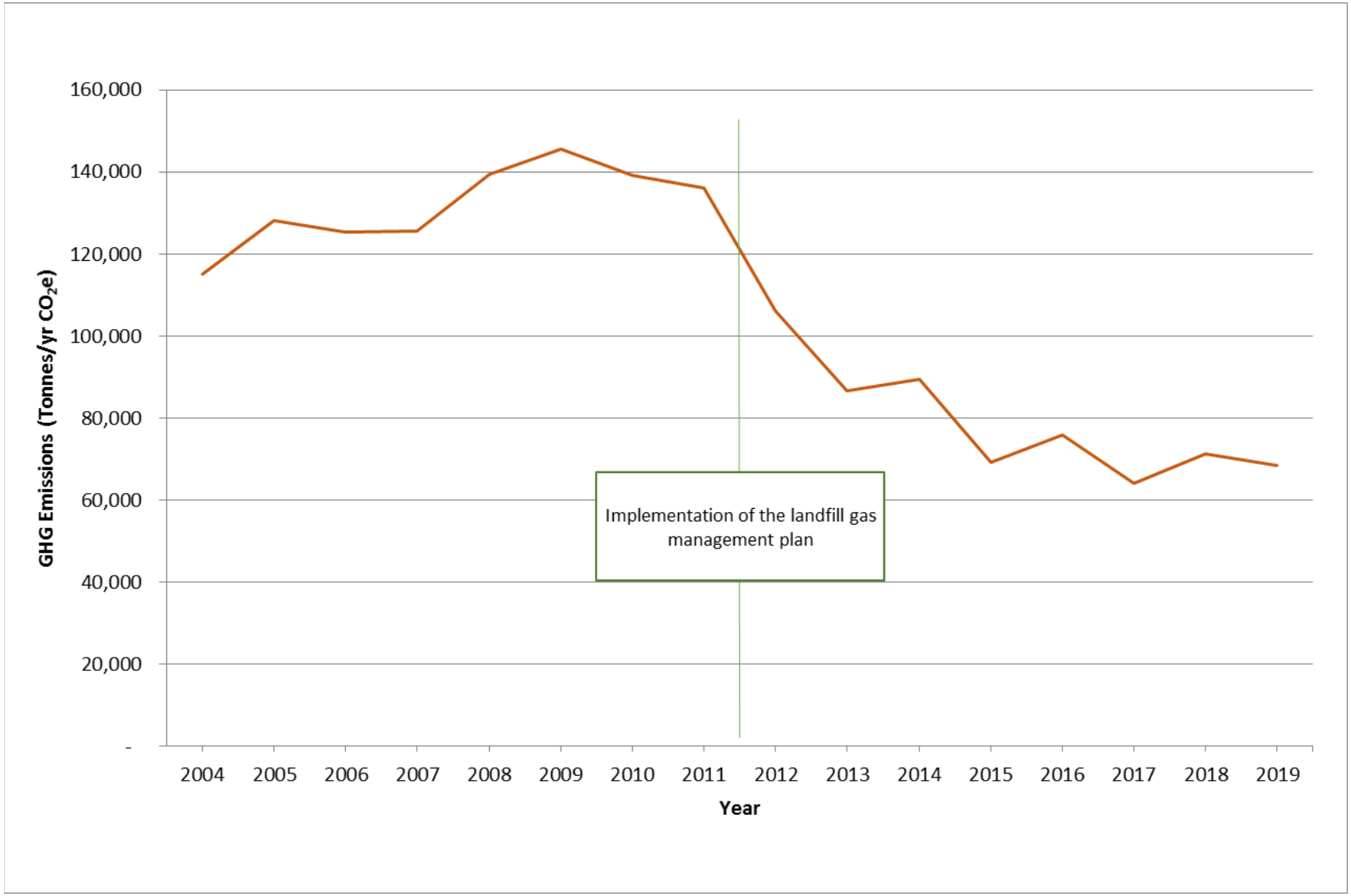


Figure 5 Fugitive GHG Emission at Hartland Landfill 2004-2019

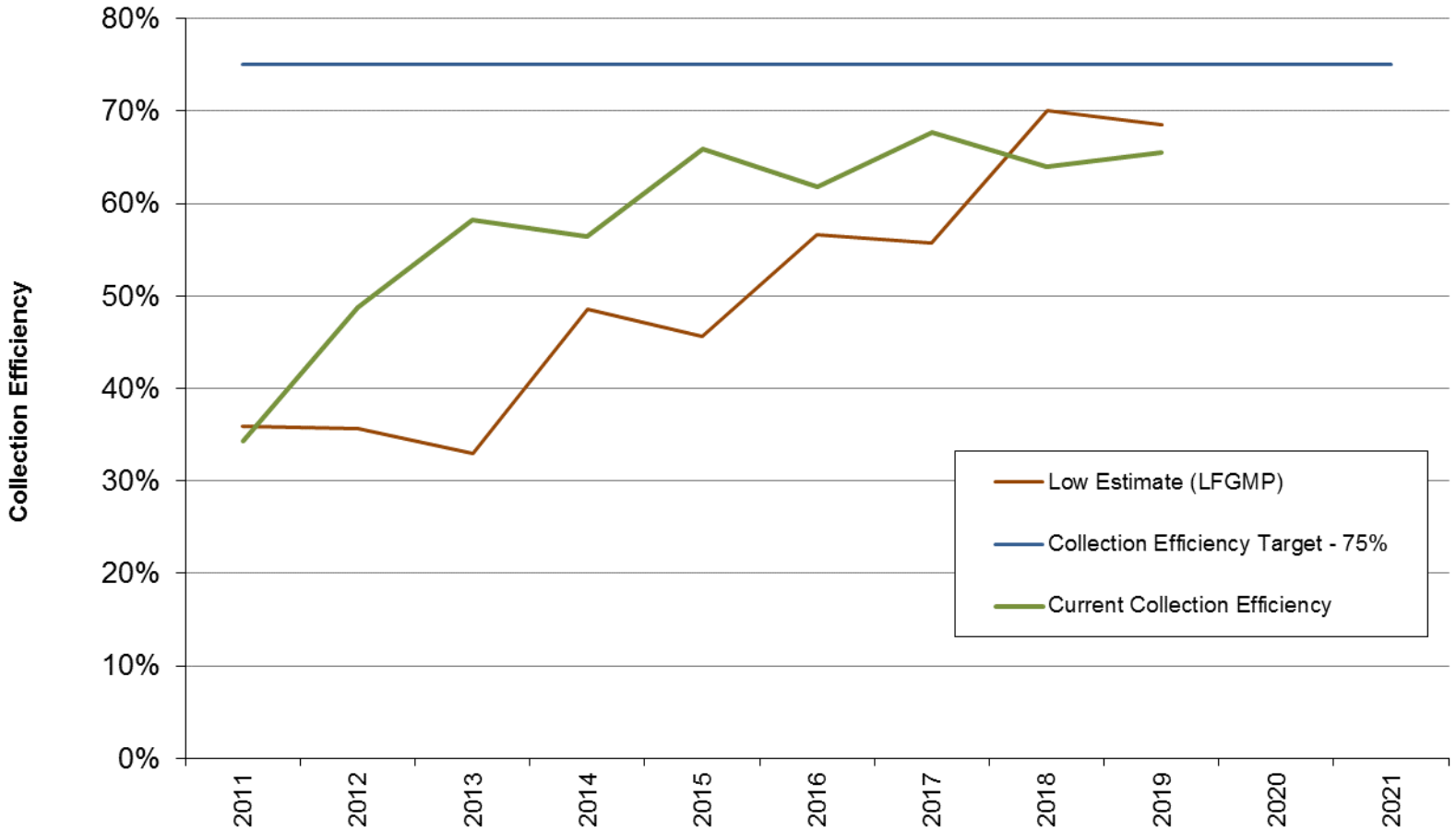


Figure 6 **High/Low Collection Efficiency Estimates from the Landfill Gas Management Plan and Current Collection Efficiency**

7.1.1 Additional Studies

As part of a long-term LFG recovery and alternatives assessment, Sperling Hansen Associates (SHA) completed a comprehensive LFG generation and capture review for 2018 to landfill closure. The intent of the assessment was to accurately evaluate current and future LFG generation potential for LFG utilization alternatives. The assessment included phase-by-phase LFG modelling using the UBCi model, and two ENV models, including the model used by the CRD. Use of the ENV annual reporting tool (ENV AR tool) for annual reporting and collection efficiency calculations is a regulatory requirement for the landfill and is described in Section 5.0. A summary of the model outputs is provided in Table 8. Average collection efficiency across all models in 2018 (including the CRD) was 70%.

SHA utilized the same ENV model (ENV AR tool), in addition to the ENV generation assessment tool (ENV GA tool). Under the *BC Landfill Gas Management Regulation*, the ENV GA tool is only used as a preliminary screening tool to determine if a landfill meets the regulatory threshold for gas generation. According the SHA, the ENV AR tool is known to overestimate LFG generation, resulting in lower LFG collection efficiencies. The ENV AR tool relies on waste tonnages back to 1981, while the ENV GA tool utilizes only 30 years of historical waste. The UBCi model, while relying on all historical waste tonnages, utilizes a variable methane generation potential, based on dry decomposable organic carbon, which results in lower overall LFG generation estimates compared to the ENV models. The accuracy of the UBCi model is supported through methane generation mass balance studies at several BC landfills.

In response to the discrepancy between modelled emissions in 2018, a LFG quantification study is planned for 2020. The study is intended to provide an accurate measurement of fugitive emissions at Hartland landfill, and support evaluation of new options to mitigate fugitive GHG emissions.

Table 8 2018 Collection Efficiency across All Models

Model	Collection Efficiency	Methodology Differences	Purpose	Explanatory Notes
ENV AR tool – CRD calculations	64%	Includes controlled waste tonnages. Uses data from all six historical waste compositions studies. Waste composition adjusted to account for controlled waste, which is consistent with the LFGMP and previous reports.	To comply with reporting requirements of the *BC Landfill Gas Management Regulation* per the existing LFGMP.	Methodology consistent with previous reporting years and follows specifications set out in the *Landfill Gas Management Facilities Design Guidelines.*
ENV AR tool – SHA calculations	66%	Excludes controlled waste in tonnages. Averages multiple years of waste composition data.	For review and conservative future LFG production for recovery alternatives assessment.	Conservative estimate – lower percentage of decomposable waste stream used. The UBCi model varies in input parameters and waste composition (UBCi).
ENV GA tool – SHA calculations	74%			
UBCi – SHA calculations	76%			

7.1.2 Destruction Devices and Usage

Table 9 shows the average gas collected from 2013-2019 and flows through destruction devices (generator, candlestick or groundflare). Flaring of gas occurs when gas collection exceeds generator capacity or during generator downtime. The generator was down for maintenance in February, March, May and July for approximately 75 days in total. During this time, the groundflare was operational.

The BC *Landfill Gas Management Facilities Design Guidelines* specify that a candlestick flare should not be used as a primary combustion device, but can be utilized as a backup combustion device when flows exceed the capacity of other approved devices. As a result, 50% or more of the total LFG collected should be directed through high efficiency destruction devices (groundflare or generator). Since 2009, the generator and/or groundflare have been the primary destruction devices. In 2019, 62.9% of the gas was directed through approved destruction devices.

Table 9 LFG Flows to Destruction Devices (2013-2019)

Annual Average	Year						
	2013	2014	2015	2016	2017	2018	2019
Gas Collected (scfm)*	987	953	1,085	1,009	1,102	1,037	1062
Destruction by Generator (scfm)*	488	492	319	269	467	535	439
Destruction by Candlestick Flare (scfm)*	477	427	304	314	461	470	395
Destruction by Groundflare (scfm)*	28	42	464	430	177	33	228
Total Gas Flared	51.2%	49.2%	70.8%	73.8%	57.9%	48.5%	58.6%
Gas through approved destruction devices	51.7%	55.2%	72.1%	69.3%	58.2%	54.7%	62.9%

Notes: *normalized to 50% methane

7.1.3 LFG Management Plan Implementation Status

The CRD has implemented the conceptual design in the *Landfill Gas Management Plan*. However, since the plan was prepared, some operational changes have occurred, which are summarized below:

- 2012: Per the *Landfill Gas Management Plan*, alignment of horizontal wells changed from east-west to north-south, due to the master fill plan cell phasing and progression.
- 2012/2013: Relocation and reconfiguration of controlled waste disposal areas. Controlled waste, initially landfilled in clay-lined cells, is now trenched into refuse. Landfilling was conducted over the controlled waste area expanding the available footprint for Cell 2. This benefits overall collection in that it allows gas wells to be installed in controlled waste areas that would otherwise be inappropriate, due to clay.
- 2014: Installation of vertical gas wells has been delayed pending further review of efficacy, due to leachate inundation or minimal gas production. Vertical gas wells installed in recent closed areas (2012) were not productive, due to density of horizontal wells and overlapping areas-of-influence.
- 2014: Since implementation of the *Landfill Gas Management Plan*, horizontal well installation depths have been reduced (made shallower). The proposed deeper wells were intended to accelerate activation; however, this was not actualized and the deeper wells triggered odour and safety issues during installation. As a result, this part of the *Landfill Gas Management Plan* was revised to allow for shallow wells. The shallow wells have fewer health and safety considerations, are less expensive to install, and can be activated in the same timeframe, as deeper wells specified in the plan.

- 2015/2016: Filling plan sequencing has changed since the plan was prepared. These changes represent schedule variations rather than whole scale deviations from the *Landfill Gas Management Plan*. Changes include:
    - Phase 2, Cell 2 vertical extension by two lifts to allow time for completion of the cliff quarry and construction of Cell 3.
- February 2017: A bypass line valve was opened at the gas plant to reduce back pressure on the well field and increase gas flows to the plant. As a result, flows increased by 50-100 scfm.
- 2018: No significant changes to the system were made in 2018.
- 2019: No significant changes to the system were made, but additional Cell 3 wells are now coming online, which is consistent with the *Landfill Gas Management Plan* prediction that Cell 3 well activation may take up to five years.

8.0 OPERATIONAL PERFORMANCE

Detailed landfill operational updates and changes are outlined in the *Hartland Landfill 2010 Operations Report*. There were no significant changes to the operation of the LFG system in 2019. The gas collection system operates continuously, except when there is a power failure or alarms that result in system shutdown. Table 10 summarizes collection system downtime (i.e., no vacuum applied on the collection system), which was less than two days in 2019. All downtime can be attributed to power outages and planned/unplanned maintenance. Table 11 summarizes the 2019 generator performance, including electricity production, which compares actual operating hours to available operating hours for each month. Average energy production for 2019 was 69.3%, a decrease from 2018 (87.9%), due to unplanned generator maintenance in June.

Table 10 Summary of 2019 Blower Downtime by Month

Month	Downtime (minutes)
January	857
February	4
March	0
April	125
May	452
June	6
July	470
August	216
September	0
October	224
November	41
December	376
Total	**2,773 (1.93 days)**

Table 11 Generator Performance 2018

Month	Engine Run Hours	Electricity Generated (MW-hour)[1]	Production (%)
January	653	954	80.1%
February	218	314	29.2%
March	604	843	70.8%
April	501	691	60.0%
May	501	729	61.2%
June	56	79	6.9%
July	591	878	73.8%
August	717	1036	87.0%
September	713	1010	88.5%
October	736	1049	89.1%
November	687	1015	92.3%
December	723	1074	92.9%
Average	**558**	**806**	**69.3%**

Notes: [1] Reported by BC Hydro

9.0 MONITORING PROGRAMS

Annual monitoring is conducted to evaluate LFG collection and control system performance. Monitoring includes both operational monitoring, e.g., generator performance monitoring and environmental monitoring (e.g., gas quality in surface probes). This section and Table 12 summarize the LFG monitoring activities.

Table 12 Summary of LFG Monitoring Programs

Task & Objectives	Frequency	Primary Parameters	Criteria	Action If Criteria Exceeded	Monitoring By
1. Perimeter subsurface probe monitoring					
To detect potential subsurface LFG migrating off site	Quarterly at perimeter probes	CH_4, CO_2, O_2, pressure and/or vacuum	LEL for methane (5.0%)	Increase sampling frequency. Initiate off-site sampling (see Task 7 below). Evaluate effectiveness of remedial measures.	EPro Staff
2. Building foundation probes					
To detect potential subsurface LFG migration into on-site building foundations	Quarterly at foundation probes	CH_4, CO_2, O_2, pressure and/or vacuum	20% of LEL 10% of LEL – CRD internal standard	Initiate appropriate remedial action.	EPro Staff
3. On-site ambient grid sampling					
To assess on-site LFG concentrations at known grid locations across the landfill surface	Once per year	THC as methane and H_2S	100 ppm as THC (methane)	Initiate investigation of remedial measures. Identify locations >100 ppm THC for Task 4.	EPro Staff
4. On-site ambient hotspot monitoring					
To identify localized sources of LFG, or releases that could create potential health, safety, environmental or operational problems	Once per year	THC as methane and H_2S	12,500 ppm/1.25% THC (25% of the LEL) 5 ppm H_2S	Initiate investigation of remedial measures. Identify locations with THC >1,000 ppm or H_2S >5 ppm as Z points (hotspots). Personal gas detectors required in high risk areas.	EPro Staff

Table 12, continued

Task & Objectives	Frequency	Primary Parameters	Criteria	Action If Criteria Exceeded	Monitoring By
5. Gas well field monitoring					
Monitor the concentrations and gas flows from all the wells in the landfill connected to the collection system	Minimum of monthly	Temperature, vacuum, flow rate, CH_4, CO_2, O_2	Maintain gas flow and methane content, control oxygen intake	Adjust wellhead vacuum.	Hartland Staff
6. Blower, flare and generator station monitoring					
Monitor the performance of the moisture separators, blowers and flare and/or generation station	Continuous	Temperature, pressure, gas flow rate, CH_4, O_2	Operational	Adjust well field if outside operational criteria.	Hartland Staff
7. Off-site properties					
To measure concentrations of gases in the event of LFG migrating off site	Task 1 exceedance	THC and H_2S	Detectable above air quality guidelines and WorkSafeBC criteria	Initiate appropriate remedial action.	Hartland Staff
8. On-site building gas monitoring					
To monitor methane and H_2S levels to protect workers in on-site buildings	Task 2 exceedance	Methane and H_2S	20% of the LEL (1% CH_4) – the Guidelines 10 ppm H_2S - WorkSafeBC	Initiate appropriate remedial action.	Hartland Staff
9. LFG speciation					
To measure concentrations of compounds in the LFG at the inlet to the gas conditioning skid and power generation station	Once every two years	VOC and H_2S	WorkSafeBC criteria for individual compounds in ambient air	Initiate Task 10 if calculated ambient concentrations exceed WorkSafeBC limits.	EPro Staff
10. On-site ambient air quality measurement					
Measure ambient VOC	Task 9 exceedance	VOC and H_2S	WorkSafeBC criteria for individual compounds in ambient air	Initiate remedial action.	EPro Staff
11. Generator performance evaluation					
Monitor the performance of the groundflare (stack test emissions)	Annual	Various	ENV Air Quality Objectives and WorkSafeBC criteria	Initiate remedial action.	EPro Staff

Notes:
EPro staff = Environmental Protection staff
LEL = lower explosive limit

9.1 Subsurface Gas Monitoring – Perimeter and Foundation Probes

Perimeter probes and foundation/trench probes have been used at Hartland landfill to monitor subsurface gas migration, if any, since 1996. Perimeter and foundation probes are required in the BC *Landfill Criteria for Municipal Solid Waste* (2016). Quarterly monitoring is conducted in five eastern perimeter monitoring probes and 12 foundation monitoring probes (Figure 7). Through long-term improvements to the LFG collection system, LFG migration potential has been reduced. Although the risk is minimal, ongoing monitoring is required to meet regulatory requirements and to confirm worker and public health and safety. A complete monitoring methodology, probe locations, details, and data from the perimeter and building foundation probes are provided in Appendix D.

9.1.1 Perimeter Probes

All probes were monitored according to the standard operating procedures four times in 2019; data is presented in Table 12, maximum values are shown in Table 13. There was no detectable methane recorded in 2019. Consistent with historical data, CO_2 levels are slightly higher in the shallower 'B' probes than the deeper 'A' probes. Elevated carbon dioxide levels may give an early indication of the presence of LFG; however, no unusually high CO_2 levels were observed. Ongoing monitoring will continue to determine if any trends develop.

9.1.2 Foundation Probes

Foundation probes were monitored four times in 2019, which is in compliance with ENV requirements (Table 14 and Table 15). Carbon dioxide levels were similar to previous years. There were no recorded exceedances of the ENV limit of 1.0% methane during the reporting period. Monitoring will continue to satisfy regulatory requirements and to determine if any trends develop.

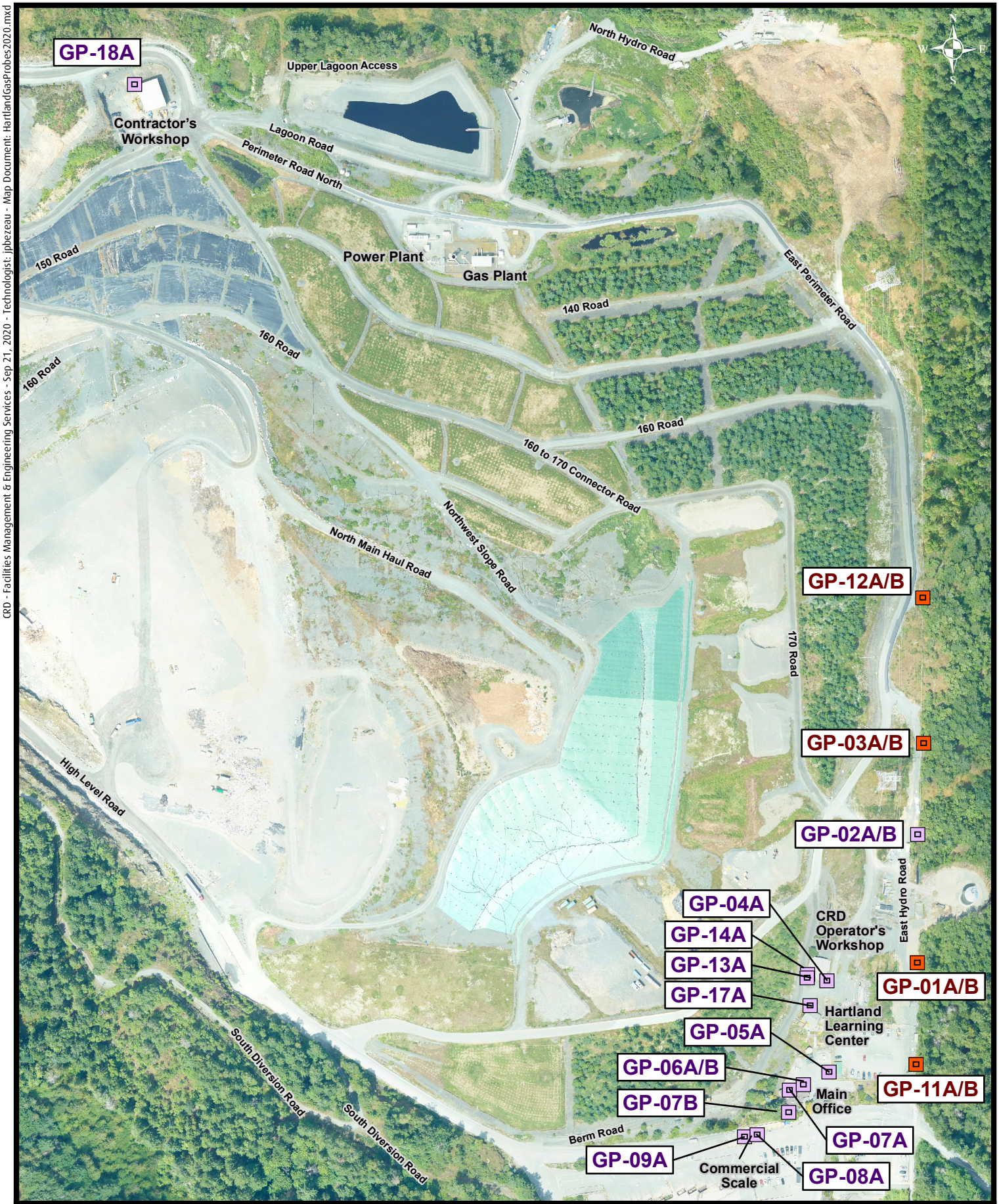
Perimeter and foundation probe monitoring results for 2019 were in compliance with the ENV requirements. Methane was not detected. The data indicates minimal risk of subsurface methane migration to adjacent properties or buildings. Quarterly monitoring should continue, to meet regulatory requirements and to evaluate health and safety risks.

Table 13 Average Gas Concentrations in Subsurface Perimeter Probes 2013-2019

Probe	CH_4 (%)							Probe	CO_2 (%)							Probe	O_2 (%)						
	2013	2014	2015	2016	2017	2018	2019		2013	2014	2015	2016	2017	2018	2019		2013	2014	2015	2016	2017	2018	2019
GP-1A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-1A	0.0	0.1	0.0	0.1	0.0	0.0	0.0	GP-1A	19.8	19.5	20.6	20.6	20.3	20.3	20.8
GP-1B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-1B	1.5	1.6	2.0	1.5	0.9	0.8	1.5	GP-1B	18.0	17.9	18.7	18.9	19.3	19.4	19.1
GP-2A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-2A	0.0	0.0	0.0	0.1	0.0	0.0	0.0	GP-2A	19.9	19.6	20.6	20.4	20.4	20.2	20.6
GP-2B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-2B	4.5	2.5	2.9	3.8	1.6	3.1	3.8	GP-2B	9.9	12.1	15.2	13.2	15.6	13.9	12.5
GP-3A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-3A	1.9	1.3	1.7	1.8	1.8	1.4	1.9	GP-3A	12.7	14.5	13.5	14.6	12.8	14.7	13.8
GP-3B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-3B	3.9	4.4	4.2	4.3	3.9	3.9	5.9	GP-3B	15.0	14.3	14.8	15.0	16.2	15.4	15.5
GP-11A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-11A	0.1	0.1	0.1	0.1	0.1	0.0	0.0	GP-11A	19.9	19.4	20.3	20.6	20.3	20.3	20.8
GP-11B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-11B	1.8	1.4	0.4	0.8	1.4	1.1	1.4	GP-11B	18.3	18.1	19.7	19.9	19.2	19.5	19.8
GP-12A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-12A	3.3	1.6	1.2	1.2	2.0	2.0	1.3	GP-12A	10.1	14.0	18.1	15.9	13.4	13.6	16.4
GP-12B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GP-12B	6.8	3.9	4.5	6.1	4.8	4.9	7.3	GP-12B	9.5	14.0	11.4	11.3	12.9	12.9	9.0

Table 14 Maximum Value Gas Concentrations in Perimeter Probes 2013-2019

Probe	CH_4 (%)	CO_2 (%)
GP-1A	0.00	0.00
GP-1B	0.00	2.00
GP-2A	0.00	0.00
GP-2B	0.00	4.40
GP-3A	0.00	2.30
GP-3B	0.00	8.20
GP-11A	0.00	0.00
GP-11B	0.00	1.50
GP-12A	0.00	3.00
GP-12B	0.00	10.40



CRD - Facilities Management & Engineering Services - Sep 21, 2020 - Technologist: jpbezeau - Map Document: HartlandGasProbes2020.mxd

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Metres

0 10 20 40 60 80 100

Projection: UTM ZONE 10N NAD 83

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Active

- Foundation Gas Probe
- Perimeter Gas Probe

LOCATION OF GAS PROBES

Table 15 Average Gas Concentrations in Subsurface Foundation Probes 2013-2019

Probe	CH_4 (%)							Probe	CO_2 (%)							Probe	O_2 (%)						
	2013[1]	2014	2015	2016	2017	2018	2019		2013	2014	2015	2016	2017	2018	2019		2013	2014	2015	2016	2017	2018	2019
GP-4A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-4A	5.30	1.25	1.35	1.70	2.07	0.05	0.00	GP-4A	8.60	7.40	19.23	18.40	19.37	20.75	20.98
GP-5A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-5A	0.98	0.73	1.00	0.80	0.73	0.65	0.58	GP-5A	19.13	18.90	19.70	19.90	19.80	19.68	20.18
GP-6A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-6A	0.73	0.48	0.58	0.50	1.03	1.00	0.78	GP-6A	19.03	19.25	20.00	19.80	19.13	19.35	20.03
GP-6B	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-6B	0.53	0.30	0.63	0.80	0.68	0.68	0.53	GP-6B	19.38	19.38	19.78	19.60	19.55	19.63	20.33
GP-7A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-7A	0.25	0.18	0.30	0.20	0.18	0.30	0.25	GP-7A	19.75	19.35	20.45	20.50	20.13	20.08	20.63
GP-7B	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-7B	0.03	0.13	0.23	0.10	0.08	0.13	0.15	GP-7B	19.90	20.30	20.50	20.60	20.30	20.33	20.73
GP-8A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-8A	0.15	0.20	0.23	0.20	0.15	0.13	0.20	GP-8A	19.73	19.30	20.53	20.50	20.25	20.35	20.63
GP-9A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-9A	0.15	0.25	0.23	0.20	0.20	0.10	0.18	GP-9A	19.73	19.23	20.50	20.40	20.13	20.33	20.73
GP-13A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-13A	2.38	2.05	3.90	2.00	3.30	2.77	2.43	GP-13A	16.40	17.78	17.03	18.10	16.80	17.27	18.48
GP-14A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-14A	0.95	2.83	3.28	0.90	1.13	0.48	0.83	GP-14A	19.10	16.83	17.80	19.60	19.10	19.95	20.38
GP-17A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-17A	0.08	0.05	0.23	0.10	0.73	0.20	0.05	GP-17A	19.85	19.65	20.43	20.30	19.63	20.00	20.58
GP-18A	n/a	0.00	0.00	0.00	0.00	0.00	0.00	GP-18A	0.20	0.35	0.33	0.20	0.28	0.33	0.25	GP-18A	19.40	18.60	19.80	19.70	19.40	19.20	20.03

[1] equipment malfunction

Table 16 Maximum Value Gas Concentrations in Foundation Probes 2013-2019

Probe	CH_4 (%)	CO_2 (%)
GP-4A	0.00	5.3
GP-5A	0.00	1.00
GP-6A	0.00	1.03
GP-6B	0.00	0.80
GP-7A	0.00	0.30
GP-7B	0.00	0.23
GP-8A	0.00	0.23
GP-9A	0.00	0.25
GP-13A	0.00	3.90
GP-14A	0.00	3.28
GP-17A	0.00	0.73
GP-18A	0.00	0.35

9.2 Surface Emissions and Hotspot Sampling

Fugitive emissions can occur from advection and/or diffusion via soil pores, gaps and defective cover materials and are monitored routinely through surface monitoring. This monitoring assesses landfill closure integrity, supports worker health and safety, informs operational or capital planning, and supports optimal LFG collection. This monitoring is a simple and low cost means to assess methane and non-methane emissions. Although hot spot (i.e., Z-point) locations change over time they are usually located at breaks or seams of cover systems and near side slopes in Phase 2, where gas collection is a challenge. The locations of all grid points and hotspots, as of August 2019, are shown in Figure 8. A summary of the results is shown in Table 16 and Table 17.

A historical summary of all Z-points is provided in Appendix E. At the end of 2019, there was a total of 22 Z-points identified. A total of 10 unique grid points were found to exceed 100 ppm THC (total hydrocarbon as methane) in 2019, largely clustered around the northwest slope of Phase 2. There were no elevated hydrogen sulphide concentrations. Hotspots have decreased significantly since the implementation of the *Landfill Gas Management Plan* in 2012.

Table 17 Summary of Grid Sampling Results 2019

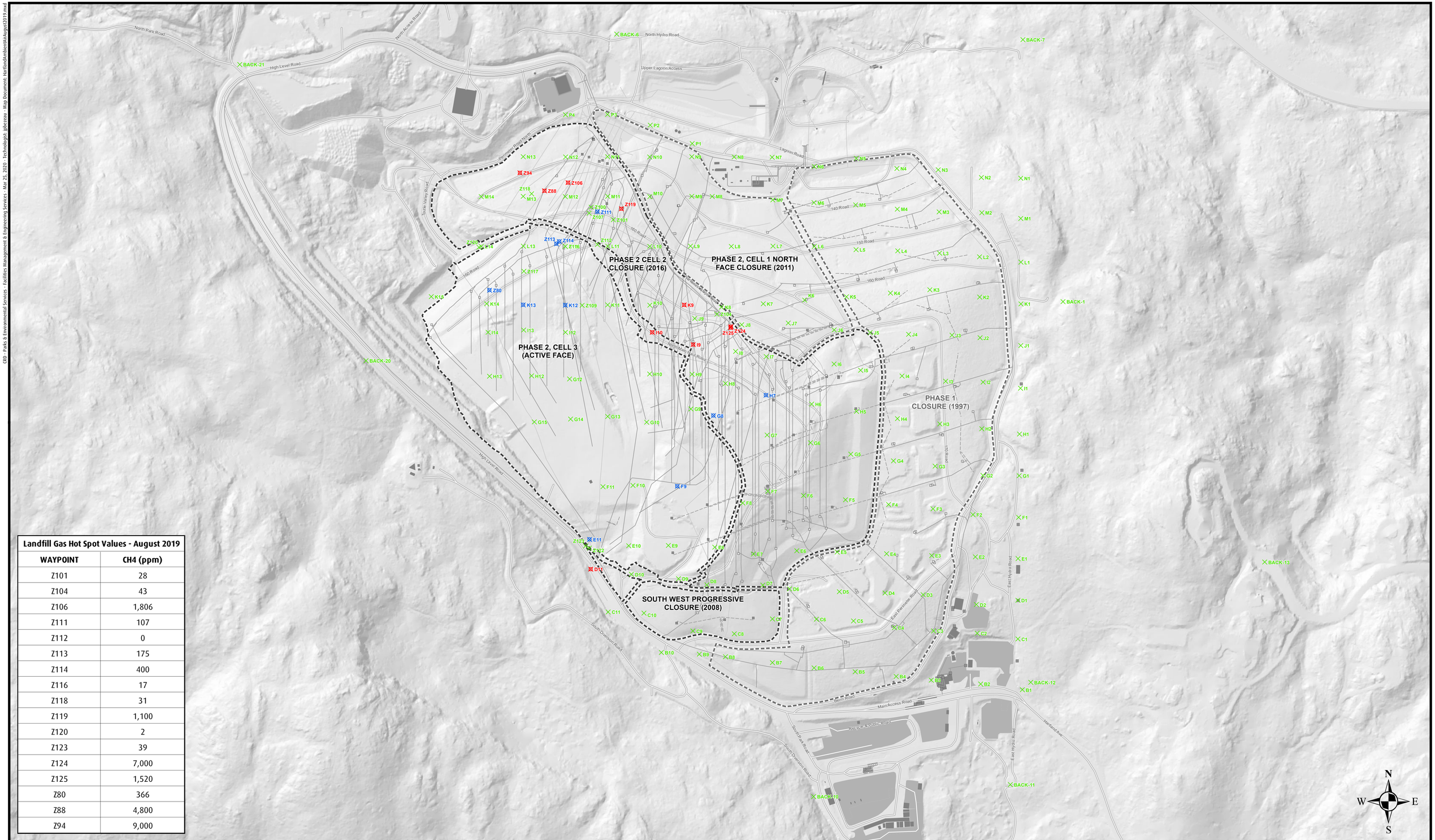
Survey date	March	August
Grid points Monitored	158	150
#Grid points >100 ppm THC	7	10
Maximum THC (ppm)	410	3,278

Table 18 Summary of Hotspot Results 2019

Survey date	March	August
Total # hotspots[1]	24	22
New hotspots at end of survey	0	0
Hotspots discontinued[2]	2	0
Maximum CH_4 (ppm)	16,700	9,000

Notes:
[1] Total number of hotspots at the end of the survey date
[2] Hot-spots discontinued at the end of the survey date

The absence of hotspots in Phase 1 indicates that the cover and gas collection system in the permanent closure is functioning. Annual monitoring should continue.



Landfill Gas Hot Spot Values - August 2019	
WAYPOINT	**CH4 (ppm)**
Z101	28
Z104	43
Z106	1,806
Z111	107
Z112	0
Z113	175
Z114	400
Z116	17
Z118	31
Z119	1,100
Z120	2
Z123	39
Z124	7,000
Z125	1,520
Z80	366
Z88	4,800
Z94	9,000

CRD
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Metres
0 20 40 60 80 100

Projection: UTM ZONE 10N NAD 83

Combustible Gas Result
(parts per million)
- 0-99 ppm
- 100-999 ppm
- 1,000-12,499 ppm
- >12,500 ppm

- Gas Probes
- Active Gas Wells
- Abandoned or Inactive Gas Wells
- Active Gas Lines
- Abandoned or Inactive Gas Lines
- Leachate Collection Lines
- Roads
- Final Closure Areas
- Progressive Closure Areas
- Structures
- Parking Lots
- Water Bodies

HARTLAND LANDFILL AMBIENT AIR MONITORING RESULTS - AUGUST 2019

Lagoon Road
Perimeter Road North
Northwest Slope Road
160 Road
Tourle Valley Road
160 Road
140 Road
150 Road
160 Road
East Perimeter Road
PHASE 2, CELL 1
NORTH FACE
CLOSURE (2011)
PHASE 2 CELL 2
CLOSURE (2016)
North Main Haul Road
PHASE 2, CELL 3
(ACTIVE FACE)
PHASE 1 (CLOSED)
170 Road
East Hydro Road
High Level Road
SOUTH WEST
PROGRESSIVE
CLOSURE (2008)
South Diversion Road
Berm Road
Main Access Road
N
W
E
S

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Metres
0 20 40 60 80 100

Projection: UTM ZONE 10N NAD 83

- Historical Z-Spot Locations (Active)
- Historical Z-Spot Locations (Inactive)
- Gas Probes
- Active Gas Wells
- Abandoned or Inactive Gas Wells
- Active Gas Lines
- Abandoned or Inactive Gas Lines
- Leachate Collection Lines
- Roads
- Final Closure Areas
- Progressive Closure Areas
- Structures
- Parking Lots
- Water Bodies

HISTORICAL Z-POINT LOCATIONS

9.3 LFG Speciation

A comprehensive LFG gas speciation program was initiated in 2019 to support LFG management and capital planning for utilization and beneficial use alternatives (e.g., renewable natural gas). Raw, unconditioned gas samples were collected once per month from April 2019 to March 2020. A short summary of results is provided below; data and a technical report is included in Appendix F.

9.3.1 Health and Safety

LFG speciation data from 2019 was consistent with historical data and indicated that undiluted LFG exceeded the WorkSafeBC limits for carbon dioxide, hydrogen sulfide, vinyl chloride, toluene and benzene, with new exceedances for Ethylbenzene and n-hexane. Methane concentrations were similar to historical levels; however, the limit was removed in 2018 so no exceedances are flagged for 2019. Ethylbenzene and n-hexane exceeded WorkSafeBC thresholds in the October for the first time. October results reported anomalously high concentrations for numerous gases, but passed laboratory QA procedures.

Exposure to undiluted LFG is unlikely, as fugitive emissions mix quickly with air. Ambient air sampling conducted in 1999 and 2001 indicated an average dilution factor greater than 100:1. To further protect worker health and safety, personal gas detectors are set to alarm at levels consistent with 100:1 dilution factor (0.5% or 5,000 ppm methane or 10% of the LEL). In addition, any areas with increased concentrations of LFG are flagged and access by staff is restricted or prohibited.

9.3.2 LFG Composition and Trends

LFG composition is highly variable and is influenced by numerous factors, including waste composition/quantity, ambient temperature (Figure 10), barometric pressure and precipitation. Data show that ambient temperature has a significant impact on LFG generation and collection rates, with gas flows increasing with increased ambient temperatures. Conversely, low temperatures, high barometric pressure and extreme levels of precipitation all result in decreased LFG generation, and ultimately decreased collection. Outside of extreme precipitation events, the overall wet climate at Hartland (~800 mm of precipitation per year) results in increased LFG generation, when compared to more arid landfill sites.

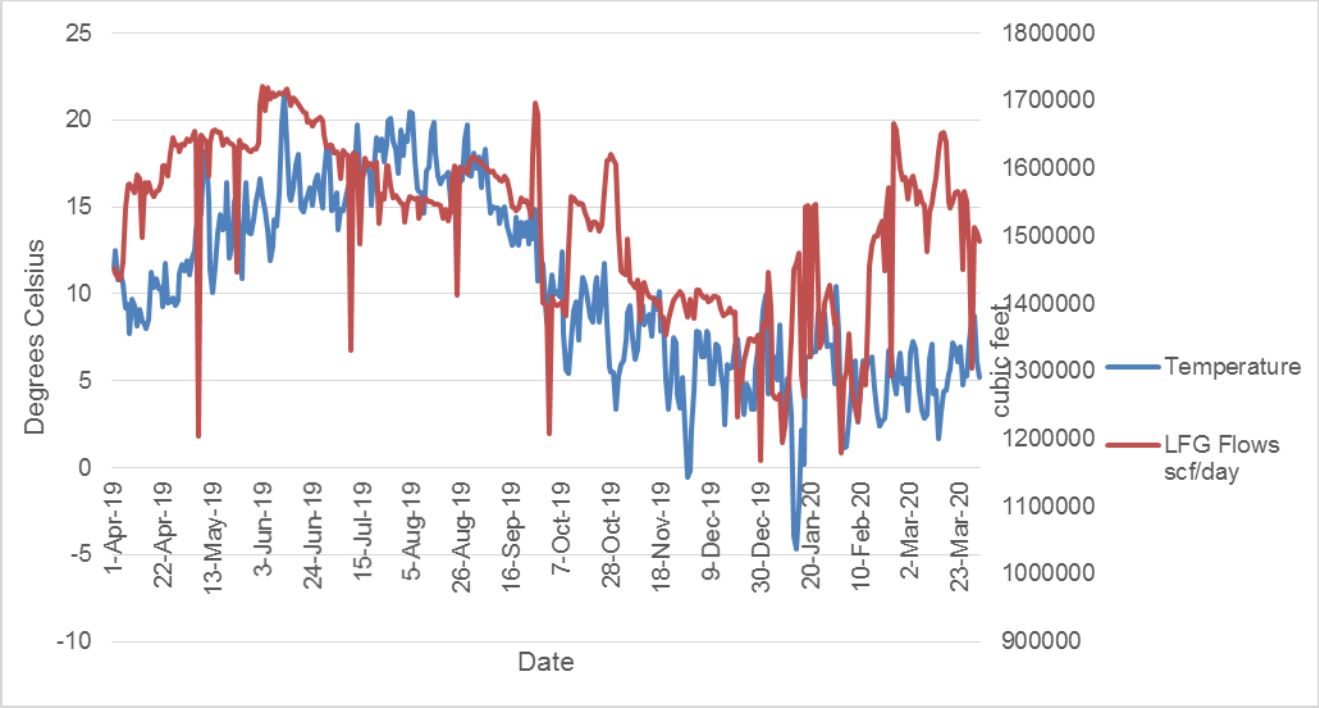

Figure 10 Daily Landfill Gas Flows and Ambient Temperature at Hartland

Key LFG constituents from the sampling program are presented below in Table 19. Increasing trends were observed in oxygen, total siloxanes, and two individual siloxanes (MM and D4). Oxygen concentrations varied between lab and field samples, likely due to sample degradation; however, they are not a levels that indicate increased risk of landfill fires. Nitrogen concentrations are elevated above expected range of <10%, according to the Guidelines. Typically, elevated nitrogen and oxygen concentrations are elevated together and indicated atmospheric interference at collection wells. However, oxygen concentrations in all samples remain below 2%. Additional sampling for these, or new parameters, may be warranted depending on future LFG capital projects. A detailed technical summary is provided in Appendix F.

Table 19 Concentrations of Key LFG Parameters in Hartland LFG 2019-2020

Parameter	Raw LFG			
	Average/Median	Max	Min	Trend Observed?
Hydrogen Sulphide (H_2S)	25.6 ppm / 16.9 ppm	89 ppm	<0.004 ppm	No
Nitrogen	18.3% / 18.1%	25.6%	13 %	No
Total reduced sulfur as H_2S	37 mg/m^3 / 31.7 mg/m^3	130 mg/m^3	0.08 mg/m^3	Possible increasing
Carbon Dioxide (CO_2)	33.6% / 34.2%	38.5	27.3	No
Oxygen (O_2)	Field: 0.76% / 0.75% Lab: 1.68% / 1.41%	Field: 1.77% Lab: 3.69%	Field: 0.24% Lab: 1.0%	Yes, increasing
Siloxanes	8.1 / 8.9	16.5	0.805	Yes, increasing
Carbon monoxide (CO)	<0.05%	n/a	n/a	n/a
Ammonia (NH_3)	>50% of results <DL	3.0	<0.029	n/a
Methane	Gas analyzer: 50.5% / 50.7% Lab: 44.0% / 44.3%	54%	39.9%	No

The following table summarizes LFG monitoring results, compliance, mitigation actions, and recommendations.

Table 20 LFG Compliance Summary 2019

Program	Compliance Location	Criteria	Findings	Mitigation/Actions	Recommendations
Perimeter Probe Monitoring	Probes GP-1A, 1B, 2A, 2B, 3A, 3B, 11A, 11B, 12A and 12B	Methane must not exceed 5% in subsurface soils (BC *Landfill Criteria for Municipal Solid Waste* & BC *Landfill Gas Management Facilities Design Guidelines*)	No exceedances Low risk of sub-surface gas Migration to adjacent properties	None	Continue quarterly monitoring.
Building Foundation Probe Monitoring	Probes GP- 4A, 5A, 6A, 6B, 7A, 7B, 8A, 9A, 13A, 14A, 17A, 18A	Maximum 1% methane in any on-site facility (BC *Landfill Criteria for Municipal Solid Waste* & BC *Landfill Gas Management Facilities Design Guidelines*)	No exceedances Low risk of subsurface gas migration to adjacent building	None	Continue quarterly monitoring.
Ambient Grid Monitoring	N/A	100 ppm total hydrocarbon (THC), as methane (CRD internal guideline)	10 grid locations >100 ppm No cover system failures suspected in the closed area of Phase 1	Investigated hot spots and mitigated, where possible.	Continue annual monitoring.
Hot Spot Monitoring	N/A	1,000 ppm THC (CRD internal guideline)	Seven hot spots (z-points) >1,000 ppm Currently 22 locations for hot spot investigation	Added new locations of hot spots to the monitoring program.	Continue annual monitoring. Investigate mitigation options.
Well Field Monitoring and Balancing	N/A	Monitor monthly. Oxygen 2.5% - gas optimization and reduction of fire potential *(BC Landfill Gas Management Facilities Design Guidelines)*	Monitoring completed monthly; Oxygen did not exceed 2.5%	None	Continue monthly monitoring at minimum.
Gas Speciation	N/A	N/A	Undiluted LFG exceeded WorkSafeBC criteria for carbon dioxide, hydrogen sulfide, vinyl chloride, toluene, benzene, ethylbenzene and n-hexane; however, ambient concentrations are likely well below WorkSafeBC limits, due to dilution with ambient air. Comprehensive sampling of gas identified increasing concentrations in oxygen and siloxanes.	None	Continue speciation sampling in 2021 or sooner to support LFG utilization planning. Continue ambient monitoring program to confirm and implement health and safety protocols for hot spots.
Gas Collection	N/A	75% gas collection efficiency target by the end of 2016, as per *Landfill Gas Management Plan*.	Gas collection efficiency was estimated at 65.5%, based on the ENV gas generation model and is within the estimated efficiency range specified in the *Landfill Gas Management Plan*, based on filling plan progression.	*Landfill Gas Management Plan* submitted to ENV.	Continue to implement the gas management plan. Conduct well field optimization and LFG quantification studies in 2020.

10.0 CONCLUSIONS AND RECOMMENDATIONS

The following section presents the key findings and recommendations developed from the 2019 LFG monitoring programs at the Hartland landfill.

GAS GENERATION

Hartland landfill generates greater than 1,000 tonnes of methane per year and is subject to the BC *Landfill Gas Management Regulation*. In 2019, the Hartland landfill is estimated to have generated 7,915 tonnes of methane, or the equivalent of approximately 198,000 tonnes CO_2. Of this total, 68,451 tonnes of CO_{2e} were uncaptured (fugitive).

GAS COLLECTION AND UTILIZATION

In 2019, the gas extraction network consisted of 146 wells that captured an average of 1,062 scfm of LFG. In 2019, nine new wells were activated and seven new wells were installed. Well field balancing was completed at least monthly to optimize collection. Well field monitoring and balancing should continue at least monthly, as recommended by the BC *Landfill Gas Management Facilities Design Guidelines*.

Target collection efficiency (75%) was expected by 2016, according to the *Landfill Gas Management Plan*. At the end of 2019, the efficiency was 65.5%, which is within the expected ranges for of the *Landfill Gas Management Plan*, based on filling plan progression (Figure 6). The CRD continues to follow the *Landfill Gas Management Plan* design specifications for reaching 75% collection efficiency. Well installation and filling plan delays have occurred, as a result of overall waste volume reductions and filling plan changes. A well field optimization study is planned for 2020, to support improved gas collection and reduce fugitive emissions.

In addition to the stipulated ENV model, gas generation and collection efficiency was assessed using an alternative LFG model, as well as differing inputs into the ENV model. The average collection efficiency across the models was 70%. A LFG quantification study is planned for 2020 to confirm model accuracy and better evaluate collection efficiencies.

As part of the BC *Landfill Gas Management Regulation* inspection and compliance review process, ENV completed a review of Hartland landfill and determined that the facility was in compliance with the requirements of the BC *Landfill Gas Management Regulation* up to and including the 2017 reporting year.

MONITORING

No elevated methane readings were observed during foundation and perimeter probe monitoring and, as a result, there is little risk of lateral LFG migration. This monitoring is a regulatory requirement and should continue on a quarterly schedule.

During the 2019 grid monitoring, 10 unique grid points were found to exceed 100 ppm THC. No new hotspots were identified 2019. It is recommended that grid monitoring and hotspot monitoring be conducted annually and that hotspots be mitigated where possible.

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12.0 REPORT SIGNOFF

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APPENDIX A

Hartland Landfill Gas Generation Model Inputs

Appendix A Hartland Landfill Gas Generation Model Inputs

Table 1

Variables		Relatively Inert	Moderately Decomposable	Decomposable
Gas Production potential (m^3 CH4/tonne), Lo =		20	120	160
Waste Composition, 1980 to	1995	0.336	0.248	0.414
Waste Composition, 1996 to	2000	0.338	0.405	0.256
Waste Composition, 2001 to	2004	0.266	0.396	0.337
Waste Composition, 2005 to	2009	0.331	0.369	0.298
Waste Composition, 2010 to	2013	0.314	0.391	0.294
Waste Composition, 2014 to	future	0.327	0.427	0.201
lag time before start of gas production, lag =	1	Years		
Historical Data Used (years)	38			
1st Year of Historical Data Used	1980			
4 Years after reporting year	2024			
methane (by volume)	0.5			
carbon dioxide (by volume)	0.5			
methane (density)	0.6557	kg/m^3	(25°C,1ATM)	
carbon dioxide (density)	1.7988	kg/m^3	(25°C,1ATM)	

Table 2

Year	Annual Tonnage	Cumulative Waste-in-place	Waste Tonnage			Methane Generation Rate, k			Annual		
			Relatively Inert	Moderately Decomposable	Decomposable	Relatively Inert	Moderately Decomposable	Decomposable	Methane Production	Landfill Gas Production	Greenhouse Gas Emissions
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(tonnes)	(year-1)	(year-1)	(year-1)	(tonnes/yr)	(m3/hr)	(as CO2e/year)
2010	152,062	4,689,889	53,374	56,567	42,121	0.02	0.04	0.09	6,624	2,306	139,110
2011	144,179	4,834,068	50,607	53,635	39,938	0.02	0.04	0.09	6,740	2,347	141,550
2012	136,763	4,970,831	48,004	50,876	37,883	0.02	0.04	0.09	6,858	2,388	144,008
2013	131,418	5,102,249	46,128	48,887	36,403	0.02	0.04	0.09	6,990	2,434	146,796
2014	128,045	5,230,294	45,840	50,962	31,243	0.02	0.04	0.09	7,149	2,489	150,130
2015	123,381	5,353,675	44,170	49,106	30,105	0.02	0.04	0.09	7,313	2,546	153,566
2016	146,704	5,500,379	53,547	62,202	30,955	0.02	0.04	0.09	7,495	2,610	157,405
2017	157,638	5,658,017	57,538	66,839	33,262	0.02	0.04	0.09	7,638	2,659	160,397
2018	159,942	5,925,830	60,138	69,095	30,709	0.02	0.04	0.09	7,909	2,754	166,095
2019	163,001	6,088,831	61,288	70,416	31,296	0.02	0.04	0.09	7,915	2,756	166,220

Appendix A, continued

Table 3

Year Annual Total (tonnes)	Refuse	% Relatively Inert	% Moderately Decomposable	% Decomposable	Total Controlled Waste	Total Waste
Average Composition for Period (1986 to 1995)						
1986	166862	33.7	24.9	41.4	610	167,472
1987	177086	33.7	24.9	41.4	600	177,686
1988	181454	33.7	24.9	41.4	2739	184,193
1989	185409	33.7	24.9	41.4	3341	188,750
1990	183590	33.7	24.9	41.4	3886	187,476
1991	173634	33.7	24.9	41.4	2322	175,956
1992	156399	33.7	24.9	41.4	5930	162,329
1993	156255	33.7	24.9	41.4	3176	159,431
1994	153614	33.7	24.9	41.4	2671	156,285
1995	155305	33.7	24.9	41.4	4688	159,993
Average Composition for Period (1996 to 2000)						
1996	153351	33.9	40.5	25.6	4177	157,528
1997	146442	33.9	40.5	25.6	2987	149,429
1998	130604	33.9	40.5	25.6	8002	138,606
1999	134257	33.9	40.5	25.6	3917	138,174
2000	136654	33.9	40.5	25.6	5585	142,239
Average Composition for Period (2001 to 2004)						
2001	135425	26.6	39.6	33.8	3108	138,533
2002	142940	26.6	39.6	33.8	3384	146,324
2003	144043	26.6	39.6	33.8	4182	148,225
2004	150787	26.6	39.6	33.8	3326	154,113
Average Composition for Period (2005 to 2009)						
2005	158848	33.2	37	29.9	4192	163,040
2006	160260	33.2	37	29.9	6560	166,820
2007	165381	33.2	37	29.9	9156	174,537
2008	154881	33.2	37	29.9	11841	166,722
2009	153263	33.2	37	29.9	7931	161,194
Average Composition for Period (2010 to 2013)						
2010	143669	31.5	39.1	29.4	8393	152,062
2011	136414	31.5	39.1	29.4	7765	144,179
2012	129280	31.5	39.1	29.4	7483	136,763
2013	123210	31.5	39.1	29.4	8252	131,418
Average Composition for Period (2014 to present)						
2014	119306	36.5	44.1	19.4	8,739	128,045
2015	112442	36.5	44.1	19.4	10,939	123,381
2016	134167	32.7	47.2	20.1	12,537	146,704
2017	144368	32.7	47.2	20.1	13,270	157,638
2018	146431	37.6	43.2	19.2	13,511	159,942
2019	147676	38.4	44.0	18.2	15,325	163,001

APPENDIX B

Well Field Data

B1 Gas Well Activation Dates

B2 Hartland Landfill Gas Well Field Data

B3 Hartland Landfill Gas Well Field Data Summary

Appendix B1 Hartland Landfill Gas Well Operation

Old Well Name	New Well Name	Lift (mASL)	Installation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Comments
BLGW0001			2002	2003	2005						x	x	x	IA														*Deactivated 2005*
BLGW0002			2002	2003	2005						x	x	x	IA														*Deactivated 2005*
BLGW0003			2002	2003	2007						x	x	x	x	x	IA												*Deactivated 2007*
BLGW0004			2002	2003	2007						x	x	x	x	x	IA												*Deactivated 2007*
BLGW0005			2002	2003	2007						x	x	x	x	x	IA												*Deactivated 2007*
BLGW0006			2002	2003	2007						x	x	x	x	x	IA												*Deactivated 2007*
BLGW0007			2002	2003	2007						x	x	x	x	x	IA												*Deactivated 2007*
BLGW0008			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0009			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0010			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0011			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0012			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0013			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0014			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0015			2002	2003	2004						x	x	IA															*Deactivated 2004*
BLGW0016			2002	2003	2008						x	x	x	x	x	x	IA											*Deactivated 2008*
BLGW0017			2002	2003	2008						x	x	x	x	x	x	IA											*Deactivated 2008*
BLGW0018			2002	2003	2008						x	x	x	x	x	x	IA											*Deactivated 2008*
BLGW0019			2002	2003	2006						x	x	x	x	IA													*Deactivated 2006*
BLGW0020			2002	2003	2006						x	x	x	x	IA													*Deactivated 2006*
BLGW0021			2002	2003	2006						x	x	x	x	IA													*Converted to vertical well OLGW0048s*
LHGW0001	LHGW0001		1999	2003	2011						x	x	x	x	x	x	x	x	x	IA								*Abandoned May 2011*
LHGW002A	LHGW002A	147	1999	2007											x	x	x	x	x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure - reconnected in Dec 2012*
LHGW002B	LHGW002B		1999	2007	2011								x	x	x	x	x	x	x	IA								*Abandoned in May 2011*
LHGW0003	LHGW0003	147	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure reconnected Jan 2013*
LHGW0004	LHGW0004	147	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
LHGW0005																												
LHGW0006	LHGW0006	143	2008	2009	2014												x	x	x	x	x	x	IA					*Abandoned May 2014*
LHGW0007	LHGW0007	143	2008	2009													x	x	x	x	x	x	x	x	x	IA		*No readings 2017-2018 - no production*
LHGW0008	LHGW0008	143	2008	2009													x	x	x	x	x	x	x	x	x	IA		*No readings 2017-2018 - no production*
LHGW0009	LHGW0009	143	2012	2012	2014															x	x	x	IA					*Start Feb 2012 - abandoned May 2014*
LHGW0010	LHGW0010	143	2011	2012	2014															x	x	x	IA					*Start Feb 2012, was 11 - abandoned May 2014*
LHGW0013	LHGW0013	151	2012	2011															x	x	x	x	x	x	x	x	x	*Start September 2011*
LHGW0017	LHGW0017	163	2014	2012																x	x	x	x	x	x	IA		*Start January 2012 / no readings 2017-2018 - no production*
LHGW0019	LHGW0019	---	2014	2014																		x	x	x	x	x	x	*Started May 2014*
LHGW0020	LHGW0020	159	2014	2014																		x	x	x	x	x	x	*Started May 2014*
LHGW0021	LHGW0021	159	2014	2014																		x	x	x	x	x	IA	*Started May 2014*
LHGW0022	LHGW0022	159	2014	2014																		x	x	x	x	x	x	*Started May 2014*
LHGW0023	LHGW0023	159	2011	2011															x	x	x	x	x	x	x	x	x	*Start September 2011, was 21*
OHGW0001	HLGW0001	139	1999	2001					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure - reconnected Jan 2013*
OHGW0002	HLGW0002		1999	2001	2011				x	x	x	x	x	x	x	x	x	x	x	IA								*Abandoned may 2011*
OHGW0003	HLGW0003	139	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure - reconnected Jan 2013*
OHGW0004	HLGW0004	147	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA		*Disconnected for Cell 1 closure - reconnected Jan 2013 / no readings 2017-2018 - no production*

Appendix B1, continued

Old Well Name	New Well Name	Lift (mASL)	Installation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Comments
OHGW0005	HLGW0005	147	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure - reconnected Jan 2013*
OHGW006A	HLGW006A	159	1999	2005									x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OHGW006B	HLGW006B	159	1999	2005									x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure - reconnected Jan 2013*
OHGW0007	HLGW0007		1999	2005	2011								x	x	x	x	x	x	x	IA								*Abandoned in May 2011*
OHGW008A	HLGW008A	143	1999	2006										x	x	x	x		x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure - reconnected Jan 2013*
OHGW008B	HLGW008B	143	1999	2006										x	x	x	x	x	x	x	x	x	x	x	x	x	x	*Disconnected for Cell 1 closure - reconnected Jan 2013*
OHGW0009	HLGW0009	139	2007	2008	2014										x	x	x	x	x	x	x	x	IA					*Disconnected for Cell 1 closure - reconnected Jan 2013 - abandoned May 2014*
OHGW0010	HLGW0010	139	2007	2008											x	x	x	x	x	x	x	x	x	x	x	IA		*Disconnected for Cell 1 closure - reconnected Jan 2013 / no readings 2017-2018 - no production*
OHGW0011	HLGW0011		2007	2008											x	x	x	x	x	x	x	x	x	x	x	IA		*Disconnected for Cell 1 closure - reconnected Jan 2013 / no readings 2017-2018 - no production*
OHGW0012	HLGW0012	147		2010														x	x	x	x	x	x	x	x	x	x	
OHGW0013	HLGW0013	147		2010														x	x	x	x	x	x	x	x	x	x	
OHGW0014	HLGW0014	155		2011															x	x	x	x	x	x	x	x	x	
OHGW0015	HLGW0015	155		2011	2014														x	x	x	x	IA					*Abandoned May 2014*
	HLGW016A	159	2012	2012																x	x	x	x	x	x	IA		*Started Dec 2012 / no readings 2017-2018 - no production*
OHGW0016/HLGW0016	HLGW016B	163	2012	2012																x	x	x	x	x	x	x	x	*Started Jan 2012*
	HLGW017A	163	2012	2013																x	x	x	x	x	x	x	x	*Started Dec 2012*
OHGW0017/HLGW0017	HLGW017B	163	2012	2012																x	x	x	x	x	x	x	x	*Started Jan 2012*
	HLGW0018	165	2012	2013																	x	x	x	x	x	x	x	*Started Jan 2013*
	HLGW019B	165	2013	2013																	x	x	x	x	x	IA		*Started Jan 2013 / no readings 2017-2018 - no production*
	HLGW019C	165	2012	2012																x	x	x	x	x	x	x	x	*Started Dec 2012*
	HLGW020B	165	2013	2013																	x	x	x	x	x	IA		*Started Jan 2013 / no readings 2017-2018 - no production*
	HLGW021B	165	2013	2013																	x	x	x	x	x	x	x	*Started Jan 2013*
	HLGW022B	165	2013	2013																	x	x	x	x	x	x	x	*Started Jan 2013*
PreviouslyHLGW0023	HLGW023B	165	2013	2013																	x	x	x	x	x	x	x	*Started Jan 2013*
	HLGW024B	171	2014	2016																				x	x	x	x	*Activated 2016*
	HLGW025B	171	2014	2016																				x	x	x	x	*Activated 2016*
	HLGW026B	171	2014	2015																			x	x	x	x	x	*Started Jan 2015*
	HLGW027A	171	2014	2017																					x	x	x	*Activated 2017*
	HLGW027B	171	2014	2015																			x	x	x	x	x	*Started Jan 2015*
	HLGW028B	171	2014	2015																			x	x	x	x	x	*Activated Jan 2015*
	HLGW028A	171	2014	2017																					x	x	x	
	HLGW029B	171	2014	2015																			x	x	x	x	x	*Activated Jan 2015*
	HLGW029A	171	2014	2017																					x	x	x	
	HLGW030A	171	2013	2014																			x	x	x	x	x	*Activated Jan 2014 temp disconnected Jun 2016 for cell 3/ reactivated Oct 2017*
	HLGW030B	171	2013	2014																			x	x	x	x	x	*Activated Jan 2014*
	HLGW031A	171	2013	2014																			x	x	x	x	x	*Activated Jan 2014 temp disconnected Jun 2016 for cell 3 / reactivated Oct 2017*
	HLGW031B	171	2013	2014																			x	x	x	x	x	*Activated Jan 2014*
	HLGW032A	171	2013	2014																			x	x	x	x	x	*Activated Jan 2014 temp disconnected Jun 2016 for cell 3/ reactivated Oct 2017*
	HLGW032B	171	2013	2014																			x	x	x	x	x	*Activated Jan 2014*

Appendix B1, continued

Old Well Name	New Well Name	Lift (mASL)	Installation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Comments
	HLGW033A	171	2013	2014																		x	x	x	x	x	x	*Activated Jan 2014 temp disconnected Jun 2016 for cell 3 / reactivated Oct 2017*
	HLGW033B	171	2013	2014																		x	x	x	x	x	x	*Activated Jan 2014*
	HLGW034A	171	2013	2014																		x	x	x	x	x	x	*Activated Jan 2014 temp disconnected Jun 2016 for cell 3 / reactivated Oct 2017*
	HLGW034B	171	2013	2014																		x	x	x	x	x	x	*Activated Jan 2014*
	HLGW035A	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	*Wells not installed*
	HLGW035B	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	*Wells not installed*
	HLGW036B	175	2015	2017																					x	x	x	*Installed 2015 - Temp connection Jan 2017*
	HLGW037B	175	2015	2017																					x	x	x	
	HLGW038B	175	2015	2017																					x	x	x	*Installed 2015 - Temp connection Jan 2017*
	HLGW039A	175	2015	2017																					x	x	x	
	HLGW039B	175	2015	2017																					x	x	x	*Installed 2015 - Temp connection Jan 2017*
	HLGW040A	175	2015	2017																					x	x	x	
	HLGW040B	175	2015	2018																						x	x	*Activated Jan 2018*
	HLGW041A	175	2015	2017																					x	x	x	
	HLGW041B	175	2015	2017																					x	x	x	
	HLGW042A	175	2015	2017																					x	x	x	
	HLGW042B	175	2015	2017																					x	x	x	*Installed 2015 - Temp Activated Jan 2017*
	HLGW043A	175	2015	2017																					x	x	x	
	HLGW043B	175	2015	2017																					x	x	x	*Installed 2015 - Temp Activated Jan 2017*
	HLGW044A	179	2015	2017																					x	x	x	
	HLGW044B	179	2015	2017																					x	x	x	*Installed 2015 - Temp Activated Jan 2017*
	HLGW045A	179	2016	2019																				I			x	*Activated April 2019*
	HLGW045B	179	2016	2018																				I		x	x	*Activated Jan 2018*
	HLGW046A	179	2016	2019																				I			x	*Activated April 2019*
	HLGW046B	179	2016	2018																				I		x	x	*Activated Jan 2018*
	HLGW047A	179	2016	2017																					x	x	x	
	HLGW047B	179	2016	2018																				I		x	x	*Activated Jan 2018*
	HLGW048A	179	2016	2017																					x	x	x	
	HLGW048B	179	2016	2018																				I		x	x	*Activated Jan 2018*
	HLGW049A	179	2016	2017																					x	x	x	
	HLGW049B	179	2016	2018																				I		x	x	*Activated Jan 2018*
	HLGW050A	179	2016	2017																					x	x	x	
	HLGW050B	179	2016	2018																				I		x	x	*Activated Jan 2018*
	HLGW051A	179	2016	2017																					x	x	x	
	HLGW051B	179	2016	2017																				I	x	x	x	
cell3	**HLGW0052**	151(3)	2017	2018																						x	x	*Activated July 2018*
cell3	**HLGW0053**	151(3)	2017	2018																						x	x	*Activated July 2018*
cell3	**HLGW0054**	151(3)	2017	2018																						x	x	*Activated July 2018*
cell3	**HLGW0055**	151(3)	2017	2018																						x	x	*Activated July 2018*
	HLGW0056	151(3)	2017	2018																						x	x	*Activated August 2018*
cell3	**HLGW0057**	155(3)	2018	2019																							x	*Activated April 2019*
cell3	**HLGW0058**	155(3)	2018	2019																							x	*Activated April 2019*
cell3	**HLGW0059**	155(3)	2018	2019																							x	*Activated April 2019*
cell3	**HLGW0060**	155(3)	2018	2019																							x	*Activated April 2019*

Appendix B1, continued

Old Well Name	New Well Name	Lift (mASL)	Installation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Comments
cell3	HLGW0061	155(3)	2018	2019																							x	*Activated April 2019*
cell3	HLGW0062	155(3)	2018	2019																							x	*Activated April 2019*
cell3	HLGW0063	155(3)	2018	2019																							x	*Activated April 2019*
cell3	HLGW0064	155(3)	2018	2020																								*Active May/June 2020*
cell3	HLGW0065		2018	2020																								*Active May/June 2020*
cell3	HLGW0066		2018	2020																								*Active May/June 2020*
cell3	HLGW0067		2018	2020																								*Active May/June 2020*
cell3	HLGW0068		2018	2020																								*Active May/June 2020*
cell3	HLGW0069		2018	2020																								*Active May/June 2020*
cell3	HLGW0070A		2019																									
cell3	HLGW0070B		2019																									
cell3	HLGW0071A		2019																									
cell3	HLGW0071B		2019																									
cell3	HLGW0072A		2019																									
cell3	HLGW0072B		2019																									
cell3	HLGW0073A		2019																									
cell3	HLGW0073B		2019																									
cell3	HLGW0074A		2019																									
cell3	HLGW0074B		2019																									
cell3	HLGW0075		2019																									
cell3	HLGW0076		2019																									
	Total		5	23																								
OLGT001A	TLGW001A		1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGT001B	TLGW001B		1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGT002A	TLGW002A		1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGT002B	TLGW002B		1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGT002C	TLGW002C		1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGT0003					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0004					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0005					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0006					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0007					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0008					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0009					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0010					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0011					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0012					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0013					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0014					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0015					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0016					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0017					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0018					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGT0019					2002	x	x	x	x	x	IA																	*Deactivated 2002*
OLGW001D	VLGW001D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA		*No readings 2017-2018 - no production*
OLGW001S	VLGW001S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA		*No readings 2017-2018 - no production*

Appendix B1, continued

Old Well Name	New Well Name	Lift (mASL)	Installation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Comments
OLGW002D	VLGW002D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA		*No readings 2017-2018 - no production*
OLGW002S	VLGW002S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA		*No readings 2017-2018 - no production*
OLGW003D	VLGW003D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW003S	VLGW003S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW004D	VLGW004D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGW004S	VLGW004S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
OLGW005D	VLGW005D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGW005S	VLGW005S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW006D	VLGW006D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW006S	VLGW006S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW007D	VLGW007D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW007S	VLGW007S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW008D	VLGW008D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW008S	VLGW008S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW009D	VLGW009D	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW009S	VLGW009S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW010S	VLGW010S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW011S	VLGW011S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW012S	VLGW012S	---	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW013D	VLGW013D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW013S	VLGW013S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW014D	VLGW014D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGW014S	VLGW014S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGW015D	VLGW015D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW015S	VLGW015S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW016D	VLGW016D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW016S	VLGW016S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW017D	VLGW017D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW017S	VLGW017S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW018D	VLGW018D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW018S	VLGW018S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW019D	VLGW019D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW019S	VLGW019S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW020D	VLGW020D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW020S	VLGW020S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW021D	VLGW021D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW021S	VLGW021S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW022D	VLGW022D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW022S	VLGW022S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW023D	VLGW023D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW023S	VLGW023S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW024D	VLGW024D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW024S	VLGW024S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGW025D	VLGW025D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	IA			
OLGW025S	VLGW025S	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
OLGW026D	VLGW026D	---	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Appendix B1, continued

Old Well Name	New Well Name	Lift (mASL)	Installation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Comments
OLGW026S	**VLGW026S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW027D	**VLGW027D**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW027S	**VLGW027S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW028S	**VLGW028S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW029D	**VLGW029D**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW029S	**VLGW029S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW030S	**VLGW030S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW031S	**VLGW031S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW032S	**VLGW032S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW033S	**VLGW033S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW034S	**VLGW034S**	**---**	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	
OLGW035S		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW035D		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW036S		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW036D		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW037S		**---**	1997	1998	2005	x	x	x	x	x	x	x	x	IA														*Deactivated 2005*
OLGW037D		**---**	1997	1998	2005	x	x	x	x	x	x	x	x	IA														*Deactivated 2005*
OLGW038S		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW038D		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW039S		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW039D		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW040S		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW040D		**---**	1997	1998	2004	x	x	x	x	x	x	x	IA															*Deactivated 2004*
OLGW041D		**---**	1997	1998	2008	x	x	x	x	x	x	x	x	x	x	x												*Deactivated 2008*
OLGW041S		**---**	1997	1998	2008	x	x	x	x	x	x	x	x	x	x	x												*Deactivated 2008*
OLGW042S	**VLGW042S**	**---**	2002	2003							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW043S	**VLGW043S**	**---**	2002	2003							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW044S	**VLGW044S**	**---**	2002	2003	2011						x	x	x	x	x	x	x	x	x	IA								*Abandoned in May 2011*
OLGW045S	**VLGW045S**	**---**	2002	2003	2011						x	x	x	x	x	x	x	x	x	IA								*Abandoned in May 2011*
OLGW046S	**VLGW046S**	**---**	2002	2003	2011						x	x	x	x	x	x	x	x	x	IA								*Abandoned in May 2011*
OLGW047S	**VLGW047S**	**---**	2002	2003							x	x	x	x	x	x	x	x	x			x	x	x	x	x	IA	*Abandoned in May 2011 -* ***Reactivated May 2014***
OLGW048S	**VLGW048S**	**---**	2002	2002	2011										x	x	x	x	x	IA								*Abandoned in May 2011*
OLGW049	**VLGW0049**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW050	**VLGW0050**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW051	**VLGW0051**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW052	**VLGW0052**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW053	**VLGW0053**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW054	**VLGW0054**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW055	**VLGW0055**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW056	**VLGW0056**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW057	**VLGW0057**	**---**	2011	2011															x	x	x	x	x	x	IA			
OLGW058	**VLGW0058**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW059	**VLGW0059**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	
OLGW060	**VLGW0060**	**---**	2011	2011															x	x	x	x	x	x	x	x	x	*73*
				Number of wells Active		95	95	95	97	97	113	113	99	97	99	94	92	92	110	108	115	130	129	131	142	141	146	

Appendix B1, continued

Old Well Name	New Well Name	Lift (mASL)	Installation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Comments
					Number of Inactive Wells	0	0	0	0	0	17	0	18	4	3	5	3	0	0	8	0	0	5	0	12	13	2	

Notes			Count
x	indicates active during the year		**2019**
BLGW0001		Buried	**0**
LHGW0001	LHGW0001	Leachate Horizontal	**8**
OHGW0001	HLGW0001	Horizontal	**78**
OLGT001A	TLGW001A	Trench	**0**
OLGW001D	VLGW001D	Vertical	**60**
		activated in year	9
		total wells	146

Appendix B2 2019 LFG Well Field Data

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW0001							
January	1/23/19 12:27	17	19.4	5.6	58	2	2
February	2/27/19 17:06	49.8	35.7	2.7	11.8	<<>>	<<>>
March	---	---	---	---	---	---	---
April	04/26/2019 8:03	11.1	21.1	1	66.8	<<>>	<<>>
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**25.97**	**25.40**	**3.10**	**45.53**	**2.00**	**2.00**
HLGW0003							
January	1/23/19 12:32	17	18.3	6	58.7	<<>>	<<>>
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/26/2019 7:45	35.7	29.3	1.2	33.8	1	1
May	---	---	---	---	---	---	---
June	06/29/2019 11:45	39.5	31.1	1.6	27.8	0	<<>>
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	9/18/19 3:33 PM	8.3	11.5	10.2	70	1	0
October	---	---	---	---	---	---	---
November	11/20/19 2:40 PM	7.3	10.2	12.7	69.8	<<>>	<<>>
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**21.56**	**20.08**	**6.34**	**52.02**	**0.67**	**0.50**
HLGW0004							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW0005							
January	1/23/19 12:20	27.6	27.2	0	45.2	12	13
February	2/27/19 17:39	31.1	27.3	0.8	40.8	<<>>	<<>>
March	3/4/19 14:30	33.7	28.7	0	37.6	6	6
April	04/26/2019 7:48	40.6	30.7	0	28.7	4	7
May	05/24/2019 9:43	38.1	29.5	0	32.4	32	32
June	06/29/2019 11:48	31.9	29.3	0	38.8	31	9
July	07/24/2019 12:31	40.7	32.2	0	27.1	8	5
August	08/28/2019 15:43	44.3	32.4	0	23.3	4	3
September	9/18/19 3:51 PM	43.1	32.7	0	24.2	6	7
October	10/24/19 2:13 PM	35	30.1	0	34.9	0	3
November	11/20/19 2:00 PM	31	28.7	0	40.3	6	3
December	12/17/19 12:38 PM	30.7	28.6	0	40.7	7	7

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**35.65**	**29.78**	**0.07**	**34.50**	**10.55**	**8.64**
HLGW006A							
January	1/23/19 11:09	37.6	31.8	0.1	30.5	<<>>	<<>>
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/24/19 12:38 PM	38.5	33.5	0	28	0	0
November	11/20/19 12:28 PM	37.3	33.2	0	29.5	0	0
December	12/16/19 5:45 PM	36.3	32.3	0	31.4	<<>>	0
Average		**37.43**	**32.70**	**0.03**	**29.85**	**0.00**	**0.00**
HLGW006B							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW008A							
January	1/30/19 15:52	46.5	34	0.2	19.3	27	33
February	2/26/19 15:49	40.8	32.6	0.4	26.2	25	22
March	03/22/2019 7:47	42.5	33	0.4	24.1	29	29
April	04/25/2019 8:12	38.2	32.1	2	27.7	29	24
May	05/29/2019 13:48	43.4	33.3	0	23.3	21	21
June	---	---	---	---	---	---	---
July	07/24/2019 16:36	40.1	31.8	3.7	24.4	22	22
August	08/30/2019 10:21	41.4	33	0.2	25.4	24	17
September	9/18/19 5:17 PM	45.2	34	0	20.8	16	18
October	10/23/19 11:55 AM	42.6	34.5	0	22.9	18	18
November	11/19/19 4:56 PM	48.1	35.8	0	16.1	19	19
December	12/18/19 2:20 PM	50	35.5	0	14.5	18	19
Average		**43.53**	**33.60**	**0.63**	**22.25**	**22.55**	**22.00**
HLGW008B							
January	1/23/19 10:48	38.8	32.3	0	28.9	30	30
February	---	---	---	---	---	---	---
March	3/4/19 10:28	38.5	33.1	0	28.4	28	28
April	04/26/2019 7:13	43.4	34.1	0.1	22.4	28	31
May	05/29/2019 12:03	43.6	33.8	0.1	22.5	28	29
June	---	---	---	---	---	---	---
July	07/24/2019 11:11	43.1	34.5	0	22.4	29	28
August	08/28/2019 16:11	43	33.7	0	23.3	28	29
September	9/18/19 2:42 PM	43.1	34.4	0	22.5	27	26
October	10/24/19 12:14 PM	35.7	32.6	0	31.7	28	28
November	11/20/19 12:10 PM	38.9	33.3	0	27.8	21	22
December	12/16/19 5:28 PM	35.3	31.9	0	32.8	23	22

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**40.34**	**33.37**	**0.02**	**26.27**	**27.00**	**27.30**
HLGW0009							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	Decommissioned May 2014						
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average	**---**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW0010							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average							**0.00**
HLGW0011							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average							**0.00**
HLGW0012							
January	1/23/19 16:41	0.2	1.9	19.2	78.7	2	<<>>
February	2/28/19 16:52	0.4	4.5	18.3	76.8	6	6
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/27/2019 14:58	46	36.1	0	17.9	3	4
July	07/24/2019 12:23	56.2	43.7	0	0.1	3	6
August	08/28/2019 15:01	57.2	42.7	0	0.1	4	8
September	9/18/19 3:20 PM	56.7	43.2	0	0.1	3	3
October	10/30/19 4:08 PM	56.5	43.4	0	0.1	3	3
November	---	---	---	---	---	---	---
December	12/17/19 6:02 PM	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**39.03**	**30.79**	**5.36**	**24.83**	**3.43**	**5.00**
HLGW0013							
January	1/23/19 16:48	51.8	36.7	0	11.5	8	6
February	2/28/19 16:58	59	40.5	0.3	0.2	3	9
March	4/4/19 14:11	58.4	41.5	0	0.1	8	12
April	04/26/2019 14:14	51.1	37.5	0	11.4	4	10
May	05/24/2019 9:18	45	35.4	0	19.6	9	4
June	06/27/2019 14:55	43.9	33.4	2.3	20.4	18	18
July	07/24/2019 12:27	46.6	36.8	0	16.6	3	5
August	08/28/2019 15:04	52.5	37.9	0	9.6	3	4
September	9/18/19 3:24 PM	46.7	36.8	0	16.5	3	6
October	10/30/19 4:15 PM	46.9	37.2	0	15.9	4	4
November	---	---	---	---	---	---	---
December	12/17/19 6:13 PM	41.5	35	0	23.5	2	3
Average		**49.40**	**37.15**	**0.24**	**13.21**	**5.91**	**7.36**
HLGW0014							
January	1/23/19 16:36	43.8	36.4	0.1	19.7	6	5
February	2/28/19 16:46	49.3	38.2	0.3	12.2	3	3
March	4/4/19 13:47	52.5	40.1	0.1	7.3	25	30
April	04/26/2019 14:17	46.1	36.2	0	17.7	10	9
May	05/24/2019 9:03	45.3	35.9	0	18.8	10	10
June	06/27/2019 14:28	41.6	35.6	0.1	22.7	2	2
July	07/24/2019 12:05	47.5	38.5	0	14	8	6
August	08/28/2019 15:06	47.6	38.6	0	13.8	13	13
September	9/18/19 3:14 PM	49.1	39.1	0	11.8	7	6
October	10/30/19 4:02 PM	33.3	34.1	0	32.6	5	6
November	---	---	---	---	---	---	---
December	12/17/19 5:57 PM	35.8	34.8	0	29.4	4	4

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**44.72**	**37.05**	**0.05**	**18.18**	**8.45**	**8.55**
HLGW0015							---
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	Decommissioned May 2014						
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW016A							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW016B							
January	1/23/19 16:14	58.3	39.6	0.1	2	109	134
February	2/28/19 16:25	57.7	38.7	0.7	2.9	122	132
March	4/4/19 13:57	53.4	38.1	0.3	8.2	128	125
April	04/26/2019 14:01	52	37.9	0.6	9.5	79	78
May	05/24/2019 9:07	51.9	37.7	0.3	10.1	133	133
June	06/27/2019 14:40	51.1	37.7	0.4	10.8	125	125
July	07/24/2019 11:56	50.2	37.8	0.6	11.4	<<>>	<<>>
August	08/28/2019 14:54	50.5	37.9	0.5	11.1	<<>>	<<>>
September	9/18/19 3:01 PM	49.5	37.5	0.9	12.1	<<>>	<<>>
October	10/30/19 3:43 PM	51.8	38.2	0.8	9.2	135	135
November	11/21/19 2:59 PM	53.4	39.2	0.6	6.8	136	136
December	12/17/19 5:39 PM	51.9	37.8	0.6	9.7	136	134
Average		**52.64**	**38.18**	**0.53**	**8.65**	**122.56**	**125.78**
HLGW017A							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW017B							
January	1/23/19 14:08	29.3	22.9	7.6	40.2	27	28
February	2/28/19 16:16	28.4	22.6	6.9	42.1	16	30
March	4/4/19 13:52	47.5	35.2	2	15.3	15	20
April	04/26/2019 13:53	40.8	31.3	3.6	24.3	30	27
May	05/24/2019 9:11	39.6	30.4	4.3	25.7	19	13
June	06/27/2019 14:35	38.2	30.7	3.7	27.4	29	12
July	07/24/2019 11:41	30.2	28.6	3.1	38.1	0	0
August	08/28/2019 14:50	54.4	40.1	0	5.5	27	29
September	9/18/19 2:56 PM	37.7	33.2	1.9	27.2	27	21
October	10/30/19 3:32 PM	31.7	25.2	7.2	35.9	28	18
November	11/21/19 2:48 PM	33.8	27.2	6.6	32.4	24	17
December	12/17/19 5:30 PM	31.5	25.1	7.2	36.2	14	16
Average		**36.93**	**29.38**	**4.51**	**29.19**	**21.33**	**19.25**
HLGW0018							
January	1/31/19 12:29	59.9	40	0	0.1	8	15
February	---	---	---	---	---	---	---
March	03/30/2019 11:24	58.5	39.2	0	2.3	12	12
April	04/24/2019 13:20	39.6	33.8	0.3	26.3	20	20
May	05/24/2019 8:51	47.7	36.6	0	15.7	11	8
June	06/27/2019 16:46	47.3	35.5	0	17.2	2	11
July	07/24/2019 11:38	50.4	49.5	0	0.1	8	5
August	08/28/2019 13:33	49.3	50.6	0	0.1	2	5
September	9/14/19 2:14 PM	51.2	48.7	0	0.1	9	3
October	10/25/19 3:58 PM	52.9	46.9	0	0.2	9	8
November	11/21/19 2:11 PM	55.3	44.6	0	0.1	5	7
December	12/17/19 4:59 PM	56.6	43.2	0	0.2	4	2

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**51.70**	**42.60**	**0.03**	**5.67**	**8.18**	**8.73**
HLGW019B							
January	---	---	---	---	---	---	---
February	2/28/19 15:42	36.8	29.8	3	30.4	65	64
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/25/19 4:02 PM	42.9	31.5	0	25.6	<<>>	<<>>
November	11/21/19 2:15 PM	42.1	31.5	0	26.4	1	1
December	10/25/19 4:02 PM	42.9	31.5	0	25.6	<<>>	<<>>
Average		**41.18**	**31.08**	**0.75**	**27.00**	**33.00**	**32.50**
HLGW019C							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW020B							
January	---	---	---	---	---	---	---
February	2/28/19 15:48	0.2	0	19.6	80.2	<<>>	<<>>
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/25/19 4:06 PM	44.4	30.9	0	24.7	<<>>	<<>>
November	11/21/19 2:20 PM	45	28.8	0	26.2	<<>>	<<>>
December	12/17/19 5:07 PM	42.5	26.4	0	31.1	<<>>	<<>>
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW021B							
January	1/31/19 12:32	58.3	41.6	0	0.1	25	37
February	2/28/19 15:56	58.9	40.7	0.2	0.2	37	37
March	03/30/2019 11:28	58.8	41.1	0	0.1	14	35
April	04/24/2019 13:17	50.4	37.1	0.2	12.3	42	51
May	05/24/2019 8:55	49.7	37.5	0	12.8	32	35
June	06/27/2019 16:49	50.8	38.5	0	10.7	69	63
July	07/24/2019 11:36	52.1	39.2	0	8.7	77	78
August	08/28/2019 13:31	51.7	38.7	0.1	9.5	34	34
September	9/14/19 2:17 PM	53.1	39.6	0	7.3	44	60
October	10/25/19 4:11 PM	50.6	38	0.4	11	35	57
November	11/21/19 2:24 PM	52.5	39.6	0.2	7.7	32	34
December	12/17/19 5:10 PM	52.9	38.5	0.3	8.3	32	32

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**53.32**	**39.18**	**0.12**	**7.39**	**39.42**	**46.08**
HLGW022B							
January	1/31/19 12:34	59.3	40.6	0	0.1	16	23
February	2/28/19 16:00	44.6	35.5	0.3	19.6	26	19
March	03/30/2019 11:30	43.7	35.5	0	20.8	36	26
April	04/24/2019 13:15	43.8	36.4	0.2	19.6	26	31
May	05/24/2019 8:53	45.7	36.8	0.1	17.4	9	20
June	06/27/2019 16:52	44.6	37.1	0	18.3	35	36
July	07/24/2019 11:34	44.3	37.4	0	18.3	7	6
August	08/28/2019 13:29	44.6	36.9	0	18.5	8	15
September	9/14/19 2:19 PM	48.4	38.9	0	12.7	11	22
October	10/25/19 4:17 PM	52.1	39.8	0	8.1	10	<<>>
November	11/21/19 2:28 PM	55.1	41.4	0	3.5	12	11
December	12/17/19 5:15 PM	54.4	40	0	5.6	10	<<>>
Average		**48.38**	**38.03**	**0.05**	**13.54**	**17.17**	**20.90**
HLGW023B							
January	1/31/19 12:36	51.5	37.7	0	10.8	20	25
February	2/28/19 16:03	55.8	38.3	0.2	5.7	15	8
March	03/30/2019 11:32	53.3	38.3	0	8.4	11	23
April	04/24/2019 13:13	50.5	38	0	11.5	33	33
May	05/24/2019 8:57	46.9	35.4	0	17.7	3	6
June	06/27/2019 16:54	43.9	35.7	0	20.4	27	41
July	07/24/2019 11:32	41.3	35.2	0	23.5	17	17
August	08/28/2019 13:27	42	35.3	0	22.7	37	14
September	9/14/19 2:21 PM	44	36.4	0	19.6	32	33
October	10/25/19 4:21 PM	46.8	36.9	0.1	16.2	10	15
November	11/21/19 2:33 PM	50.7	39	0	10.3	8	16
December	12/17/19 5:18 PM	49.8	37.9	0	12.3	9	12

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**48.04**	**37.01**	**0.03**	**14.93**	**18.50**	**20.25**
HLGW024B							
January	---	---	---	---	---	---	---
February	2/28/19 12:44	41.3	31.1	0.9	26.7	6	<<>>
March	03/30/2019 11:06	41.9	34.2	0.7	23.2	38	26
April	---	---	---	---	---	---	---
May	---	50.1	---	---	---	---	---
June	06/27/2019 17:28	49.4	37.8	0.1	12.7	20	22
July	07/24/2019 11:24	51.7	38.9	0.1	9.3	17	18
August	08/28/2019 13:41	50.3	38.5	0	11.2	31	26
September	9/14/19 1:59 PM	52.6	39.5	0	7.9	15	21
October	10/25/19 1:20 PM	55.4	40.7	0	3.9	26	25
November	11/21/19 1:56 PM	52.6	39.2	0	8.2	19	29
December	12/17/19 3:04 PM	48.4	34.3	0	17.3	3	4
Average		**49.37**	**37.13**	**0.20**	**13.38**	**19.44**	**21.38**
HLGW025B							
January	1/31/19 12:25	58.4	41.5	0	0.1	8	11
February	2/28/19 12:48	58.7	41	0.1	0.2	<<>>	<<>>
March	03/30/2019 11:19	---	---	---	---	---	---
April	04/24/2019 13:23	58.3	41.6	0	0.1	8	11
May	05/24/2019 8:40	56.9	39.8	0	3.3	13	25
June	06/27/2019 16:40	51.3	37.3	1.3	10.1	16	21
July	07/24/2019 11:29	19.2	17.2	8.6	55	5	<<>>
August	08/28/2019 13:38	39.2	29	0	31.8	0	2
September	9/14/19 2:11 PM	69.3	26.2	0	4.5	0	5
October	10/25/19 1:08 PM	57.4	42.5	0	0.1	18	9
November	11/21/19 1:45 PM	57.4	42.4	0.1	0.1	<<>>	8
December	12/17/19 3:09 PM	58.2	41.7	0	0.1	11	11

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**53.12**	**36.38**	**0.92**	**9.58**	**8.78**	**11.44**
HLGW026B							
January	1/31/19 12:20	58.7	41.2	0	0.1	33	64
February	2/28/19 12:54	60	39.7	0.1	0.2	<<>>	<<>>
March	03/30/2019 11:14	59.1	40.8	0	0.1	36	56
April	04/24/2019 13:27	54.4	38.8	0.3	6.5	23	45
May	05/24/2019 8:42	57.1	39.7	0	3.2	23	32
June	05/24/2019 8:42	56.7	40.1	0	3.2	15	28
July	07/24/2019 11:27	56.2	40.5	0	3.3	29	34
August	08/28/2019 13:39	54.7	40.1	0	5.2	13	32
September	05/24/2019 8:42	53.9	40.1	0	6	26	27
October	10/25/19 1:14 PM	57.6	40.5	0	1.9	27	28
November	11/21/19 1:51 PM	58.2	41.7	0	0.1	38	27
December	12/17/19 3:12 PM	58.9	41	0	0.1	10	<<>>
Average		**57.13**	**40.35**	**0.03**	**2.49**	**24.82**	**37.30**
HLGW027A							
January	1/30/19 15:56	45.7	35.5	0.1	18.7	6	18
February	2/26/19 13:00	41.8	34.6	0.2	23.4	25	40
March	03/22/2019 7:51	43.9	34.7	0.6	20.8	19	24
April	04/25/2019 8:17	45.1	36.2	0.5	18.2	21	35
May	05/29/2019 13:30	47.2	35.9	0	16.9	15	33
June	06/28/2019 11:50	47.1	36.6	0.2	16.1	1	3
July	07/24/2019 16:38	47.1	36.4	0	16.5	15	16
August	08/30/2019 10:25	46.5	36.3	0	17.2	16	16
September	9/18/19 5:20 PM	47.9	37.3	0	14.8	19	23
October	10/23/19 1:13 PM	57	40.6	0	2.4	19	20
November	11/19/19 6:38 PM	57	42.9	0	0.1	11	16
December	12/18/19 4:50 PM	56.8	43	0	0.2	11	15

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**48.59**	**37.50**	**0.13**	**13.78**	**14.83**	**21.58**
HLGW027B							
January	1/31/19 12:18	44.2	34.9	0.6	20.3	34	44
February	2/28/19 13:00	43.3	34	1.2	21.5	<<>>	<<>>
March	03/30/2019 11:06	41.9	34.2	0.7	23.2	38	26
April	04/24/2019 13:28	47.1	36.9	0.4	15.6	14	21
May	05/24/2019 8:44	50.1	37.6	0	12.3	35	52
June	06/27/2019 17:28	49.4	37.8	0.1	12.7	20	22
July	07/24/2019 11:24	51.7	38.9	0.1	9.3	17	18
August	08/28/2019 13:41	50.3	38.5	0	11.2	31	26
September	9/14/19 1:59 PM	52.6	39.5	0	7.9	15	21
October	10/25/19 1:20 PM	55.4	40.7	0	3.9	26	25
November	11/21/19 1:56 PM	52.6	39.2	0	8.2	19	29
December	12/17/19 3:16 PM	57	39.5	0	3.5	8	19
Average		**49.63**	**37.64**	**0.26**	**12.47**	**23.36**	**27.55**
HLGW028A							
January	1/30/19 16:00	55.2	38.9	0	5.9	44	49
February	2/26/19 13:04	51.5	37.4	0	11.1	51	48
March	03/22/2019 7:54	51.3	37.9	0.1	10.7	46	46
April	04/25/2019 8:19	47.3	36.9	0.2	15.6	56	51
May	05/29/2019 13:32	49.4	36.7	0	13.9	48	46
June	06/28/2019 11:56	50.6	37.8	0.1	11.5	45	53
July	07/24/2019 16:40	49.8	37.3	0.1	12.8	52	52
August	08/30/2019 10:27	48.7	37.2	0.2	13.9	50	47
September	9/18/19 5:22 PM	50.5	37.9	0	11.6	40	47
October	10/23/19 1:17 PM	51.4	38.9	0	9.7	50	49
November	11/19/19 6:34 PM	57.8	40.8	0	1.4	43	52
December	12/18/19 4:53 PM	59.1	40.8	0	0.1	58	52

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**51.88**	**38.21**	**0.06**	**9.85**	**48.58**	**49.33**
HLGW028B							
January	1/31/19 12:09	50.8	37.2	0.7	11.3	9	7
February	03/30/2019 11:01	59.3	40.4	0.1	0.2	37	38
March	2/28/19 13:46	58.5	41.2	0.1	0.2	5	21
April	04/24/2019 13:37	48.8	36.6	0.9	13.7	8	11
May	05/24/2019 8:45	55.4	39.2	0	5.4	20	24
June	06/27/2019 17:26	51.2	38.2	0.1	10.5	7	9
July	07/24/2019 11:22	58.1	41.8	0	0.1	4	12
August	08/28/2019 13:42	46.4	37.3	0.4	15.9	27	24
September	9/14/19 1:57 PM	58.4	41.1	0.1	0.4	8	9
October	10/25/19 1:25 PM	57.5	42.4	0	0.1	<<>>	<<>>
November	11/21/19 2:01 PM	56.8	43.1	0	0.1	0	<<>>
December	12/17/19 3:19 PM	57.6	42.3	0	0.1	<<>>	<<>>
Average		**54.90**	**40.07**	**0.20**	**4.83**	**12.50**	**17.22**
HLGW029A							
January	1/30/19 16:02	59.4	40.5	0	0.1	26	39
February	2/26/19 13:08	57.7	39.2	0.1	3	3	4
March	03/22/2019 7:57	57.1	40.2	0.1	2.6	26	57
April	04/25/2019 8:21	52.1	38.4	0.1	9.4	34	39
May	05/29/2019 13:34	54.1	38.6	0	7.3	38	43
June	06/28/2019 12:00	58.7	41.1	0	0.2	34	38
July	07/24/2019 16:42	55.6	39.6	0	4.8	25	35
August	08/30/2019 10:29	54.4	39.4	0	6.2	19	33
September	9/18/19 5:24 PM	52.2	38.9	0	8.9	14	22
October	10/23/19 1:22 PM	56.5	40.6	0	2.9	27	26
November	11/19/19 6:29 PM	57.6	42.3	0	0.1	34	24
December	12/18/19 4:57 PM	57.7	42.2	0	0.1	18	31

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**56.09**	**40.08**	**0.03**	**3.80**	**24.83**	**32.58**
HLGW029B							
January	1/31/19 12:07	38.5	30.8	3	27.7	31	22
February	2/28/19 13:50	59.6	40	0.2	0.2	20	20
March	03/30/2019 10:38	59.8	40.1	0	0.1	10	17
April	04/24/2019 13:39	43.6	33.8	1.4	21.2	19	24
May	05/24/2019 8:48	52.5	37.7	0	9.8	29	30
June	06/27/2019 17:24	48.4	36.5	0.3	14.8	9	8
July	07/24/2019 11:20	51.1	38.4	0	10.5	2	6
August	08/28/2019 13:44	43	35.4	0.6	21	6	8
September	9/14/19 1:54 PM	51	37.7	0	11.3	2	5
October	10/25/19 1:31 PM	58.4	41.5	0	0.1	3	4
November	11/21/19 2:04 PM	57.7	42.2	0	0.1	2	<<>>
December	12/17/19 3:23 PM	58.7	41.2	0	0.1	5	0
Average		**51.86**	**37.94**	**0.46**	**9.74**	**11.50**	**13.09**
HLGW030A							
January	---	---	---	---	---	---	---
February	2/26/19 13:48	6.8	6.2	15.2	71.8	4	1
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/28/2019 12:10	24.7	22.3	4.7	48.3	<<>>	<<>>
July	07/24/2019 16:54	42	31.4	2.9	23.7	30	28
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 1:30 PM	18.9	19.6	9.6	51.9	<<>>	<<>>
November	11/19/19 6:24 PM	40.8	34.8	1.6	22.8	<<>>	<<>>
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**26.64**	**22.86**	**6.80**	**43.70**	**17.00**	**14.50**
HLGW030B							
January	1/31/19 11:31	57.3	39	0.3	3.4	19	23
February	2/28/19 11:13	59.2	39.6	0.4	0.8	17	16
March	03/30/2019 11:35	59.2	40.1	0	0.7	12	32
April	04/24/2019 13:10	59.1	40.5	0.1	0.3	21	25
May	05/24/2019 8:04	56.2	39	0.4	4.4	30	30
June	06/27/2019 16:57	49.1	36.8	0.7	13.4	19	26
July	07/23/2019 17:16	56.2	39.5	0.3	4	19	24
August	08/28/2019 13:24	51.5	38.2	0.1	10.2	22	21
September	9/14/19 1:28 PM	54.2	38.9	0.3	6.6	19	23
October	10/24/19 4:39 PM	56.8	39.8	0.2	3.2	26	29
November	11/20/19 4:48 PM	58.8	41	0	0.2	38	11
December	12/17/19 12:55 PM	59	40.9	0	0.1	9	9
Average		**56.38**	**39.44**	**0.23**	**3.94**	**20.92**	**22.42**
HLGW031A							
January	---	---	---	---	---	---	---
February	2/26/19 13:56	19.1	19.9	7	54	2	2
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 1:36 PM	19.8	22	6.8	51.4	<<>>	<<>>
November	11/19/19 6:19 PM	18.7	24.8	2.7	53.8	<<>>	<<>>
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**19.20**	**22.23**	**5.50**	**53.07**	**2.00**	**2.00**
HLGW031B							
January	1/31/19 11:34	49.9	37	0.1	13	10	24
February	2/28/19 11:16	46.3	35.1	1.1	17.5	35	35
March	03/30/2019 11:38	45	35.4	0.4	19.2	27	38
April	04/24/2019 13:07	46.7	35.9	0.6	16.8	43	51
May	05/24/2019 8:05	51.9	37.7	0.3	10.1	8	36
June	06/27/2019 17:01	45.2	35.5	0.6	18.7	63	64
July	07/23/2019 17:18	56.9	39.6	0	3.5	7	41
August	08/28/2019 13:22	50.9	38.3	0	10.8	8	23
September	9/14/19 1:30 PM	52.7	38.6	0	8.7	18	19
October	10/24/19 4:44 PM	51.2	37.8	0.3	10.7	20	26
November	11/20/19 4:53 PM	49.5	37.6	0.6	12.3	27	25
December	12/17/19 12:59 PM	57.4	40.1	0	2.5	18	19
Average		**50.30**	**37.38**	**0.33**	**11.98**	**23.67**	**33.42**
HLGW032A							
January	---	---	---	---	---	---	---
February	2/26/19 14:01	33.8	29.5	2.4	34.3	5	4
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 1:42 PM	42.1	34.5	1.4	22	0	0
November	11/19/19 6:10 PM	40.8	34.1	0.3	24.8	<<>>	1
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**38.90**	**32.70**	**1.37**	**27.03**	**2.50**	**1.67**
HLGW032B							
January	1/31/19 11:36	48.1	36.5	0.3	15.1	30	34
February	2/28/19 11:19	46.7	34.9	1.2	17.2	24	29
March	03/30/2019 11:40	44.6	35.1	0.5	19.8	20	21
April	04/24/2019 13:05	44.3	34.9	0.7	20.1	40	39
May	05/24/2019 8:07	45.6	35.6	0.3	18.5	34	34
June	06/27/2019 17:04	44.3	35.4	0.5	19.8	22	21
July	07/23/2019 17:20	59.6	40.2	0	0.2	37	50
August	08/28/2019 13:20	57.5	39.8	0	2.7	33	38
September	9/14/19 1:32 PM	57.9	39.8	0	2.3	17	42
October	10/24/19 4:49 PM	54.7	38.9	0.2	6.2	35	45
November	11/20/19 4:58 PM	56	39.8	0.2	4	23	45
December	12/17/19 1:04 PM	58.8	40.1	0	1.1	52	<<>>
Average		**51.51**	**37.58**	**0.33**	**10.58**	**30.58**	**36.18**
HLGW033A							
January	1/30/19 16:09	44.5	32.9	2.6	20	30	31
February	2/26/19 14:05	42.5	30.8	3.6	23.1	32	30
March	03/22/2019 8:01	42.8	32.1	3.2	21.9	28	32
April	04/25/2019 8:35	41.5	31.6	3.1	23.8	27	27
May	05/29/2019 13:39	43.1	32.1	2.9	21.9	31	30
June	06/28/2019 12:15	44.7	32.8	2.4	20.1	33	31
July	---	---	---	---	---	---	---
August	08/30/2019 10:43	41.7	31.7	3	23.6	29	30
September	9/18/19 5:36 PM	41.7	31.3	3.1	23.9	30	30
October	10/23/19 1:47 PM	44.1	33	3.2	19.7	27	26
November	11/19/19 6:06 PM	41.7	32	4	22.3	25	26
December	12/18/19 5:04 PM	45.4	33.4	2.9	18.3	25	25

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**43.06**	**32.15**	**3.09**	**21.69**	**28.82**	**28.91**
HLGW033B							
January	---	---	---	---	---	---	---
February	2/28/19 11:21	4.9	2.4	3.2	89.5	<<>>	<<>>
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/24/19 4:57 PM	28.6	22.1	8.2	41.1	<<>>	<<>>
November	11/20/19 5:05 PM	4.4	10.1	11.9	73.6	<<>>	<<>>
December	12/17/19 1:07 PM	0.9	2.8	18.5	77.8	<<>>	<<>>
Average		**9.70**	**9.35**	**10.45**	**70.50**	**0.00**	**0.00**
HLGW034A							
January	---	---	---	---	---	---	---
February	2/26/19 14:10	37.6	31.6	0.6	30.2	4	4
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 1:51 PM	38.5	33.2	0	28.3	<<>>	<<>>
November	11/19/19 6:00 PM	23.8	27.5	0	48.7	0	<<>>
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**33.30**	**30.77**	**0.20**	**35.73**	**2.00**	**4.00**
HLGW034B							
January	1/31/19 11:39	50.8	36.3	0.3	12.6	15	13
February	2/28/19 11:24	49.7	35.6	1.1	13.6	23	25
March	03/30/2019 11:43	49.6	36	0.4	14	16	21
April	04/24/2019 13:03	50.5	36.6	0.5	12.4	5	14
May	05/24/2019 8:10	53.2	37.3	0.3	9.2	9	14
June	06/27/2019 17:07	49.7	36.5	0.4	13.4	13	19
July	07/23/2019 17:23	50.9	36.9	0.4	11.8	38	38
August	08/28/2019 13:18	50.9	36.8	0.4	11.9	25	28
September	9/14/19 1:34 PM	52.1	37.5	0.3	10.1	38	39
October	10/24/19 5:02 PM	54	38.1	0.2	7.7	16	16
November	11/20/19 5:10 PM	36.8	31.3	1.7	30.2	32	30
December	12/17/19 1:12 PM	44.5	34.3	0.9	20.3	37	27
Average		**49.39**	**36.10**	**0.58**	**13.93**	**22.25**	**23.67**
HLGW036B							
January	1/31/19 12:23	58.4	40	0	1.6	3	6
February	2/28/19 11:57	--	---	---	---	---	---
March	03/30/2019 11:16	57.9	39.8	0	2.3	6	12
April	04/24/2019 13:25	33.7	28.4	3.4	34.5	6	3
May	05/24/2019 8:38	58.4	41.5	0	0.1	7	10
June	06/27/2019 16:38	51.7	38.4	0	9.9	6	8
July	07/23/2019 11:33	52.2	38.9	0	8.9	8	9
August	08/28/2019 12:54	44	35.2	0	20.8	11	10
September	9/14/19 2:08 PM	46.6	37	0	16.4	4	9
October	10/25/19 12:54 PM	30	26.1	5.8	38.1	15	8
November	9/14/19 2:08 PM	46.6	37	0	16.4	4	9
December	9/14/19 2:08 PM	46.6	37	0	16.4	4	9

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**47.83**	**36.30**	**0.84**	**15.04**	**6.73**	**8.45**
HLGW037B							
January	1/31/19 12:15	58.2	41.7	0	0.1	46	41
February	2/28/19 11:54	58.6	41.1	0.1	0.2	<<>>	<<>>
March	03/30/2019 11:09	36.6	31.9	1	30.5	40	21
April	04/24/2019 13:30	58.2	41.7	0	0.1	18	28
May	05/24/2019 8:35	59.7	40.2	0	0.1	24	38
June	06/27/2019 16:35	57.9	42	0	0.1	26	31
July	07/23/2019 11:36	57.7	42.2	0	0.1	19	19
August	08/28/2019 12:56	58.5	41.4	0	0.1	21	29
September	9/14/19 2:03 PM	55.8	40.3	0	3.9	30	35
October	10/25/19 12:49 PM	57.7	42.2	0	0.1	28	37
November	11/20/19 5:53 PM	57.4	42.4	0	0.2	28	39
December	9/14/19 2:03 PM	55.8	40.3	0	3.9	30	35
Average		**56.01**	**40.62**	**0.09**	**3.28**	**28.18**	**32.09**
HLGW038B							
January	1/31/19 12:12	58.7	41.2	0	0.1	22	35
February	2/28/19 11:50	54.1	37.8	1.4	6.7	<<>>	<<>>
March	03/30/2019 11:04	40.1	32.3	2.4	25.2	14	7
April	04/24/2019 13:32	58.3	41.6	0	0.1	9	14
May	04/24/2019 8:34	57.4	40	0	2.6	34	38
June	06/27/2019 16:32	55.9	40.1	0	4	12	14
July	07/23/2019 11:39	51.9	39	0.1	9	12	13
August	08/28/2019 12:57	45.1	36.5	0.7	17.7	9	12
September	9/14/19 2:01 PM	45.5	36.3	0.8	17.4	8	9
October	10/25/19 12:45 PM	58.8	41.1	0	0.1	10	12
November	11/20/19 5:48 PM	58	41.9	0	0.1	16	10
December	12/17/19 1:42 PM	53	38.9	0	8.1	10	10

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**53.07**	**38.89**	**0.45**	**7.59**	**14.18**	**15.82**
HLGW039A							
January	1/30/19 16:25	53.3	38.6	0.5	7.6	34	38
February	2/26/19 12:29	51.9	37	1	10.1	36	40
March	03/22/2019 8:13	50.7	38	0.3	11	33	31
April	04/25/2019 8:24	48	36.4	1.1	14.5	10	11
May	05/29/2019 13:28	48.6	35.7	1.4	14.3	38	38
June	06/28/2019 11:38	54.7	39.4	0.4	5.5	9	17
July	07/24/2019 16:44	47.1	35.5	1.6	15.8	37	31
August	08/30/2019 10:31	46.9	36.5	0.9	15.7	30	36
September	9/18/19 5:26 PM	47.1	35.5	1.8	15.6	38	35
October	10/23/19 12:36 PM	49.6	37.6	1.2	11.6	37	37
November	11/19/19 5:29 PM	52.4	39.2	1	7.4	38	38
December	12/18/19 4:45 PM	58.5	41.3	0	0.2	36	<<>>
Average		**50.73**	**37.56**	**0.93**	**10.78**	**31.33**	**32.00**
HLGW039B							
January	1/31/19 12:04	39.3	32.9	0	27.8	15	7
February	2/28/19 11:47	40.8	32.8	0.8	25.6	<<>>	<<>>
March	03/30/2019 10:40	35.1	31.4	0	33.5	4	2
April	04/24/2019 13:33	58.8	41.1	0	0.1	4	7
May	05/24/2019 8:32	41.8	34.8	0	23.4	6	9
June	06/27/2019 16:30	39.5	34	0	26.5	11	<<>>
July	07/23/2019 11:41	47.1	36.8	0	16.1	9	6
August	08/28/2019 13:00	42.2	34.6	0	23.2	4	5
September	9/14/19 1:51 PM	45.8	35.8	0	18.4	7	6
October	10/25/19 12:38 PM	53.5	38.1	0.2	8.2	11	7
November	11/20/19 5:43 PM	49.6	37.5	0.4	12.5	4	7
December	12/17/19 1:39 PM	46.3	35	0	18.7	6	7

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**44.98**	**35.40**	**0.12**	**19.50**	**7.36**	**6.30**
HLGW040A							
January	1/30/19 16:19	48.5	37.3	0.7	13.5	11	13
February	2/26/19 12:35	42.1	33.3	1.9	22.7	<<>>	13
March	03/22/2019 8:08	42.8	35	1.3	20.9	11	12
April	04/25/2019 8:28	40.3	33.9	1.3	24.5	11	6
May	05/29/2019 13:36	47.8	37.1	0	15.1	10	10
June	06/28/2019 11:45	54.5	40.1	0.1	5.3	0	1
July	07/24/2019 16:48	47	37	0.2	15.8	6	7
August	08/30/2019 10:37	45.1	37.2	0	17.7	8	8
September	9/18/19 5:28 PM	45.3	36.2	0.3	18.2	7	7
October	10/23/19 12:41 PM	45.1	37.1	0.4	17.4	27	30
November	11/19/19 5:34 PM	56.3	43.6	0	0.1	5	4
December	12/18/19 5:15 PM	56.8	43.1	0	0.1	3	4
Average		**47.63**	**37.58**	**0.52**	**14.28**	**9.00**	**9.58**
HLGW040B							
January	1/31/19 12:02	42.4	34.9	0	22.7	21	30
February	2/28/19 11:44	40.5	33.4	0.9	25.2	<<>>	11
March	03/30/2019 10:36	41.1	34.4	0.2	24.3	27	9
April	04/24/2019 13:41	59.4	40.3	0	0.3	12	36
May	05/24/2019 8:30	57	39.8	0	3.2	10	22
June	06/27/2019 16:28	49.3	38.1	0	12.6	17	22
July	07/23/2019 11:44	49.7	38.7	0	11.6	30	26
August	08/28/2019 13:01	47.1	37.3	0	15.6	18	13
September	9/14/19 1:49 PM	49.5	38.3	0	12.2	18	17
October	10/25/19 12:34 PM	43.9	35.4	0	20.7	16	17
November	11/20/19 5:39 PM	47.4	37.7	0	14.9	<<>>	16
December	12/17/19 1:34 PM	50.3	37.9	0	11.8	16	16

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**48.13**	**37.18**	**0.09**	**14.59**	**18.50**	**19.58**
HLGW041A							
January	---	---	---	---	---	---	---
February	2/26/19 12:39	3.80	7.10	14.00	75.10	<<>>	0.00
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 12:49 PM	25.90	26.90	3.10	44.10	1.00	3.00
November	11/19/19 5:40 PM	57.60	42.30	0.00	0.10	<<>>	<<>>
December	---	---	---	---	---	---	---
Average		**29.10**	**25.43**	**5.70**	**39.77**	**1.00**	**1.50**
HLGW041B							
January	1/31/19 11:59	45.6	36.1	0.6	17.7	11	17
February	2/28/19 11:41	46.7	35.2	1.2	16.9	34	7
March	03/30/2019 10:33	44.9	35.3	0.8	19	28	28
April	04/24/2019 13:44	53.3	39	0	7.7	6	7
May	05/24/2019 8:25	46.1	36.2	0.2	17.5	12	11
June	06/27/2019 16:26	42.6	35	0.8	21.6	10	8
July	07/23/2019 11:46	52.3	39.1	0	8.6	25	33
August	08/28/2019 13:04	44.8	36.1	0	19.1	9	9
September	9/14/19 1:48 PM	46.8	37	0.2	16	10	7
October	10/25/19 12:30 PM	39.9	32.9	2.3	24.9	10	<<>>
November	11/20/19 5:36 PM	56.6	43.2	0	0.2	9	9
December	12/17/19 1:30 PM	57.5	42.4	0	0.1	33	31

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**48.09**	**37.29**	**0.51**	**14.11**	**16.42**	**15.18**
HLGW042A							
January	---	---	---	---	---	---	---
February	2/26/19 12:43	35.4	29.5	2	33.1	6	6
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 12:55 PM	46.6	37.2	0	16.2	1	<<>>
November	11/19/19 5:43 PM	55.8	38.4	0	5.8	2	1
December	---	---	---	---	---	---	---
Average		**45.93**	**35.03**	**0.67**	**18.37**	**3.00**	**3.50**
HLGW042B							
January	1/31/19 11:53	51.8	37.5	0.3	10.4	30	32
February	2/28/19 11:37	50.8	36.7	0.9	11.6	35	31
March	03/30/2019 11:54	48.6	36.6	0.5	14.3	37	36
April	04/24/2019 12:50	52.1	37.8	0.5	9.6	38	49
May	05/24/2019 8:21	49.6	36.6	0.6	13.2	39	46
June	06/27/2019 17:20	47.5	36.4	0.6	15.5	29	34
July	07/23/2019 17:31	49.3	36.7	0.9	13.1	46	41
August	08/28/2019 13:08	47	35.9	1	16.1	30	31
September	9/14/19 1:42 PM	47.2	36	1.1	15.7	43	47
October	10/24/19 5:21 PM	46.8	35.8	1.3	16.1	49	46
November	11/20/19 5:30 PM	57.7	42.2	0	0.1	2	10
December	12/17/19 1:25 PM	58.4	41.5	0	0.1	3	2

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**50.57**	**37.48**	**0.64**	**11.32**	**31.75**	**33.75**
HLGW043A							
January	---	---	---	---	---	---	---
February	2/26/19 12:48	15.1	17.1	6.7	61.1	2	3
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 1:01 PM	36.6	33.2	0	30.2	<<>>	<<>>
November	11/19/19 5:47 PM	43	33.7	1.3	22	0	<<>>
December	---	---	---	---	---	---	---
Average		**31.57**	**28.00**	**2.67**	**37.77**	**1.00**	**3.00**
HLGW043B							
January	1/31/19 11:48	46.8	36.1	0	17.1	36	37
February	2/28/19 11:34	45.9	35.4	0.3	18.4	<<>>	59
March	03/30/2019 11:50	43.6	35.1	0	21.3	37	15
April	04/24/2019 12:57	52.3	38	0	9.7	24	26
May	05/24/2019 8:19	46	36	0	18	12	22
June	06/27/2019 17:18	44.8	35.8	0	19.4	12	8
July	07/23/2019 17:29	46.5	36	0	17.5	27	19
August	08/28/2019 13:11	44.9	35.8	0	19.3	30	25
September	9/14/19 1:41 PM	46.5	36.3	0	17.2	24	19
October	10/24/19 5:17 PM	43.7	35.1	0	21.2	20	18
November	11/20/19 5:25 PM	58.6	41.3	0	0.1	14	13
December	12/17/19 1:22 PM	59.3	40.6	0	0.1	12	13

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**48.24**	**36.79**	**0.03**	**14.94**	**22.55**	**22.83**
HLGW044A							
January	1/30/19 16:13	59.5	40.4	0	0.1	11	13
February	2/26/19 12:51	53.7	37.2	0.7	8.4	3	12
March	03/22/2019 8:04	50.6	37	0	12.4	23	21
April	04/25/2019 8:32	54.6	38.1	0	7.3	30	31
May	05/29/2019 13:41	43.2	33.4	0.7	22.7	44	40
June	06/28/2019 12:22	52.7	37.3	0	10	29	25
July	07/24/2019 16:51	51.7	36.9	0	11.4	18	14
August	08/30/2019 10:41	50.5	37.1	0	12.4	18	30
September	9/18/19 5:34 PM	50.8	36.7	0.1	12.4	6	21
October	10/23/19 1:05 PM	48.3	36	0.7	15	23	27
November	11/19/19 5:53 PM	58.4	41.5	0	0.1	19	23
December	12/18/19 5:09 PM	59	40.9	0	0.1	21	24
Average		**52.75**	**37.71**	**0.18**	**9.36**	**20.42**	**23.42**
HLGW044B							
January	1/31/19 11:42	43.9	33.2	1.5	21.4	6	7
February	2/28/19 11:26	44.5	31.5	5.1	18.9	4	8
March	03/30/2019 11:46	32.9	25.9	4.9	36.3	3	2
April	04/24/2019 12:59	38.2	31.7	2.3	27.8	11	9
May	05/24/2019 8:15	35.4	27.2	4.6	32.8	5	<<>>
June	06/27/2019 17:14	44.3	33.2	1.7	20.8	1	2
July	07/23/2019 17:25	32	26.8	3.9	37.3	7	8
August	08/28/2019 13:15	27.5	23.9	5	43.6	8	6
September	9/14/19 1:36 PM	32.9	27.2	4.3	35.6	24	6
October	10/24/19 5:09 PM	48.3	35.3	1.3	15.1	20	20
November	11/20/19 5:21 PM	40.3	33.2	1.4	25.1	<<>>	11
December	12/17/19 1:17 PM	39.3	32.7	0.8	27.2	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**38.29**	**30.15**	**3.07**	**28.49**	**8.90**	**7.90**
HLGW047A							
January	1/30/19 16:21	48	37.5	0.2	14.3	43	42
February	2/26/19 11:32	45.1	36.3	0.4	18.2	38	41
March	03/22/2019 8:10	46.3	37.6	0	16.1	27	31
April	04/25/2019 8:26	47	37.5	0	15.5	25	25
May	05/29/2019 13:44	45.8	36.4	0.5	17.3	35	24
June	06/28/2019 10:52	45.9	37.5	0.1	16.5	24	25
July	07/24/2019 16:46	45.9	37.1	0.2	16.8	24	22
August	08/30/2019 10:34	45.9	37.5	0	16.6	30	24
September	9/18/19 5:30 PM	46.7	37.2	0.3	15.8	25	24
October	10/23/19 12:10 PM	48.7	39	0	12.3	19	22
November	11/19/19 5:04 PM	52.1	40.3	0	7.6	40	30
December	12/18/19 2:32 PM	53.7	39.9	0	6.4	20	18
Average		**47.59**	**37.82**	**0.14**	**14.45**	**29.17**	**27.33**
HLGW048A							
January	---	---	---	---	---	---	---
February	2/26/19 11:37	59.4	37.6	0.4	2.6	3	1
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	07/24/2019 16:34	41.2	32.4	0.3	26.1	60	56
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 12:15 PM	59.6	40.3	0	0.1	0	1
November	11/19/19 5:08 PM	59.4	40.5	0	0.1	<<>>	<<>>
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**54.90**	**37.70**	**0.18**	**7.23**	**21.00**	**19.33**
HLGW049A							
January	---	---	---	---	---	---	---
February	2/26/19 11:42	6.5	8.7	13.3	71.5	3	<<>>
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	11/19/19 5:12 PM	31.1	28.3	3.2	37.4	<<>>	<<>>
December	---	---	---	---	---	---	---
Average		**18.80**	**18.50**	**8.25**	**54.45**	**3.00**	**0.00**
HLGW050A							
January	---	---	---	---	---	---	---
February	2/26/19 11:47	28.4	25.1	5.2	41.3	13	13
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/28/2019 11:11	26.1	22.1	7.6	44.2	<<>>	<<>>
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 12:24 PM	36	24.7	1.6	37.7	<<>>	<<>>
November	11/19/19 5:18 PM	48.9	32.3	1	17.8	<<>>	<<>>
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**34.85**	**26.05**	**3.85**	**35.25**	**13.00**	**0.00**
HLGW051A							
January	---	---	---	---	---	---	---
February	2/26/19 12:21	21.6	21	5.7	51.7	5	4
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 12:28 PM	32.1	27.3	0.5	40.1	<<>>	<<>>
November	11/19/19 5:22 PM	47.6	32	0	20.4	<<>>	<<>>
December	---	---	---	---	---	---	---
Average		**33.77**	**26.77**	**2.07**	**37.40**	**5.00**	**0.00**
LHGW002A							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0003							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0004							
January	1/23/19 12:16	25.9	27.2	0	46.9	3	3
February	2/27/19 17:32	34	28.8	0.8	36.4	<<>>	<<>>
March	3/4/19 14:27	46.1	33.6	0	20.3	3	3
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	08/28/2019 15:41	43.8	32.8	0	23.4	1	0
September	---	---	---	---	---	---	---
October	10/24/19 2:06 PM	39	32.6	0	28.4	22	9
November	11/20/19 1:56 PM	31	29.4	0	39.6	1	1
December	12/17/19 12:31 PM	36.2	31.2	0	32.6	1	1

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**36.57**	**30.80**	**0.11**	**32.51**	**5.17**	**2.83**
LHGW0006							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	Decommissioned May 2014						
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0007							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0008							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0009							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	Decommissioned May 2014						
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0010							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	Decommissioned May 2014						
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0013							
January	1/23/19 16:45	56.8	37.7	0.3	5.2	14	15
February	2/28/19 16:55	60	38.7	0.6	0.7	14	13
March	4/4/19 14:13	59.2	39.3	0.2	1.3	18	20
April	04/26/2019 14:15	47.3	35.1	1.1	16.5	19	19
May	05/24/2019 9:17	49.1	35.8	0.9	14.2	19	19
June	06/27/2019 14:53	56.7	43.2	0	0.1	0	3
July	07/24/2019 12:26	44.8	34.5	2	18.7	17	11
August	08/28/2019 15:03	49.2	35.3	1.6	13.9	9	9
September	9/18/19 3:21 PM	51.7	37	1.3	10	10	10
October	10/30/19 4:11 PM	58	39.6	0.4	2	10	9
November	---	---	---	---	---	---	---
December	12/17/19 6:07 PM	58.3	39.6	0.2	1.9	9	8

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**53.74**	**37.80**	**0.78**	**7.68**	**12.64**	**12.36**
LHGW0017							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0019							
January	1/23/19 13:49	21.9	18.1	7	53	17	<<>>
February	2/28/19 16:08	36.5	29.8	3	30.7	107	120
March	4/4/19 13:50	38.3	32.4	1.4	27.9	9	9
April	04/26/2019 13:51	48.9	36.5	0.2	14.4	21	19
May	05/24/2019 9:09	47.6	37.2	0	15.2	35	33
June	06/27/2019 14:33	51.5	38.2	0	10.3	21	21
July	07/24/2019 11:50	55.9	40.4	1	2.7	3	4
August	08/28/2019 14:47	36	33.9	2.4	27.7	16	14
September	9/18/19 2:52 PM	49.4	38.8	0	11.8	26	24
October	10/30/19 3:28 PM	51.2	38.8	0.1	9.9	4	4
November	11/21/19 2:38 PM	56.1	40.7	0	3.2	4	4
December	12/17/19 5:25 PM	57	40.4	0	2.6	<<>>	1

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**45.86**	**35.43**	**1.26**	**17.45**	**23.91**	**23.00**
LHGW0020							
January	1/23/19 16:06	1.3	1.4	18.3	79	53	52
February	2/28/19 16:19	55.9	37.2	1	5.9	5	11
March	4/4/19 13:54	59.5	40.2	0.2	0.1	27	26
April	04/26/2019 13:57	59.2	40.4	0.2	0.2	10	28
May	05/24/2019 9:08	50.5	38	0	11.5	9	22
June	06/27/2019 14:37	26.9	29.1	0.1	43.9	25	<<>>
July	07/24/2019 11:52	57.5	42.3	0	0.2	2	2
August	08/28/2019 14:51	44.2	38	0	17.8	14	28
September	9/18/19 2:59 PM	47.4	37.8	0	14.8	26	34
October	10/30/19 3:36 PM	40.6	34.3	0	25.1	14	40
November	11/21/19 2:52 PM	44.7	36	0	19.3	13	13
December	12/17/19 5:33 PM	43.6	34.6	0.1	21.7	12	15
Average		**44.28**	**34.11**	**1.66**	**19.96**	**17.50**	**24.64**
LHGW0021							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
LHGW0022							
January	1/23/19 16:24	42.2	33.3	0	24.5	39	66
February	2/28/19 16:33	40.5	32.7	1.3	25.5	3	5
March	4/4/19 14:00	52.2	36.3	0	11.5	6	9
April	04/26/2019 14:03	45.9	34.3	0.2	19.6	9	9
May	05/24/2019 9:01	46	34.5	0	19.5	7	7
June	06/27/2019 14:46	40.6	32.7	0.3	26.4	6	3
July	07/24/2019 11:59	39.3	33.6	0	27.1	0	3
August	08/28/2019 14:57	41.4	33.6	0	25	11	10
September	9/18/19 3:05 PM	47	36.3	0.1	16.6	<<>>	2
October	10/30/19 3:49 PM	43	34.2	0.1	22.7	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/17/19 5:43 PM	46.6	34.4	0	19	1	1
Average		**44.06**	**34.17**	**0.18**	**21.58**	**9.11**	**11.50**
LHGW0023							
January	1/23/19 16:28	58.2	33.1	0	8.7	19	24
February	2/28/19 16:37	56.2	33.9	0.1	9.8	41	41
March	4/4/19 14:02	61.9	37.9	0	0.2	11	9
April	04/26/2019 14:05	36.1	29.5	1	33.4	25	5
May	---	---	---	---	---	---	---
June	06/27/2019 14:48	60.4	39.5	0	0.1	<<>>	2
July	07/24/2019 12:01	60.4	39.5	0	0.1	2	2
August	08/28/2019 14:58	43.6	34.5	0	21.9	12	11
September	9/18/19 3:08 PM	56.1	37.9	0	6	0	2
October	10/30/19 3:54 PM	30.5	29.3	0	40.2	0	1
November	---	---	---	---	---	---	---
December	12/17/19 5:49 PM	29.4	27.3	0.9	42.4	3	4

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**49.28**	**34.24**	**0.20**	**16.28**	**12.56**	**10.10**
TLGW001A							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
TLGW001B							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
TLGW002A							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
TLGW002B							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
TLGW002C							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**---**	**---**	**---**	**---**	**---**	**0.00**
VLGW001D							
January	---	---	---	---	---	---	---
February	2/26/19 17:28	44.5	15.5	1	39	<<>>	<<>>
March	2/4/19 14:27	41	15.8	0.2	43	<<>>	2
April	04/25/2019 9:00	48.2	15.1	0.2	36.5	2	3
May	---	---	---	---	---	---	---
June	06/28/2019 13:27	51.9	13.8	0.4	33.9	2	4
July	07/24/2019 17:11	51.9	13.5	0.7	33.9	3	2
August	---	---	---	---	---	---	---
September	9/18/19 10:54 AM	50.4	14.8	0.2	34.6	1	3
October	10/23/19 4:02 PM	49.5	14.8	0.5	35.2	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 12:52 PM	54.9	15.3	0.1	29.7	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**49.04**	**14.83**	**0.41**	**35.73**	**2.00**	**2.80**
VLGW001S							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW002D							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW002S							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW003D							
January	1/22/19 11:54	31.2	19.1	0	49.7	<<>>	<<>>
February	2/26/19 10:55	40.9	20.2	0	38.9	3	5
March	2/4/19 13:55	39.6	19.9	0.1	40.4	8	8
April	04/25/2019 9:12	65.6	21.4	0	13	3	6
May	05/29/2019 14:13	64.3	21.3	0	14.4	8	15
June	06/28/2019 13:06	47	18.5	0.1	34.4	5	5
July	07/24/2019 17:14	41.2	18.2	0	40.6	7	4
August	08/28/2019 16:43	55.5	18.6	0	25.9	7	6
September	9/18/19 10:58 AM	68.4	20.3	0	11.3	3	4
October	10/23/19 11:23 AM	61.6	20.5	0.1	17.8	<<>>	<<>>
November	11/19/19 4:29 PM	62.6	21.4	0.1	15.9	0	0
December	12/16/19 1:32 PM	58.1	21.7	0	20.2	0	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**53.00**	**20.09**	**0.03**	**26.88**	**4.40**	**5.89**
VLGW003S							
January	1/22/19 11:42	43.3	29.2	0	27.5	23	23
February	2/26/19 10:51	50.9	31.7	0.1	17.3	0	0
March	2/4/19 13:54	49	30.8	0.3	19.9	2	4
April	04/25/2019 9:11	44.2	25.2	0	30.6	2	0
May	05/29/2019 14:12	49.2	23.2	0.3	27.3	4	2
June	06/28/2019 13:03	43.5	24.1	0.1	32.3	3	0
July	07/24/2019 17:15	42.1	24	0.2	33.7	1	1
August	08/28/2019 16:41	45.6	25.2	0	29.2	6	6
September	9/18/19 10:56 AM	49.8	29.3	0.1	20.8	1	1
October	10/23/19 11:20 AM	52.8	31.5	0.1	15.6	<<>>	<<>>
November	11/19/19 4:26 PM	54.5	31.2	0.1	14.2	<<>>	<<>>
December	12/16/19 1:29 PM	52.5	30.7	0	16.8	<<>>	<<>>
Average		**48.12**	**28.01**	**0.11**	**23.77**	**4.67**	**4.11**
VLGW004D							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW004S							
January	---	---	---	---	---	---	---
February	2/26/19 17:03	8.8	4.5	16.7	70	<<>>	<<>>
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/28/2019 12:35	9.2	4.2	17	69.6	0	2
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**9.00**	**4.35**	**16.85**	**69.80**	**0.00**	**0.00**
VLGW005D							
January	1/22/19 13:26	89.2	10.7	0	0.1	4	5
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/28/2019 13:45	90.6	9.1	0.2	0.1	3	0
July	---	---	---	---	---	---	---
August	---	---	---	---	---	0	0
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**89.90**	**9.90**	**0.10**	**0.10**	**2.33**	**0.00**
VLGW005S							
January	1/22/19 13:23	38.1	23.8	0	38.1	4	4
February	---	---	---	---	---	---	---
March	2/4/19 14:11	30.3	21.6	0.2	47.9	3	<<>>
April	04/25/2019 8:51	82.7	17.1	0	0.2	3	2
May	05/29/2019 12:36	35.2	20.3	0.4	44.1	3	<<>>
June	06/28/2019 13:43	83.8	15.9	0.1	0.2	5	6
July	---	---	---	---	---	---	---
August	08/30/2019 11:54	83.3	16.6	0	0.1	1	0
September	9/18/19 4:03 PM	56	20.7	0.1	23.2	2	2
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	12/16/19 1:12 PM	31.2	21	0.1	47.7	<<>>	1
Average		**55.08**	**19.63**	**0.11**	**25.19**	**3.00**	**2.50**
VLGW006D							
January	1/22/19 16:23	46	19.2	0	34.8	4	5
February	2/27/19 10:55	51.3	19.5	0.4	28.8	<<>>	<<>>
March	3/4/19 9:45	51.3	19.7	0	29	2	3
April	04/25/2019 13:30	52.8	19.6	0.1	27.5	0	4
May	05/29/2019 12:34	50.1	19.7	0.1	30.1	2	2
June	06/28/2019 13:57	34.5	19.5	0.2	45.8	4	1
July	07/24/2019 13:51	31.8	19.8	0.1	48.3	2	1
August	08/30/2019 11:51	75.1	20	0	4.9	2	0
September	9/18/19 3:59 PM	43	18.4	0.9	37.7	2	1
October	10/23/19 4:53 PM	39.4	18.4	0.8	41.4	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 2:11 PM	39.9	18.9	0.1	41.1	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**46.84**	**19.34**	**0.25**	**33.58**	**2.25**	**2.13**
VLGW006S							
January	1/22/19 16:20	68.7	15.9	0.2	15.2	<<>>	<<>>
February	2/27/19 10:52	74.6	15.5	0.3	9.6	5	5
March	3/4/19 9:43	54.6	12.8	3.3	29.3	0	0
April	04/25/2019 13:29	68.5	13.6	3.4	14.5	2	5
May	05/29/2019 12:31	43.4	17.7	0.3	38.6	0	1
June	06/28/2019 13:54	27.5	17.5	0.5	54.5	2	2
July	07/24/2019 13:50	25.6	18.1	0.5	55.8	4	0
August	08/30/2019 11:49	45.8	18.4	0.5	35.3	0	0
September	9/18/19 3:57 PM	54.9	15	1.7	28.4	2	4
October	10/23/19 4:49 PM	37.3	18.2	0.3	44.2	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 2:07 PM	44.4	18.3	0.2	37.1	<<>>	<<>>
Average		**49.57**	**16.45**	**1.02**	**32.95**	**1.88**	**2.13**
VLGW007D							
January	1/22/19 16:46	63.2	20.5	0	16.3	5	0
February	2/27/19 11:26	65.8	20.6	0.3	13.3	<<>>	<<>>
March	3/4/19 10:22	66	20.9	0.1	13	5	13
April	04/25/2019 14:28	70.4	20.6	0.2	8.8	8	14
May	05/29/2019 12:27	69.9	20.4	0.1	9.6	12	13
June	06/28/2019 14:27	52.5	19.5	0.6	27.4	12	6
July	07/24/2019 13:58	53.5	22.9	0	23.6	7	5
August	08/30/2019 11:41	55.4	23.3	0.6	20.7	11	9
September	9/18/19 5:06 PM	62.6	25.1	0.1	12.2	3	8
October	10/23/19 5:25 PM	57.4	27	0	15.6	8	5
November	---	---	---	---	---	---	---
December	12/16/19 2:37 PM	49.2	24.8	0	26	4	5

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**60.54**	**22.33**	**0.18**	**16.95**	**7.50**	**7.80**
VLGW007S							
January	1/22/19 16:43	35.6	20.8	0	43.6	8	7
February	---	---	---	---	---	---	---
March	3/4/19 10:20	42.9	18.7	0	38.4	2	2
April	04/25/2019 14:26	54	19.8	0.2	26	7	10
May	05/29/2019 12:26	52.3	20	0.1	27.6	0	6
June	06/28/2019 14:25	31.6	19.4	0.4	48.6	<<>>	2
July	07/24/2019 13:56	29.3	20.4	0.1	50.2	1	0
August	08/30/2019 11:40	43.1	15.5	4.4	37	0	<<>>
September	9/18/19 5:04 PM	47.3	10.7	6.1	35.9	7	6
October	10/23/19 5:20 PM	34.7	10.6	7.5	47.2	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 2:33 PM	53.9	11.9	4.4	29.8	<<>>	<<>>
Average		**42.47**	**16.78**	**2.32**	**38.43**	**3.57**	**4.71**
VLGW008D							
January	1/22/19 17:00	0.1	0.1	20	79.8	5	1
February	---	---	---	---	---	---	---
March	3/4/19 10:14	76.3	23.6	0	0.1	4	7
April	04/25/2019 14:21	52.8	18.8	0.1	28.3	4	6
May	05/29/2019 12:20	48.4	18	0.1	33.5	3	5
June	06/28/2019 14:42	38.4	17.5	0.3	43.8	3	2
July	07/24/2019 13:35	36	18.8	0.4	44.8	3	3
August	08/30/2019 11:34	76.7	23.2	0	0.1	0	3
September	9/18/19 4:59 PM	45.6	19.2	0	35.2	2	3
October	10/24/19 11:01 AM	48.3	19.8	0	31.9	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 2:52 PM	52.2	20.4	0	27.4	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**47.48**	**17.94**	**2.09**	**32.49**	**3.00**	**3.75**
VLGW008S							
January	1/22/19 16:57	45.4	20.8	0	33.8	4	5
February	2/27/19 11:42	45.7	20.9	0.5	32.9	<<>>	<<>>
March	3/4/19 10:12	46.2	20.4	0	33.4	2	5
April	04/25/2019 14:20	47.7	19.7	0	32.6	4	6
May	05/29/2019 12:18	46.9	19.4	0	33.7	3	4
June	06/28/2019 14:39	37.9	18.6	0.2	43.3	4	2
July	07/24/2019 13:34	36.2	19.5	0	44.3	4	2
August	08/30/2019 11:33	42.2	20.4	0	37.4	2	1
September	9/18/19 4:58 PM	57.4	21.3	0	21.3	0	3
October	10/24/19 10:55 AM	64	22.1	0	13.9	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 2:49 PM	68.8	22.5	0	8.7	<<>>	<<>>
Average		**48.95**	**20.51**	**0.06**	**30.48**	**2.88**	**3.50**
VLGW009D							
January	1/22/19 13:40	47.6	22.8	0	29.6	1	2
February	---	---	---	---	---	---	---
March	2/4/19 14:24	89.6	10.2	0	0.2	<<>>	3
April	04/25/2019 8:57	40.4	23.4	0.2	36	1	<<>>
May	---	---	---	---	---	---	---
June	06/28/2019 13:35	39.7	22.4	0.1	37.8	4	3
July	---	---	---	---	---	---	---
August	08/28/2019 16:35	41.7	22.2	0	36.1	4	0
September	9/18/19 4:10 PM	33.3	21.8	0	44.9	4	1
October	10/23/19 4:23 PM	27.6	21.2	0	51.2	<<>>	1
November	---	---	---	---	---	---	0
December	12/16/19 1:21 PM	34	21.8	0	44.2	<<>>	0

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**44.24**	**20.73**	**0.04**	**35.00**	**2.80**	**1.25**
VLGW009S							
January	1/22/19 13:37	74.3	25.6	0	0.1	6	5
February	2/26/19 17:34	49.3	17.3	7	26.4	<<>>	<<>>
March	2/4/19 14:22	42.5	15.7	8	33.8	4	3
April	04/25/2019 8:56	33.2	11.4	9.9	45.5	4	0
May	---	---	---	---	---	---	---
June	06/28/2019 13:32	75.5	24.1	0.2	0.2	5	1
July	---	---	---	---	---	---	0
August	08/28/2019 16:33	75.7	24.2	0	0.1	2	0
September	9/18/19 4:09 PM	30.3	9.3	12.1	48.3	4	4
October	10/23/19 4:16 PM	74.2	25.1	0.5	0.2	2	0
November	---	---	---	---	---	---	---
December	12/16/19 1:17 PM	76.4	23.5	0	0.1	<<>>	<<>>
Average		**59.04**	**19.58**	**4.19**	**17.19**	**3.86**	**1.63**
VLGW010S							
January	1/22/19 13:46	53.4	26.5	0.8	19.3	3	3
February	2/27/19 10:40	0.2	0	20.4	79.4	20	13
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/28/2019 13:39	0.2	0	20.9	78.9	<<>>	1
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/23/19 4:38 PM	25.8	16.9	4.4	52.9	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 1:59 PM	28.3	17.8	4.5	49.4	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**21.58**	**12.24**	**10.20**	**55.98**	**11.50**	**5.67**
VLGW011S							
January	1/22/19 16:15	9.5	9.7	9.4	71.4	3	3
February	2/27/19 10:45	25	16.8	0.8	57.4	11	18
March	3/4/19 9:40	52.5	23.3	0.4	23.8	1	3
April	04/25/2019 14:30	62.8	29.1	0	8.1	7	6
May	05/29/2019 12:29	58.5	28.5	0	13	0	1
June	---	---	---	---	---	---	---
July	07/24/2019 13:54	37.8	27.6	0	34.6	3	2
August	08/30/2019 11:46	49.6	29.7	0	20.7	2	2
September	9/18/19 5:08 PM	49.2	29.6	0	21.2	9	8
October	10/23/19 4:44 PM	26.2	25.7	0	48.1	1	0
November	---	---	---	---	---	---	---
December	12/16/19 2:03 PM	23.2	24.1	0	52.7	2	2
Average		**39.43**	**24.41**	**1.06**	**35.10**	**3.90**	**4.50**
VLGW012S							
January	1/22/19 16:52	38.9	19.4	0	41.7	4	0
February	2/27/19 11:48	59.6	20.2	0.1	20.1	<<>>	<<>>
March	3/4/19 10:17	68.8	24.7	0	6.5	2	4
April	04/25/2019 14:24	51.2	24	0	24.8	6	7
May	05/29/2019 12:23	48.5	23.4	0	28.1	0	2
June	06/28/2019 14:35	46.4	24.6	0	29	4	1
July	07/24/2019 14:00	46.9	25.9	0	27.2	5	6
August	08/30/2019 11:37	45.9	25.7	0	28.4	3	3
September	9/18/19 5:02 PM	48.6	25.5	0	25.9	5	3
October	10/24/19 10:49 AM	45.2	26.2	0.2	28.4	<<>>	2
November	---	---	---	---	---	---	---
December	12/16/19 2:43 PM	39.8	25.4	0.1	34.7	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**49.07**	**24.09**	**0.04**	**26.80**	**3.63**	**3.11**
VLGW013D							
January	---	---	---	---	---	---	---
February	2/27/19 12:36	35.4	19.3	1.4	43.9	1	0
March	---	---	---	---	---	---	---
April	04/25/2019 14:17	53.6	18.4	0.1	27.9	3	3
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	08/30/2019 11:29	35.3	20.3	0	44.4	1	<<>>
September	---	---	---	---	---	---	0
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**41.43**	**19.33**	**0.50**	**38.73**	**1.67**	**1.00**
VLGW013S							
January	---	---	---	---	---	---	---
February	2/27/19 12:34	36.4	18.2	1.3	44.1	5	6
March	---	---	---	---	---	---	---
April	04/25/2019 14:16	47.6	18.2	0.5	33.7	2	2
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	08/30/2019 11:27	27.8	18.8	0.2	53.2	0	<<>>
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**37.27**	**18.40**	**0.67**	**43.67**	**2.33**	**4.00**
VLGW014D							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW014S							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW015D							
January	1/22/19 13:07	48.6	15.9	0	35.5	<<>>	<<>>
February	---	---	---	---	---	---	---
March	2/4/19 14:07	51.3	16.6	0	32.1	7	6
April	04/25/2019 9:04	45.2	14.8	0	40	3	5
May	05/29/2019 12:42	46.5	14.4	0	39.1	4	2
June	06/28/2019 12:43	37.7	13.6	0	48.7	7	5
July	07/24/2019 16:58	34.7	13	0	52.3	0	1
August	08/30/2019 12:02	85.2	12.6	0	2.2	3	6
September	9/18/19 4:17 PM	72.7	15.2	0.1	12	2	1
October	10/23/19 3:46 PM	52.3	14.1	0	33.6	5	3
November	---	---	---	---	---	---	---
December	12/16/19 12:46 PM	45.2	14.6	0	40.2	<<>>	4
Average		**51.94**	**14.48**	**0.01**	**33.57**	**3.88**	**3.67**
VLGW015S							
January	1/22/19 13:01	41.9	24.6	0	33.5	0	1
February	2/26/19 16:48	40.6	23.7	0.7	35	<<>>	<<>>
March	2/4/19 14:06	40.1	24.5	0.2	35.2	2	2
April	04/25/2019 9:03	38.8	23.9	0	37.3	1	0
May	05/29/2019 12:41	68.2	29.9	0	1.9	<<>>	5
June	06/28/2019 12:40	45.3	23.7	0.1	30.9	5	3
July	07/24/2019 16:57	47.6	24.7	0	27.7	2	2
August	08/30/2019 12:00	46.5	24.5	0	29	0	3
September	9/18/19 4:14 PM	47	24.7	0.2	28.1	6	6
October	10/23/19 3:42 PM	49.6	25.8	0	24.6	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 12:43 PM	43.8	24.1	0	32.1	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**46.31**	**24.92**	**0.11**	**28.66**	**2.29**	**2.75**
VLGW016D							
January	1/22/19 13:18	39.9	20.4	0	39.7	<<>>	<<>>
February	2/26/19 16:41	45.3	20.6	0.1	34	36	34
March	2/4/19 14:17	50.9	21.9	0	27.2	2	6
April	04/25/2019 8:48	38.2	21.3	0	40.5	0	3
May	05/29/2019 12:54	52.9	21.4	0	25.7	2	4
June	06/28/2019 12:29	54.9	21.7	0	23.4	4	1
July	07/24/2019 17:05	52.4	22.1	0	25.5	2	4
August	08/30/2019 11:02	46.8	22.7	0	30.5	35	34
September	9/18/19 4:30 PM	39.7	22.2	0	38.1	0	22
October	10/23/19 3:38 PM	45.5	22.8	0	31.7	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 1:03 PM	47.5	23.1	0	29.4	<<>>	<<>>
Average		**46.73**	**21.84**	**0.01**	**31.43**	**10.13**	**13.50**
VLGW016S							
January	1/22/19 13:14	52.8	27.6	0	19.6	2	1
February	2/26/19 16:38	57	29.5	0.2	13.3	0	6
March	2/4/19 14:15	58.8	29.8	0.4	11	1	4
April	04/25/2019 8:47	27.1	26.2	0.2	46.5	1	1
May	05/29/2019 12:52	60.2	26.8	0	13	0	3
June	06/28/2019 12:26	39.9	29	0.3	30.8	4	3
July	07/24/2019 17:03	39.7	30.7	0.1	29.5	2	1
August	08/30/2019 11:01	72.2	24.9	0.5	2.4	2	3
September	9/18/19 4:28 PM	53.9	34.2	0.5	11.4	0	5
October	10/23/19 3:32 PM	39.7	32.6	0.2	27.5	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 12:58 PM	38.6	29.8	0.1	31.5	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**49.08**	**29.19**	**0.23**	**21.50**	**1.33**	**3.00**
VLGW017D							
January	1/22/19 16:31	73	26.9	0	0.1	3	2
February	2/27/19 11:02	71.9	27.3	0.7	0.1	13	13
March	3/4/19 9:50	71.1	28.8	0	0.1	8	9
April	04/25/2019 13:35	48.1	25.1	0.4	26.4	36	37
May	05/29/2019 12:57	50.3	25.1	0.4	24.2	4	3
June	06/28/2019 14:03	5.6	17.7	1.8	74.9	3	3
July	07/24/2019 13:47	49.3	26.2	0.3	24.2	0	4
August	08/30/2019 11:11	51.8	26.8	0	21.4	1	4
September	9/18/19 4:35 PM	39.7	24.6	0.8	34.9	6	1
October	10/23/19 5:04 PM	53	27.4	0.2	19.4	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 2:19 PM	65.2	28.7	0	6.1	<<>>	<<>>
Average		**52.64**	**25.87**	**0.42**	**21.07**	**8.22**	**8.44**
VLGW017S							
January	1/22/19 16:27	70	29.7	0.2	0.1	17	13
February	---	---	---	---	---	---	---
March	3/4/19 9:48	69.7	30	0.1	0.2	13	17
April	04/25/2019 13:34	69.9	29.3	0.3	0.5	12	17
May	05/29/2019 12:56	67.8	29	0	3.2	7	16
June	06/28/2019 14:01	59.3	27.1	0.2	13.4	10	9
July	07/24/2019 13:45	66.2	29.7	0.1	4	7	13
August	08/30/2019 11:08	66.1	29.5	0.3	4.1	6	7
September	9/18/19 4:34 PM	64.7	29	0.3	6	5	6
October	10/23/19 4:59 PM	69.5	30.1	0.2	0.2	5	6
November	---	---	---	---	---	---	---
December	12/16/19 2:16 PM	69.3	29.9	0.4	0.4	4	7

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**67.25**	**29.33**	**0.21**	**3.21**	**8.60**	**11.10**
VLGW018D							
January	1/22/19 16:39	47.7	29.8	0	22.5	4	0
February	2/27/19 11:15	49.3	29	1.1	20.6	<<>>	<<>>
March	3/4/19 9:54	44.3	27.8	0	27.9	5	6
April	04/25/2019 13:39	52.1	28.4	0	19.5	8	9
May	05/29/2019 13:02	48.9	27.7	0	23.4	3	3
June	06/28/2019 14:21	44.6	27.9	0.1	27.4	5	3
July	07/24/2019 13:42	44.2	28.6	0	27.2	0	4
August	08/30/2019 11:17	46.7	29.1	0	24.2	2	2
September	9/18/19 4:39 PM	49.7	29.8	0	20.5	5	6
October	10/23/19 5:14 PM	42.9	29.9	0	27.2	0	4
November	---	---	---	---	---	---	---
December	12/16/19 2:27 PM	41.7	28.8	0.1	29.4	<<>>	<<>>
Average		**46.55**	**28.80**	**0.12**	**24.53**	**3.56**	**4.11**
VLGW018S							
January	1/22/19 16:36	45.1	29.1	0	25.8	1	1
February	2/27/19 11:13	45.9	27.8	0.3	26	<<>>	9
March	3/4/19 9:52	42.5	26.8	0.1	30.6	6	6
April	04/25/2019 13:38	47.2	25.4	1.6	25.8	7	7
May	05/29/2019 13:01	44	24.3	2.3	29.4	2	3
June	06/28/2019 14:18	42.6	25	4.3	28.1	4	4
July	07/24/2019 13:41	45.2	27.4	4.1	23.3	5	5
August	08/30/2019 11:15	46.5	27.9	3.3	22.3	0	1
September	9/18/19 4:38 PM	52.8	30.8	0.5	15.9	6	5
October	10/23/19 5:11 PM	42.7	29.7	0	27.6	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 2:24 PM	43.5	29.5	0	27	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**45.27**	**27.61**	**1.50**	**25.62**	**3.88**	**4.56**
VLGW019D							
January	1/22/19 17:15	45.2	31.9	0	22.9	5	3
February	2/27/19 12:08	46.4	30.6	1.1	21.9	<<>>	<<>>
March	3/4/19 9:59	42.7	29.2	1.2	26.9	5	2
April	04/25/2019 13:44	48.1	31	0	20.9	3	1
May	05/29/2019 13:05	43.1	28.6	1.3	27	0	1
June	06/28/2019 17:25	43	29.5	0.6	26.9	2	3
July	07/24/2019 13:39	45.1	31.4	0	23.5	4	4
August	08/30/2019 11:21	46	31.6	0.1	22.3	2	3
September	9/18/19 4:44 PM	48	32.2	0	19.8	7	6
October	10/24/19 11:13 AM	48.1	32.9	0.4	18.6	1	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 3:00 PM	48.6	33.2	0	18.2	3	2
Average		**45.85**	**31.10**	**0.43**	**22.63**	**3.20**	**2.78**
VLGW019S							
January	1/22/19 17:11	48	32.9	0.1	19	<<>>	2
February	2/27/19 12:05	50.7	32.5	0.1	16.7	5	5
March	3/4/19 9:56	49.5	32.1	0	18.4	8	11
April	04/25/2019 13:43	49.9	31.3	0	18.8	6	7
May	05/29/2019 13:04	49.6	31.2	0	19.2	5	7
June	06/28/2019 17:22	47.3	31	0.1	21.6	4	5
July	07/24/2019 13:38	48.6	32.3	0	19.1	2	3
August	08/30/2019 11:19	48.6	32.5	0	18.9	20	19
September	9/18/19 4:41 PM	49.9	32.9	0	17.2	5	7
October	10/24/19 11:07 AM	51	34	0	15	4	2
November	---	---	---	---	---	---	---
December	12/16/19 2:57 PM	49.8	33.4	0.1	16.7	0	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**49.35**	**32.37**	**0.04**	**18.24**	**5.90**	**6.80**
VLGW020D							
January	1/22/19 17:28	48	32.9	0.1	19	<<>>	2
February	2/27/19 12:18	50.7	32.5	0.1	16.7	5	5
March	---	49.5	32.1	0	18.4	8	11
April	---	49.9	31.3	0	18.8	6	7
May	---	49.6	31.2	0	19.2	5	7
June	06/28/2019 17:33	34	29.1	0	36.9	1	3
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/24/19 11:27 AM	40.6	31.8	0	27.6	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 3:08 PM	38	30.3	0	31.7	<<>>	1
Average		**45.04**	**31.40**	**0.03**	**23.54**	**5.00**	**5.14**
VLGW020S							
January	1/22/19 17:25	25.3	25.3	0	49.4	5	24
February	2/27/19 12:15	25.1	24.4	0.7	49.8	6	3
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/28/2019 17:29	24	25.3	0.2	50.5	2	3
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	10/24/19 11:22 AM	29.8	28.3	0	41.9	2	2
November	---	---	---	---	---	---	---
December	12/16/19 3:05 PM	26.8	26.2	0	47	<<>>	1

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**26.20**	**25.90**	**0.18**	**47.72**	**3.75**	**6.60**
VLGW021D							
January	1/22/19 17:39	48	19.1	0.3	32.6	<<>>	<<>>
February	3/4/19 10:09	48.7	19.2	2.1	30	11	<<>>
March	3/4/19 10:09	45.8	18.7	0.8	34.7	0	2
April	04/25/2019 13:53	53.4	19.7	0	26.9	2	4
May	05/29/2019 12:16	50.6	19.5	0	29.9	0	5
June	06/28/2019 17:40	41.7	17.4	0.3	40.6	4	6
July	07/24/2019 13:31	39.6	18.2	0	42.2	3	1
August	08/28/2019 16:29	53.8	19.9	0	26.3	3	4
September	9/18/19 4:54 PM	49.6	19.9	0	30.5	<<>>	<<>>
October	10/24/19 11:58 AM	51.9	20.2	0	27.9	<<>>	<<>>
November	---	---	---	---	---	---	---
December	12/16/19 5:08 PM	53.4	19.9	0	26.7	<<>>	<<>>
Average		**48.77**	**19.25**	**0.32**	**31.66**	**3.29**	**3.67**
VLGW021S							
January	1/22/19 17:34	41.2	20.5	0	38.3	4	1
February	2/27/19 12:40	38.8	20.4	0.7	40.1	<<>>	3
March	3/4/19 10:06	32	20.7	0	47.3	7	3
April	04/25/2019 13:52	77.9	22	0	0.1	2	2
May	05/29/2019 12:14	66.9	22.2	0	10.9	4	8
June	06/28/2019 17:38	33.6	19.4	0.2	46.8	4	3
July	07/24/2019 13:29	33.7	21.1	0	45.2	2	1
August	08/28/2019 16:28	71.3	19.5	0	9.2	2	2
September	9/18/19 4:52 PM	61	21.7	0	17.3	6	6
October	10/24/19 11:55 AM	58	21	0	21	2	3
November	---	---	---	---	---	---	---
December	12/16/19 5:04 PM	61.7	22.6	0	15.7	<<>>	2

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**52.37**	**21.01**	**0.08**	**26.54**	**3.67**	**3.09**
VLGW022D							
January	1/23/19 11:32	1.4	5.9	13.7	79	<<>>	<<>>
February	2/27/19 15:49	0.4	3	16.6	80	<<>>	<<>>
March	3/4/19 10:45	0.4	4	14.3	81.3	2	1
April	04/26/2019 7:35	68.5	31.4	0	0.1	1	6
May	05/24/2019 9:36	62.9	27.5	0.5	9.1	3	6
June	06/29/2019 10:39	38.3	22.3	1	38.4	1	2
July	07/24/2019 13:14:00 PM	38.6	23	0.4	38	2	0
August	---	---	---	---	---	---	---
September	9/18/19 10:40 AM	68.3	30.7	0	1	0	3
October	10/24/19 1:00 PM	46.5	25	0.2	28.3	2	<<>>
November	11/20/19 12:48 PM	47.7	25.2	0.1	27	<<>>	<<>>
December	12/16/19 6:18 PM	46.9	24.6	0	28.5	<<>>	<<>>
Average		**38.17**	**20.24**	**4.25**	**37.34**	**1.57**	**3.00**
VLGW022S							
January	1/23/19 11:29	28.9	16.4	5	49.7	5	3
February	2/27/19 15:46	44.9	18.5	1.7	34.9	8	2
March	---	---	---	---	---	---	---
April	04/26/2019 7:34	40.9	20.4	0.1	38.6	<<>>	<<>>
May	---	---	---	---	---	---	---
June	06/29/2019 10:37	33.8	20.9	0.5	44.8	1	0
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**37.13**	**19.05**	**1.83**	**42.00**	**4.67**	**1.67**
VLGW023D							
January	1/22/19 12:16	45.5	16.6	0	37.9	3	<<>>
February	2/26/19 11:10	48	16.9	0.2	34.9	<<>>	3
March	2/4/19 14:00	48.3	17.5	0	34.2	1	1
April	04/25/2019 9:09	44.5	17.4	0	38.1	2	2
May	05/29/2019 12:47	50.4	17.6	0	32	6	5
June	---	---	---	---	---	---	---
July	07/24/2019 17:19	49.9	17.3	0	32.8	4	4
August	08/30/2019 10:52	50.1	17.5	0	32.4	7	5
September	9/18/19 4:22 PM	49.4	17	0.2	33.4	6	6
October	10/23/19 11:39 AM	52.3	17.2	0.8	29.7	<<>>	8
November	11/19/19 4:41 PM	54.7	17.4	0.1	27.8	3	5
December	12/16/19 12:29 PM	54.5	17.5	0.2	27.8	3	5
Average		**49.78**	**17.26**	**0.14**	**32.82**	**3.89**	**4.40**
VLGW023S							
January	1/22/19 12:08	37.4	24.5	0	38.1	4	2
February	2/26/19 11:06	28.5	22.4	0.1	49	5	3
March	2/4/19 13:58	29.5	23.4	0	47.1	28	24
April	04/25/2019 9:07	32	24.1	0	43.9	1	1
May	05/29/2019 12:46	67.7	26	0	6.3	1	5
June	---	---	---	---	---	---	---
July	07/24/2019 17:18	58.5	32.7	0	8.8	0	3
August	08/30/2019 10:50	52.2	32.9	0.1	14.8	1	4
September	9/18/19 4:21 PM	47.3	32.9	0	19.8	1	2
October	10/23/19 11:35 AM	43.5	32	0.1	24.4	1	1
November	11/19/19 4:35 PM	42.6	30.5	0.1	26.8	<<>>	<<>>
December	12/16/19 12:24 PM	44.3	29	0.2	26.5	2	1

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**43.95**	**28.22**	**0.05**	**27.77**	**4.40**	**4.60**
VLGW024D							
January	1/22/19 12:53	42.3	23.6	0.3	33.8	4	4
February	2/26/19 15:59	40	20.8	3.4	35.8	<<>>	<<>>
March	2/4/19 14:03	39.4	21.6	1.7	37.3	3	6
April	04/25/2019 8:39	39.1	22.5	2.1	36.3	5	3
May	05/29/2019 12:49	46.8	24.1	0.3	28.8	3	3
June	06/28/2019 12:47	51.2	25.8	0.8	22.2	7	6
July	07/24/2019 17:01	52.1	27.1	0.4	20.4	2	1
August	08/30/2019 10:55	52.6	28.1	0.3	19	6	2
September	9/18/19 4:25 PM	52.7	27.6	0.4	19.3	5	9
October	10/23/19 11:45 AM	50.1	27.3	0.4	22.2	<<>>	<<>>
November	11/19/19 4:47 PM	53	26.6	0.3	20.1	<<>>	<<>>
December	12/16/19 12:38 PM	51.1	25.9	0.2	22.8	<<>>	<<>>
Average		**47.53**	**25.08**	**0.88**	**26.50**	**4.38**	**4.25**
VLGW024S							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW025D							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW025S							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW026D							
January	1/22/19 17:50	42.1	29	0	28.9	3	0
February	2/27/19 13:29	43.4	28.3	1	27.3	<<>>	<<>>
March	3/4/19 10:03	50.4	29.8	0	19.8	6	8
April	04/25/2019 13:50	53.1	31.3	0	15.6	4	6
May	05/29/2019 12:12	42.5	28.8	0	28.7	2	2
June	06/28/2019 17:46	63.2	36.5	0.1	0.2	3	2
July	07/24/2019 13:26	63	36.9	0	0.1	7	9
August	08/28/2019 16:25	57.3	30.9	0.4	11.4	7	7
September	9/18/19 4:49 PM	45.1	30.4	0.1	24.4	1	2
October	10/24/19 12:05 PM	32.9	26.6	1.5	39	2	2
November	---	---	---	---	---	---	---
December	12/16/19 5:18 PM	33.1	26.5	0.2	40.2	4	3
Average		**47.83**	**30.45**	**0.30**	**21.42**	**3.90**	**4.10**
VLGW026S							
January	1/22/19 17:45	36.3	26	0	37.7	4	2
February	2/27/19 13:25	37.8	25.9	1.6	34.7	7	7
March	3/4/19 10:02	45.9	26.7	0	27.4	34	34
April	04/25/2019 13:48	48.4	29.2	0	22.4	2	2
May	05/29/2019 12:11	39.8	28	0	32.2	5	0
June	06/28/2019 17:43	67.3	32.3	0.3	0.1	4	3
July	07/24/2019 13:25	66.8	33.1	0	0.1	5	5
August	08/28/2019 16:24	62.5	30.9	0	6.6	6	6
September	9/18/19 4:48 PM	44.6	29.6	0	25.8	2	3
October	10/24/19 12:02 PM	32.3	26.8	0.1	40.8	1	2
November	---	---	---	---	---	---	---
December	12/16/19 5:14 PM	30.5	25.2	0	44.3	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**46.56**	**28.52**	**0.18**	**24.74**	**7.00**	**6.40**
VLGW027D							
January	1/23/19 11:24	37.6	24	0	38.4	11	4
February	2/27/19 15:42	48.8	23.5	0.4	27.3	<<>>	<<>>
March	3/4/19 10:43	52.5	24	0.2	23.3	4	16
April	04/26/2019 7:31	56.5	24.9	0	18.6	10	10
May	05/24/2019 9:33	56.3	25	0	18.7	12	3
June	06/29/2019 10:34	44.4	25.1	0	30.5	13	9
July	07/24/2019 13:16	46	25.5	0	28.5	7	8
August	08/28/2019 15:47	46.2	24.9	0	28.9	2	3
September	9/18/19 10:36 AM	49.5	26	0	24.5	10	10
October	10/24/19 12:53 PM	46.6	26.1	0	27.3	8	10
November	11/20/19 12:43 PM	46.5	26.1	0	27.4	8	9
December	12/16/19 6:12 PM	44.6	25.5	0	29.9	5	10
Average		**47.96**	**25.05**	**0.05**	**26.94**	**8.18**	**8.36**
VLGW027S							
January	1/23/19 11:21	46.6	18.6	1.1	33.7	<<>>	<<>>
February	2/27/19 15:39	61.8	19	0.7	18.5	<<>>	<<>>
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	12/16/19 6:09 PM	26.1	19.7	1	53.2	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**44.83**	**19.10**	**0.93**	**35.13**	**0.00**	**0.00**
VLGW028S							
January	1/23/19 11:38	42.9	28.2	0	28.9	2	0
February	2/27/19 15:58	44.5	27.4	1.5	26.6	<<>>	<<>>
March	3/4/19 14:58	41.8	26.8	0.1	31.3	2	2
April	04/26/2019 7:38	44.6	26.2	0	29.2	1	2
May	---	---	---	---	---	---	---
June	06/29/2019 10:44	35.1	25.1	0	39.8	0	<<>>
July	07/24/2019 12:39	51.2	24	1.2	23.6	2	1
August	08/28/2019 15:23	54.8	26	0	19.2	2	3
September	9/18/19 10:50 AM	60.2	29.8	0	10	3	4
October	10/24/19 1:31 PM	41.6	27.7	0.3	30.4	<<>>	<<>>
November	11/20/19 1:05 PM	42.6	27.8	0.3	29.3	<<>>	1
December	12/16/19 6:25 PM	40.6	27	0.2	32.2	3	3
Average		**45.45**	**26.91**	**0.33**	**27.32**	**1.88**	**2.00**
VLGW029D							
January	1/23/19 11:16	39.3	26.9	0.2	33.6	11	6
February	2/27/19 15:35	42.5	26.1	0.5	30.9	<<>>	<<>>
March	3/4/19 10:41	42.2	26	0.3	31.5	7	5
April	04/26/2019 7:29	50.4	26.8	0	22.8	8	11
May	05/24/2019 9:32	49.2	26.5	0	24.3	6	10
June	06/29/2019 10:32	43.8	26.6	0.2	29.4	13	11
July	07/24/2019 13:21	46.6	26.9	0.1	26.4	9	8
August	08/28/2019 15:50	45.5	25.8	0	28.7	10	11
September	9/18/19 10:33 AM	47.2	27.5	0	25.3	7	6
October	10/24/19 12:47 PM	45.5	27.9	0	26.6	14	11
November	11/20/19 12:38 PM	43.4	28.1	0	28.5	7	8
December	12/16/19 6:04 PM	42	27.6	0	30.4	5	4

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**44.80**	**26.89**	**0.11**	**28.20**	**8.82**	**8.27**
VLGW029S							
January	1/23/19 11:13	42.4	26.2	0.1	31.3	3	3
February	2/27/19 15:32	56.3	27.7	0.3	15.7	<<>>	<<>>
March	3/4/19 10:39	38.7	24.5	0	36.8	2	2
April	04/26/2019 7:28	66.2	33.7	0	0.1	5	4
May	05/24/2019 9:31	61.7	29.6	0	8.7	1	4
June	06/29/2019 10:29	25.9	22.6	0	51.5	6	2
July	07/24/2019 13:19	67.5	32.4	0	0.1	0	2
August	08/28/2019 15:48	47.4	25.1	0	27.5	8	7
September	9/18/19 10:32 AM	38.5	25.3	0	36.2	1	1
October	10/24/19 12:44 PM	65.9	34	0	0.1	<<>>	0
November	11/20/19 12:35 PM	65.3	34.6	0	0.1	3	<<>>
December	12/16/19 5:59 PM	66.1	33.8	0	0.1	<<>>	<<>>
Average		**53.49**	**29.13**	**0.03**	**17.35**	**3.22**	**2.78**
VLGW030S							
January	1/23/19 11:42	34	25.6	1.6	38.8	2	0
February	2/27/19 16:02	34.2	25.1	2.3	38.4	<<>>	9
March	3/4/19 14:55	4.8	3.7	16.1	75.4	<<>>	<<>>
April	04/26/2019 7:40	19.3	13.4	9.3	58	1	<<>>
May	---	---	---	---	---	---	---
June	06/29/2019 10:49	0.5	0.5	20.7	78.3	0	<<>>
July	07/24/2019 12:37	22.9	15.9	8	53.2	1	1
August	08/28/2019 15:26	22.1	13.9	8.8	55.2	1	0
September	9/18/19 10:47 AM	32.7	21.3	4.6	41.4	<<>>	0
October	---	---	---	---	---	---	---
November	11/20/19 1:09 PM	25.4	19.6	7.5	47.5	<<>>	1
December	12/16/19 6:29 PM	26.4	25.5	0	48.1	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**22.23**	**16.45**	**7.89**	**53.43**	**1.00**	**1.83**
VLGW031S							
January	1/23/19 13:32	2.7	2.1	19	76.2	<<>>	<<>>
February	2/27/19 18:04	37.6	21	4.1	37.3	<<>>	<<>>
March	3/4/19 14:11	32.4	19.8	4.2	43.6	1	<<>>
April	04/25/2019 14:39	36.5	19.7	3.7	40.1	1	1
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	08/28/2019 15:20	40.5	20.1	3.4	36	3	3
September	---	---	---	---	---	---	---
October	10/24/19 4:06 PM	30.3	23	0.2	46.5	<<>>	<<>>
November	11/20/19 2:54 PM	24.2	22.3	0.3	53.2	<<>>	<<>>
December	12/16/19 6:48 PM	22.8	22.3	0.2	54.7	<<>>	<<>>
Average		**28.38**	**18.79**	**4.39**	**48.45**	**1.67**	**2.00**
VLGW032S							
January	1/23/19 11:46	40	28.2	0	31.8	3	2
February	2/27/19 16:07	41.2	27.5	1	30.3	<<>>	<<>>
March	---	---	---	---	---	---	---
April	04/26/2019 7:42	48	27.4	0.1	24.5	3	1
May	---	---	---	---	---	---	---
June	06/29/2019 10:52	51.9	27.8	0	20.3	5	5
July	07/24/2019 12:34	46.4	27.3	0	26.3	0	2
August	08/28/2019 15:28	47.5	26.7	0	25.8	4	4
September	9/18/19 10:45 AM	46.5	27.5	0	26	3	3
October	10/24/19 1:38 PM	44.5	27.1	0	28.4	<<>>	<<>>
November	11/20/19 1:12 PM	40.6	27.7	0	31.7	<<>>	<<>>
December	12/16/19 6:33 PM	39.6	27.6	0	32.8	2	1

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**44.62**	**27.48**	**0.11**	**27.79**	**2.86**	**2.57**
VLGW033S							
January	1/23/19 13:27	19.6	26.5	0	53.9	5	6
February	2/27/19 17:59	21.5	25.7	0.5	52.3	<<>>	1
March	3/4/19 14:08	28	27.9	0.1	44	0	0
April	04/25/2019 14:37	35.3	29.5	0	35.2	<<>>	<<>>
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	08/28/2019 15:18	35.4	30.6	0	34	1	0
September	---	---	---	---	---	---	---
October	10/24/19 4:02 PM	22.2	28.5	0	49.3	1	0
November	11/20/19 2:51 PM	30	28.4	0	41.6	<<>>	<<>>
December	12/16/19 6:44 PM	19.1	27.2	0.1	53.6	<<>>	<<>>
Average		**26.39**	**28.04**	**0.09**	**45.49**	**1.75**	**0.00**
VLGW034S							
January	1/23/19 13:20	28.7	27.8	2	41.5	3	3
February	2/27/19 17:46	31.4	28.1	1.1	39.4	4	1
March	3/4/19 14:06	32	27.9	0.2	39.9	<<>>	<<>>
April	04/25/2019 14:35	36.4	28.4	0	35.2	2	1
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	08/28/2019 15:15	50.6	36.1	0	13.3	1	3
September	---	---	---	---	---	---	---
October	10/24/19 3:56 PM	35.8	34.4	0	29.8	3	3
November	11/20/19 2:47 PM	34.6	33.3	0	32.1	<<>>	<<>>
December	12/16/19 6:40 PM	31	32.1	0	36.9	<<>>	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**35.06**	**31.01**	**0.41**	**33.51**	**2.60**	**2.20**
VLGW042S							
January	1/22/19 13:31	51.4	23	0	25.6	10	22
February	2/26/19 17:10	52.7	23	0.1	24.2	<<>>	<<>>
March	2/4/19 14:19	50.9	22.9	0	26.2	10	15
April	04/25/2019 8:53	48.4	22.2	0	29.4	5	9
May	05/29/2019 12:38	49.2	21.9	0	28.9	4	6
June	06/28/2019 13:20	48.4	21.5	0.1	30	<<>>	23
July	07/24/2019 17:07	49.3	21.2	0	29.5	11	9
August	08/30/2019 11:56	49.9	21.8	0	28.3	2	4
September	9/18/19 4:06 PM	51	21.8	0.1	27.1	6	8
October	10/23/19 3:52 PM	51.3	22.4	0.2	26.1	3	8
November	---	---	---	---	---	---	---
December	12/16/19 1:08 PM	50.5	23	0.2	26.3	4	<<>>
Average		**50.27**	**22.25**	**0.06**	**27.42**	**6.11**	**11.56**
VLGW043S							
January	1/22/19 17:20	61.9	34.8	1.4	1.9	<<>>	<<>>
February	2/27/19 12:12	54.4	30.9	4.2	10.5	6	5
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/28/2019 17:12	29.2	16.9	11	42.9	4	3
July	---	---	---	---	---	---	---
August	08/30/2019 11:23	36.9	23.1	7.8	32.2	<<>>	<<>>
September	---	---	---	---	---	---	---
October	10/24/19 11:18 AM	52.1	31.7	4.2	12	0	1
November	---	---	---	---	---	---	---
December	12/16/19 3:13 PM	51.6	30.9	3.9	13.6	0	<<>>

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**47.68**	**28.05**	**5.42**	**18.85**	**2.50**	**0.00**
VLGW047S							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW0049							
January	1/23/19 10:41	52.9	28.2	3.9	15	5	0
February	2/27/19 13:36	50.2	26	4.8	19	25	11
March	3/4/19 10:26	48.4	26.2	4.8	20.6	8	10
April	04/26/2019 7:11	56.7	29.5	3.3	10.5	13	10
May	05/29/2019 12:01	55.6	28.9	3.4	12.1	15	8
June	06/28/2019 17:51	41	21.5	7.5	30	11	22
July	07/24/2019 11:09	67.8	31.9	0.1	0.2	15	12
August	08/28/2019 16:09	61.9	31.6	0.2	6.3	16	11
September	9/18/19 2:40 PM	52.9	32.2	0	14.9	14	16
October	10/24/19 12:10 PM	56	30.9	0.1	13	3	15
November	11/20/19 12:05 PM	49.5	27.8	5.4	17.3	8	15
December	12/16/19 5:24 PM	38.6	21.4	7.9	32.1	2	6

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**52.63**	**28.01**	**3.45**	**15.92**	**11.25**	**11.33**
VLGW0050							
January	1/23/19 11:03	33.9	27.4	0	38.7	3	1
February	2/27/19 15:25	33.9	25.4	0.6	40.1	4	3
March	3/4/19 10:35	38.6	28.3	0	33.1	2	1
April	04/26/2019 7:22	44.6	28.8	0	26.6	0	0
May	05/24/2019 9:29	45.8	30.3	0	23.9	1	0
June	06/26/2019 10:26	46.4	29.5	0.1	24	2	<<>>
July	07/24/2019 12:19	44.9	29.8	0	25.3	0	0
August	---	---	---	---	---	---	---
September	9/18/19 10:29 AM	72.7	27.1	0	0.2	1	4
October	10/24/19 12:30 PM	32.8	28.2	0.1	38.9	1	2
November	11/20/19 12:24 PM	34.6	28.7	0	36.7	<<>>	<<>>
December	12/16/19 5:42 PM	33.1	27.3	0.4	39.2	<<>>	<<>>
Average		**41.94**	**28.25**	**0.11**	**29.70**	**1.56**	**1.38**
VLGW0051							
January	1/23/19 11:50	38.6	30.3	0	31.1	18	19
February	---	---	---	---	---	---	---
March	3/4/19 14:15	42.7	30.2	0	27.1	21	12
April	04/26/2019 7:50	50.7	31.4	0	17.9	17	15
May	05/24/2019 9:39	51	31.1	0	17.9	17	18
June	06/29/2019 11:51	50.3	32.1	0	17.6	21	23
July	07/24/2019 12:16	50.3	32.9	0	16.8	10	16
August	08/28/2019 15:31	49	31.9	0	19.1	16	21
September	9/18/19 3:37 PM	49.4	32.8	0	17.8	17	20
October	10/24/19 1:44 PM	44	32	0	24	13	20
November	11/20/19 1:39 PM	42.9	31.7	0	25.4	14	16
December	12/17/19 12:03 PM	41.2	30.8	0	28	17	19

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**46.37**	**31.56**	**0.00**	**22.06**	**16.45**	**18.09**
VLGW0052							
January	1/23/19 10:52	42	32.4	0	25.6	37	38
February	2/27/19 13:40	42.1	31.7	0.3	25.9	5	6
March	3/4/19 10:30	41.6	32.6	0	25.8	8	4
April	04/26/2019 7:15	49.3	34.2	0	16.5	37	36
May	05/29/2019 12:05	49.9	34.1	0	16	7	6
June	06/28/2019 17:55	49.8	34.1	0.2	15.9	7	6
July	07/24/2019 11:14	50.7	35.4	0	13.9	22	21
August	08/28/2019 16:13	49.5	34.5	0	16	8	8
September	9/18/19 2:44 PM	48.4	34.8	0	16.8	11	10
October	10/24/19 12:18 PM	43.2	33.9	0	22.9	8	8
November	11/20/19 12:14 PM	44.3	34	0	21.7	34	7
December	12/16/19 5:32 PM	40.9	32.6	0	26.5	7	7
Average		**45.98**	**33.69**	**0.04**	**20.29**	**15.92**	**13.08**
VLGW0053							
January	1/23/19 10:57	36.6	30.6	0	32.8	3	3
February	2/27/19 13:44	44.8	32	0.3	22.9	7	6
March	3/4/19 10:33	37.7	30.8	0	31.5	1	1
April	04/26/2019 7:18	39.9	31.1	0	29	<<>>	2
May	05/29/2019 12:07	39.8	30.7	0	29.5	3	1
June	06/28/2019 17:59	52.3	33.4	0.3	14	5	3
July	07/24/2019 11:16	57.1	35.8	0	7.1	13	14
August	08/28/2019 16:20	49.7	34.1	0	16.2	4	5
September	9/18/19 2:47 PM	38.8	31.6	0	29.6	3	1
October	10/24/19 12:24 PM	43.3	33	0	23.7	1	1
November	11/20/19 12:18 PM	46.7	33.7	0	19.6	<<>>	<<>>
December	12/16/19 5:36 PM	44.7	32.9	0	22.4	<<>>	0

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**44.28**	**32.48**	**0.05**	**23.19**	**4.44**	**3.36**
VLGW0054							
January	1/23/19 11:54	1	1	16.2	81.8	31	24
February	2/27/19 16:19	41.7	29.4	1.8	27.1	<<>>	<<>>
March	3/4/19 14:18	41.8	31.2	0	27	<<>>	1
April	04/26/2019 7:52	50	31.8	0	18.2	1	3
May	05/24/2019 9:27	48.1	31.6	0	20.3	4	4
June	06/29/2019 11:53	46.7	33	0	20.3	11	10
July	07/24/2019 12:13	45.3	32.6	0	22.1	0	1
August	08/28/2019 15:34	48.2	32.1	0	19.7	6	5
September	9/18/19 3:39 PM	46.2	32.4	0	21.4	3	3
October	10/24/19 1:49 PM	42.5	31.5	0	26	2	3
November	11/20/19 1:43 PM	38.8	31	0	30.2	<<>>	2
December	12/17/19 12:08 PM	42.9	31.1	0	26	<<>>	<<>>
Average		**41.10**	**29.06**	**1.50**	**28.34**	**7.25**	**5.60**
VLGW0055							
January	1/23/19 12:05	45.2	32.2	0	22.6	<<>>	<<>>
February	2/27/19 16:33	46.7	31.6	1.2	20.5	<<>>	<<>>
March	3/4/19 14:20	44.6	31.3	0	24.1	3	4
April	04/26/2019 7:55	51.1	32.9	0	16	3	4
May	05/24/2019 9:25	49	31.9	0	19.1	1	5
June	06/29/2019 11:57	46.8	32.7	0	20.5	13	12
July	07/24/2019 12:10	50.8	34	0	15.2	4	3
August	08/28/2019 15:36	51.1	33.8	0	15.1	7	6
September	9/18/19 3:41 PM	50.4	34.8	0	14.8	2	3
October	10/24/19 1:54 PM	44.5	33.9	0	21.6	1	2
November	11/20/19 1:46 PM	40.5	32.9	0	26.6	3	3
December	12/17/19 12:14 PM	40.7	32.2	0	27.1	5	3

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**46.78**	**32.85**	**0.10**	**20.27**	**4.20**	**4.50**
VLGW0056							
January	1/23/19 12:09	62	35.5	0	2.5	3	3
February	2/27/19 16:37	63.3	35.2	0.8	0.7	<<>>	<<>>
March	3/4/19 14:22	63.5	35.7	0	0.8	2	3
April	04/26/2019 7:57	45.8	29.3	0	24.9	2	1
May	05/24/2019 9:22	46.2	29.1	0	24.7	2	2
June	---	---	---	---	---	---	---
July	07/24/2019 12:08	50.3	32	0	17.7	1	2
August	08/28/2019 15:38	48.2	31.7	0	20.1	7	8
September	9/18/19 3:44 PM	46.1	32.7	0	21.2	1	1
October	10/24/19 1:58 PM	34.9	30.5	0	34.6	0	1
November	11/20/19 1:50 PM	30.2	28.7	0	41.1	<<>>	3
December	12/17/19 12:24 PM	28.8	27.8	0	43.4	<<>>	<<>>
Average		**47.21**	**31.65**	**0.07**	**21.06**	**2.25**	**2.67**
VLGW0057							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
VLGW0058							
January	1/23/19 16:19	24.3	28.1	0	47.6	<<>>	8
February	2/28/19 16:29	27.5	28.6	0.2	43.7	3	2
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/27/2019 14:43	30.4	29.3	0.5	39.8	2	2
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---
Average		**27.40**	**28.67**	**0.23**	**43.70**	**2.50**	**4.00**
VLGW0059							
January	1/23/19 16:32	48.3	33.9	1.6	16.2	<<>>	<<>>
February	2/28/19 16:40	49.4	34.1	2.8	13.7	2	4
March	4/4/19 14:04	55.2	38	0.3	6.5	2	4
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/27/2019 14:26	44.2	35.8	0	20	3	2
July	07/24/2019 12:03	44.9	36.8	0	18.3	1	1
August	---	---	---	---	---	---	---
September	9/18/19 3:11 PM	50.8	38.6	0	10.6	2	1
October	10/30/19 3:57 PM	50.7	38.7	0	10.6	<<>>	2
November	---	---	---	---	---	---	---
December	12/17/19 5:52 PM	48.5	37.6	0	13.9	1	4

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**49.00**	**36.69**	**0.59**	**13.73**	**1.83**	**2.57**
VLGW0060							
January	1/23/19 16:52	62.5	37.4	0	0.1	2	3
February	2/28/19 17:03	62	37.8	0.1	0.1	3	2
March	4/4/19 14:07	61.8	38.1	0	0.1	3	4
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	06/27/2019 15:00	41.4	32.5	0	26.1	<<>>	0
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	9/18/19 3:27 PM	50.6	35.5	0	13.9	3	3
October	10/30/19 4:21 PM	47.8	35.1	0	17.1	3	2
November	---	---	---	---	---	---	---
December	12/17/19 6:17 PM	50.2	34.4	0	15.4	1	1
Average		**53.76**	**35.83**	**0.01**	**10.40**	**2.50**	**2.14**
HLGW049B							
January	1/31/19 11:56	44.7	35.2	1.3	18.8	23	40
February	2/28/19 12:23	42.9	33.2	2.7	21.2	<<>>	<<>>
March	03/30/2019 10:31	40.1	33.1	2	24.8	76	37
April	04/24/2019 12:48	49.9	38.2	0.5	11.4	43	45
May	05/24/2019 8:28	47.3	36.5	0.8	15.4	19	78
June	06/27/2019 16:24	45.8	36.3	1.2	16.7	35	<<>>
July	07/23/2019 11:48	46.6	37.2	0.6	15.6	32	41
August	08/28/2019 13:06	45.7	36.8	0.1	17.4	40	23
September	9/14/19 1:46 PM	45.9	36.7	0.9	16.5	30	29
October	10/25/19 1:56 PM	43.2	34.8	2.3	19.7	28	29
November	11/20/19 6:18 PM	57.3	42.5	0	0.2	24	9
December	12/17/19 2:15 PM	57.9	42	0	0.1	21	19

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**47.28**	**36.88**	**1.03**	**14.82**	**33.73**	**35.00**
HLGW040B							
January	1/31/19 12:02	42.4	34.9	0	22.7	21	30
February	2/28/19 11:44	40.5	33.4	0.9	25.2	<<>>	11
March	03/30/2019 10:36	41.1	34.4	0.2	24.3	27	9
April	04/24/2019 13:41	59.4	40.3	0	0.3	12	36
May	05/24/2019 8:30	57	39.8	0	3.2	10	22
June	06/27/2019 16:28	49.3	38.1	0	12.6	17	22
July	07/23/2019 11:44	49.7	38.7	0	11.6	30	26
August	08/28/2019 13:01	47.1	37.3	0	15.6	18	13
September	9/14/19 1:49 PM	49.5	38.3	0	12.2	18	17
October	10/25/19 12:34 PM	43.9	35.4	0	20.7	16	17
November	11/20/19 5:39 PM	47.4	37.7	0	14.9	<<>>	16
December	12/17/19 1:34 PM	50.3	37.9	0	11.8	16	16
Average		**48.13**	**37.18**	**0.09**	**14.59**	**18.50**	**19.58**
HLGW045B							
January	1/30/19 17:10	37	33.1	0	29.9	4	2
February	2/28/19 12:10	35.1	30.5	1.6	32.8	<<>>	<<>>
March	---	---	---	---	---	---	---
April	04/24/2019 12:38	32.8	31.6	0.3	35.3	2	1
May	05/29/2019 13:22	36.1	34.3	0	29.6	8	3
June	06/27/2019 16:15	---	---	---	---	---	---
July	07/23/2019 11:29	36.7	34.6	0	28.7	<<>>	<<>>
August	08/28/2019 12:51	33.6	33.2	0	33.2	1	1
September	---	---	---	---	---	---	---
October	10/25/19 1:37 PM	37.2	32.1	0	30.7	<<>>	<<>>
November	11/20/19 6:01 PM	32.2	30.8	0	37	<<>>	<<>>
December	12/17/19 1:57 PM	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**35.09**	**32.53**	**0.24**	**32.15**	**3.75**	**1.75**
HLGW046B							
January	1/30/19 17:08	42.6	34.2	0.4	22.8	<<>>	<<>>
February	2/28/19 12:14	34.6	29.1	1.4	34.9	2	<<>>
March	---	---	---	---	---	---	---
April	04/24/2019 12:40	44.5	35.5	1	19	1	2
May	05/29/2019 13:20	43.9	36.3	0	19.8	9	9
June	06/27/2019 16:17	39.2	35.1	0	25.7	7	7
July	07/23/2019 11:27	27.6	22.2	7	43.2	1	<<>>
August	08/28/2019 12:49	39.8	35.1	0.1	25	2	1
September	---	---	---	---	---	---	---
October	10/25/19 1:44 PM	50.9	39	0	10.1	<<>>	<<>>
November	11/20/19 6:05 PM	39.1	34.1	0.6	26.2	<<>>	<<>>
December	12/17/19 2:01 PM	32.8	28.6	2.2	36.4	1	<<>>
Average		**39.50**	**32.92**	**1.27**	**26.31**	**3.29**	**4.75**
HLGW047B							
January	1/30/19 17:05	25.1	20.4	9.4	45.1	<<>>	<<>>
February	2/28/19 12:17	14	10.7	14.8	60.5	<<>>	<<>>
March	---	---	---	---	---	---	---
April	04/24/2019 12:43	40.3	32.4	3.5	23.8	7	12
May	05/29/2019 13:18	44.4	31.9	3.7	20	6	7
June	06/27/2019 16:19	46.4	38.7	0	14.9	9	9
July	07/23/2019 11:26	48.4	39.6	0	12	5	4
August	08/28/2019 12:46	44	38	0	18	6	7
September	---	---	---	---	---	---	---
October	10/25/19 1:48 PM	42.4	36.3	1.9	19.4	<<>>	<<>>
November	11/20/19 6:09 PM	42.1	30.6	6.2	21.1	2	0
December	12/17/19 2:07 PM	33.1	26.5	6.8	33.6	2	2

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**38.02**	**30.51**	**4.63**	**26.84**	**5.29**	**5.86**
HLGW048B							
January	1/30/19 17:02	46.2	36.9	0.1	16.8	2	6
February	2/28/19 12:19	28.8	28.4	2.1	40.7	<<>>	<<>>
March	---	---	---	---	---	---	---
April	04/24/2019 12:46	57.9	42	0	0.1	7	10
May	05/29/2019 13:15	56.6	40	0.3	3.1	7	11
June	06/27/2019 16:22	55.9	40.2	0	3.9	2	2
July	07/23/2019 11:23	29.3	32.3	0.1	38.3	2	3
August	08/28/2019 12:44	32.3	32.8	0	34.9	3	0
September	---	---	---	---	---	---	---
October	10/25/19 1:53 PM	58	41.9	0	0.1	2	19
November	11/20/19 6:14 PM	57.3	42.6	0	0.1	<<>>	2
December	12/17/19 2:11 PM	48.6	38.5	0	12.9	4	4
Average		**47.09**	**37.56**	**0.26**	**15.09**	**3.63**	**6.33**
HLGW050B							
January	1/31/19 11:50	45.2	35.9	0	18.9	29	30
February	2/28/19 12:31	43.1	34.6	0.4	21.9	<<>>	<<>>
March	03/30/2019 11:52	42.2	35.2	0	22.6	24	17
April	04/24/2019 12:53	54.5	39.5	0	6	15	20
May	05/24/2019 8:23	50.3	37.7	0	12	20	23
June	06/27/2019 17:22	47.1	37.1	0	15.8	17	19
July	07/23/2019 17:33	47.5	37.1	0	15.4	23	22
August	08/28/2019 13:09	45.4	36.5	0	18.1	24	20
September	9/14/19 1:44 PM	46.5	36.8	0	16.7	15	18
October	10/25/19 2:04 PM	43.1	36.1	0	20.8	26	22
November	11/20/19 6:23 PM	55.8	40.5	0	3.7	20	22
December	12/17/19 2:19 PM	54.9	39.6	0	5.5	18	22

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**47.97**	**37.22**	**0.03**	**14.78**	**21.00**	**21.36**
HLGW051B							
January	1/31/19 11:45	48.4	36.4	0	18.8	23	40
February	2/28/19 12:23	42.2	34.2	0.3	21.2	<<>>	<<>>
March	03/30/2019 10:31	38.3	33.6	0.1	24.8	76	37
April	04/24/2019 12:48	56.8	39.9	0	11.4	43	45
May	05/24/2019 8:17	50.9	37.9	0	15.4	19	78
June	06/27/2019 17:16	45.2	36.3	0	16.7	35	<<>>
July	07/23/2019 17:27	47.4	37	0.1	15.6	32	41
August	08/28/2019 13:06	45.3	36.4	0	17.4	40	23
September	9/14/19 1:46 PM	46.4	37	0	16.5	30	29
October	10/25/19 1:56 PM	41.2	35.3	0	19.7	28	29
November	11/20/19 6:18 PM	57.3	40.9	0	0.2	24	9
December	12/17/19 2:15 PM	57.9	40.4	0	0.1	21	19
Average		**48.11**	**37.11**	**0.04**	**14.82**	**33.73**	**35.00**
HLGW0052							
January	1/30/19 16:45	57.2	42.7	0	0.1	19	24
February	2/28/19 17:12	57.2	42.3	0.4	0.1	13	27
March	03/22/2019 8:22	57.3	42.6	0	0.1	22	28
April	04/20/2019 13:42	58.1	41.8	0	0.1	30	36
May	05/24/2019 7:39	52.8	39.7	0	7.5	70	68
June	06/27/2019 14:21	52.1	39.9	0	8	65	71
July	07/23/2019 11:18	52	40.2	0	7.8	74	74
August	08/28/2019 12:40	51.6	39.9	0.1	8.4	70	71
September	9/14/19 12:39 PM	51.3	40	0.2	8.5	74	74
October	10/25/19 5:28 PM	51.7	39.7	0.6	8	67	73
November	11/22/19 2:15 PM	48.7	38.1	1.3	11.9	73	70
December	12/18/19 12:45 PM	48.1	37.6	1.3	13	70	73

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**53.18**	**40.38**	**0.33**	**6.13**	**53.92**	**57.42**
HLGW0053							
January	1/30/19 16:48	55.5	40.2	0.1	4.2	24.0	30.0
February	2/28/19 17:15	52.1	38.5	1.5	7.9	27.0	27.0
March	03/22/2019 8:26	53.1	40.0	0.3	6.6	26.0	31.0
April	04/20/2019 13:40	48.6	37.6	0.8	13.0	27.0	26.0
May	05/24/2019 7:37	43.0	35.4	1.1	20.5	25.0	25.0
June	06/27/2019 14:19	41.8	35.2	1.3	21.7	25.0	17.0
July	07/23/2019 11:15	47.4	37.8	1.2	13.6	17.0	19.0
August	08/28/2019 12:38	43.2	35.7	1.6	19.5	18.0	12.0
September	9/14/19 12:36 PM	44.8	36.2	2.0	17.0	11.0	3.0
October	10/25/19 5:24 PM	46.4	36.6	2.4	14.6	3.0	3.0
November	11/22/19 2:10 PM	43.3	35.4	2.9	18.4	2.0	3.0
December	12/18/19 12:40 PM	44.2	36.0	1.9	17.9	2.0	2.0
Average		**46.95**	**37.05**	**1.43**	**14.58**	**17.25**	**16.50**
HLGW0054							
January	---	---	---	---	---	---	---
February	2/28/19 17:18	8	9.9	12.3	69.8	<<>>	6
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	05/24/2019 7:34	1.9	6.7	13	78.4	<<>>	<<>>
June	06/27/2019 14:17	5.3	10.6	11.2	72.9	0	1
July	07/23/2019 11:11	56.3	42.9	0	0.8	2	3
August	08/28/2019 12:34	18.8	22.5	4.8	53.9	2	3
September	9/14/19 12:34 PM	26.8	27.3	3.7	42.2	0	1
October	10/25/19 5:20 PM	44.9	37.7	1.1	16.3	<<>>	1
November	11/22/19 2:06 PM	25.1	28.8	3.8	42.3	<<>>	0
December	12/18/19 12:35 PM	55.7	40.9	0	3.4	1	1

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**26.98**	**25.26**	**5.54**	**42.22**	**1.00**	**2.00**
HLGW0055							
January	1/30/19 16:56	49.6	38.8	0.1	11.5	60	62
February	2/28/19 17:22	50.6	38.4	0.8	10.2	56	56
March	03/22/2019 8:33	48.7	38.4	0.7	12.2	60	54
April	04/20/2019 13:36	44.8	37.5	1	16.7	40	57
May	05/24/2019 7:30	43.2	36.4	1	19.4	57	55
June	06/27/2019 14:12	39.3	36	1.3	23.4	50	9
July	07/23/2019 11:09	57	42.4	0	0.6	11	20
August	08/28/2019 12:31	52.2	40.9	0	6.9	18	25
September	9/14/19 12:31 PM	50.7	40.3	0.1	8.9	22	22
October	10/25/19 5:09 PM	51.1	40.1	0.2	8.6	20	21
November	11/22/19 2:03 PM	50.2	39.8	0.4	9.6	18	22
December	12/18/19 12:31 PM	51.8	40.3	0.2	7.7	19	19
Average		**49.10**	**39.11**	**0.48**	**11.31**	**35.92**	**35.17**
HLGW0056							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	---	---	---	---	---	---	---
August	---	---	---	---	---	---	---
September	---	---	---	---	---	---	---
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	---	---	---	---	---	---	---

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
HLGW0057							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/20/2019 13:22	53.4	46.2	0.3	0.1	9	12
May	05/24/2019 7:17	42.1	45.8	0.2	11.9	7	6
June	06/27/2019 13:29	45.6	47.9	0.2	6.3	5	7
July	07/23/2019 10:52	52.8	47.1	0	0.1	24	29
August	08/28/2019 12:11	44.8	53.1	1.9	0.2	5	6
September	9/14/19 12:06 PM	39	60.7	0.1	0.2	6	1
October	10/25/19 4:32 PM	53.1	46.8	0	0.1	3	<<>>
November	11/22/19 2:26 PM	54	45.9	0	0.1	60	8
December	12/17/19 6:32 PM	52.5	47.3	0	0.2	17	18
Average		**48.59**	**48.98**	**0.30**	**2.13**	**15.11**	**10.88**
HLGW0058							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/20/2019 13:24	51.4	45.2	0.2	3.2	7	8
May	05/24/2019 7:19	51.8	44.2	0	4	16	21
June	06/27/2019 13:55	50.8	47.5	0.2	1.5	17	24
July	07/23/2019 10:55	52.8	47.1	0	0.1	26	30
August	08/28/2019 12:14	52.6	47.3	0	0.1	29	32
September	9/14/19 12:08 PM	52.1	47.8	0	0.1	32	30
October	10/25/19 4:36 PM	54	45.9	0	0.1	31	31
November	11/22/19 1:40 PM	55.1	44.8	0	0.1	27	32
December	12/17/19 6:36 PM	55.3	44.6	0	0.1	32	32

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**52.88**	**46.04**	**0.04**	**1.03**	**24.11**	**26.67**
HLGW0059							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/20/2019 13:26	49	50.4	0.1	0.5	34	36
May	05/24/2019 7:21	47.4	48.6	0	4	34	35
June	06/27/2019 13:58	49.9	48.6	0	1.5	35	36
July	07/23/2019 10:58	52.4	47.5	0	0.1	38	42
August	08/28/2019 12:16	52.7	47.2	0	0.1	38	42
September	9/14/19 12:10 PM	51.5	48.4	0	0.1	42	42
October	10/25/19 4:40 PM	54.1	45.8	0	0.1	46	47
November	11/22/19 1:43 PM	52.7	42.7	0	4.6	45	45
December	12/17/19 6:39 PM	52.6	43.1	0	4.3	46	47
Average		**51.37**	**46.92**	**0.01**	**1.70**	**39.78**	**41.33**
HLGW0060							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/20/2019 13:29	33.2	45.3	0.0	21.5	2.0	<<>>
May	05/24/2019 7:23	41.0	49.6	0.0	9.4	1.0	0.0
June	06/27/2019 14:01	20.9	40.7	0.0	38.4	<<>>	0.0
July	07/23/2019 11:00	30.2	41.1	0.2	28.5	<<>>	0.0
August	08/28/2019 12:21	27.7	36.8	0.1	35.4	1.0	1.0
September	9/18/19 12:40 PM	28.2	45.2	0.0	26.6	2.0	1.0
October	10/25/19 4:44 PM	32.2	43.2	0.0	24.6	0.0	1.0
November	11/22/19 1:47 PM	11.0	23.0	0.3	65.7	<<>>	0.0
December	12/17/19 6:43 PM	25.1	29.2	0.0	45.7	<<>>	1.0

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**27.72**	**39.34**	**0.07**	**32.87**	**1.20**	**0.50**
HLGW0061							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/20/2019 13:31	48.6	40.7	0	10.7	11	16
May	05/24/2019 7:24	48.4	41.7	0	9.9	13	13
June	06/27/2019 14:04	44.2	39.8	0	16	14	12
July	07/23/2019 11:02	43.5	39.1	0	17.4	18	19
August	08/28/2019 12:23	41.8	37.9	0	20.3	11	9
September	9/14/19 12:14 PM	41.1	39.3	0.2	19.4	9	3
October	10/25/19 4:48 PM	30.2	48.4	0	21.4	2	3
November	11/22/19 1:50 PM	14.8	24.7	1.4	59.1	2	3
December	12/18/19 12:18 PM	32.8	33	0.9	33.3	1	2
Average		**38.38**	**38.29**	**0.28**	**23.06**	**9.00**	**8.89**
HLGW0062							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/20/2019 13:33	56.8	43	0.00	0.2	14	19
May	05/24/2019 7:26	51	43.2	0.00	5.8	16	20
June	06/27/2019 14:07	49.2	43.1	0.00	7.7	21	25
July	07/23/2019 11:05	52	43.6	0.00	4.4	12	19
August	08/28/2019 12:26	47.7	42.1	0.00	10.2	25	26
September	9/14/19 12:16 PM	48.7	42.1	0.00	9.2	27	25
October	10/25/19 4:51 PM	53.1	42.3	0.00	4.6	27	27
November	11/22/19 1:53 PM	49.3	39.8	0.00	10.9	27	28
December	12/18/19 12:21 PM	52.5	40.8	0.00	6.7	30	30

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
Average		**51.14**	**42.22**	**0.00**	**6.63**	**22.11**	**24.33**
HLGW0063							
January	---	---	---	---	---	---	---
February	---	---	---	---	---	---	---
March	---	---	---	---	---	---	---
April	04/20/2019 13:34	46.7	48.1	0	5.2	5	8
May	05/24/2019 7:28	37.8	45.6	0	16.6	10	3
June	06/27/2019 14:09	44.1	47.8	0	8.1	2	2
July	07/23/2019 11:07	56.3	43.6	0	0.1	7	9
August	08/28/2019 12:29	50.3	42.5	0	7.2	8	7
September	9/14/19 12:18 PM	46.3	40.3	0	13.4	10	10
October	10/25/19 4:55 PM	44.9	38.4	0	16.7	8	9
November	11/22/19 1:57 PM	39.2	35.7	0.1	25	7	9
December	12/18/19 12:27 PM	55.7	41.5	0	2.8	7	7
Average		**46.81**	**42.61**	**0.01**	**10.57**	**7.11**	**7.11**

Note:
<<>> = under or over range of instrument

Appendix B3 2019 Hartland Landfill Gas Well Field Data Summary

Name	Refuse Lift (mASL)	Year Activated	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)
HLGW016B	163	2012	52.6	122.6	12	33,890,654	959,682	34,453	8.77%	8.78%
HLGW0052	151(3)	2018	53.2	53.9	12	15,060,794	426,476	15,311	3.90%	12.68%
HLGW028A	171	2017	51.9	48.6	12	13,241,357	374,956	13,461	3.42%	16.10%
HLGW021B	165	2013	53.3	39.4	12	11,039,775	312,613	11,223	2.86%	18.96%
HLGW0055	151(3)	2018	49.1	35.9	12	9,263,921	262,326	9,418	2.40%	21.36%
HLGW051B	179	2017	48.1	33.7	12	8,523,518	241,360	8,665	2.20%	23.56%
HLGW042B	175	2017	50.6	31.8	12	8,433,840	238,821	8,574	2.18%	25.74%
HLGW049B	179	2018	47.3	33.7	12	8,375,873	237,180	8,515	2.17%	27.91%
HLGW039A	175	2017	50.7	31.3	12	8,350,593	236,464	8,489	2.16%	30.07%
HLGW037B	175	2017	56.0	28.2	12	8,291,612	234,794	8,429	2.14%	32.21%
HLGW032B	171	2014	51.5	30.6	12	8,275,222	234,329	8,412	2.14%	34.35%
HLGW0059	155(3)	2019	51.4	39.8	9	8,050,085	227,954	8,184	2.08%	36.44%
HLGW026B	171	2015	57.1	24.8	12	7,447,551	210,892	7,571	1.93%	38.36%
HLGW029A	171	2017	56.1	24.8	12	7,317,297	207,204	7,439	1.89%	40.25%
HLGW047A	179	2017	47.6	29.2	12	7,291,805	206,482	7,413	1.89%	42.14%
HLGW031B	171	2014	50.3	23.7	12	6,253,489	177,080	6,357	1.62%	43.76%
HLGW030B	171	2014	56.4	20.9	12	6,195,274	175,432	6,298	1.60%	45.36%
HLGW027B	171	2015	49.6	23.4	12	6,091,598	172,496	6,193	1.58%	46.94%
HLGW033A	171	2014	43.1	28.8	11	5,975,937	169,221	6,075	1.55%	48.48%
HLGW034B	171	2014	49.4	22.3	12	5,772,993	163,474	5,869	1.49%	49.97%
LHGW0019	---	2014	45.9	23.9	12	5,759,684	163,097	5,855	1.49%	51.46%
HLGW043B	175	2017	48.2	22.5	12	5,713,452	161,788	5,808	1.48%	52.94%
HLGW044A	179	2017	52.8	20.4	12	5,657,501	160,203	5,751	1.46%	54.41%
HLGW050B	179	2018	48.0	21.0	12	5,291,468	149,838	5,379	1.37%	55.77%
HLGW0058	155(3)	2019	52.9	24.1	9	5,023,067	142,238	5,106	1.30%	57.07%
HLGW008B	143	2006	40.3	27.0	10	4,767,994	135,015	4,847	1.23%	58.31%
HLGW008A	143	2006	43.5	22.5	11	4,725,516	133,812	4,804	1.22%	59.53%

Appendix B3, continued

Name	Refuse Lift (mASL)	Year Activated	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)
HLGW040B	175	2018	48.1	18.5	12	4,677,728	132,459	4,755	1.21%	60.74%
HLGW040B	175	2018	48.1	18.5	12	4,677,728	132,459	4,755	1.21%	61.95%
HLGW023B	165	2013	48.0	18.5	12	4,668,820	132,207	4,746	1.21%	63.16%
HLGW0062	155(3)	2019	51.1	22.1	9	4,455,409	126,164	4,529	1.15%	64.31%
HLGW022B	165	2013	48.4	17.2	12	4,363,139	123,551	4,435	1.13%	65.44%
HLGW0053	151(3)	2018	47.0	17.3	12	4,254,436	120,473	4,325	1.10%	66.54%
HLGW024B	171	2016	49.4	19.4	10	4,202,374	118,999	4,272	1.09%	67.62%
HLGW041B	175	2017	48.1	16.4	12	4,147,364	117,441	4,216	1.07%	68.70%
HLGW017B	163	2012	36.9	21.3	12	4,138,058	117,177	4,207	1.07%	69.77%
LHGW0020	159	2014	44.3	17.5	12	4,070,183	115,255	4,138	1.05%	70.82%
HLGW038B	175	2017	53.1	14.2	12	3,953,403	111,949	4,019	1.02%	71.84%
VLGW0052	---	2011	46.0	15.9	12	3,844,069	108,853	3,908	0.99%	72.84%
HLGW027A	171	2017	48.6	14.8	12	3,786,325	107,217	3,849	0.98%	73.82%
VLGW0051	---	2011	46.4	16.5	11	3,674,323	104,046	3,735	0.95%	74.77%
HLGW028B	171	2015	54.9	12.5	12	3,604,954	102,081	3,665	0.93%	75.70%
LHGW0013	151	2011	53.7	12.6	11	3,269,785	92,590	3,324	0.85%	76.55%
HLGW029B	171	2015	51.9	11.5	12	3,132,808	88,712	3,185	0.81%	77.36%
VLGW0049	---	2011	52.6	11.3	12	3,110,011	88,066	3,162	0.80%	78.16%
HLGW0057	155(3)	2019	48.6	15.1	9	2,892,757	81,914	2,941	0.75%	78.91%
LHGW0023	159	2011	49.3	12.6	10	2,708,586	76,699	2,753	0.70%	79.61%
VLGW017S	---	1997	67.3	8.6	10	2,531,785	71,693	2,574	0.65%	80.26%
HLGW019B	165	2013	41.2	33.0	4	2,379,269	67,374	2,419	0.62%	80.88%
VLGW016D	---	1997	46.7	10.1	11	2,278,212	64,512	2,316	0.59%	81.47%
HLGW040A	175	2017	47.6	9.0	12	2,252,013	63,770	2,289	0.58%	82.05%
HLGW025B	171	2016	53.1	8.8	11	2,245,208	63,578	2,282	0.58%	82.63%
VLGW007D	---	1996	60.5	7.5	11	2,186,283	61,909	2,223	0.57%	83.20%
VLGW017D	---	1997	52.6	8.2	11	2,084,029	59,013	2,119	0.54%	83.74%
VLGW029D	---	1997	44.8	8.8	12	2,075,269	58,765	2,110	0.54%	84.27%
VLGW027D	---	1997	48.0	8.2	12	2,061,253	58,368	2,095	0.53%	84.81%

Appendix B3, continued

Name	Refuse Lift (mASL)	Year Activated	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)
HLGW0018	165	2013	51.7	8.2	11	2,036,897	57,679	2,071	0.53%	85.33%
HLGW048A	179	2017	54.9	21.0	4	2,018,774	57,166	2,052	0.52%	85.85%
HLGW0005	147	2003	35.7	10.5	12	1,974,887	55,923	2,008	0.51%	86.37%
LHGW0022	159	2014	44.1	9.1	11	1,933,216	54,743	1,965	0.50%	86.87%
HLGW0014	155	2011	44.7	8.5	11	1,820,552	51,553	1,851	0.47%	87.34%
HLGW044B	179	2017	38.3	8.9	12	1,790,241	50,694	1,820	0.46%	87.80%
HLGW039B	175	2017	45.0	7.4	12	1,740,048	49,273	1,769	0.45%	88.25%
VLGW026S	---	1997	46.6	7.0	11	1,569,545	44,445	1,596	0.41%	88.66%
HLGW036B	175	2017	47.8	6.7	11	1,549,328	43,872	1,575	0.40%	89.06%
VLGW042S	---	2003	50.3	6.1	11	1,479,386	41,892	1,504	0.38%	89.44%
VLGW0054	---	2011	41.1	7.3	11	1,434,857	40,631	1,459	0.37%	89.81%
HLGW0013	147	2010	49.4	5.9	11	1,405,647	39,804	1,429	0.36%	90.17%
VLGW019S	---	1997	49.4	5.9	11	1,402,193	39,706	1,425	0.36%	90.54%
HLGW0061	155(3)	2019	38.4	9.0	9	1,360,821	38,534	1,383	0.35%	90.89%
HLGW0063	155(3)	2019	46.8	7.1	9	1,311,490	37,137	1,333	0.34%	91.23%
VLGW003D	---	1996	53.0	4.4	12	1,225,028	34,689	1,245	0.32%	91.54%
VLGW003S	---	1996	48.1	4.7	12	1,179,559	33,402	1,199	0.31%	91.85%
VLGW024D	---	1997	47.5	4.4	12	1,092,430	30,934	1,111	0.28%	92.13%
VLGW0053	---	2011	44.3	4.4	12	1,033,892	29,277	1,051	0.27%	92.40%
VLGW0055	---	2011	46.8	4.2	12	1,032,186	29,228	1,049	0.27%	92.67%
HLGW030A	171	2014	26.6	17.0	5	991,264	28,070	1,008	0.26%	92.92%
VLGW023D	---	1997	49.8	3.9	11	932,234	26,398	948	0.24%	93.16%
VLGW023S	---	1997	44.0	4.4	11	931,291	26,371	947	0.24%	93.40%
VLGW021S	---	1997	52.4	3.7	11	924,710	26,185	940	0.24%	93.64%
VLGW029S	---	1997	53.5	3.2	12	905,438	25,639	920	0.23%	93.88%
VLGW026D	---	1997	47.8	3.9	11	898,192	25,434	913	0.23%	94.11%
VLGW009S	---	1996	59.0	3.9	9	897,270	25,408	912	0.23%	94.34%
VLGW015D	---	1997	51.9	3.9	10	881,069	24,949	896	0.23%	94.57%
HLGW047B	179	2018	38.0	5.3	10	879,735	24,911	894	0.23%	94.80%

Appendix B3, continued

Name	Refuse Lift (mASL)	Year Activated	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)
VLGW012S	---	1996	49.1	3.6	11	856,598	24,256	871	0.22%	95.02%
VLGW018S	---	1997	45.3	3.9	11	844,767	23,921	859	0.22%	95.24%
VLGW018D	---	1997	46.6	3.6	11	797,073	22,571	810	0.21%	95.44%
HLGW050A	179	2017	34.9	13.0	4	793,309	22,464	806	0.21%	95.65%
VLGW020D	---	1997	45.0	5.0	8	788,625	22,331	802	0.20%	95.85%
VLGW021D	---	1997	48.8	3.3	11	771,677	21,852	784	0.20%	96.05%
HLGW048B	179	2018	47.1	3.6	10	747,262	21,160	760	0.19%	96.25%
VLGW019D	---	1997	45.8	3.2	11	706,440	20,004	718	0.18%	96.43%
VLGW008S	---	1996	48.9	2.9	11	677,609	19,188	689	0.18%	96.60%
VLGW011S	---	1996	39.4	3.9	10	673,174	19,062	684	0.17%	96.78%
VLGW007S	---	1996	42.5	3.6	10	663,988	18,802	675	0.17%	96.95%
LHGW0004	147	2003	36.6	5.2	7	579,011	16,396	589	0.15%	97.10%
VLGW005S	---	1996	55.1	3.0	8	578,631	16,385	588	0.15%	97.25%
HLGW046B	179	2018	39.5	3.3	10	568,150	16,088	578	0.15%	97.40%
VLGW008D	---	1996	47.5	3.0	9	561,191	15,891	570	0.15%	97.54%
VLGW032S	---	1997	44.6	2.9	10	558,081	15,803	567	0.14%	97.69%
VLGW0056	---	2011	47.2	2.3	11	511,490	14,484	520	0.13%	97.82%
VLGW015S	---	1997	46.3	2.3	11	509,703	14,433	518	0.13%	97.95%
VLGW006D	---	1996	46.8	2.3	11	507,451	14,370	516	0.13%	98.08%
HLGW045B	179	2018	35.1	3.8	8	460,797	13,048	468	0.12%	98.20%
VLGW006S	---	1996	49.6	1.9	11	447,582	12,674	455	0.12%	98.32%
VLGW009D	---	1996	44.2	2.8	8	433,785	12,283	441	0.11%	98.43%
VLGW0060	#N/A	#N/A	53.8	2.5	7	411,823	11,662	419	0.11%	98.54%
VLGW028S	---	1997	45.4	1.9	11	410,318	11,619	417	0.11%	98.64%
VLGW001D	---	1996	49.0	2.0	8	343,466	9,726	349	0.09%	98.73%
VLGW010S	---	1996	21.6	11.5	3	325,917	9,229	331	0.08%	98.81%
VLGW034S	---	1997	35.1	2.6	8	319,258	9,040	325	0.08%	98.90%
VLGW016S	---	1997	49.1	1.3	11	315,129	8,924	320	0.08%	98.98%
VLGW0059	---	2011	49.0	1.8	8	314,604	8,909	320	0.08%	99.06%

Appendix B3, continued

Name	Refuse Lift (mASL)	Year Activated	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)
VLGW0050	---	2011	41.9	1.6	11	314,127	8,895	319	0.08%	99.14%
VLGW043S	---	2003	47.7	2.5	6	313,108	8,866	318	0.08%	99.22%
VLGW022S	---	1997	37.1	4.7	4	303,368	8,590	308	0.08%	99.30%
HLGW0012	147	2010	39.0	3.4	5	292,888	8,294	298	0.08%	99.38%
VLGW022D	---	1997	38.2	1.6	9	236,334	6,692	240	0.06%	99.44%
HLGW051A	179	2017	33.8	5.0	3	221,725	6,279	225	0.06%	99.49%
VLGW020S	---	1997	26.2	3.8	5	215,050	6,090	219	0.06%	99.55%
VLGW005D	---	1996	89.9	2.3	2	183,655	5,201	187	0.05%	99.60%
HLGW042A	175	2017	45.9	3.0	3	180,970	5,125	184	0.05%	99.64%
VLGW031S	---	1997	28.4	1.7	8	165,619	4,690	168	0.04%	99.69%
VLGW033S	---	1997	26.4	1.8	8	161,719	4,579	164	0.04%	99.73%
HLGW0060	155(3)	2019	27.7	1.2	9	131,065	3,711	133	0.03%	99.76%
HLGW032A	171	2014	38.9	2.5	3	127,716	3,617	130	0.03%	99.80%
VLGW013S	---	1997	37.3	2.3	3	114,197	3,234	116	0.03%	99.83%
HLGW0054	151(3)	2018	27.0	1.0	9	106,288	3,010	108	0.03%	99.85%
VLGW013D	---	1997	41.4	1.7	3	90,689	2,568	92	0.02%	99.88%
VLGW0058	---	2011	27.4	2.5	3	89,960	2,547	91	0.02%	99.90%
VLGW030S	---	1997	22.2	1.0	9	87,583	2,480	89	0.02%	99.92%
HLGW034A	171	2014	33.3	2.0	3	87,464	2,477	89	0.02%	99.95%
HLGW0001	139	2001	26.0	2.0	3	68,203	1,931	69	0.02%	0.02%
HLGW031A	171	2014	19.2	2.0	3	50,430	1,428	51	0.01%	99.96%
HLGW049A	179	2017	18.8	3.0	2	49,379	1,398	50	0.01%	99.97%
HLGW043A	175	2017	31.6	1.0	3	41,456	1,174	42	0.01%	99.98%
HLGW041A	175	2017	29.1	1.0	3	38,216	1,082	39	0.01%	99.99%
HLGW0003	139	2003	21.6	0.7	5	31,460	891	32	0.01%	100.00%
HLGW0004	147	2003	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW006A	159	2005	37.4	0.0	4	0	0	0	0.00%	100.00%
HLGW006B	159	2005	--	--	0	0	0	0	0.00%	100.00%
HLGW0009	139	2008	---	---	0	0	0	0	0.00%	100.00%

Appendix B3, continued

Name	Refuse Lift (mASL)	Year Activated	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)
HLGW0010	139	2008	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW0011	0	2008	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW0015	155	2011	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW016A	159	2012	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW017A	163	2013	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW019C	165	2012	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW020B	165	2013	0.0	0.0	3	0	0	0	0.00%	100.00%
HLGW033B	171	2014	9.7	0.0	3	0	0	0	0.00%	100.00%
LHGW002A	147	2007	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0003	147	2003	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0006	143	2009	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0007	143	2009	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0008	143	2009	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0009	143	2012	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0010	143	2012	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0017	163	2012	0.0	0.0	0	0	0	0	0.00%	100.00%
LHGW0021	159	2014	0.0	0.0	0	0	0	0	0.00%	100.00%
TLGW001A	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
TLGW001B	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
TLGW002A	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
TLGW002B	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
TLGW002C	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW001S	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW002D	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW002S	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW004D	---	1996	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW004S	---	1996	9.0	0.0	2	0	0	0	0.00%	100.00%
VLGW014D	---	1997	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW014S	---	1997	0.0	0.0	0	0	0	0	0.00%	100.00%

Appendix B3, continued

Name	Refuse Lift (mASL)	Year Activated	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Methane Flow (m3)	Energy (GJ)	Well Production (% of Total)	Cumulative Total (%)
VLGW024S	---	1997	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW025D	---	1997	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW025S	---	1997	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW027S	---	1997	44.8	0.0	3	0	0	0	0.00%	100.00%
VLGW047S	---	2003	0.0	0.0	0	0	0	0	0.00%	100.00%
VLGW0057	---	2011	0.0	0.0	0	0	0	0	0.00%	100.00%
HLGW0056	151(3)	2018	0.0	0.0	0	0	0	0	0.00%	100.00%

Note: (3) – indicates lift is in Cell 3

APPENDIX C

2019 Hartland Landfill Gas Collection Data

Appendix C1 2019 Hartland Landfill Gas Collection Data

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Jan-19	47.94	---	-31.33	85.39	367.70	0	697,218	844,667	1,541,885
2-Jan-19	49.18	0.40	-30.15	88.80	293.76	0	722,204	782,725	1,504,929
3-Jan-19	---	---	-31.10	126.22	303.76	43,143	740,795	763,869	1,547,807
4-Jan-19	---	---	-28.47	1,394.15	41.70	1,342,223	32,942	39,525	1,414,690
5-Jan-19	52.20	0.30	-31.50	917.26	152.18	808,127	388,290	255,348	1,451,765
6-Jan-19	52.01	---	-31.65	94.80	342.40	0	708,105	772,683	1,480,788
7-Jan-19	50.55	---	-31.75	90.25	449.40	0	677,495	797,490	1,474,985
8-Jan-19	47.98	0.40	-31.96	85.90	368.91	0	656,285	843,010	1,499,295
9-Jan-19	49.80	0.30	-31.94	79.67	361.83	0	947,797	538,952	1,486,749
10-Jan-19	50.30	0.30	-31.96	82.02	372.58	0	757,840	739,829	1,497,669
11-Jan-19	48.70	0.50	-30.83	88.30	350.63	3,120	687,634	770,447	1,461,201
12-Jan-19	49.71	0.40	-31.96	83.51	345.91	0	719,138	800,820	1,519,958
13-Jan-19	49.32	---	-31.97	79.83	364.57	0	686,033	822,078	1,508,111
14-Jan-19	49.17	0.50	-31.96	76.67	362.31	0	676,467	823,899	1,500,366
15-Jan-19	50.12	0.60	-31.96	75.66	372.25	0	690,232	811,684	1,501,916
16-Jan-19	50.55	0.40	-31.96	74.31	383.43	0	691,947	804,654	1,496,601
17-Jan-19	50.68	0.40	-31.96	76.79	378.39	0	692,341	804,966	1,497,307
18-Jan-19	50.74	0.60	-31.96	78.78	367.27	0	690,575	797,080	1,487,655
19-Jan-19	48.80	0.60	-25.50	78.38	333.80	0	627,258	575,063	1,202,321
20-Jan-19	49.37	---	-31.97	78.18	473.59	0	673,302	839,812	1,513,114
21-Jan-19	---	0.60	-31.69	76.91	311.71	0	920,361	562,318	1,482,679
22-Jan-19	48.20	0.40	-31.96	77.94	355.14	0	649,315	863,347	1,512,662
23-Jan-19	49.88	0.50	-31.95	80.76	335.34	0	692,032	821,607	1,513,639
24-Jan-19	48.85	0.50	-31.96	75.03	412.00	0	637,050	852,842	1,489,892
25-Jan-19	48.55	0.50	-31.96	81.76	345.08	0	662,438	835,598	1,498,036
26-Jan-19	50.90	0.30	-18.96	72.65	182.25	0	581,235	312,860	894,095
27-Jan-19	50.99	---	-31.95	81.74	325.60	0	1,007,706	489,240	1,496,946
28-Jan-19	50.00	0.50	-31.95	80.65	388.80	0	705,681	801,202	1,506,883
29-Jan-19	49.85	0.50	-31.95	76.34	405.64	0	696,921	803,115	1,500,036
30-Jan-19	50.27	0.40	-31.96	73.24	364.94	0	697,353	796,868	1,494,221
31-Jan-19	50.28	0.40	-31.94	79.61	353.29	0	714,595	800,719	1,515,314

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Feb-19	50.51	0.81	-31.72	84.37	318.83	0	788,413	737,814	1,526,227
2-Feb-19	49.38	---	-31.17	81.89	361.88	0	760,420	741,783	1,502,203
3-Feb-19	50.95	0.68	-31.51	81.14	388.42	0	736,145	796,328	1,532,473
4-Feb-19	51.12	0.79	-31.33	73.71	412.55	0	773,128	754,766	1,527,894
5-Feb-19	48.53	0.96	-31.96	70.14	487.40	0	697,596	837,050	1,534,646
6-Feb-19	49.87	0.92	-31.97	66.68	344.92	0	687,844	842,167	1,530,011
7-Feb-19	48.62	1.00	-31.96	67.91	383.64	0	689,088	856,656	1,545,744
8-Feb-19	49.30	0.92	-31.96	73.20	332.25	0	723,844	837,886	1,561,730
9-Feb-19	51.40	0.50	-29.42	74.72	405.45	0	723,120	746,787	1,469,907
10-Feb-19	---	---	-25.76	66.55	707.53	0	611,656	-	611,656
11-Feb-19	49.10	0.60	-29.57	1,004.87	148.62	912,625	238,355	-	1,150,980
12-Feb-19	---	---	-29.95	1,548.60	32.19	1,429,215	-	-	1,429,215
13-Feb-19	---	---	-29.94	1,546.31	31.79	1,434,782	-	-	1,434,782
14-Feb-19	---	---	-29.95	1,546.67	31.20	1,434,143	-	-	1,434,143
15-Feb-19	48.00	0.60	-29.34	1,520.54	33.51	1,407,613	-	-	1,407,613
16-Feb-19	---	---	-29.94	1,549.04	33.49	1,420,310	-	-	1,420,310
17-Feb-19	---	---	-29.94	1,550.47	31.85	1,430,370	-	-	1,430,370
18-Feb-19	---	---	-29.95	1,548.18	26.44	1,426,840	-	-	1,426,840
19-Feb-19	50.20	0.50	-29.95	1,548.86	33.14	1,442,893	-	-	1,442,893
20-Feb-19	49.00	0.60	-29.95	1,548.80	34.02	1,448,736	-	-	1,448,736
21-Feb-19	49.50	0.50	-29.95	1,548.37	32.86	1,430,711	-	-	1,430,711
22-Feb-19	49.10	0.60	-28.99	1,506.34	28.56	1,395,354	-	-	1,395,354
23-Feb-19	48.20	0.70	-29.95	1,550.18	30.22	1,447,062	-	-	1,447,062
24-Feb-19	---	---	-29.94	1,551.46	33.02	1,433,577	-	-	1,433,577
25-Feb-19	50.60	0.70	-29.95	1,548.97	30.66	1,422,959	-	-	1,422,959
26-Feb-19	46.10	1.50	-29.94	1,549.92	26.74	1,412,613	-	-	1,412,613
27-Feb-19	48.70	0.90	-29.95	1,550.63	27.77	1,405,813	-	-	1,405,813
28-Feb-19	48.50	0.90	-29.95	1,550.10	33.68	1,410,407	-	-	1,410,407

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Mar-19	---	0.72	-29.94	1,546.32	29.13	1,405,889	-	63,166	1,469,055
2-Mar-19	---	0.72	-29.95	1,547.05	27.44	1,408,102	-	63,806	1,471,908
3-Mar-19	---	0.72	-29.95	1,548.39	26.75	1,405,974	-	107,716	1,513,690
4-Mar-19	---	0.71	-29.94	1,548.56	26.32	1,401,165	-	66,349	1,467,514
5-Mar-19	---	0.71	-29.94	1,549.11	26.14	1,401,448	-	64,372	1,465,820
6-Mar-19	---	---	-30.00	784.79	184.81	670,955	524,339	278,480	1,473,774
7-Mar-19	50.76	1.13	-31.19	76.26	410.41	0	788,214	710,049	1,498,263
8-Mar-19	49.43	1.22	-29.31	72.61	379.87	0	715,978	732,679	1,448,657
9-Mar-19	49.16	1.22	-30.91	74.04	320.83	0	765,678	731,212	1,496,890
10-Mar-19	48.12	1.28	-32.81	69.39	342.71	0	693,155	847,473	1,540,628
11-Mar-19	49.22	1.33	-34.66	75.03	365.53	0	665,127	823,994	1,489,121
12-Mar-19	49.10	1.11	-32.36	78.94	342.46	0	700,611	833,464	1,534,075
13-Mar-19	49.61	1.13	-31.56	74.57	360.58	0	673,157	829,297	1,502,454
14-Mar-19	47.06	1.28	-31.98	77.47	407.09	0	646,216	867,245	1,513,461
15-Mar-19	47.80	1.12	-30.28	80.97	338.02	0	659,607	812,033	1,471,640
16-Mar-19	48.45	1.05	-30.23	77.19	370.18	0	649,945	817,926	1,467,871
17-Mar-19	48.64	1.03	-30.87	76.86	367.82	0	657,538	824,106	1,481,644
18-Mar-19	48.47	0.92	-28.57	75.39	322.52	0	919,246	481,527	1,400,773
19-Mar-19	---	---	-25.42	414.18	242.51	331,423	704,237	414,475	1,450,135
20-Mar-19	49.89	0.81	-32.41	75.85	306.63	0	798,892	728,539	1,527,431
21-Mar-19	49.35	0.78	-32.52	76.34	338.14	0	709,706	814,087	1,523,793
22-Mar-19	48.88	0.85	-31.97	80.16	358.94	0	678,569	820,800	1,499,369
23-Mar-19	49.56	0.86	-31.96	82.68	371.04	0	698,241	828,229	1,526,470
24-Mar-19	47.88	0.91	-31.40	80.03	371.33	0	664,584	853,732	1,518,316
25-Mar-19	48.56	0.89	-30.46	76.50	377.65	0	678,929	816,850	1,495,779
26-Mar-19	49.97	0.85	-30.61	80.23	356.41	0	685,758	812,721	1,498,479
27-Mar-19	48.78	0.93	-30.96	76.50	407.28	0	663,454	839,085	1,502,539
28-Mar-19	49.45	0.89	-30.97	75.10	387.89	0	682,032	818,059	1,500,091
29-Mar-19	48.04	0.89	-30.97	76.95	367.14	0	673,953	824,543	1,498,496
30-Mar-19	47.32	0.91	-30.96	76.53	337.57	0	663,420	839,457	1,502,877
31-Mar-19	48.20	0.82	-30.96	76.67	368.32	0	650,633	828,679	1,479,312

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Apr-19	49.71	0.74	-30.96	77.06	373.65	0.00	655,607	797,190	1,452,797
2-Apr-19	50.71	0.68	-30.95	77.80	405.93	0.00	678,519	765,862	1,444,381
3-Apr-19	51.42	0.72	-30.97	79.68	417.50	0.00	693,544	744,660	1,438,204
4-Apr-19	50.98	0.81	-30.97	81.16	423.04	0.00	661,274	773,092	1,434,366
5-Apr-19	50.68	0.77	-30.96	78.93	413.17	0.00	694,152	768,108	1,462,260
6-Apr-19	50.89	0.73	-30.97	84.01	361.43	0.00	772,944	769,150	1,542,094
7-Apr-19	49.61	0.78	-30.96	81.40	374.89	0.00	814,038	760,584	1,574,622
8-Apr-19	48.15	0.83	-30.97	79.94	343.91	0.00	772,349	804,782	1,577,131
9-Apr-19	48.52	0.77	-30.66	80.07	348.04	0.00	790,070	781,194	1,571,264
10-Apr-19	46.92	0.80	-30.54	78.89	362.55	0.00	830,208	734,720	1,564,928
11-Apr-19	47.87	0.77	-30.95	81.34	367.57	0.00	860,417	730,330	1,590,747
12-Apr-19	49.17	0.72	-30.94	81.52	337.20	0.00	928,720	656,220	1,584,940
13-Apr-19	47.98	0.99	-28.95	81.24	291.99	0.00	1,020,805	477,066	1,497,871
14-Apr-19	50.07	0.71	-30.95	82.79	392.67	0.00	808,962	770,813	1,579,775
15-Apr-19	49.46	0.78	-30.71	81.40	370.36	0.00	820,427	743,145	1,563,572
16-Apr-19	49.84	0.74	-30.95	83.47	336.29	0.00	1,014,981	563,659	1,578,640
17-Apr-19	48.68	0.81	-30.96	81.75	330.91	0.00	779,729	786,686	1,566,415
18-Apr-19	47.82	0.80	-30.95	84.36	362.73	0.00	752,181	806,092	1,558,273
19-Apr-19	49.12	0.72	-30.96	84.56	333.73	0.00	780,088	785,337	1,565,425
20-Apr-19	49.65	0.72	-30.97	84.94	347.24	0.00	808,757	759,952	1,568,709
21-Apr-19	48.77	0.77	-30.95	82.64	293.91	0.00	865,285	713,663	1,578,948
22-Apr-19	47.86	0.86	-30.96	83.89	308.91	0.00	813,559	791,031	1,604,590
23-Apr-19	48.36	0.81	-30.95	84.32	304.07	0.00	821,611	783,071	1,604,682
24-Apr-19	47.80	0.60	-30.84	991.89	144.88	971,346.00	361,260	256,334	1,588,940
25-Apr-19	---	---	-30.96	1,551.55	31.41	1,574,813.00	-	47,705	1,622,518
26-Apr-19	47.40	0.77	-30.96	1,552.67	30.00	1,600,474.00	-	46,025	1,646,499
27-Apr-19	47.90	0.80	-30.95	1,551.95	30.60	1,591,343.00	-	42,248	1,633,591
28-Apr-19	---	0.79	-30.96	1,552.42	29.62	1,588,403.00	-	45,499	1,633,902
29-Apr-19	48.10	0.72	-30.60	1,537.21	31.13	1,588,297.00	-	37,090	1,625,387
30-Apr-19	47.60	0.85	-30.96	1,548.17	30.31	1,636,240.00	-	0	1,636,240

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-May-19	---	0.68	-30.96	1,550.47	30.55	1,633,712.00	-	1,279	1,634,991
2-May-19	46.80	0.75	-30.94	1,554.42	29.64	1,631,856.00	-	11,789	1,643,645
3-May-19	47.40	0.77	-30.96	1,550.20	31.24	1,621,310.00	-	19,282	1,640,592
4-May-19	48.30	0.77	-30.95	1,554.53	30.60	1,625,242.00	-	18,930	1,644,172
5-May-19	50.00	0.75	-30.95	1,550.87	29.63	1,625,690.00	-	29,137	1,654,827
6-May-19	49.00	0.68	-30.96	1,552.64	30.41	1,621,078.00	-	19,939	1,641,017
7-May-19	48.00	0.24	-21.86	1,127.92	31.98	1,169,296.00	-	33,693	1,202,989
8-May-19	47.90	0.60	-30.96	1,555.68	30.17	1,644,853.00	-	4,771	1,649,624
9-May-19	47.80	0.54	-30.95	1,552.91	30.05	1,637,081.00	-	7,224	1,644,305
10-May-19	50.70	0.45	-30.95	1,554.53	30.13	1,639,526.00	-	-	1,639,526
11-May-19	49.70	0.45	-29.95	831.59	143.82	819,444.00	493,384	275,128	1,587,956
12-May-19	50.31	0.55	-30.98	87.62	274.69	0.00	939,527	698,190	1,637,717
13-May-19	50.14	0.74	-30.96	88.92	351.62	0.00	771,020	885,029	1,656,049
14-May-19	50.09	0.75	-30.96	87.08	344.71	0.00	771,302	885,158	1,656,460
15-May-19	50.14	0.73	-30.95	85.92	363.68	0.00	764,165	889,944	1,654,109
16-May-19	51.06	0.68	-30.97	84.33	343.08	0.00	781,088	872,032	1,653,120
17-May-19	51.74	0.66	-30.79	85.85	341.08	0.00	808,881	825,828	1,634,709
18-May-19	49.90	0.75	-30.97	84.80	393.66	0.00	747,532	893,855	1,641,387
19-May-19	50.91	0.63	-30.96	87.46	370.27	0.00	770,859	872,954	1,643,813
20-May-19	50.78	0.60	-30.96	87.81	352.92	0.00	763,854	873,921	1,637,775
21-May-19	50.83	0.70	-30.97	86.87	324.18	0.00	790,271	845,643	1,635,914
22-May-19	50.54	0.67	-30.96	86.53	288.12	0.00	861,918	770,730	1,632,648
23-May-19	49.80	0.48	-27.28	87.75	256.69	0.00	744,211	701,914	1,446,125
24-May-19	50.70	0.51	-30.95	87.58	291.07	0.00	852,863	789,796	1,642,659
25-May-19	50.61	0.68	-30.95	89.45	340.37	0.00	825,548	805,707	1,631,255
26-May-19	50.50	0.66	-30.96	87.05	316.38	0.00	813,324	820,283	1,633,607
27-May-19	50.36	0.58	-30.96	85.40	282.14	0.00	816,304	815,659	1,631,963
28-May-19	49.90	0.51	-30.97	87.65	313.31	0.00	808,158	818,003	1,626,161
29-May-19	49.77	0.69	-30.96	87.81	314.11	0.00	803,269	821,918	1,625,187
30-May-19	50.15	0.65	-30.96	88.25	302.71	0.00	827,563	801,012	1,628,575
31-May-19	50.12	0.57	-30.95	87.81	301.32	0.00	851,314	777,418	1,628,732

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Jun-19	49.36	0.52	-30.68	212.11	255.07	132,450.00	786,912	717,956	1,637,318
2-Jun-19	50.05	0.51	-30.96	88.40	292.72	0.00	868,152	827,519	1,695,671
3-Jun-19	49.89	0.58	-30.95	87.17	312.67	0.00	888,586	833,028	1,721,614
4-Jun-19	---		-30.83	683.13	205.80	704,044.00	702,584	278,453	1,685,081
5-Jun-19	47.60	0.70	-30.95	1,554.14	30.11	1,711,331.00	-	7,566	1,718,897
6-Jun-19	49.50	0.90	-30.95	1,552.13	31.06	1,701,489.00	-	1,700	1,703,189
7-Jun-19	49.00	0.70	-30.95	1,553.09	31.09	1,694,261.00	-	17,758	1,712,019
8-Jun-19	48.20	0.70	-30.96	1,552.17	30.88	1,684,639.00	-	22,375	1,707,014
9-Jun-19	---		-30.95	1,551.06	30.99	1,688,716.00	-	19,799	1,708,515
10-Jun-19	48.80	0.60	-30.94	1,550.81	31.27	1,698,799.00	-	12,661	1,711,460
11-Jun-19	49.00	0.60	-30.95	1,553.29	31.57	1,704,618.00	-	5,864	1,710,482
12-Jun-19	49.30	0.40	-30.95	1,553.69	30.35	1,712,332.00	-	-	1,712,332
13-Jun-19	49.30	0.60	-30.96	1,552.07	30.94	1,718,155.00	-	-	1,718,155
14-Jun-19	49.20	0.60	-30.96	1,552.23	28.20	1,703,000.00	-	296	1,703,296
15-Jun-19	---		-30.95	1,552.63	31.50	1,690,849.00	-	2,952	1,693,801
16-Jun-19	---		-30.94	1,552.72	29.70	1,698,693.00	-	5,879	1,704,572
17-Jun-19	49.20	0.60	-30.95	1,553.31	30.32	1,700,069.00	-	107	1,700,176
18-Jun-19	49.20	0.60	-30.95	1,551.87	29.97	1,695,932.00	-	-	1,695,932
19-Jun-19	49.80	0.60	-30.96	1,550.53	30.26	1,688,852.00	-	-	1,688,852
20-Jun-19	50.10	0.60	-30.87	1,548.89	30.68	1,672,692.00	-	11,200	1,683,892
21-Jun-19	44.00	0.60	-30.95	1,551.61	30.66	1,672,202.00	-	9,660	1,681,862
22-Jun-19	44.40	0.60	-30.95	1,552.02	29.27	1,668,171.00	-	-	1,668,171
23-Jun-19	---	---	-30.95	1,551.24	29.73	1,668,579.00	-	1,032	1,669,611
24-Jun-19	47.40	0.50	-30.95	1,550.26	29.55	1,662,048.00	-	-	1,662,048
25-Jun-19	47.40	0.50	-30.95	1,551.82	30.53	1,664,727.00	-	4,701	1,669,428
26-Jun-19	47.10	0.60	-30.97	1,552.73	29.97	1,671,952.00	-	-	1,671,952
27-Jun-19	46.30	0.60	-30.95	1,552.12	30.46	1,676,114.00	-	-	1,676,114
28-Jun-19	47.00	0.50	-30.95	1,553.21	30.44	1,670,227.00	-	-	1,670,227
29-Jun-19	---	---	-30.95	1,552.40	29.74	1,649,260.00	-	1,014	1,650,274
30-Jun-19	47.40	0.60	-30.95	1,551.72	29.98	1,628,955.00	-	1,460	1,630,415

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Jul-19	49.40	0.50	-30.96	1,552.84	29.94	1,634,391.00	-	-	1,634,391
2-Jul-19	48.50	0.50	-30.95	1,552.24	30.08	1,634,091.00	-	-	1,634,091
3-Jul-19	---	---	-30.95	1,552.87	31.63	1,623,190.00	-	-	1,623,190
4-Jul-19	48.20	0.70	-30.94	1,553.02	31.71	1,624,237.00	-	104	1,624,341
5-Jul-19	49.40	0.50	-30.95	1,551.51	30.21	1,623,874.00	-	-	1,623,874
6-Jul-19	49.30	0.60	-30.54	573.08	234.04	523,423.00	677,696	383,056	1,584,175
7-Jul-19	50.33	0.56	-30.96	89.26	338.14	0.00	739,765	886,275	1,626,040
8-Jul-19	50.76	0.60	-30.97	88.18	376.10	0.00	737,807	882,766	1,620,573
9-Jul-19	50.71	0.53	-30.95	89.88	348.27	0.00	738,823	880,662	1,619,485
10-Jul-19	43.15	0.30	-25.42	86.64	253.46	0.00	749,580	582,042	1,331,622
11-Jul-19	51.07	0.54	-30.97	88.65	347.99	0.00	762,439	861,192	1,623,631
12-Jul-19	50.36	0.58	-30.97	88.63	367.49	0.00	757,560	860,756	1,618,316
13-Jul-19	50.72	0.48	-30.98	88.03	351.30	0.00	766,889	852,731	1,619,620
14-Jul-19	50.94	0.40	-28.18	88.26	367.85	0.00	727,549	760,742	1,488,291
15-Jul-19	51.00	0.47	-30.09	88.74	350.45	0.00	773,652	807,972	1,581,624
16-Jul-19	50.87	0.51	-30.96	87.61	334.87	0.00	765,748	850,378	1,616,126
17-Jul-19	51.05	0.47	-30.97	87.12	311.32	0.00	855,927	748,788	1,604,715
18-Jul-19	51.72	0.60	-30.96	88.62	386.64	0.00	783,003	825,347	1,608,350
19-Jul-19	50.56	0.60	-30.96	86.00	391.41	0.00	759,635	845,566	1,605,201
20-Jul-19	50.12	0.59	-30.97	88.27	347.07	0.00	821,019	779,040	1,600,059
21-Jul-19	50.40	0.49	-30.97	87.65	381.97	0.00	731,664	877,941	1,609,605
22-Jul-19	51.12	0.37	-29.10	87.24	308.90	0.00	826,571	692,018	1,518,589
23-Jul-19	48.31	0.37	-29.70	604.25	185.49	576,657.00	522,874	462,825	1,562,356
24-Jul-19	48.29	0.48	-30.11	601.10	256.64	558,113.00	588,223	408,429	1,554,765
25-Jul-19	49.98	0.59	-30.97	87.40	371.10	0.00	765,581	838,246	1,603,827
26-Jul-19	50.58	0.44	-30.96	88.16	334.94	0.00	778,073	825,095	1,603,168
27-Jul-19	51.23	0.43	-30.96	87.81	370.94	0.00	768,197	805,387	1,573,584
28-Jul-19	50.44	0.54	-30.97	86.27	379.51	0.00	733,852	822,206	1,556,058
29-Jul-19	50.92	0.44	-30.95	86.85	367.94	0.00	740,336	819,268	1,559,604
30-Jul-19	51.80	0.44	-30.95	87.54	350.40	0.00	749,083	805,637	1,554,720
31-Jul-19	51.55	0.53	-30.97	87.51	384.84	0.00	737,354	811,983	1,549,337

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Aug-19	51.53	0.48	-30.96	89.67	373.90	0.00	736,329	810,799	1,547,128
2-Aug-19	51.26	0.48	-30.41	90.48	360.55	0.00	733,857	786,266	1,520,123
3-Aug-19	51.11	0.50	-31.11	85.69	401.11	0.00	715,450	831,154	1,546,604
4-Aug-19	50.82	0.47	-31.46	86.96	365.25	0.00	729,356	828,484	1,557,840
5-Aug-19	51.28	0.39	-31.45	88.40	376.08	0.00	729,319	827,279	1,556,598
6-Aug-19	51.20	0.36	-31.45	87.17	336.52	0.00	741,392	813,834	1,555,226
7-Aug-19	51.55	0.41	-31.47	87.38	350.85	0.00	744,004	811,595	1,555,599
8-Aug-19	---	0.43	-30.58	299.99	318.48	229,597.00	626,695	669,036	1,525,328
9-Aug-19	50.30	0.49	-30.82	531.97	273.99	457,697.00	522,398	556,777	1,536,872
10-Aug-19	51.94	0.64	-31.46	91.25	363.31	0.00	733,402	822,196	1,555,598
11-Aug-19	51.88	0.67	-31.45	91.41	369.18	0.00	726,336	827,725	1,554,061
12-Aug-19	51.18	0.65	-31.46	89.99	379.40	0.00	724,800	826,113	1,550,913
13-Aug-19	50.96	0.57	-31.46	88.52	363.15	0.00	731,660	819,534	1,551,194
14-Aug-19	50.95	0.48	-31.46	87.21	364.70	0.00	729,680	817,536	1,547,216
15-Aug-19	50.70	0.47	-31.46	87.25	360.65	0.00	728,186	819,504	1,547,690
16-Aug-19	50.94	0.50	-31.46	87.70	369.65	0.00	731,633	815,414	1,547,047
17-Aug-19	51.56	0.61	-31.47	88.08	381.21	0.00	734,801	811,095	1,545,896
18-Aug-19	52.06	0.60	-31.46	91.13	341.89	0.00	887,367	638,604	1,525,971
19-Aug-19	52.31	0.56	-31.46	89.21	380.99	0.00	734,267	805,444	1,539,711
20-Aug-19	51.40	0.61	-31.47	90.02	389.34	0.00	828,667	692,921	1,521,588
21-Aug-19	51.91	0.59	-31.47	87.49	358.20	0.00	716,744	823,878	1,540,622
22-Aug-19	51.48	0.66	-31.46	89.20	336.71	0.00	754,238	826,642	1,580,880
23-Aug-19	50.71	0.63	-31.47	90.47	323.01	0.00	765,273	838,086	1,603,359
24-Aug-19	49.08	0.49	-27.66	88.23	245.62	0.00	769,620	642,571	1,412,191
25-Aug-19	51.22	0.61	-31.46	88.90	322.27	0.00	764,054	837,905	1,601,959
26-Aug-19	49.90	0.63	-31.46	87.91	367.22	0.00	742,047	855,531	1,597,578
27-Aug-19	49.88	0.56	-31.45	86.43	355.80	0.00	747,990	850,088	1,598,078
28-Aug-19	50.85	0.44	-31.46	87.27	372.99	0.00	764,016	828,788	1,592,804
29-Aug-19	51.10	0.41	-31.46	86.14	297.82	0.00	780,178	826,524	1,606,702
30-Aug-19	50.65	0.55	-31.45	87.60	298.84	0.00	775,402	840,597	1,615,999
31-Aug-19	50.45	0.66	-31.45	91.25	334.79	0.00	770,845	845,669	1,616,514

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Sep-19	50.95	0.58	-31.46	88.95	302.67	0.00	777,412	835,667	1,613,079
2-Sep-19	50.54	0.61	-31.45	89.25	279.83	0.00	766,904	842,258	1,609,162
3-Sep-19	50.29	0.54	-31.45	85.33	274.58	0.00	766,186	843,651	1,609,837
4-Sep-19	50.61	0.51	-31.46	85.57	301.95	0.00	780,795	824,173	1,604,968
5-Sep-19	50.31	0.58	-31.46	86.94	279.84	0.00	783,229	819,523	1,602,752
6-Sep-19	50.70	0.52	-31.46	85.23	313.35	0.00	788,935	809,390	1,598,325
7-Sep-19	50.28	0.52	-31.46	84.88	307.87	0.00	778,167	816,288	1,594,455
8-Sep-19	51.09	0.66	-31.45	89.29	314.02	0.00	784,418	811,590	1,596,008
9-Sep-19	51.65	0.69	-31.46	89.83	362.05	0.00	777,348	811,188	1,588,536
10-Sep-19	51.35	0.74	-31.46	88.78	289.54	0.00	766,617	820,688	1,587,305
11-Sep-19	50.67	0.74	-31.46	88.72	312.62	0.00	755,410	828,161	1,583,571
12-Sep-19	49.72	0.81	-31.47	87.98	289.91	0.00	784,000	797,961	1,581,961
13-Sep-19	50.72	0.74	-31.46	89.10	311.65	0.00	761,178	826,981	1,588,159
14-Sep-19	50.59	0.76	-31.47	88.27	401.45	0.00	754,864	827,698	1,582,562
15-Sep-19	52.15	0.72	-31.44	89.48	350.72	0.00	760,455	804,699	1,565,154
16-Sep-19	52.57	0.75	-31.47	85.95	365.60	0.00	742,423	800,914	1,543,337
17-Sep-19	51.89	0.77	-31.47	86.31	356.52	0.00	732,505	809,425	1,541,930
18-Sep-19	52.66	0.75	-31.45	87.20	345.58	0.00	737,407	800,962	1,538,369
19-Sep-19	51.44	0.73	-31.47	82.11	357.71	0.00	732,578	808,975	1,541,553
20-Sep-19	51.16	0.72	-31.47	87.24	322.41	0.00	752,380	804,056	1,556,436
21-Sep-19	51.22	0.68	-31.47	85.57	357.16	0.00	755,295	796,377	1,551,672
22-Sep-19	51.77	0.71	-31.46	87.83	348.13	0.00	763,786	789,047	1,552,833
23-Sep-19	52.74	0.69	-31.47	87.21	345.93	0.00	764,776	778,299	1,543,075
24-Sep-19	51.12	0.76	-31.47	86.78	359.47	0.00	829,348	699,407	1,528,755
25-Sep-19	50.56	0.82	-31.45	83.75	390.02	0.00	802,113	817,437	1,619,550
26-Sep-19	50.08	0.99	-31.46	86.30	315.70	0.00	861,299	836,366	1,697,665
27-Sep-19	50.97	0.97	-31.45	86.77	341.79	0.00	849,518	831,096	1,680,614
28-Sep-19	50.94	0.85	-31.46	83.02	370.99	0.00	792,675	720,595	1,513,270
29-Sep-19	50.28	0.69	-31.45	76.55	473.74	0.00	607,486	792,625	1,400,111
30-Sep-19	49.71	0.75	-31.46	82.61	521.39	0.00	599,840	799,881	1,399,721

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Oct-19	50.49	0.74	-31.44	75.93	431.63	0.00	592,406	804,645	1,397,051
2-Oct-19	49.56	1.19	-26.74	85.56	268.01	4,285.00	600,153	602,484	1,206,922
3-Oct-19	52.79	0.69	-31.46	84.24	381.05	0.00	605,366	805,524	1,410,890
4-Oct-19	52.65	0.72	-31.47	81.67	417.42	0.00	589,036	810,299	1,399,335
5-Oct-19	51.51	0.74	-31.46	84.11	434.37	0.00	570,612	827,314	1,397,926
6-Oct-19	50.58	0.77	-31.45	82.05	430.32	0.00	567,833	831,846	1,399,679
7-Oct-19	51.50	0.70	-31.46	82.09	409.54	0.00	589,411	813,570	1,402,981
8-Oct-19	53.53	0.66	-31.46	84.26	493.72	0.00	596,652	792,896	1,389,548
9-Oct-19	52.30	0.82	-31.45	76.74	464.30	0.00	569,333	812,305	1,381,638
10-Oct-19	50.24	0.91	-31.43	72.97	430.23	0.00	646,987	831,754	1,478,741
11-Oct-19	50.44	0.90	-31.46	74.30	343.35	0.00	727,709	830,420	1,558,129
12-Oct-19	51.63	0.80	-31.44	75.54	342.11	0.00	742,908	813,103	1,556,011
13-Oct-19	52.14	0.81	-31.47	82.97	335.52	0.00	743,494	806,821	1,550,315
14-Oct-19	51.98	0.85	-31.44	83.83	322.48	0.00	743,535	804,359	1,547,894
15-Oct-19	51.32	0.90	-31.45	83.59	316.10	0.00	740,839	808,541	1,549,380
16-Oct-19	52.37	0.81	-31.47	85.27	327.58	0.00	754,564	792,019	1,546,583
17-Oct-19	53.67	0.77	-31.46	83.34	357.91	0.00	756,562	777,916	1,534,478
18-Oct-19	53.40	0.84	-31.46	83.04	375.21	0.00	739,597	783,794	1,523,391
19-Oct-19	52.00	0.89	-31.10	81.68	430.03	0.00	720,951	787,862	1,508,813
20-Oct-19	52.60	0.88	-31.46	84.34	358.94	0.00	716,530	803,607	1,520,137
21-Oct-19	51.90	0.90	-31.45	83.62	376.27	0.00	721,580	798,266	1,519,846
22-Oct-19	51.51	0.87	-31.50	85.28	413.84	0.00	716,675	801,021	1,517,696
23-Oct-19	50.36	0.96	-31.47	81.79	380.07	0.00	696,613	811,134	1,507,747
24-Oct-19	50.21	0.96	-31.46	83.37	338.19	0.00	708,676	808,829	1,517,505
25-Oct-19	50.68	0.91	-31.47	83.74	346.02	0.00	763,008	802,647	1,565,655
26-Oct-19	50.17	1.05	-31.46	82.55	359.53	0.00	795,084	816,216	1,611,300
27-Oct-19	48.18	1.20	-31.46	78.36	353.49	0.00	772,823	841,564	1,614,387
28-Oct-19	48.24	1.16	-31.47	76.10	314.23	0.00	781,569	838,783	1,620,352
29-Oct-19	49.11	1.15	-31.45	76.36	322.95	0.00	780,631	833,202	1,613,833
30-Oct-19	48.72	1.29	-31.46	76.16	358.41	0.00	753,605	851,354	1,604,959
31-Oct-19	49.69	1.09	-31.46	73.40	330.80	0.00	691,865	817,144	1,509,009

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Nov-19	50.48	0.94	-31.46	75.82	340.82	0.00	647,869	800,570	1,448,439
2-Nov-19	50.29	0.94	-31.46	75.70	377.91	0.00	733,624	711,445	1,445,069
3-Nov-19	51.27	0.89	-31.47	76.71	375.69	0.00	651,466	790,509	1,441,975
4-Nov-19	51.52	0.89	-31.45	82.08	361.40	0.00	671,346	824,926	1,496,272
5-Nov-19	51.45	0.86	-31.46	83.14	368.48	0.00	638,900	794,466	1,433,366
6-Nov-19	51.55	0.91	-31.46	85.30	402.71	0.00	635,327	793,886	1,429,213
7-Nov-19	51.03	0.95	-31.46	78.76	422.79	0.00	623,069	800,455	1,423,524
8-Nov-19	49.90	---	-31.38	987.67	157.10	873,013.00	243,374	318,538	1,434,925
9-Nov-19	---	---	-29.64	776.27	220.18	653,942.00	326,938	393,355	1,374,235
10-Nov-19	51.39	0.88	-31.46	85.00	376.58	0.00	572,281	856,301	1,428,582
11-Nov-19	50.54	1.04	-31.48	83.48	453.48	0.00	569,681	861,240	1,430,921
12-Nov-19	51.33	0.92	-31.47	82.79	480.15	0.00	571,790	847,202	1,418,992
13-Nov-19	51.78	0.90	-31.47	79.79	446.07	0.00	566,720	843,365	1,410,085
14-Nov-19	51.80	0.87	-31.48	82.64	461.20	0.00	565,650	843,369	1,409,019
15-Nov-19	52.43	0.86	-31.48	82.63	407.38	0.00	569,175	836,899	1,406,074
16-Nov-19	51.74	0.91	-31.48	80.62	524.31	0.00	551,800	846,055	1,397,855
17-Nov-19	51.53	0.86	-31.47	82.69	448.21	0.00	560,167	845,088	1,405,255
18-Nov-19	52.39	0.85	-31.48	81.37	499.10	0.00	553,654	830,580	1,384,234
19-Nov-19	53.93	0.80	-31.48	83.06	432.65	0.00	563,594	813,320	1,376,914
20-Nov-19	52.78	0.97	-31.48	78.42	525.28	0.00	520,699	832,014	1,352,713
21-Nov-19	51.93	0.99	-31.49	73.44	497.43	0.00	538,610	837,717	1,376,327
22-Nov-19	52.61	0.96	-31.48	73.33	424.15	0.00	559,118	831,911	1,391,029
23-Nov-19	51.29	1.00	-31.47	74.58	476.96	0.00	556,227	848,045	1,404,272
24-Nov-19	52.32	0.87	-31.48	79.21	544.44	0.00	574,747	835,115	1,409,862
25-Nov-19	52.05	0.93	-31.49	76.48	503.40	0.00	573,706	839,483	1,413,189
26-Nov-19	52.38	0.96	-31.48	74.47	392.85	0.00	581,465	835,961	1,417,426
27-Nov-19	53.99	0.85	-31.48	77.12	483.47	0.00	589,197	822,954	1,412,151
28-Nov-19	53.41	0.96	-31.31	74.28	700.99	0.00	577,559	818,507	1,396,066
29-Nov-19	51.84	1.09	-30.73	70.38	592.30	0.00	572,131	808,438	1,380,569
30-Nov-19	52.31	1.05	-31.49	68.88	453.74	0.00	572,712	834,881	1,407,593

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
1-Dec-19	51.58	1.04	-31.01	69.02	515.48	0.00	565,390	827,013	1,392,403
2-Dec-19	51.38	1.05	-30.55	76.05	481.34	0.00	559,678	819,377	1,379,055
3-Dec-19	51.22	0.96	-31.48	80.40	417.07	0.00	559,247	861,483	1,420,730
4-Dec-19	52.18	0.85	-31.48	81.31	530.97	0.00	570,951	849,158	1,420,109
5-Dec-19	52.63	0.90	-31.48	82.70	473.67	0.00	566,633	846,470	1,413,103
6-Dec-19	51.86	0.96	-31.48	80.15	475.89	0.00	552,749	856,728	1,409,477
7-Dec-19	52.89	0.87	-31.48	80.82	412.19	0.00	572,983	837,050	1,410,033
8-Dec-19	53.14	0.85	-31.48	83.72	355.46	0.00	571,987	831,675	1,403,662
9-Dec-19	51.13	0.98	-31.48	82.34	437.41	0.00	549,096	855,256	1,404,352
10-Dec-19	51.11	0.95	-31.48	77.68	427.23	0.00	559,697	850,132	1,409,829
11-Dec-19	51.85	0.89	-31.48	80.11	407.97	0.00	566,485	843,164	1,409,649
12-Dec-19	53.14	0.83	-31.47	82.05	348.37	0.00	670,597	738,315	1,408,912
13-Dec-19	52.72	0.93	-31.48	78.70	538.62	0.00	547,835	843,368	1,391,203
14-Dec-19	52.24	0.96	-31.47	77.26	518.65	0.00	536,719	846,099	1,382,818
15-Dec-19	52.47	0.97	-31.49	77.68	400.13	0.00	541,157	842,831	1,383,988
16-Dec-19	51.34	1.06	-31.49	73.02	424.33	0.00	525,992	859,358	1,385,350
17-Dec-19	51.39	0.91	-31.48	79.39	406.50	0.00	536,452	856,129	1,392,581
18-Dec-19	52.87	0.88	-31.48	82.30	371.75	0.00	567,796	818,523	1,386,319
19-Dec-19	54.17	0.85	-31.47	81.04	341.28	0.00	845,212	542,012	1,387,224
20-Dec-19	50.59	0.65	-28.06	78.95	444.30	0.00	574,357	657,120	1,231,477
21-Dec-19	54.22	0.94	-31.47	78.83	584.99	0.00	472,926	825,239	1,298,165
22-Dec-19	54.04	0.90	-31.47	77.57	564.16	0.00	465,545	817,200	1,282,745
23-Dec-19	54.15	0.89	-31.48	77.88	437.90	0.00	500,204	815,114	1,315,318
24-Dec-19	53.27	0.94	-31.55	77.60	467.13	0.00	508,057	823,435	1,331,492
25-Dec-19	54.18	0.87	-31.97	78.47	417.73	0.00	544,174	804,322	1,348,496
26-Dec-19	52.79	0.98	-31.86	76.68	442.75	0.00	528,087	819,085	1,347,172
27-Dec-19	52.93	0.91	-31.48	77.37	391.86	0.00	532,673	811,447	1,344,120
28-Dec-19	52.41	0.92	-31.46	77.84	465.73	0.00	518,629	826,456	1,345,085
29-Dec-19	51.73	0.84	-31.47	80.92	408.00	0.00	521,558	831,078	1,352,636
30-Dec-19	51.00	0.55	-26.85	78.42	388.07	0.00	470,089	696,981	1,167,070
31-Dec-19	50.64	0.84	-31.63	80.42	467.66	0.00	549,060	821,541	1,370,601

Appendix C1, continued

Date	Methane Daily Avg %	Oxygen Daily Av %	Field Pressure ("H_20)	Flare 1 Temp Avg F	Flare 2 Temp Avg F	Groundflare Daily Flow scf	Candlestick Flare 2 Daily Flow scf	Gen Flow scf	Total Flows scf
Total						**119,237,262**	**171,906,349**	**180,514,816.00**	**554,812,792**
Daily Average scf	**50.3**	**0.7**	**-31.0**	**---**	**---**	**326,677**	**564,633**	**628,725**	**1,520,035**
Average scfm						**226.86**	**392.11**	**436.61**	**1,056**
normalize to 50% methane scfm	**---**	**---**	**---**	**---**	**---**	**228.3**	**394.55**	**439.3**	**1,062**

APPENDIX D

Subsurface Perimeter and Foundation Probe Monitoring

D1 Subsurface Perimeter and Foundation Probe Monitoring Methodology

D2 Probe Location and Completion Information

D3 Hartland Landfill Gas Monitoring Program 2019 Gas Probe Data

Appendix D1 Subsurface Perimeter and Foundation Probe Monitoring Methodology

The following is the subsurface probe and foundation monitoring field methodology, as outlined in *Hartland Landfill Standard Operating Procedures* (2019). All monitoring is completed with a LANDTEC Gas Analyzer and Extraction Monitor (GEM) 2000+.

CALIBRATION

Prior to each monitoring event, the gas analyzer is calibrated using the calibration gases at Hartland. Prior to calibration, the gas monitor is set to Gas Analyzer (GA) mode for ambient measurements.

Methane and carbon dioxide gases are used to calibrate the methane and carbon dioxide sensors, and zero the oxygen sensor. Oxygen gas is used to calibrate the oxygen sensor and zero the methane sensor. All calibration values should be recorded on the field sheet.

MONITORING

Weather conditions, including barometric pressure, precipitation and temperature are recorded prior to commencing work.

The following monitoring procedure is followed for each gas probe:

1. Zero pressure.
2. Connect tubing to the gas sample port (ensure pump is off), open valve, wait until pressure reading stabilizes and record value.
3. Turn on pump and wait at least 200 seconds.
4. Watch for any methane or carbon dioxide spikes.
5. At the end of 200 seconds, record the gas concentrations and any spikes on the field sheet.
6. Quickly navigate to the pressure screen and record the static pressure reading (this helps determine whether the screen is plugged/open, or water is covering the screen).
7. Disconnect the tubing from the sampling port and close the gas monitoring valve.
8. Open the water level monitoring port (not all wells will have a water level monitoring port).
9. Follow the same procedure (steps 1-8) for gas probe B.
10. Once monitoring for probe B is completed measure the water level for probe A, followed by probe B.
11. Before moving to the next station, ensure that all valves are closed.

At the end of the day, check gas levels using the calibration gas and record on the field sheet.

Appendix D2 Probe Location and Completion Information

Probe	Probe Location	Well Information
East Property Boundary Perimeter Probes		
GP-1A	90 m north of main gate	Depth: 10.37 m, Screen height: 2.91 m
GP-1B	90 m north of main gate	Depth: 5.82 m, Screen height: 2.91 m
GP-2A	70 m north of GP-1	Depth: 10.61 m, Screen height: 2.91 m
GP-2B	70 m north of GP-1	Depth: 6.36 m, Screen height: 2.91 m
GP-3A	120 m north of GP-1	Depth: 10.63 m, Screen height: 2.91 m
GP-3B	120 m north of GP-1	Depth: 4.83 m, Screen height: unknown
GP-11A	20 m north of main gate in mountain biking parking lot	Depth: 10.72 m, Screen height: unknown
GP-11B	20 m north of main gate in mountain biking parking lot	Depth: 5.23 m, Screen height: unknown
GP-12A	50 m north of GP-3 along perimeter road	Depth: 9.00 m, Screen height: unknown
GP-12B	50 m north of GP-3 along perimeter road	Depth: 5.72 m, Screen height: unknown
Horizontal Subsurface Building Gas Probes		
GP-4A	South east corner of workshop	2.4 m from southeast corner of building in gravel road
GP-5A	Admin building parking lot, behind mountain bike washrooms	3 m along west side of mountain bike washroom building
GP-6A	Northeast corner of admin building	15 m west along north side of building
GP-6B	Northeast corner of admin building	15 m west along north side of building
GP-7A	Against north wall of Hartland admin office	10 m south toward southeast corner of building
GP-7B	Against wall in southwest corner of Hartland admin building	Follows 'H' pattern under building extension
GP-8A	Eastside of auto-scale building	Unknown
GP-9A	Westside of auto-scale building	Unknown
GP-13A	2 m south of Hartland workshop entrance	Unknown
GP-14A	Westside of Hartland workshop	12 m along east side of workshop
GP-17A	North corner of Hartland Interpretive Centre (monitoring initiated January 2011)	Follows building perimeter
GP-18A	Northwest corner of the contractor’s workshop	Follows building perimeter

Appendix D3 Hartland Landfill Gas Monitoring Program 2019 Gas Probe Data

GAS PROBE 01A

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	14:24	-9.0	4.14	-3.32	0.0	0.0	20.3	Under vacuum
20/06/2019	2019	14:32	-20.0	8.02	0.56	0.0	0.0	20.8	
09/08/2019	2019	14:01	4.0	7.60	0.14	0.0	0.0	21.2	Under vacuum
09/12/2019	2019	---	---	---	---	---	---	---	Inaccessible due to construction

GAS PROBE 01B

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	14:28	-15.00	4.27	1.36	0.0	2.0	17.8	
20/06/2019	2019	14:36	-15.00	4.67	1.76	0.0	1.6	19.1	
09/08/2019	2019	14:05	5.00	4.94	2.03	0.0	1.0	20.4	
09/12/2019	2019	---	---	---	---	---	---	---	Inaccessible due to construction

GAS PROBE 02A

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	14:11	-16.00	5.78	-1.92	0.0	0.0	20.2	
20/06/2019	2019	14:17	-7.00	7.83	0.13	0.0	0.0	20.6	
09/08/2019	2019	13:52	-2.00	7.85	0.15	0.0	0.0	20.1	
09/12/2019	2019	11:41	-15.00	5.80	-1.90	0.0	0.0	21.3	

Appendix D3, continued

GAS PROBE 02B

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	14:15	-11	5.44	1.99	0.0	3.6	9.3	
20/06/2019	2019	14:23	-13	5.84	2.39	0.0	4.2	9.6	
09/08/2019	2019	13:56	-3	5.99	2.54	0.0	4.4	14.4	
09/12/2019	2019	11:45	-10	6.19	2.74	0.0	2.9	16.5	

GAS PROBE 03A

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	13:57	-13.0	10.47	2.75	0.0	2.2	11.3	
20/06/2019	2019	14:04	-17.0	10.63	2.91	0.0	2.3	12.0	Dry
09/08/2019	2019	13:43	-1.0	10.68	2.96	0.0	2.2	13.2	
09/12/2019	2019	11:28	-8.0	10.09	2.37	0.0	0.8	18.5	

GAS PROBE 03B

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	14:00	-19.0	4.75	2.83	0.0	6.0	14.0	
20/06/2019	2019	14:08	-18.0	4.76	2.84	0.0	6.2	15.9	Dry
09/08/2019	2019	13:47	-2.0	4.76	2.84	0.0	3.0	18.9	
09/12/2019	2019	11:32	-13.0	4.74	2.82	0.0	8.2	13.1	

GAS PROBE 04A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	12:41	-11.0	0.0	0.0	20.8	
20/06/2019	2019	13:21	-4.0	0.0	0.0	20.7	
09/08/2019	2019	12:30	-26.0	0.0	0.0	21.2	
09/12/2019	2019	11:17	-20.0	0.0	0.0	21.2	

Appendix D3, continued

GAS PROBE 05A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	11:07	-8.0	0.0	0.3	20.5	
20/06/2019	2019	11:02	-16.0	0.0	0.7	19.8	
09/08/2019	2019	11:09	-12.0	0.0	0.6	20.2	
09/12/2019	2019	12:48	-9.0	0.0	0.7	20.2	

GAS PROBE 06A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	11:12	-9.0	0.0	0.0	20.7	
20/06/2019	2019	11:06	-14.0	0.0	1.5	19.6	
09/08/2019	2019	11:19	-16.0	0.0	1.5	18.9	
09/12/2019	2019	12:56	-13.0	0.0	0.1	20.9	

GAS PROBE 06B

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	11:16	-8.0	0.0	0.0	20.8	
20/06/2019	2019	11:10	-9.0	0.0	0.9	19.8	
09/08/2019	2019	11:23	-12.0	0.0	0.6	20.2	
09/12/2019	2019	13:00	-15.0	0.0	0.6	20.5	

GAS PROBE 07A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	11:20	-10.0	0.0	0.0	20.9	
20/06/2019	2019	11:14	-17.0	0.0	0.5	19.9	
09/08/2019	2019	11:27	-12.0	0.0	0.3	20.7	
09/12/2019	2019	13:01	-14.0	0.0	0.2	21.0	

GAS PROBE 7B

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	11:44	-16.0	0.0	0.2	20.5	
20/06/2019	2019	11:22	-15.0	0.0	0.1	20.5	
09/08/2019	2019	11:33	-13.0	0.0	0.0	20.9	
09/12/2019	2019	13:13	-12.0	0.0	0.3	21.0	

GAS PROBE 08A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	11:49	-7.0	0.0	0.1	20.5	
20/06/2019	2019	11:29	-16.0	0.0	0.3	20.2	
09/08/2019	2019	11:40	-15.0	0.0	0.3	20.7	
09/12/2019	2019	13:19	-17.0	0.0	0.1	21.1	

GAS PROBE 09A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	11:56	-5.0	0.0	0.1	20.7	
20/06/2019	2019	11:34	-16.0	0.0	0.3	20.3	
09/08/2019	2019	11:44	-17.0	0.0	0.2	20.8	
09/12/2019	2019	13:24	-14.0	0.0	0.1	21.1	

GAS PROBE 11A

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	14:35	-8.0	4.70	-3.11	0.0	0.0	20.4	
20/06/2019	2019	11:50	-12.0	7.99	0.18	0.0	0.0	20.9	
09/08/2019	2019	11:52	-21.0	7.99	0.18	0.0	0.0	21.2	
09/12/2019	2019	---	---	---	---	---	---	---	

GAS PROBE 11B

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	14:39	-14.0	4.83	2.51	0.0	1.5	19.4	
20/06/2019	2019	11:56	-3.0	5.71	3.39	0.0	1.1	20.1	
09/08/2019	2019	11:56	-13.0	5.79	3.47	0.0	1.5	19.8	
09/12/2019	2019	---	---	---	---	---	---	---	

Appendix D3, continued

GAS PROBE 12A

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	13:37	-12.0	7.29	1.20	0.0	0.0	20.4	
20/06/2019	2019	13:42	-14.0	10.31	4.22	0.0	3.0	9.0	
09/08/2019	2019	13:28	-16.0	10.34	4.25	0.0	1.7	15.7	Dry
09/12/2019	2019	11:07	-8.0	8.36	2.27	0.0	0.3	20.6	

GAS PROBE 12B

Date	Reporting Year	Time	Pressure/Vacuum	Static water level	Exposed screen above water	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	metres	metres	percent in air	percent in air	percent in air	
27/03/2019	2019	13:40	-12.0	6.43	3.62	0.0	5.7	4.2	
20/06/2019	2019	13:46	-14.0	6.54	3.73	0.0	7.5	11.0	Dry
09/08/2019	2019	13:32	7.0	6.53	3.72	0.0	5.4	16.0	Dry
09/12/2019	2019	11:13	-8.0	6.28	3.47	0.0	10.4	4.8	

GAS PROBE 13A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	12:22	-5.0	0.0	1.8	18.8	
20/06/2019	2019	13:08	-7.0	0.0	3.2	17.5	
09/08/2019	2019	12:25	-8.0	0.0	3.1	18.2	
09/12/2019	2019	12:06	-5.0	0.0	1.6	19.4	

GAS PROBE 14A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	12:27	-6.0	0.0	0.2	20.8	
20/06/2019	2019	13:13	-7.0	0.0	0.0	20.7	
09/08/2019	2019	12:30	-16.0	0.0	1.6	19.8	
09/12/2019	2019	12:10	-12.0	0.0	1.5	20.2	

Appendix D3, continued

GAS PROBE 17A HLC

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	12:16	-13.0	0.0	0.0	20.8	
20/06/2019	2019	13:03	-17.0	0.0	0.0	20.4	
09/08/2019	2019	12:20	-15.0	0.0	0.1	20.1	
09/12/2019	2019	12:01	-12.0	0.0	0.1	21.0	

GAS PROBE 18A

Date	Reporting Year	Time	Pressure/Vacuum	Methane (CH_4)	Carbon Dioxide (Co_2)	Oxygen (O_2)	Comment
			inches of water	percent in air	percent in air	percent in air	
27/03/2019	2019	12:52	-18.0	0.0	0.2	20	
20/06/2019	2019	13:33	-9.0	0.0	0.3	19.7	
09/08/2019	2019	12:10	-16.0	0.0	0.0	21.2	
09/12/2019	2019	10:52	-15.8	0.0	0.5	19.2	

APPENDIX E

Grid and Hot Spot Monitoring

E1 Grid and Hot Spot Monitoring Methodology

E2 Grid and Z Point Monitoring Data

E3 Hartland Landfill Historic Z Point Data

Appendix E1 Grid and Hot Spot Monitoring Methodology

The following is the grid sampling field methodology, as outlined in *Hartland Landfill Standard Operating Procedures* (2012).

Monitoring usually takes two full days, beginning at 0730 hours and ending between 1600 and 1630. Prior to each monitoring day, the gas analyzer must be calibrated using the calibration gases at Hartland. At the beginning of each field day, the fuel cell for the Flame Ionization Detector (FID) is filled with hydrogen gas and the unit is warmed up for at least 30 minutes before calibration. Calibration is conducted with two methane span gases (currently 500 ppm and 14,990 ppm methane), and a zero gas to generate a proper calibration slope. After successful calibration, as span check is completed and recorded on the calibration sheet. In addition, the Jerome sensor is regenerated at the beginning and end of each day to remove any residual hydrogen sulphide on the gold sensor.

The Jerome analyzer is factory calibrated and, therefore, does not require field calibration. After regeneration, the instrument is turned on for 30 minutes before zeroing. Once it is zeroed, the zero filter is attached to the unit and a sample is taken.

MONITORING

There is an established walking pattern over the grid points and it denotes two distinct monitoring areas (Phase 1 and Phase 2/Active Face). These areas are monitored separately, due to the distinct differences in gas concentrations, level of landfilling activity, and placement of litter fences. This results in acquisition of data from a similar area under similar environmental conditions, as monitoring typically takes two days. In each area, the grid points are traversed alphabetically (e.g., B1, B2, B3, B4, etc.) where physically possible. In some cases, litter fences, controlled waste trenches or active filling areas limit or restrict access resulting in deviation from the standard protocol. These deviations should be recorded on the field sheet.

Weather conditions dictate when this monitoring can be completed. The FID cannot operate in rainy conditions and monitoring should be delayed until two consecutive days of dry weather are predicted. In addition, high to moderate winds blow gases away from their origin and dilute gas concentrations. These conditions are not representative of typical landfill conditions and monitoring does not take place on these days.

The following procedure is used to collect methane and H_2S readings at each grid point:

1. Place the hydrogen sulphide (H_2S) analyzer on the ground then press the “Sample” button.
2. The second staff person should place the FID intake controller 4 inches from the ground surface for 30 seconds.
3. Once the H_2S analyzer has reported a value (approximately 30 seconds), the methane value should be read from the FID and both values recorded on the field sheet.
4. The FID is programmed to alarm if methane levels exceed 100 ppm. If the alarm sounds while walking a traverse, staff must investigate the area for the source of elevated methane by means of a detailed 10-by-10 metre (m) grid. The 10-by-10 m grid should be traversed between all adjacent grid points. Obvious sources of methane include bird poles or a seam/edge of a temporary closure lining.
5. Once the source has been identified, record the source description, methane and H_2S values, as well as the location coordinates. This data represents a “hot spot” (>1,000 ppm of methane) or “Z-spot” (>12,500 ppm of methane), identified on figures 5 and 6 as a red, or purple, ‘X’, respectively.
6. If an obvious source cannot be identified, the location and data/observations from the highest localized reading should be recorded.
7. Continue with this method until all grid points, background stations, and pre-existing Z-spots have been monitored. Pre-existing Z-spots can be removed from the monitoring list if methane levels are below 1,000 ppm for three consecutive monitoring events.
8. At the end of each field day, a span check is completed on the FID and recorded on the field sheet.

Appendix E2 2019 Grid and Z Point Monitoring Data

Table 1. Hartland Landfill VOC & TRS Grid Data

	Mar-19	
WAYPOINT	Methane (ppm)	H2S (ppm)
B1	0.00	0.000
B2	0.00	0.000
B3	0.00	0.000
B4	0.00	0.000
B5	0.00	0.000
B6	1.03	0.000
B7	0.57	0.000
B8	2.24	0.000
B9	1.42	0.000
B10	0.00	0.000
C1	0.00	0.000
C10	6.20	0.000
C11	13.98	0.000
C2	0.00	0.000
C3	23.02	0.000
C4	6.67	0.000
C5	5.56	0.000
C6	2.27	0.000
C7	4.47	0.000
C8	4.32	0.000
C9	6.89	0.000
D1	0.00	0.000
D10	29.81	3.160
D11	---	---
D2	0.00	0.000
D3	0.30	0.000
D4	4.47	0.000
D5	0.47	0.000
D6	1.58	0.000
D7	23.89	0.000
D8	6.42	0.000
D9	2.56	0.000
E1	0.00	0.000
E10	9.06	0.000
E11	410.00	0.000
E2	0.97	0.000
E3	1.17	0.000
E4	0.00	0.000
E5	0.00	0.000
E6	0.51	0.000
E7	2.08	0.000
E8	1.98	0.000
E9	1.51	0.000
F1	0.00	0.000
F10	0.00	0.000
F11	---	---
F12	---	---

Table 1, continued

	Mar-19	
WAYPOINT	Methane (ppm)	H2S (ppm)
F2	0.00	0.000
F3	0.00	0.000
F4	0.00	0.000
F5	3.89	0.000
F6	7.33	0.00
F7	50.06	0.00
F8	5.23	0.00
F9	---	---
G1	0.00	0.000
G10	0.00	0.000
G12	0.00	0.000
G13	0.00	0.00
G14	---	---
G15	---	---
G2	0.00	0.000
G3	0.00	0.000
G4	0.00	0.000
G5	10.47	0.000
G6	1.63	0.000
G7	10.98	0.000
G8	32.44	0.000
G9	32.08	0.000
H1	0.00	0.000
H10	18.32	0.000
H11	0.00	0.000
H12	38.54	10.430
H13	0.00	0.000
H2	0.00	0.000
H3	0.00	0.000
H4	0.00	0.000
H5	21.42	0.000
H6	32.01	0.000
H7	14.99	0.00
H8	17.58	0.00
H9	7.60	0.00
I1	0.23	0.00
I10	0.00	0.00
I11	0.00	0.00
I12	0.00	0.000
I13	25.89	0.00
I14	26.91	0.000
I15	23.13	0.000
I2	0.00	0.000
I3	0.00	0.000
I4	0.00	0.000
I5	0.00	0.000
I6	0.60	0.000
I7	12.82	0.000
I8	36.74	0.000
I9	0.00	0.000

Table 1, continued

	Mar-19	
WAYPOINT	Methane (ppm)	H2S (ppm)
J1	0.00	0.000
J2	0.00	0.000
J3	0.00	0.000
J4	0.00	0.000
J5	0.00	0.000
J6	0.00	0.000
J7	0.00	0.000
J8	0.00	0.000
J9	0.00	0.000
K1	0.00	0.000
K10	4.23	0.000
K11	0.00	0.000
K12	19.43	0.000
K13	0.00	0.000
K14	0.00	0.000
K15	---	---
K2	0.87	0.000
K3	0.00	0.000
K4	0.00	0.000
K5	0.00	0.000
K6	0.00	0.000
K7	0.00	0.000
K8	0.00	0.000
K9	19.23	0.000
L1	0.62	0.000
L10	0.00	0.000
L11	0.00	0.000
L12	0.00	0.000
L13	66.55	0.000
L14	0.00	0.000
L2	0.00	0.000
L3	0.00	0.000
L4	0.00	0.000
L5	0.00	0.000
L6	0.00	0.000
L7	0.00	0.000
L8	0.00	0.000
L9	0.00	0.000
M1	0.00	0.000
M10	0.00	0.000
M11	2.53	0.000
M12	7.47	0.000
M13	0.00	0.000
M14	0.00	0.000
M2	0.00	0.000
M3	0.00	0.000
M4	0.00	0.000
M5	0.00	0.000
M6	0.00	0.000
M7	0.81	0.000

Table 1, continued

	Mar-19	
WAYPOINT	Methane (ppm)	H2S (ppm)
M8	0.78	3.020
M9	0.00	0.000
N1	0.00	0.000
N10	0.00	0.000
N11	0.00	3.270
N12	0.51	3.880
N13	2.59	4.400
N2	0.00	0.000
N3	0.00	0.000
N4	0.00	3.280
N5	0.00	3.740
N6	0.00	3.510
N7	0.00	3.730
N8	0.00	3.440
N9	10.89	3.470
P1	---	---
P2	2.12	3.430
P3	0.00	3.110
P4	0.00	3.670

Appendix E2, continued

Table 2. Hartland Landfill VOC & TRS Background Monitoring

WayPoint	VOC FID (ppm)	TRS H2S (ppm)
Back 1	0.00	0.000
Back 6	1	4.49
Back 7	0.00	0.000
Back 10	37.00	0.000
Back 11	1.00	3.800
Back 12	0.00	0.000
Back 13	0.00	3.550
Back 20	*not accessible*	*due to construction*
Back 21	*not accessible*	*due to construction*

Appendix E2, continued

Table 3. Hartland Landfill VOC from Walkabout

Date	Point	VOC FID (ppm)	TRS H2S (ppm)	Comments
19-Mar-2019	Z80	72.00	0.00	
19-Mar-2019	Z88	2874.00	0.00	Infrastructure box near top of N. face closure tarp
19-Mar-2019	Z94	2859.00	0.00	Ripped tarp - north closure
19-Mar-2019	Z100	7.00	0.00	
19-Mar-2019	Z101	39.00	0.00	Side of Bench Road between L11 to M11
19-Mar-2019	Z104	4.00	0.00	West face closure - Bench Road by K8
19-Mar-2019	Z106	3950.00	0.00	LFG infrastructure on N. face interim closure
19-Mar-2019	Z107	9.00	0.00	
19-Mar-2019	Z109	0.00	0.00	Tarp seam along W. face closure
19-Mar-2019	Z111	0.00	0.00	LFG infrastructure (small culvert with a 2" gas line running through it - W. face closure near gas well
19-Mar-2019	Z112	0.00	0.00	
19-Mar-2019	Z113	38.00	0.00	Hole in tarp
19-Mar-2019	Z114	0.00	0.00	Hole in tarp
19-Mar-2019	Z116	48.00	0.00	Hole in tarp, could not be located on March 2018 event. May be covered.
19-Mar-2019	Z117	0.00	0.00	
19-Mar-2019	Z118	0.00	0.00	Hole in tarp
19-Mar-2019	Z119	0.00	0.00	4 holes along LFG pipe
19-Mar-2019	Z120	0.00	0.00	3 large holes in tarp, 10 ft west of L14
19-Mar-2019	Z122	64.80	0.00	Concrete box infrastructure with black lid
19-Mar-2019	Z123	28747.00	0.00	Yellow manhole lid, near Z122
19-Mar-2019	Z124	0.00	0.00	Concrete box infrastructure with silver lid by road
19-Mar-2019	Z125	missed	0.00	Box adjacent to Z124, slightly south

Appendix E3 Hartland Landfill Historical Z-Point Data

Northing	Easting	Point	Sort Order	Created	Active? Y or N	Oct-2009	Jan-2010	Jun-2010	Jan-2011	Dec-2011	Mar-2012	May-2012	Jul-2012	Dec-2012	Mar-2013	Oct-2013	Mar-2014	Jul-2014	Mar-2015	Sep-2015	Sep-2016	Mar-2017	Aug-2017	Mar-2018	Mar-2019	Location / notes
5376376.24	465770.27	Z1	1	Apr-2001	N																					
5376382.91	465752.09	Z2	2	Apr-2001	N																					
5376390.19	465731.55	Z3	3	Apr-2001	N																					
5376404.12	465695.20	Z4	4	Apr-2001	N																					
5376409.56	465682.96	Z5	5	Apr-2001	N																					
5376307.82	465646.30	Z6	6	Apr-2001	N																					
5376379.40	465641.99	Z7	7	Apr-2001	N																					
5376358.61	465629.59	Z8	8	Apr-2001	N																					
5376294.56	465571.38	Z9	9	Apr-2001	N																					
5376288.59	465571.74	Z10	10	Apr-2001	N																					
5376301.61	465588.85	Z11	11	Apr-2001	N																					
5376153.49	465921.77	Z12	12	Apr-2001	N																					
5376069.56	465700.69	Z13	13	Jun-2003	N																					
---	---	Z14	14	n/a	N																					
---	---	Z15	15	n/a	N																					
---	---	Z16	16	n/a	N																					
---	---	Z17	17	n/a	N																					
---	---	Z18	18	n/a	N																					
---	---	Z19	19	n/a	N																					
5376240.81	465682.72	Z20	20	Dec-2001	N																					
5376249.22	465672.08	Z21	21	Nov-2002	N																					
5376140.63	465682.91	Z22	22	Dec-2001	N																					
5376199.46	465617.53	Z23	23	Dec-2001	N																					
5376344.34	465719.78	Z24	24	Dec-2001	N																					
5376341.83	465741.15	Z25	25	Dec-2001	N																					
5376332.13	465767.23	Z26	26	Dec-2001	N																					
5376157.75	465907.15	Z27	27	Jun-2003	N																					
5376127.51	465683.22	Z28	28	Jun-2003	N																					
5376305.09	465604.31	Z29	29	Nov-2003	N																					
5376154.49	465756.65	Z30	30	Nov-2003	N																					
5375849.50	465901.32	Z31	31	Dec-2004	N																					
5376179.56	465851.44	Z32	32	Dec-2004	N																					
5376200.63	465818.31	Z33	33	Dec-2004	N																					
5376157.59	465835.86	Z34	34	Dec-2004	N																					
5376147.38	465848.08	Z35	35	Dec-2004	N																					
5376099.41	465792.74	Z36	36	Dec-2004	N																					
5376298.24	465750.39	Z37	37	Dec-2004	N					15																
5376283.62	465801.38	Z38	38	Dec-2004	N																					
5376322.83	465824.59	Z39	39	Dec-2004	N																					
5375817.05	465744.70	Z40	40	Mar-2005	N																					
5376147.36	465850.85	Z41	41	Sep-2005	N																					
5376155.19	465838.23	Z42	42	Sep-2005	N					14,400		---	1,285	1,116	1,442	667	---	565	---	4.27	10.56	DISCONTINUED				
5376256.03	465630.94	Z43	43	Mar-2005	N																					
5376364.18	465792.37	Z44	44	Mar-2005	N																					
5376338.64	465774.39	Z45	45	Feb-2006	N																					
5376322.08	465752.91	Z46	46	Feb-2006	N																					
5376175.39	465850.23	Z47	47	Feb-2006	N					16,700																
5376101.47	465847.01	Z48	48	Feb-2006	N					121																
5375901.10	465848.17	Z49	49	Feb-2006	N					13																
5375953.93	465888.09	Z50	50	Feb-2006	N					43																
5376100.18	465962.24	Z51	51	Feb-2006	N					3																
5375975.37	465696.95	Z52	52	Feb-2006	N					18																
5376194.67	465817.08	Z53	53	Feb-2006	N																					
5376112.28	465834.80	Z54	54	Feb-2007	N					56																
5376360.04	465590.39	Z55	55	Feb-2007	N																					
5376230.52	465707.61	Z56	56	Feb-2007	N																					

Appendix E3, continued

Northing	Easting	Point	Sort Order	Created	Active? Y or N	Oct-2009	Jan-2010	Jun-2010	Jan-2011	Dec-2011	Mar-2012	May-2012	Jul-2012	Dec-2012	Mar-2013	Oct-2013	Mar-2014	Jul-2014	Mar-2015	Sep-2015	Sep-2016	Mar-2017	Aug-2017	Mar-2018	Mar-2019	Location / notes
5376146.42	465711.45	Z57	57	Feb-2007	N					13,500																
5376156.98	465740.43	Z58	58	Feb-2007	N					14																
5376179.09	465731.85	Z59	59	Feb-2007	N																					
		Z60	60	n/a	N																					
5375826.01	465743.17	Z61	61	Mar-2007	N																					
		Z62	62	n/a	N																					
5376202.48	465808.02	Z63	63	Mar-2007	N					432																
5376222.89	465785.18	Z64	64	Mar-2007	N					61,300	1,020	23,500		467		52	53				34.34	DISCONTINUED				
5376022.24	465735.25	Z65	65	Mar-2007	N																					
5376254.13	465648.75	Z66	66	Mar-2007	N																					
5376200.88	465678.92	Z67	67	Mar-2007	N					10,100																
5376231.00	465640.00	Z68	68	Nov-2007	N					17																
5376259.00	465772.00	Z69	69	Mar-2008	N					2																
5376112.00	465801.00	Z70	70	Nov-2007	N																					
5376097.00	465704.00	Z71	71	Sep-2008	N					573																
5376153.49	465921.77	Z72	72	Sep-2008	N																					
5376307.59	465739.45	Z73	73	Sep-2008	N					3																
5376230.77	465743.00	Z74	74	Sep-2008	N																					
5375953.74	465849.99	Z75	75	Sep-2008	N					26																
5376050.48	465710.00	Z76	76	Feb-2009	N					33																
5376051.20	465820.81	Z77	77	Feb-2009	N					13																
5376222.29	465772.39	Z78	78	Feb-2009	N					97																
5376120.72	465805.84	Z79	79	Feb-2009	N					88																
5376199.66	465562.00	Z80	80	Oct-2009	N					26,800	13,100	48,600	21,100	15,000	12,500	14	66.1	5,048	326	5032	MISSED	MISSED	0	79	72	
5376249.92	465708.55	Z81	81	Oct-2009	N					106																
5376240.56	465727.11	Z82	82	Oct-2009	N																					
5376354.32	465720.64	Z83	83	Oct-2009	N					5																
5375847.24	465856.80	Z84	84	Jan-2010	N					56		9,890	3,706	12,000	886	12	174	DISCONTINUED								
5375908.06	465797.51	Z85	85	Jan-2010	N					24																
5376299.34	465738.10	Z86	86	Jan-2010	N					21,000	11,700	32,200	28,800	2,798	4	38	18,600	3,076	8	35	4.01	DISCONTINUED				
5376293.64	465535.40	Z87	87	Jan-2010	N					60,000	51,700	38,000	11,700	15,000	7,200	29	10,800	20,800	1,326	13	0.7	MISSED	10.27	MISSED	DISCONTINUED	
5376317.71	465627.16	Z88	88	Jan-2010	Y		50,000	0	2,395	15,000	22,000	15,000	10,300	15,000	8,720	3,600	41,700	8,919	10,500	15,400	15700	4,700	10,300	6,370	2,874	Infrastructure box near top of N. face closure tarp
		Z89	89		N					170																
		Z90	90		N					3,028																
		Z91	91		N					364																
		Z92	92		N					1,049		15,000	19,200	52	463	discontinued										
		Z93	93		N					23		3,791				56	70.9									
5376339.03	465598.07	Z94	94	Jan-2011	Y				12,500	20,000	15,000	15,000	79,700	15,000	12,500	MISSED	23,800	73,200	42,100	41,400	134	14,000	11,300	16,700	2,859	Ripped tarp - north closure
		Z95	95		N					1,490	34,400	34,400		3	29	12	DISCONTINUED									
		Z96	96		N					927			3,668	423	261	28	DISCONTINUED									
		Z97	97		N					1,750			2,280	2	5	37	DISCONTINUED									
		Z98	98		N					5,364			1,032	7	1	1	DISCONTINUED									
		Z99	99		N					3,800					---											
5376298.15	465682.45	Z100	100		Y					2,300	15,000	15,000	10,800	15,000	12,500	1,088	18,900	314	5,685	11,200	3.21	MISSED	MISSED	MISSED	7	
5376283.35	465708.83	Z101	101	Dec-2011	Y					11,700	23	17,800	30,900	15,000	12,500	127	14,500	17,600	2,803	28,200	52	8,500	85.81	1,400	39	Side of Bench Road between L11 to M11
		Z102	102		N						9,657	14,700		352	360	13	3	DISCONTINUED								
		Z103	103		N						13,700	15,000	6,400	2,531	12,500	27	5.4	DISCONTINUED								
5376171.21	465831.76	Z104	104	Mar-2012	Y						32,500	18,000	19,400	5,325	12,500	2,510	36,500	12,300	19,700	1,168	84	6,600	172	4	4	West face closure - Bench Road by K8

Appendix E3, continued

Northing	Easting	Point	Sort Order	Created	Active? Y or N	Oct-2009	Jan-2010	Jun-2010	Jan-2011	Dec-2011	Mar-2012	May-2012	Jul-2012	Dec-2012	Mar-2013	Oct-2013	Mar-2014	Jul-2014	Mar-2015	Sep-2015	Sep-2016	Mar-2017	Aug-2017	Mar-2018	Mar-2019	Location / notes
		Z105	105		N							6,766	3,865	1,531	360	88	36	DISCONTINUED								
5376327.32	465654.99	Z106	106	May-2012	Y							61,300	35,700	42,000	12,500	6,566	2,693	9,300	2,072	8,086	50,300	11,000	1989	0	3950	LFG infrastructure on N. face interim closure
5376291.17	465680.05	Z107	107		Y							1,600	3,376		25	113	25,000	12,200	83	23,500	8		0	MISSED	9	
		Z108	108		Y										12,500	7	0.31	15,500	3							
5376181.69	465671.86	Z109	109	Dec-2012	Y									1,800	88	52	7,559	13	30,100	3	7,924	13,000	1,199	1	0	Tarp seam along W. face closure
		Z110	110																							
5376292.76	465689.88	Z111	111	Dec-2012	Y									138,900	10,900	4,200	53.2	26,900	385	5,270	84	1,200	1,127	2	0	LFG infrastructure (small culvert with a 2" gas line running through it - W. face closure near gas well
		Z112	112		Y										12,500	12	76,800	32	48,400	7,000	105		MISSED	1	0	
5376254.68	465641.39	Z113	113	Oct-2013	Y											9,466	5,900	30,000	31,600	MISSED	26,700	25,000	17,300	9	38	Hole in tarp
5376257.42	465644.69	Z114	114	Oct-2013	Y											48,400	---	34,400	11,400	MISSED	185	25,000	13,100	12	0	Hole in tarp
		Z115	115		Y											61,800	---	6,560	12,900	MISSED	1	MISSED	MISSED	MISSED		
5376251.73	465651.90	Z116	116	Mar-2013	Y												---	MISSED	MISSED	MISSED	MISSED	25,000	23,500	21	48	Hole in tarp could not be located on March 2018 event. May be covered.
		Z117	117		Y												26,500	MISSED	30,700	MISSED	6	MISSED	MISSED	9	0	
5376314.21	465611.88	Z118	118	Jul-2014	Y												12,600	3600	MISSED	9,639	10	25	1,032	1,407	0	Hole in tarp
5376296.43	465718.43	Z119	119	Jul-2014	Y												15,900	15,900	16,200	7,000	4,773	6,966	8,890	3,100	0	4 holes along LFG pipe
5376250.71	465549.48	Z120	120	Mar-2015	N														16,900	MISSED	2	17,000	-0.66	4	0	3 large holes in tarp, 10 ft west of L14
		Z121	121		N															1,000						
5375893.77	465680.50	Z122	122	Mar-2017	Y																MISSED	8,500	7,224	MISSED	64.80	Concrete box infrastructure with black lid
5376018.60	465942.74	Z123	123	Mar-2017	Y																MISSED	8,400	365	MISSED	28747.00	Yellow manhole lid, near Z122
5376156.54	465848.29	Z124	124	Mar-2017	Y																MISSED	6,300	6,645	3,288	0.00	Concrete box infrastructure with silver lid by road
5376155.12	465848.01	Z125	125	Mar-2017	Y																MISSED	14,000	3,002	5,028	missed	Box adjacent to Z124, slightly South

Existing hot spots surveyed	0	1	1	2	44	12	19	18	22	25	29	32	26	23	23	27	22	24	24	20
Missed (m)	0	0	0	0	0	0	0	0	0	0	1	0	2	2	6	6	5	4	6	1
Active z pts at start	0	1	1	2	44	12	19	18	22	25	29	32	26	23	23	27	25	24	24	23
Added - new (n)	4	5	0	1	1	1	1	0	2	1	2	0	2	0	0	0	4	0	0	0
Discontinued at end of survey	0	0	0	0	0	0	0	0	0	0	1	4	4	0	0	0	3	0	0	3
Max Methane Concentration	0	50,000	0	12,500	61,300	51,700	61,300	79,700	138,900	12,500	61,800	76,800	73,200	48,400	41,400	50,300	25,000	23,500	16,700	28,747

Notes:

	Methane over 1,000 ppm
	Methane under 1,000 ppm

APPENDIX F

Landfill Gas Speciation Data

F1 Hartland Monthly Gas composition Data (March 2019-April 2020)

F2 Hartland Landfill Ambient VOC Data

F3 Landfill Gas Speciation Technical Summary 2019-2020

Appendix F1 Hartland Monthly Gas composition Data (March 2019-April 2020)

Parameter	Date	5-Apr-19	28-May-19	3-Jul-19	27-Jul-19	15-Aug-19	23-Oct-19	31-Oct-19	21-Nov-19	26-Nov-19	9-Dec-19	12-Dec-19	29-Jan-20	28-Feb-20	25-Mar-20	Max.	Min.	TWA (ppm)	STEL/ Ceiling (ppm)	Notations
	CAS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm			
Ammonia	7664-41-7	<2.6	<3.30	<2	1.1	4.30	<0.31	<0.46	---	---	<0.42	<0.48	---	<0.48	0.55	0.63	4.30	0.55	25	35	
Acetone	67-64-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	250	500	
Benzene	71-43-2	---	**7.01**	0.485	**0.613**	**0.61**	**7.887**	---	---	0.275	0.3662	---	**0.642**	0.426	**0.582**	7.89	0.28	0.5	2.5	skin; A1, 1
Bromodichloromethane	75-27-4	---	0.33	<0.0403	<0.045	<0.039	<0.021	---	---	<0.0001	<0.0004	---	<0.001	<0.0012	<0.0045	0.33	0.33			2B
Bromoform	75-25-2	---	0.036	<0.0005	<0.001	<0.001	<0.0813	---	---	<0.0006	<0.0006	---	<0.001	<0.0006	<0.0174	0.04	0.04	0.5		
4-Bromofluorobenzene	460-004	---	1027000	964000	1041000	1028000	964000	1048000	---	959000	1046000	---	982000	961000	961000.00	1048000	959000			
Bromomethane (Methyl bromide)	74-83-9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	1		skin
n-butane	106-97-8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		1000	EX
2-Butanone	78-93-3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	50	100	
n-Butyl mercaptan	109-79-5	<0.004	0.010	0.0091	< 0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.0100	0.0091	0.5		
Butyl(t) mercaptan	75-66-1	0.0544	0.093	0.0306	< 0.004	0.0462	0.0449	0.0379	---	0.053	0.0466	---	0.055	0.1	0.110	0.1100	0.0306			
Carbon Disulfide	75-15-0	<0.0499	0.055	0.0248	0.0038	0.0264	0.0351	0.0345	---	0.031	0.0257	---	0.022	0.027	0.036	0.0550	0.0038	4	12	Skin
Carbonyl sulfide	463-58-1	<1.6	0.054	0.0181	0.0199	<0.004	0.0337	0.0383	---	<0.6	<1.3	---	<0.025	0.041	0.065	0.1	0.0	5		
Carbon Tetrachloride	56-23-5	---	<0.0043	<0.0001	<0.0001	<0.0001	<1.558	---	---	<0.0381	<0.0366	---	<0.043	<0.0445	<0.0636	0.00	0.00	2		skin; A2, 2B
Chlorobenzene	108-90-7	---	0.371	0.0445	0.0528	0.04	0.606	---	---	0.002	0.0367	---	0.080	0.02	0.0348	0.61	0.00	10		
Chloroethane (Ethyl chloride)	75-00-3	---	<2.08	<0.163	<0.152	<0.197	<5.305	---	---	<0.1516	<0.1099	---	<0.182	<0.1516	<1.1369	0.00	0.00	100		skin
Chloroform	67-66-3	---	<0.084	<0.0016	<0.003	<0.002	<0.057	---	---	<0.0012	<0.0012	---	<0.002	<0.0018	<0.0037	0.00	0.00	2		2B; R
Chloromethane (methyl chloride)	74-87-3	---	<14.53	<0.286	<0.533	<0.412	<1.259	---	---	<0.2663	<0.0775	---	<0.281	<0.2615	<0.4261	0.00	0.00	50	100	skin; R
Decane (nC10)	124-18-5	---	<1.72	0.3420	0.6702	0.186	3.437	---	---	<0.0086	<0.1569	---	0.563	<0.0301	<0.2578	3.44	0.19			
Dibromochloromethane	124-48-1	---	<0.387	<0.0063	<0.024	<0.020	<0.329	---	---	<0.0023	<0.0023	---	<0.002	<0.0023	<0.0704	0.00	0.00			
1,2-Dibromoethane (Ethylene dibromide)	106-93-4	---	---	---	---	---	---	---	---	---	---	---	---	---		0.00	0.00	0.5		skin; 2A
Dibromomethane	74-95-3	---	---	---	---	---	---	---	---	---	---	---	---	---		0.00	0.00			
Dichlorodifluoromethane	75-71-8	---	---	---	---	---	---	---	---	---	---	---	---	---		0.00	0.00	1000		
1,2-dichlorobenzene	95-50-1	---	<0.20	<0.0027	<0.005	<0.004	<0.699	---	---	<0.0050	<0.0048	---	<0.004	<0.0045	<0.1497	0.00	0.00	25	50	
1,3-Dichlorobenzene (o-dichlorobenzene)	541-73-1	---	<0.068	<0.0009	<0.002	<0.001	<0.233	---	---	<0.0017	<0.0016	---	<0.001	<0.0001	<0.0499	0.00	0.00			
1,4-dichlorobenzene (p-dichlorobenzene)	106-46-7	---	0.103	0.0318	0.076	0.014	0.266	---	---	<0.0017	0.0098	---	0.036	<0.0016	<0.0499	0.27	0.01	10		2B
1-1,dichloroethane	75-34-3	---	0.550	<0.0519	0.097	0.045	0.600	---	---	0.034	<0.0272	---	0.040	0.031	0.04	0.60	0.03	100		
1-2,dichloroethane (ethylene dichloride)	107-06-2	---	<0.020	<0.0011	<0.007	0.105	<1.433	---	---	<0.0494	<0.0618	---	<0.047	<0.047	<0.0791	0.11	0.11	1	2	2B
1,1-Dichloroethene (1,1-dichloroethylene)	75-35-4	---	<0.139	0.0101	0.011	0.01	0.152	---	---	0.012	<0.0098	---	0.015	0.014	0.01	0.15	0.01	1		2B
1,2-dichloroethylene (1,2-dichloroethene)	156-59-2	---	11.20	0.852	0.714	1.009	12.535	---	---	0.618	0.6179	---	0.772	0.684	0.83	12.54	0.62	200		
trans-1,2-Dichloroethene	156-60-5	---	0.522	0.0547	0.046	0.053	0.656	---	---	0.035	0.0424	---	0.108	0.075	<0.0757	0.66	0.03	200		
1,2-Dichloropropane (propylene dichloride)	78-87-5	---	0.346	<0.0368	<0.028	<0.026	<0.757	---	---	<0.0162	<0.0260	---	<0.052	<0.043	<0.0476	0.35	0.35	75	110	1; S (D)
1,3-Dichloropropene (1,3-dichloropropylene cis and trans)	542-75-6	---	<0.200	<0.0117	<0.022	<0.022	<0.156	---	---	<0.0004	<0.0013	---	<0.002	<0.002	<0.0093	0.00	0.00	1		skin; 2B
cis-1,3-Dichloropropylene (1,3-dichloropropene)	542-75-6	---	<0.0757	<0.00584	<0.013	<0.015	<0.151	---	---	<0.0002	<0.0002	---	<0.001	<0.0002	<0.0065	0.00	0.00			
trans-1,3-Dichloropropylene (1,3-dichloropropene)	542-75-6	---	<0.180	<0.0132	<0.017	<0.015	<0.030	---	---	<0.0002	<0.0013	---	<0.002	<0.0017	<0.0065	0.00	0.00			
Diethyl disulfide	110-81-6	<0.002	<0.0025	<0.002	<0.002	<0.002	<0.002	<0.002	---	<0.002	<0.002	---	<0.013	<0.016	<0.029	0.000	0.000			
Diethyl Sulfide	352-93-2	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.000	0.000			
Dimethyl sulfide	75-18-3	0.0799	0.110	0.0023	0.0334	0.0478	0.0827	0.0703	---	0.073	0.0501	---	<0.013	0.062	0.075	0.1100	0.0023	10		
Dimethyl disulfide	624-92-0	<0.002	0.0053	0.0474	<0.002	<0.002	0.0042	<0.002	---	<0.002	<0.002	---	0.04	<0.016	<0.029	0.0474	0.0042	0.5		skin
2,5-Dimethylthiophene	638-02-8	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.000	0.000			
Ethylbenzene	100-41-4	---	17.27	2.11	2.441	1.808	29.014	---	---	0.085	1.2757	---	2.786	0.652	1.695	29.01	0.09	20		2B
Ethyl mercaptan	75-08-1	0.0747	0.088	0.0302	<0.004	0.046	0.0494	0.0316	---	0.060	0.0605	---	0.066	0.058	0.090	0.0900	0.0302	0.5		
Ethyl Methyl Sulfide	624-89-5	<0.004	<0.002	0.0055	<0.004	<0.004	0.0053	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.006	0.005	100		skin
2-Ethylthiophene	872-55-9	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.000	0.000			
n-heptane	142-82-5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	400	500	
n-hexane	110-54-3	---	**28.94**	1.756	1.5888	2.043	**24.456**	---	---	1.387	1.1632	---	1.646	1.4186	1.419	28.94	1.16	20		skin
2-Hexanone (methyl butyl ketone)	591-78-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	5	10	skin; R
Isobutyl Mercaptan	513-53-1	0.0644	0.130	0.0589	<0.004	<0.004	<0.004	0.0112	---	<0.004	<0.004	---	0.054	0.068	0.12	0.1300	0.0112			
Isopropyl Mercaptan	75-33-2	0.489	0.570	0.182	<0.004	0.261	0.301	0.205	---	0.346	0.35	---	0.38	0.45	0.67	0.670	0.182			
Isopropanol	67-63-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200	400	
Isopropylbenzene (cumene)	98-82-8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	25	75	2B
4-Methyl-2-pentanone (methyl isopropyl ketone)	108-11-2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	20	75	2B
Methyl acetate	79-20-9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200	250	
Methyl t-butyl ether (MTBE)	1634-04-4	---	<0.582	0.00999	<0.014	<0.012	<1.942	---	---	<0.0139	<0.0136	---	<0.013	<0.0136	<0.4161	0.01	0.01	50		
Methylene Chloride (syn: Dichloromethane)	75-09-2	---	<0.806	<0.0605	<0.052	<0.049	<0.950	---	---	<0.0576	<0.0403	---	<0.060	<0.0576	<0.0864	0.00	0.00	25		2A
Methyl mercaptan	74-93-1	0.0258	0.040	0.0108	<0.004	0.006	0.0194	0.0074	---	0.023	0.0146	---	0.047	0.068	0.06	0.0680	0.0060	0.5		
2-Methylthiophene	554-14-3	<0.004	---	0.0236	<0.004	0.0165	0.0053	<0.004	---	<0.004	<0.004	---	---	---	---	0.024	0.005			
3-Methylthiophene	616-44-4	<0.004	0.037	0.0283	<0.004	0.0181	0.0088	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.037	0.009			
n-nonane	111-84-2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200		
n-octane	111-65-9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	300		
n-pentane	109-66-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	1000		

Appendix F1, continued

Parameter	Date	5-Apr-19	28-May-19	3-Jul-19	27-Jul-19	15-Aug-19	23-Oct-19	31-Oct-19	21-Nov-19	26-Nov-19	9-Dec-19	12-Dec-19	29-Jan-20	28-Feb-20	25-Mar-20	Max.	Min.	TWA (ppm)	STEL/ Ceiling (ppm)	Notations
	CAS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm			
phenol	108-95-2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	5		skin
n-Propyl Mercaptan (propanethiol)	107-03-9	0.072	0.069	0.0231	<0.004	0.04	0.0368	0.021	---	0.039	0.0496	---	0.044	0.054	0.052	0.072	0.021			
sec-Butyl Mercaptan + Thiophene	513-53-1	0.362	---	0.163	<0.006	0.22	0.17	0.11	---	0.163	0.207	---	---	---	---	0.362	0.110			
Styrene	100-42-5	---	<1.62	<0.158	0.256	<0.153	1.697	---	---	0.003	0.0901	---	0.219	0.0279	0.0657	1.70	0.00	20	40	2B
Thiophene	110-02-1	---	0.410	---	---	---	---	---	---	---	---	---	0.200	0.240	0.34	0.41	0.20			
1,1,1,2-Tetrachloroethane	630-20-6	---	<0.00903	<0.000117	<0.0002	<0.0002	<0.020	---	---	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0044	0.00	0.00			2B
1,1,2,2-Tetrachloroethane	79-34-5	---	<0.204	<0.0306	<0.061	<0.010	<0.041	---	---	<0.0004	<0.0022	---	<0.019	<0.0001	<0.0035	0.00	0.00	1		skin; 2B
Tetrachloroethene (tetrachloroethylene)	127-18-4	---	0.7962	0.104	<0.265	0.081	0.973	---	---	0.006	0.0548	---	0.107	0.038	<0.0885	0.97	0.01	25	100	2A
Tetrahydrothiophene	110-01-0	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.00	0.00			
Toluene	108-88-3	---	**100.30**	6.820	6.501	7.165	**100.305**	---	---	1.056	5.1214	---	8.518	4.591	7.2973	100.30	1.06	20		R
1,1,1-Trichloroethane (methyl chloroform)	71-55-6	---	<0.075	<0.0099	<0.014	<0.008	<0.128	---	---	0.004	0.0020	---	0.005	0.002	<0.0275	0.01	0.00	350	450	
1,1,2-Trichloroethane	79-00-5	---	<0.220	<0.00178	<0.003	<0.002	<0.068	---	---	<0.0007	<0.0072	---	<0.008	<0.0044	<0.0044	0.00	0.00	10		skin
Trichloroethene (trichloroethylene)	79-01-6	---	0.983	<0.100	0.082	0.077	<1.042	---	---	<0.0223	<0.0428	---	<0.078	<0.0447	<0.0633	0.98	0.08	10	25	A2, 2A
Trichlorofluoromethane	75-69-4	---	3.328	0.388	0.262	<0.231	1.531	---	---	0.091	0.0587	---	0.056	0.046	<0.2670	3.33	0.05		C 1000	
1,2,4-trimethylbenzene	95-63-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	25		
Vinyl Chloride	75-01-4	---	**16.391**	**1.260**	**1.154**	**1.53**	**<8.998**	---	---	**<1.956**	0.8763	---	**<1.878**	**<1.9169**	**<1.7995**	16.39	0.88	1		A1, 1
ortho-Xylene	95-47-6	---	7.002	0.891	1.131	0.693	14.003	---	---	0.024	0.5343	---	1.207	0.27	0.6218	14.00	0.02			
meta-& para-Xylene	108-38-3 & 106-42-3	---	24.874	3.178	3.823	2.464	41.226	---	---	0.103	1.7849	---	4.169	0.70	2.2709	41.23	0.10			
Xylenes	1330-20-7	---	31.777	4.076	4.951	3.155	55.265	---	---	0.127	2.3257	---	5.388	0.97	2.9014	55.27	0.13	100	150	
Methane	74-82-8	439000	436000	454000	447000	437000.00	445000	399000	---	481000	429000	464000	427000	443000	447000.0	481000	399000		simple asphixiant	EX
Carbon Monoxide	630-08-0	<2.5	**<500**	**<500**	**<500**	**<500**	**<500**	**<500**	---	**<500**	**<500**	**<500**	**<500**	**<500**	**<500**	0.0	0.0	25	100	R
Carbon dioxide	124-38-9	**273000**	**327000**	**385000**	**368000**	**359000**	**340000**	**305000**	---	**381000**	**313000**	**380000**	**292000**	**356000**	**343000**	385000	273000	5000	15000	
Nitrogen	7727-37-9	149000	188000	167000	181000	168000	169000	251000	---	136000	186000	165000	207000	208000	202000				simple asphixiant	
Oxygen	7782-44-7	14000	14500	10100	10000	11800	11400	36900	---	9300	16600	13600	29700	19300	14100					
Hydrogen sulfide	7783-06-4	**37.10**	0.60	5.20	<0.004	9.0	**14.5**	**16.9**	---	**27.8**	**30.9**	---	**51**	**89**	**27**	89.00	0.60		10	ceiling
Total Reduced Sulfur (22) as H2S	30-39-5	38.40	2.50	5.90	0.057	9.8	15.3	17.5	---	28.6	31.7	---	52	90	28					
Aggregate Organics																				
D3(CVMS) Hexamethylcyclotrisiloxane	541-05-9	<0.0632	<0.0256	<0.0256	0.97	0.06	0.057	0.048	0.123	0.050	0.0753	---	<0.026	0.06	0.146	0.97	0.05			
D4 (CVMS) Octamethylcyclotetrasiloxane	556-67-2	<0.0140	<0.0140	0.18	0.10	0.41	0.772	0.472	1.179	0.325	0.7056	---	0.622	0.29	0.655	1.18	0.10			
D5 (CVMS) Decamethylcyclopentasiloxane	541-02-6	<0.0112	<0.0112	0.12	<0.016	0.15	0.298	0.166	0.857	0.066	0.2631	---	0.222	0.03	0.215	0.86	0.03			
D6 (CVMS) Dodecamethylcyclohexasiloxane	540-97-6	<0.0093	<0.0093	<0.00934	<0.092	0.01	<0.009	<0.009	<0.009	0.009	0.0099	---	<0.009	<0.0093	<0.0093	0.01	0.01			
MM(LVMS) Hexamethyldisiloxane	107-46-0	<0.0256	<0.0256	0.15	0.22	0.19	0.294	0.271	0.388	0.468	0.3027	---	0.191	0.41	0.255	0.47	0.15			
MDM (LVMS) Octamethyltrisiloxane	556-67-2	<0.0140	<0.0140	<0.0140	0.02	0.02	0.027	0.022	0.017	0.017	0.0313	---	0.015	0.02	0.026	0.03	0.02			
MD2M (LVMS) Decamethyltetrasiloxane	141-62-8	<0.0134	<0.0134	<0.0134	<0.013	<0.013	<0.013	<0.013	<0.013	0.013	<0.0134	---	<0.013	<0.0134	<0.0134	0.01	0.01			
MD3M (LVMS) Dodecamethylpentasiloxane	541-02-6	<0.0112	<0.0112	<0.0112	<0.011	<0.011	<0.011	<0.011	<0.011	0.011	0.0132	---	<0.011	<0.0112	<0.0112	0.01	0.01			
Aliphatic hydrocarbon gases																				
Ethane	78-84-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		simple asphixiant	EX
Butane	106-97-8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		1000	EX
Butene	9003-28-5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00			(I)
Pentene	646-04-08	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00			
Propane	74-98-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		simple asphixiant	EX
Ethene	74-85-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200 ppm		
Propene	115-07-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	500 ppm		
Pentane	109-66-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	1000		
Hexene	592-41-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	50 ppm		R

Notes:
Blank cells = below detection limit
ND = not detected
All data taken from the gas plant piping after the blowers
The term "Skin" identifies substances that contribute significantly to the overall exposure by the skin route. For more information see OHS Guideline G5.52.
ACGIH notations A1 and A2 and IARC notations 1, 2A and 2B indicate substances designated as carcinogens under section 5.57(1) of the OHS Regulation. The different categories used by the two organizations indicate different levels of certainty of carcinogenic effect, e.g. from confirmed carcinogen to probable or possible. For more information see OHS Guideline G5.57.
The letter "R" means that the substance has an adverse reproductive effect under section 5.57(1) of the OHS Regulation. For more information see OHS Guideline G5.57.
The letter "S" indicates that the substance is a sensitizer under section 5.57(1) of the OHS Regulation. For more information see OHS Guideline G5.57.
The letter "C" indicates a ceiling limit, which is defined in section 5.1 of the OHS Regulation.
ACGIH notations A1 and A2 and IARC notations 1, 2A and 2B indicate substances designated as carcinogens under section 5.57(1) of the OHS Regulation. The different categories used by the two organizations indicate different levels of certainty of carcinogenic effect, e.g. from confirmed carcinogen to probable or possible. For more information see OHS Guideline G5.57.
The term "Skin" identifies substances that contribute significantly to the overall exposure by the skin route. For more information see OHS Guideline G5.52.
The term "R" identifies substances with an adverse reproductive effect under section 5.57(1) of the OHS Regulations
The term "EX" identifies substances that are flammable asphixiants or excursion above the exposure limit could approach 10% of the lower explosive limit

Appendix F2 Hartland Landfill Ambient VOC Data

Date	30-Nov-99							20-Dec-00					19-Dec-01			
Site / Parameter (ppm)	Maint. Shop	G-9	J-6	P-5 Background	F-8	I-8	D-11	North Toe #5	D-11	J-6	J-7	H-8	Z-9	Z-11	Z-24	Z-26
Total Hydrocarbons	1.1	1849.0	13984.0	10.0	19999.0	2184.0	15354.0	6560.0	11736.0	6028.0	17793.0	ND	>20,000	>20,000	>20,000	>20,000
Benezene	0.0	0.0	0.0046*	0.0	0.0	0.0	<	0.0	0.0	0.0	0.0	0.0	<	<	<	<
Chlorobenzene	<	<	0.0	<	0.0	<	<	0.0	<	0.0	<	0.0	<	<	<	<
Ethylbenzene	<	<	0.002*	0.0	0.0023*	0.0	<	0.0	0.0	0.0	0.0	0.0	<	<	<	<
Tetrachloroethene	<	0.0	0.0	<	<	<	<	0.0	<	0.0	0.0	0.0	<	<	<	<
Toluene	0.0	0.0087*	0.0076*	0.0	0.009*	0.0058*	<	<	0.0	0.0	0.0	0.0	<	<	<	<
Xylenes	0.0	0.0	0.004*	0.0	0.0041*	0.0	<	0.1	0.0	0.0	0.0	0.0	<	<	<	<

Notes:
< Below detection limit
* Sample saturated, actual results could be 20 to 100% higher
ND Not done

Landfill Gas Speciation Technical Summary 2019-2020

Capital Regional District | Parks & Environmental Services, Environmental Protection

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September 2020

LANDFILL GAS SPECIATION TECHNICAL SUMMARY
2019-2020

1.0 INTRODUCTION

Landfill gas (LFG) quality is monitored and reviewed by Hartland and GeoEnvironmental staff on a routine basis to support regulatory requirements, gas-to-energy usage, well-field balancing, and health and safety programs. Current monitoring programs review key constituents, according to industry standards, that are relevant to regulatory compliance, optimizing usage/collection efficiency, maintaining health and safety, and tracking trends over time.

In 2019, to support LFG capital planning, staff completed a comprehensive sampling program. This monitoring program consisted of monthly sampling for an extensive list of parameters. This report reviews the monthly sampling data collected between April 2019 and March 2020, as well as historical datasets for specific parameters, back to 2009. Data were assessed against gas plant flows, ambient temperature and precipitation.

Comprehensive gas sampling and analysis was conducted to assist with detailed screening of possible gas upgrading technologies to support the Capital Regional District's (CRD) renewable natural gas (RNG) initiative. Thresholds for pipeline quality gas have been established by the receiver (FortisBC) and are compared against raw LFG concentrations, where applicable, to focus gas upgrading technology screening and selection processes by CRD staff. A health and safety review of gas concentrations (against WorkSafeBC criteria) is not included within the scope of this document, but is included within the 2019 Landfill Gas Report for Hartland Landfill.

2.0 LANDFILL GAS FLOWS AND CLIMATE

LFG flows were reviewed and compared to barometric pressure[1], temperature[2] and precipitation[3] from April 2019-March 2020. LFG flows followed a trend similar to previous years, with maximum flows reached in June, followed by a decline to seasonal lows in the late fall/early winter.

[1] Source: Environment Canada Weather Station: Victoria International Airport – hourly average (kPa).
[2] Source: Hartland weather station – hourly average (C^{o})
[3] Source: Environment Canada Weather Station: Victoria International Airport – Daily total precipitation

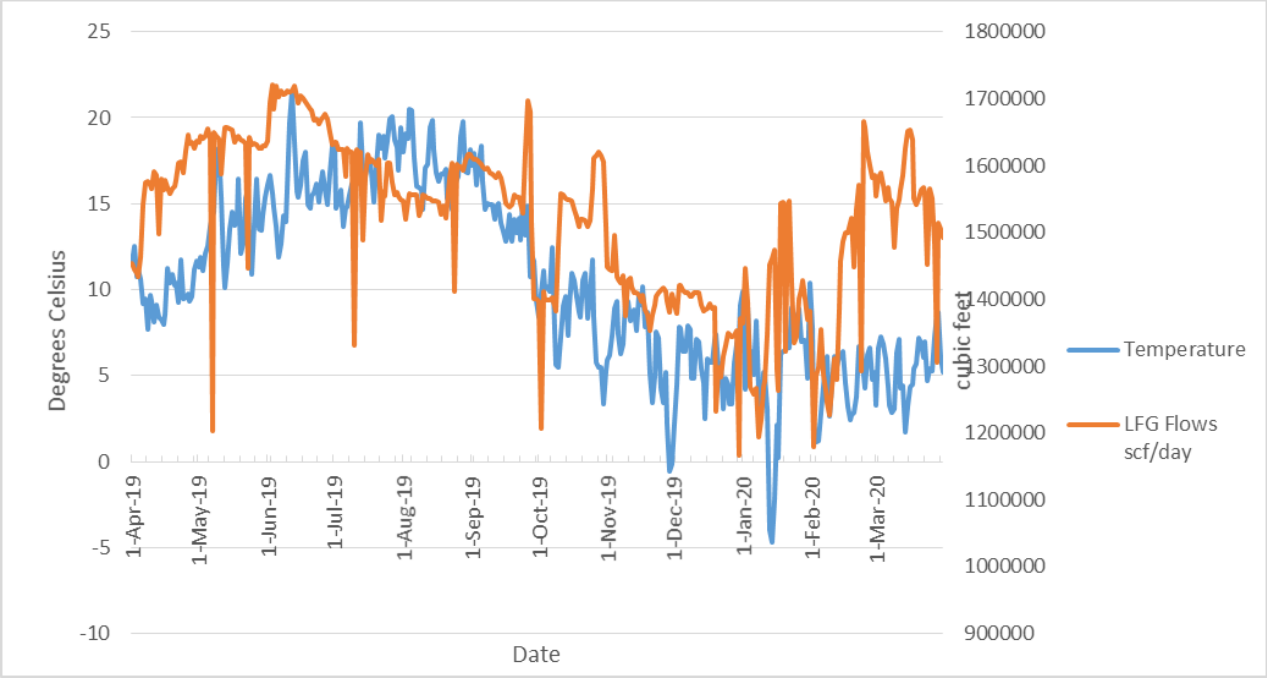

Figure 1 **LFG Flows and Daily Average Temperature**

LFG flows and average daily temperature largely followed the same trend except for two periods in August 2019 and March 2020. In August 2019, after an extended dry period (see Figure 2), LFG declined, likely due to a decrease in moisture within the waste mass. In February/March, LFG production increased significantly after extreme precipitation levels in February. The lag time between extreme precipitation and increased gas production may be the period at which the refuse reached an ideal moisture content, leading to an increase in anaerobic productivity. The amount of precipitation a landfill receives has a significant impact on LFG generation rates (Conestoga-Rovers & Associates, 2010).

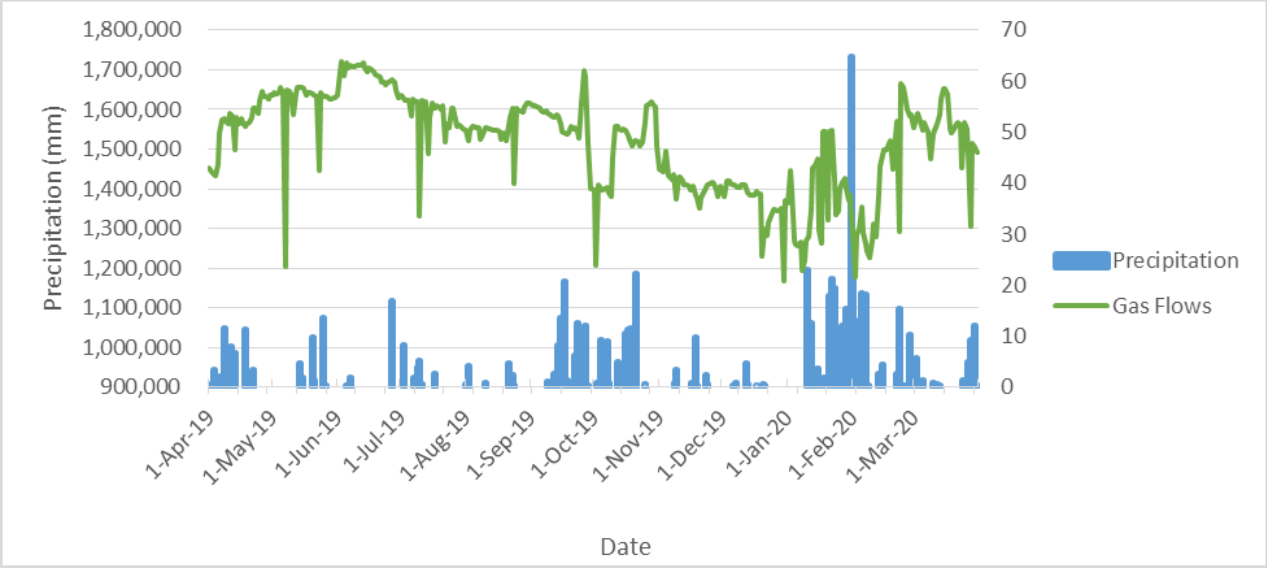

Figure 2 **LFG Flows (scf/day) and Total Daily Precipitation**

Barometric pressure can also affect LFG generation rates (Bentley, et al, 2003). At Hartland, barometric pressure and LFG flows appear to have an inverse relationship, as expected, with low barometric pressures largely correlating with higher gas flows. This trend is also observed with fugitive surface emissions.

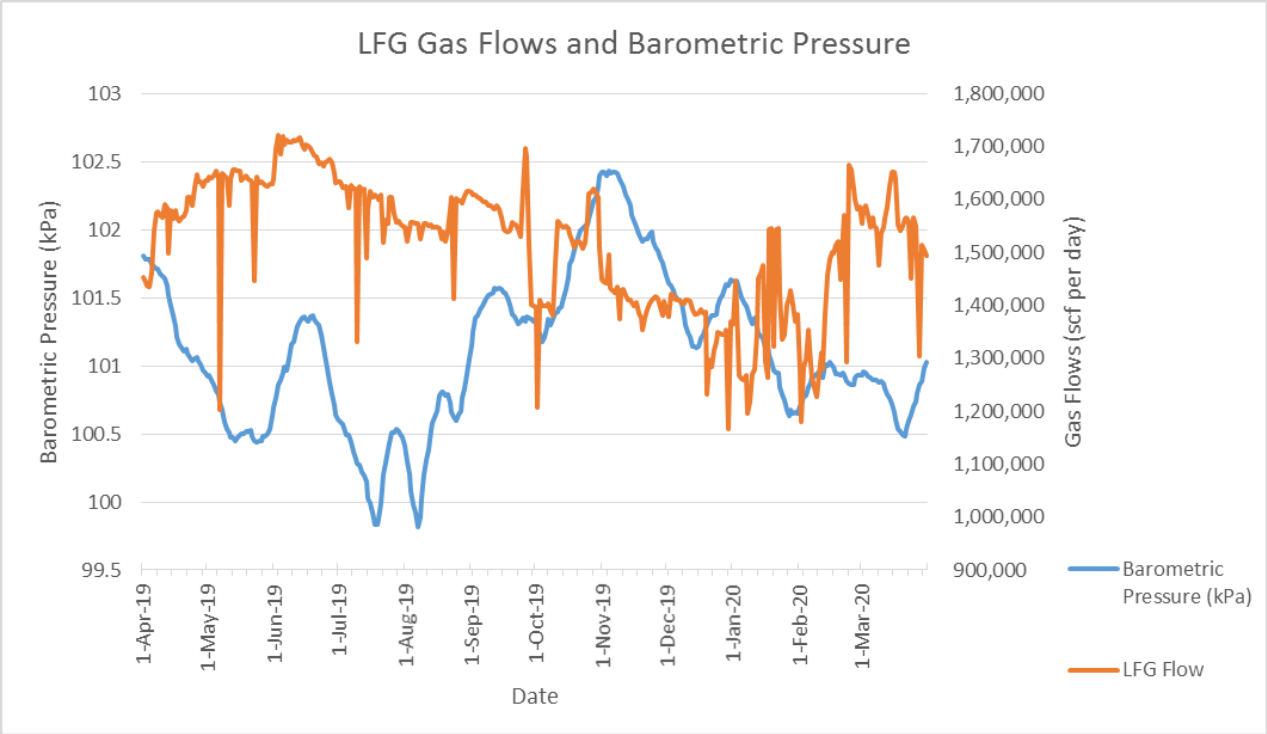

Figure 3 LFG Flows (scf/day) and Barometric Pressure (kPa)

It is important to emphasize that no single variable is responsible for the fluctuations observed in annual LFG flows and collection. LFG generation is influenced by numerous variables, including climate, waste composition, volume and age, as well as filling plan and waste compaction, which inevitably impact LFG generation and collection volumes. Well field adjustments are critical to optimizing gas collection in response to varying LFG generation rates.

3.0 GAS WELL FIELD BALANCING

Adjustments at Hartland are completed at least monthly, or in response to significant changes in gas concentrations or when new collection wells come online. Adjustments can be made in two ways: total vacuum exerted on the well field can be changed at the blowers; and vacuum/draw can be changed at individual wells. The well field vacuum (31.5 "H_2O) was not adjusted during the sample period.

Well field balancing requires site-specific understanding of a landfill's well field dynamics, and typical gas concentrations that is often gained through experience and historical knowledge. Gas collection and well field adjustments may have been impacted from September 2019 to March 2020, due the absence of the well field technician. According to the technician, well field adjustments were completed on a more limited basis to avoid field upsets and oxygen intrusion, which can lead to subsurface fires. This may account for some of the decline in collected gas volumes during that time period.

Well balancing occurs over a three- to seven-day period, due to the high number of wells and limited staff resources; as a result, the immediate influence of well balancing on overall gas quality is difficult to discern. During routine well field balancing events, daily gas collection typically increases at least 1% to 9% for the duration of the balancing process and may stay elevated for longer periods (days to weeks), depending on metrological conditions. Additional review, including shortening of well field adjustments (to one-two days) may be required to determine overall well field response and resultant gas changes due to balancing events.

Table 1 LFG Composition and Well Field Balancing Events

Date	Last Well field adjustment	Field CH4 (%)	Field CO2 (%)	Field O2 (%)	Field Balance gas (%)	Barometric Pressure kPa	Monthly average flow[1] (scfm)	Monthly average flow[1] m^3/hr
5-Apr-19	Mar. 22 & 30/ Apr. 20, 24-26	50.4	37.0	0.6	12.0	99.99	1,068	1,814
28-May-19	May 24 & 29	48.40	36.60	0.70	14.30	99.90	1,126	1,913
3-Jul-19	Jun. 27-29	48.00	36.20	0.50	14.80	99.90	1,107	1,881
21-Jul-19	Jul. 23-24	47.80	36.20	0.60	15.30	100.80	1,107	1,881
15-Aug-19	Aug. 28 & 30	48.60	36.90	0.50	14.00	102.30	1,104	1,876
23-Oct-19	Oct. 23-24, 30	44.90	35.00	2.00	18.30	103.15	999	1,697
31-Oct-19	Oct. 23-24, 30	49.50	36.00	0.70	13.40	102.65	999	1,697
26-Nov-19	Nov. 19-22	45.40	33.80	2.50	18.30	100.75	1,017	1,728
9-Dec-19	Dec. 16-18	48.20	36.60	0.80	14.40	101.46	988	1,679
29-Jan-20	Jan. 11, 14, 22, 30	51.40	36.30	0.50	11.80	99.63	980	1,665
28-Feb-20	Feb. 18, 20, 21	49.40	35.30	1.10	14.20	99.11	982	1,668
25-Mar-20	Mar. 18-31	47.60	35.20	0.90	16.30	101.55	1,046	1,777

[1] - Normalized to 50% methane

4.0 LFG COMPOSITION

The summary below is an analysis of key constituents in raw LFG at the Hartland gas utilization facility (gas plant). The table includes comparison to FortisBC thresholds for upgraded biogas for applicable parameters (obtained from Biomethane Specifications, FortisBC, August 2019). It is important to note that raw LFG has been compared to standards for upgraded gas (FortisBC) in order to assist staff in selecting the appropriate gas upgrading technology. Once upgraded, Hartland LFG will be within required thresholds. Raw data is included in Appendix A.

Table 2 FortisBC RNG Thresholds compared to Raw LFG at Hartland

		Raw LFG			
Property/ Contaminant	**FortisBC Threshold in upgraded biogas (RNG)[1]**	**Average/Median**	**Max**	**Min**	**Trend Observed?**
Hydrogen Sulphide (H_2S)	<6 mg/m^3 4.3 ppm	25.6 ppm / 16.9 ppm	89 ppm	<0.004 ppm	No
Nitrogen	Not specified	18.3 % / 18.1%	25.6%	13 %	No
Sulfur (Total reduced sulfur as H_2S)	<23 mg/m^3	37 mg/m^3/ 31.7 mg/m^3	130 mg/m^3	0.08 mg/m^3	Possible increasing
Carbon Dioxide (CO_2)	<2% by volume	33.6% / 34.2%	38.5	27.3	No
Oxygen (O_2)	<0.4% by volume	Field: 0.76% / 0.75% Lab: 1.68% / 1.41%	Field: 1.77% Lab: 3.69%	Field: 0.24% Lab: 1.0%	Yes, increasing
Siloxanes	<1 mg/m^3	8.1 / 8.9	16.5	0.805	Yes, increasing
Carbon monoxide (CO)	<2% by volume	<0.05%	n/a	n/a	n/a
Ammonia (NH_3)	<3 mg/m^3	>50% of results <DL	3.0	<0.029	n/a
Methane	Not specified	Gas analyzer: 50.5% / 50.7% Lab: 44.0% / 44.3%	54%	39.9%	No
Inert gases (as nitrogen)	<4% by volume	18.2% /18.1%	20%	13%	

[1] – Biomethane specifications are subject to periodic change. Values are from FortisBC Biomethane Specifications document (August 2019) included in Appendix B.

Hydrogen sulphide was highly variable, across the sample period with results ranging from <0.004 ppm to 89 ppm (Figure 4) and a median of 16.9 ppm. While an increasing trend is observed in the recent dataset (Figure 5), it is largely within the range of historical data collected between 2009 and 2017, which varies between 0.004 and 40.3 ppm). Additional sampling may help determine if trends exist.

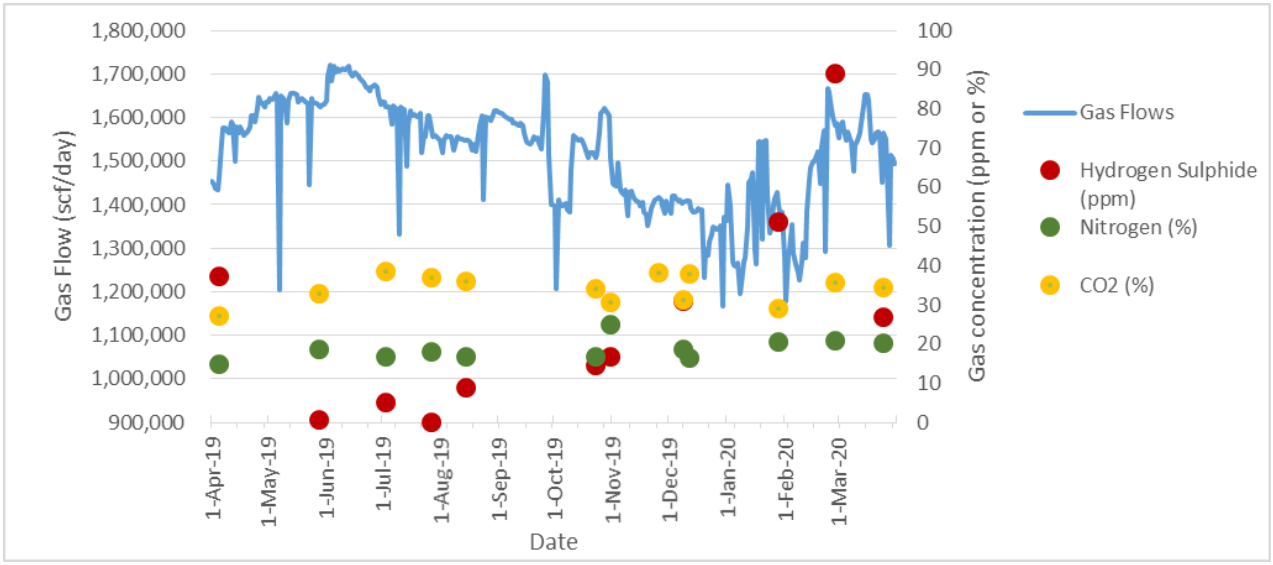

Figure 4 Hydrogen Sulphide, Nitrogen and Carbon Dioxide Concentrations and Gas Flows

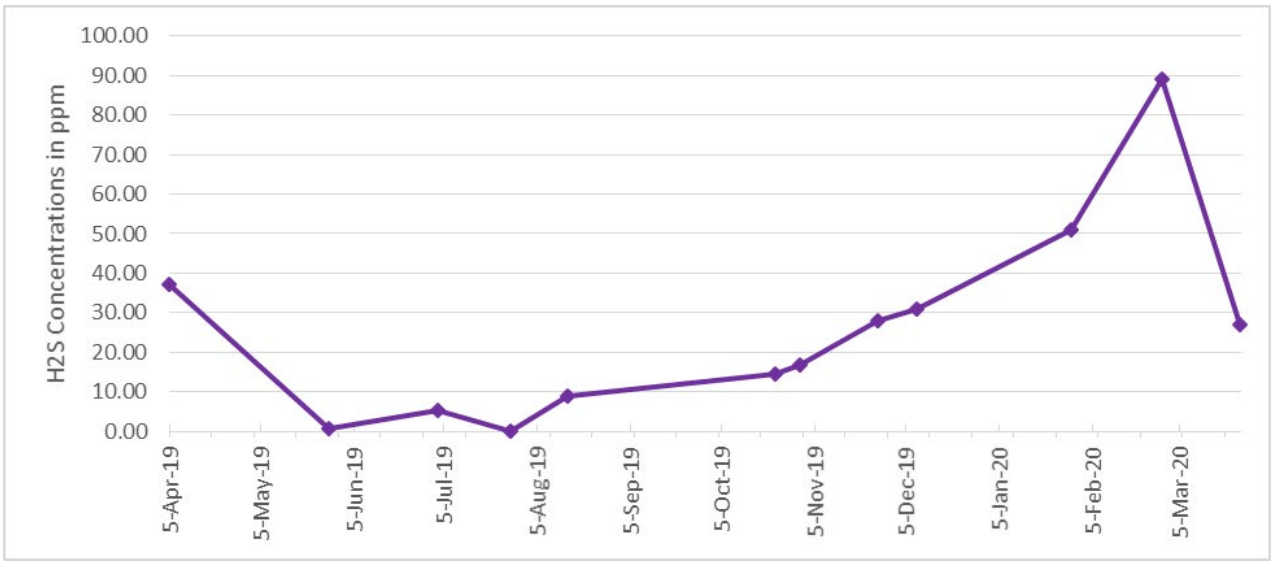

Figure 5 Hydrogen Sulphide Concentrations in Raw LFG 2019-2020

Total Reduced Sulfur (TRS) as H_2S followed a similar pattern to Hydrogen sulphide ranging from 0.08 to 130 mg/m^3 (Figure 6), with a median of 22.8 ppm, and primarily consisted of H_2S. TRS increased from May 2019 to February 2020, and decreased in concentration in March. It is unclear if this is a seasonal trend, but it is expected to follow a similar trend to H_2S, which has remained variable over the last 10 years.

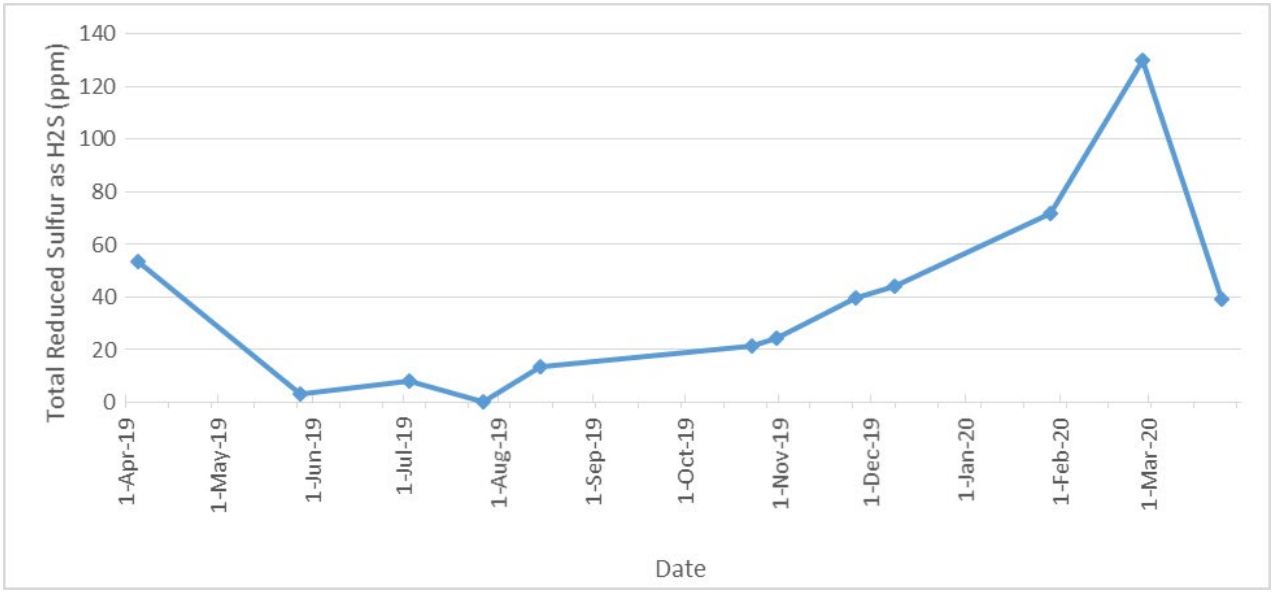

Figure 6 Total Reduced Sulfur as H_2S 2019-2020

Nitrogen remained largely consistent across the study period ranging from 13% to 20% with a median of 18.1% (Figure 4). No trends were observed. FortisBC requires less than 4% inert gases (as nitrogen) in upgraded gas. In addition, the SCS Technical Feasibility Report indicates that removal of nitrogen and carbon dioxide is a key step required to increase the energy content of the biogas (SCS, 2018). A detailed understanding of nitrogen concentration in raw gas will inform appropriate upgrading technologies for nitrogen removal.

The BC LFG Management Facilities Design Guidelines indicate that a typical nitrogen concentration in LFG is less than 10% and higher concentrations coincide with elevated oxygen and indicate possible atmospheric intrusion into the collection system. Oxygen is not elevated in the gas flows and remains below 2%. The elevated nitrogen in Hartland LFG is a result of flow optimization in the wellfield in order to meet regulatory objectives for collection efficiency. Nitrogen (balance gas) concentrations could be reduced, if required, but would result in a decrease in overall flows to the gas plant. Further investigation into individual extraction well concentrations may be warranted, depending on the nitrogen removal efficiency of available upgrading technologies.

Carbon Dioxide ranged from 27.3% to 38.5% across the sample period (Figure 4). No trends were observed.

Oxygen (Figure 7) ranged from 0.24% to 3.69% (field and lab results). Average oxygen concentrations for both lab and field data were less than 2% (0.76% and 1.68%, respectively). Continuous oxygen readings from the gas plant trended conversely with gas flows from March to November 2019, and then switched to follow a similar trend (oxygen and gas flows increased together) from December 2019 to March 2020 (Figure 8). Laboratory reported oxygen concentrations are more variable and do not appear to trend with gas plant flows.

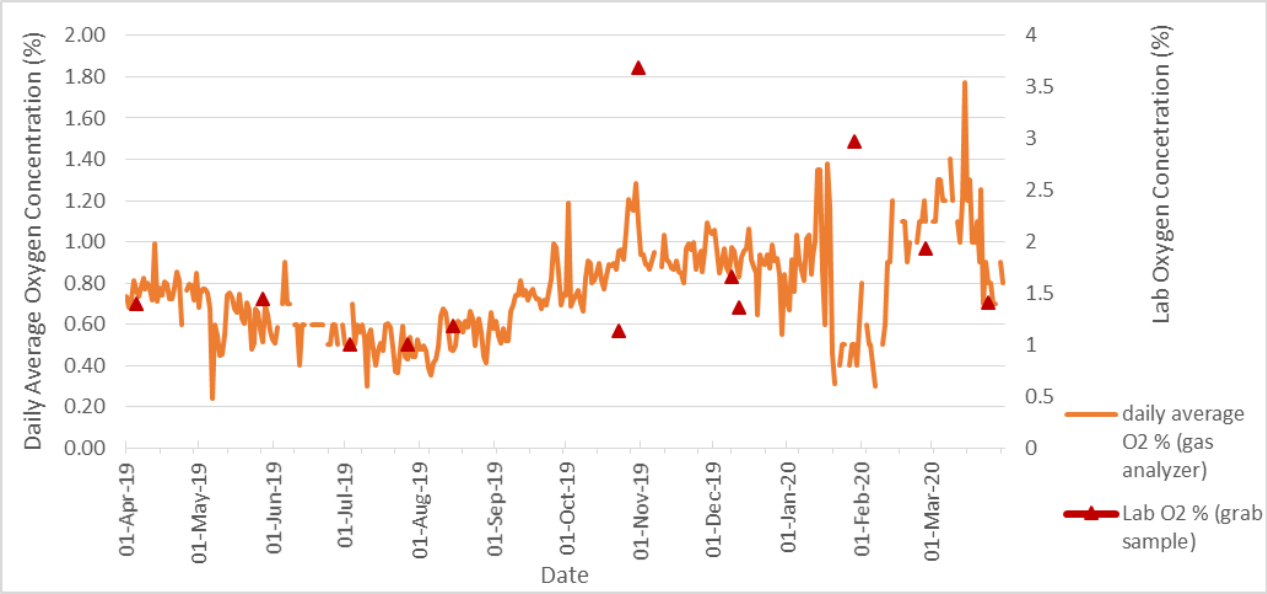

Figure 7 **Oxygen Concentrations in Lab and Field Samples 2019-2020**

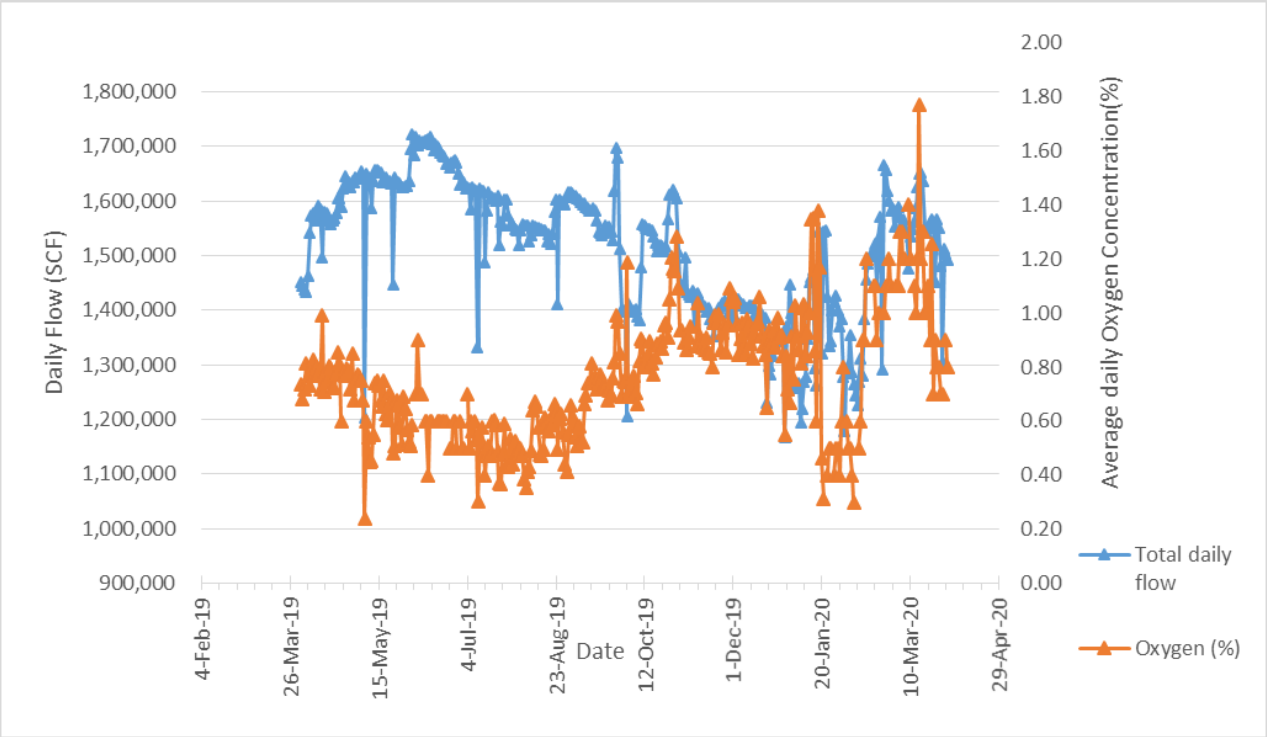

Figure 8 Oxygen Concentrations and Average Daily Das Flow 2019-2020

Ammonia was less than the laboratory detection limit in 67% of the samples, and highly variable, when above the detection limit. No trends were observed.

Carbon monoxide was consistently below the laboratory detection limit (<500 ppm). No trends were observed.

Total siloxanes (Figure 9) total siloxane concentrations are an aggregate of the reported individual siloxanes and used for comparison to FortisBC thresholds. Concentrations were variable with a maximum in September (16.5 mg/m^3), followed by a low in April through May 2019 (less than lab detection limits).

Across the sample period, the siloxanes with the highest individual concentrations (Figure 10) were MM, D4 and Decamethylcyclopentasiloxane (D5). An increasing trend is observed in total and select individual siloxanes [hexamethyldisiloxane (MM/L2), Octamethylcyclo-trisiloxane (D4)].

D4 and D5 are prevalent in many consumer products and consistently comprise the majority of siloxanes in LFG (Narros, *et al*, 2009). An inverse relationship between D4 and MM is observed in the data, and it is possible one may be a degradation product of the other, though no supporting information could be found for this. Observations for individual siloxane concentrations are summarized below:

- D3: Low values <0.1 ppm for first two sampling events (April and May 2019) very high concentration of 0.97 ppm in July and then reduced values <0.1 ppm for remaining sampling events
- D4, D5, MM: Low values <0.1 ppm for first two sampling events and then elevated levels >0.1 ppm throughout remaining sampling events
    - D4 – concentrations range from <0.014 to 0.77 ppm
    - D5 – values range from <0.011 ppm to 0.3 ppm
    - MM – values range from <0.026 to 0.47 ppm
- D6, MDM, MD2M, MD3M: Low values <0.1 ppm throughout all sampling events.

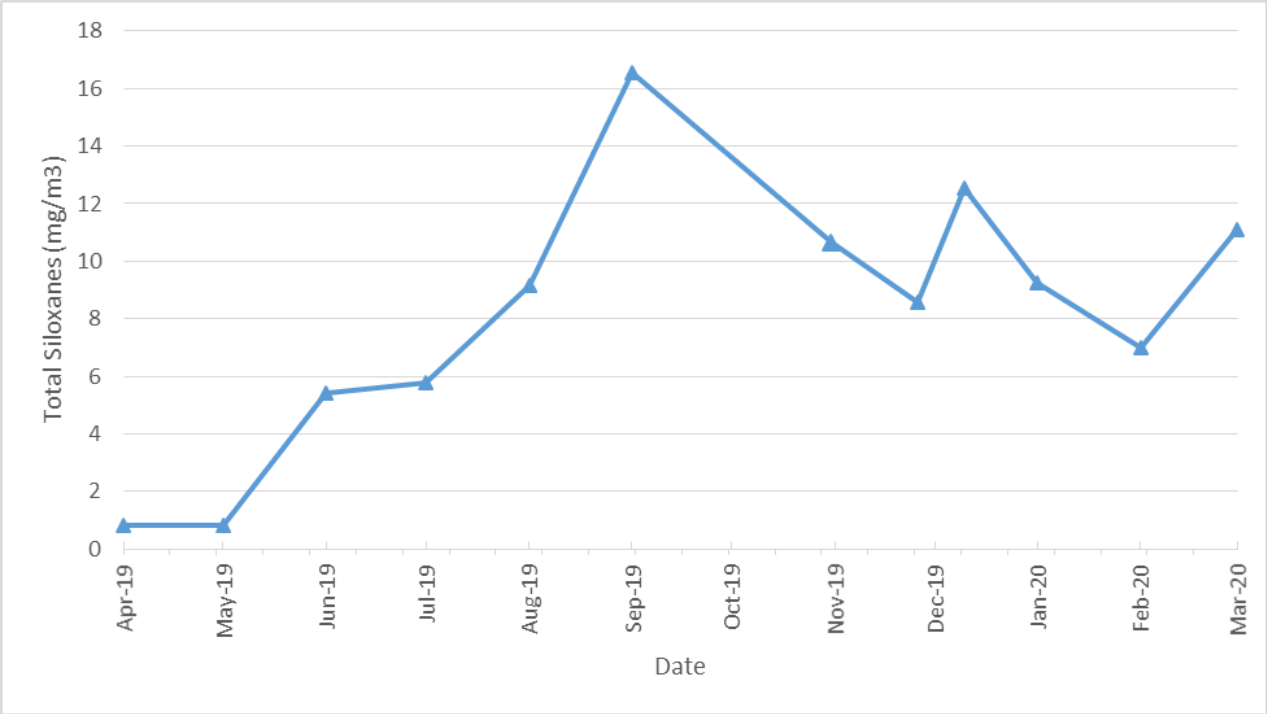

Figure 9 **Total Siloxanes in Raw LFG 2019-2020**

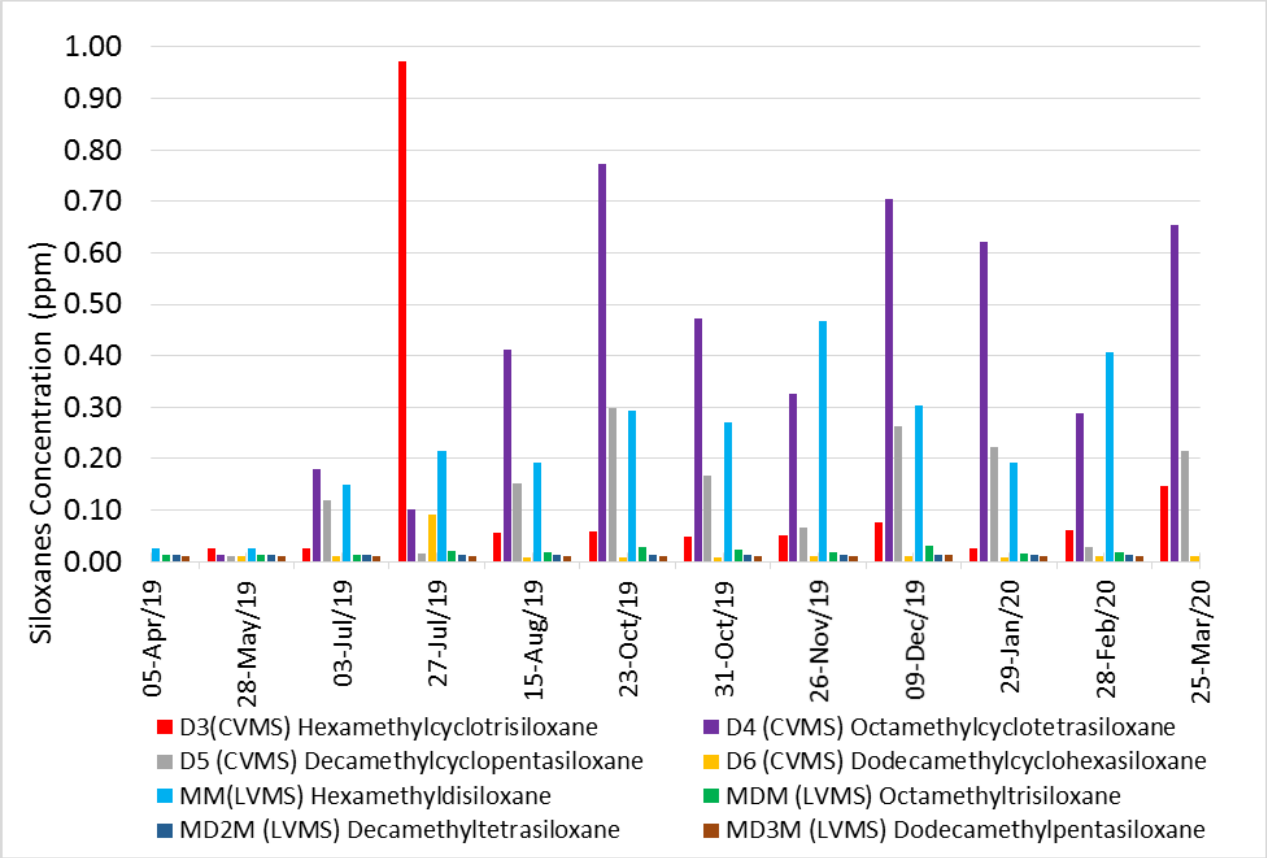

Figure 10 **Individual Siloxanes in Raw LFG 2019-2020**

Methane concentrations are plotted in Figure 11 and Figure 12 and exhibit an inverse relationship with LFG flows. Methane concentrations in Figure 11 were measured by the gas analyzer at the LFG plant, and at the lab in Figure 12. Concentrations of methane ranged from 43% to 54%, with an average of 50.5% at the gas analyzer; and from 39.9% to 48.1%, with an average of 44% in lab samples. Data from the gas analyzer is a daily average concentration, while the lab data is an instantaneous concentration (grab sample), which may account for the discrepancies between the two datasets. It is important to note that a decrease in methane concentrations at the gas plant typically corresponds with an increase in oxygen concentrations (and vice versa).

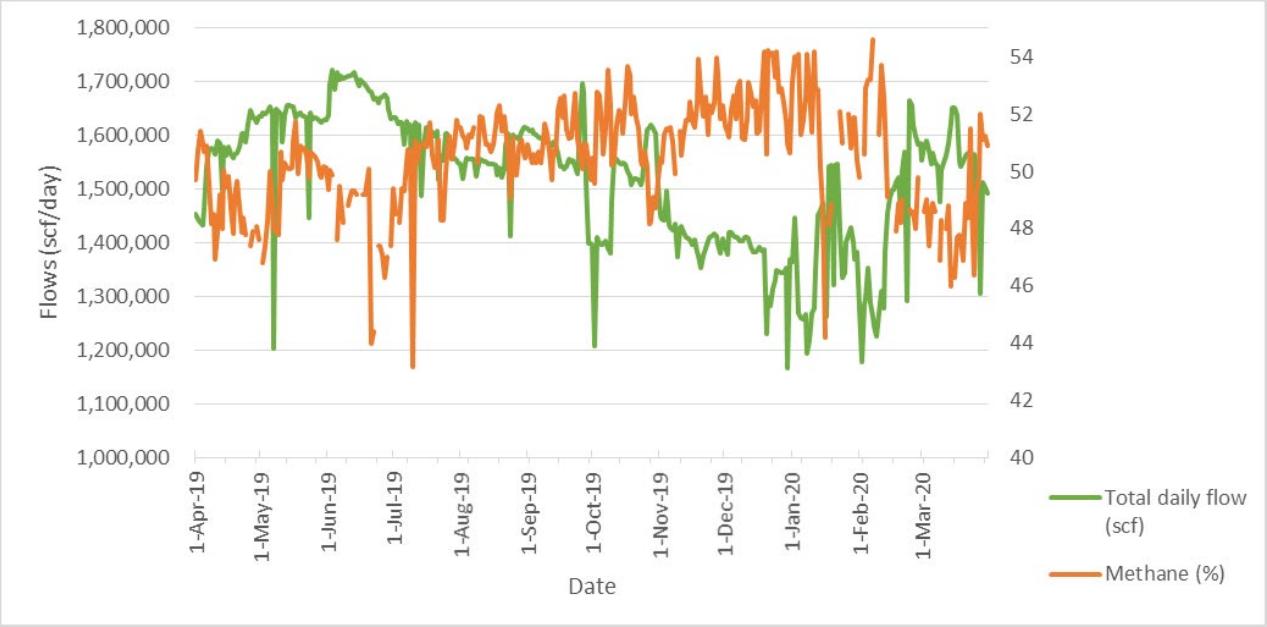

Figure 11 **Daily Gas Plant Flows and Methane Concentrations at the Gas Analyzer 2019-2020**

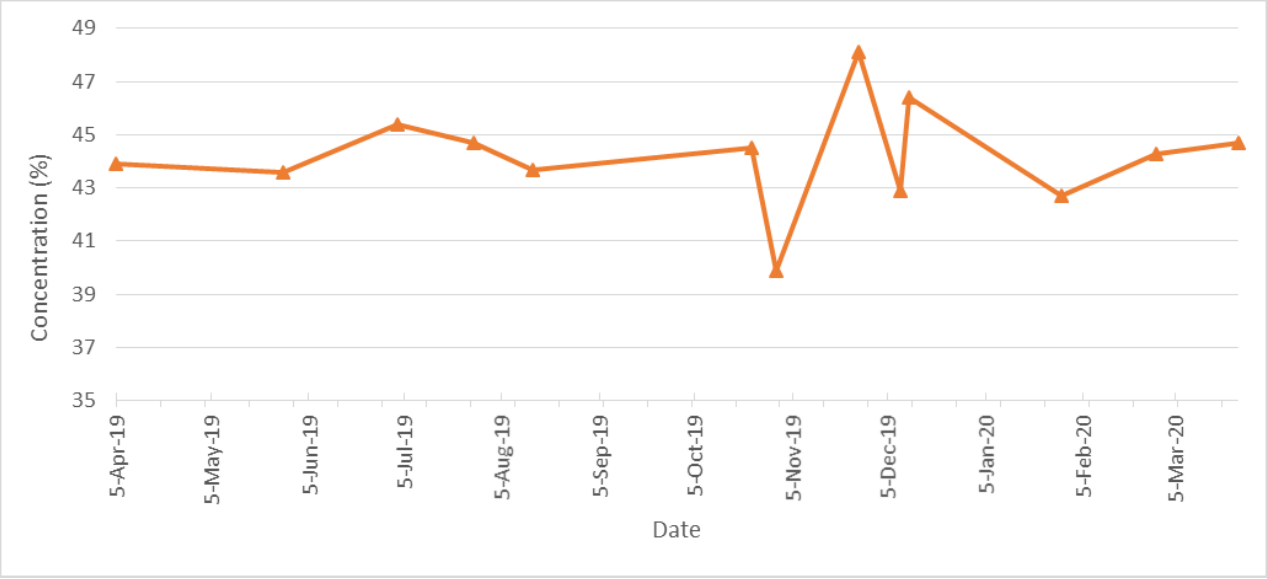

Figure 12 **Methane Concentrations in Lab Samples 2019-2020**

5.0 CONCLUSIONS

LFG composition is highly variable and is influenced by numerous factors, including waste composition/quantity, ambient temperature, barometric pressure and precipitation. Many constituents in LFG varied throughout the monitoring period with some identified trends/relationships. Overall, the data show that:

- ambient temperature has a significant impact on LFG generation and collection rates, with gas flows increasing with increased ambient temperatures.
- high barometric pressure results in decreased LFG generation, and ultimately decreased collection.
- high precipitation events result in an eventual increase in gas production, after a lag time for refuse to reach an ideal moisture content. The overall wet climate at Hartland (~800 mm of precipitation per year) results in increased LFG generation, when compared to more arid landfill sites.
- individual well balancing events increased total daily flow by 1% to 9%, for short periods of time (typically days to weeks), but are critical for optimizing gas collection in response to varying LFG generation rates.
- The data show that parameters/variables, such methane and gas flows, display inverse relationships over the sample period.

Raw LFG exceeded five of the seven applicable FortisBC thresholds (H_2S, TRS, CO_2, O_2, and siloxanes) during the sample period, while ammonia and carbon monoxide were consistently below established thresholds. It is important to note, that exceedances of FortisBC thresholds are expected in raw LFG and comparisons were made to support evaluation and selection of appropriate upgrading technologies that will effectively treat the applicable constituents to pipeline quality gas.

Additional sampling is not recommended for RNG planning until more detail is provided on upgrading technologies and performance specifications. However, existing LFG monitoring programs will continue to provide data and support to the RNG project, as well as other current and future LFG management programs.

6.0 REFERENCES

Bentley et al. (2003). A Method for Estimating the Rate of Landfill Gas Generation by Measurement and Analysis of Barometric Pressure Waves.

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Appendix A – Raw Data

Parameter	Date	5-Apr-19	28-May-19	3-Jul-19	27-Jul-19	15-Aug-19	23-Oct-19	31-Oct-19	21-Nov-19	26-Nov-19	9-Dec-19	12-Dec-19	29-Jan-20	28-Feb-20	25-Mar-20	Max.	Min.	TWA (ppm)	STEL/ Ceiling (ppm)	Notations
	CAS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm			
Ammonia	7664-41-7	<2.6	<3.30	<2	1.1	4.30	<0.31	<0.46	---	<0.42	<0.48	---	<0.48	0.55	0.63	4.30	0.55	25	35	
Acetone	67-64-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	250	500	
Benzene	71-43-2	---	**7.01**	0.485	**0.613**	**0.61**	**7.887**	---	---	0.275	0.3662	---	**0.642**	0.426	**0.582**	7.89	0.28	0.5	2.5	skin; A1, 1
Bromodichloromethane	75-27-4	---	0.33	<0.0403	<0.045	<0.039	<0.021	---	---	<0.0001	<0.0004	---	<0.001	<0.0012	<0.0045	0.33	0.33			2B
Bromoform	75-25-2	---	0.036	<0.0005	<0.001	<0.001	<0.0813	---	---	<0.0006	<0.0006	---	<0.001	<0.0006	<0.0174	0.04	0.04	0.5		
4-Bromofluorobenzene	460-004	---	1027000	964000	1041000	1028000	964000	1048000	---	959000	1046000	---	982000	961000	961000.00	1048000	959000			
Bromomethane (Methyl bromide)	74-83-9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	1		skin
n-butane	106-97-8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		1000	EX
2-Butanone	78-93-3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	50	100	
n-Butyl mercaptan	109-79-5	<0.004	0.010	0.0091	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.0100	0.0091	0.5		
Butyl(t) mercaptan	75-66-1	0.0544	0.093	0.0306	< 0.004	0.0462	0.0449	0.0379	---	0.053	0.0466	---	0.055	0.1	0.110	0.1100	0.0306			
Carbon Disulfide	75-15-0	<0.0499	0.055	0.0248	0.0038	0.0264	0.0351	0.0345	---	0.031	0.0257	---	0.022	0.027	0.036	0.0550	0.0038	4	12	Skin
Carbonyl sulfide	463-58-1	<1.6	0.054	0.0181	0.0199	<0.004	0.0337	0.0383	---	<0.6	<1.3	---	<0.025	0.041	0.065	0.1	0.0	5		
Carbon Tetrachloride	56-23-5	---	<0.0043	<0.0001	<0.0001	<0.0001	<1.558	---	---	<0.0381	<0.0366	---	<0.043	<0.0445	<0.0636	0.00	0.00	2		skin; A2, 2B
Chlorobenzene	108-90-7	---	0.371	0.0445	0.0528	0.04	0.606	---	---	0.002	0.0367	---	0.080	0.02	0.0348	0.61	0.00	10		
Chloroethane (Ethyl chloride)	75-00-3	---	<2.08	<0.163	<0.152	<0.197	<5.305	---	---	<0.1516	<0.1099	---	<0.182	<0.1516	<1.1369	0.00	0.00	100		skin
Chloroform	67-66-3	---	<0.084	<0.0016	<0.003	<0.002	<0.057	---	---	<0.0012	<0.0012	---	<0.002	<0.0018	<0.0037	0.00	0.00	2		2B; R
Chloromethane (methyl chloride)	74-87-3	---	<14.53	<0.286	<0.533	<0.412	<1.259	---	---	<0.2663	<0.0775	---	<0.281	<0.2615	<0.4261	0.00	0.00	50	100	skin; R
Decane (nC10)	124-18-5	---	<1.72	0.3420	0.6702	0.186	3.437	---	---	<0.0086	<0.1569	---	0.563	<0.0301	<0.2578	3.44	0.19			
Dibromochloromethane	124-48-1	---	<0.387	<0.0063	<0.024	<0.020	<0.329	---	---	<0.0023	<0.0023	---	<0.002	<0.0023	<0.0704	0.00	0.00			
1,2-Dibromoethane (Ethylene dibromide)	106-93-4	---	---	---	---	---	---	---	---	---	---	---	---	---		0.00	0.00	0.5		skin; 2A
Dibromomethane	74-95-3	---	---	---	---	---	---	---	---	---	---	---	---	---		0.00	0.00			
Dichlorodifluoromethane	75-71-8	---	---	---	---	---	---	---	---	---	---	---	---	---		0.00	0.00	1000		
1,2-dichlorobenzene	95-50-1	---	<0.20	<0.0027	<0.005	<0.004	<0.699	---	---	<0.0050	<0.0048	---	<0.004	<0.0045	<0.1497	0.00	0.00	25	50	
1,3-Dichlorobenzene (o-dichlorobenzene)	541-73-1	---	<0.068	<0.0009	<0.002	<0.001	<0.233	---	---	<0.0017	<0.0016	---	<0.001	<0.0001	<0.0499	0.00	0.00			
1,4-dichlorobenzene (p-dichlorobenzene)	106-46-7	---	0.103	0.0318	0.076	0.014	0.266	---	---	<0.0017	0.0098	---	0.036	<0.0016	<0.0499	0.27	0.01	10		2B
1-1,dichloroethane	75-34-3	---	0.550	<0.0519	0.097	0.045	0.600	---	---	0.034	<0.0272	---	0.040	0.031	0.04	0.60	0.03	100		
1-2,dichloroethane (ethylene dichloride)	107-06-2	---	<0.020	<0.0011	<0.007	0.105	<1.433	---	---	<0.0494	<0.0618	---	<0.047	<0.047	<0.0791	0.11	0.11	1	2	2B
1,1-Dichloroethene (1,1-dichloroethylene)	75-35-4	---	<0.139	0.0101	0.011	0.01	0.152	---	---	0.012	<0.0098	---	0.015	0.014	0.01	0.15	0.01	1		2B
1,2-dichloroethylene (1,2-dichloroethene)	156-59-2	---	11.20	0.852	0.714	1.009	12.535	---	---	0.618	0.6179	---	0.772	0.684	0.83	12.54	0.62	200		
trans-1,2-Dichloroethene	156-60-5	---	0.522	0.0547	0.046	0.053	0.656	---	---	0.035	0.0424	---	0.108	0.075	<0.0757	0.66	0.03	200		
1,2-Dichloropropane (propylene dichloride)	78-87-5	---	0.346	<0.0368	<0.028	<0.026	<0.757	---	---	<0.0162	<0.0260	---	<0.052	<0.043	<0.0476	0.35	0.35	75	110	1; S (D)
1,3-Dichloropropene (1,3-dichloropropylene cis and trans)	542-75-6	---	<0.200	<0.0117	<0.022	<0.022	<0.156	---	---	<0.0004	<0.0013	---	<0.002	<0.002	<0.0093	0.00	0.00	1		skin; 2B
cis-1,3-Dichloropropylene (1,3-dichloropropene)	542-75-6	---	<0.0757	<0.00584	<0.013	<0.015	<0.151	---	---	<0.0002	<0.0002	---	<0.001	<0.0002	<0.0065	0.00	0.00			
trans-1,3-Dichloropropylene (1,3-dichloropropene)	542-75-6	---	<0.180	<0.0132	<0.017	<0.015	<0.030	---	---	<0.0002	<0.0013	---	<0.002	<0.0017	<0.0065	0.00	0.00			
Diethyl disulfide	110-81-6	<0.002	<0.0025	<0.002	<0.002	<0.002	<0.002	<0.002	---	<0.002	<0.002	---	<0.013	<0.016	<0.029	0.000	0.000			
Diethyl Sulfide	352-93-2	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.000	0.000			
Dimethyl sulfide	75-18-3	0.0799	0.110	0.0023	0.0334	0.0478	0.0827	0.0703	---	0.073	0.0501	---	<0.013	0.062	0.075	0.1100	0.0023	10		
Dimethyl disulfide	624-92-0	<0.002	0.0053	0.0474	<0.002	<0.002	0.0042	<0.002	---	<0.002	<0.002	---	0.04	<0.016	<0.029	0.0474	0.0042	0.5		skin
2,5-Dimethylthiophene	638-02-8	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.000	0.000			

Parameter	Date	5-Apr-19	28-May-19	3-Jul-19	27-Jul-19	15-Aug-19	23-Oct-19	31-Oct-19	21-Nov-19	26-Nov-19	9-Dec-19	12-Dec-19	29-Jan-20	28-Feb-20	25-Mar-20	Max.	Min.	TWA (ppm)	STEL/ Ceiling (ppm)	Notations
	CAS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm			
Ethylbenzene	100-41-4	---	17.27	2.11	2.441	1.808	29.014	---	---	0.085	1.2757	---	2.786	0.652	1.695	29.01	0.09	20		2B
Ethyl mercaptan	75-08-1	0.0747	0.088	0.0302	<0.004	0.046	0.0494	0.0316	---	0.060	0.0605	---	0.066	0.058	0.090	0.0900	0.0302	0.5		
Ethyl Methyl Sulfide	624-89-5	<0.004	<0.002	0.0055	<0.004	<0.004	0.0053	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.006	0.005	100		skin
2-Ethylthiophene	872-55-9	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.000	0.000			
n-heptane	142-82-5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	400	500	
n-hexane	110-54-3	---	**28.94**	1.756	1.5888	2.043	**24.456**	---	---	1.387	1.1632	---	1.646	1.4186	1.419	28.94	1.16	20		skin
2-Hexanone (methyl butyl ketone)	591-78-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	5	10	skin; R
Isobutyl Mercaptan	513-53-1	0.0644	0.130	0.0589	<0.004	<0.004	<0.004	0.0112	---	<0.004	<0.004	---	0.054	0.068	0.12	0.1300	0.0112			
Isopropyl Mercaptan	75-33-2	0.489	0.570	0.182	<0.004	0.261	0.301	0.205	---	0.346	0.35	---	0.38	0.45	0.67	0.670	0.182			
Isopropanol	67-63-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200	400	
Isopropylbenzene (cumene)	98-82-8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	25	75	2B
4-Methyl-2-pentanone (methyl isopropyl ketone)	108-11-2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	20	75	2B
Methyl acetate	79-20-9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200	250	
Methyl t-butyl ether (MTBE)	1634-04-4	---	<0.582	0.00999	<0.014	<0.012	<1.942	---	---	<0.0139	<0.0136	---	<0.013	<0.0136	<0.4161	0.01	0.01	50		
Methylene Chloride (syn: Dichloromethane)	75-09-2	---	<0.806	<0.0605	<0.052	<0.049	<0.950	---	---	<0.0576	<0.0403	---	<0.060	<0.0576	<0.0864	0.00	0.00	25		2A
Methyl mercaptan	74-93-1	0.0258	0.040	0.0108	<0.004	0.006	0.0194	0.0074	---	0.023	0.0146	---	0.047	0.068	0.06	0.0680	0.0060	0.5		
2-Methylthiophene	554-14-3	<0.004	---	0.0236	<0.004	0.0165	0.0053	<0.004	---	<0.004	<0.004	---	---	---	---	0.024	0.005			
3-Methylthiophene	616-44-4	<0.004	0.037	0.0283	<0.004	0.0181	0.0088	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.037	0.009			
n-nonane	111-84-2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200		
n-octane	111-65-9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	300		
n-pentane	109-66-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	1000		
phenol	108-95-2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	5		skin
n-Propyl Mercaptan (propanethiol)	107-03-9	0.072	0.069	0.0231	<0.004	0.04	0.0368	0.021	---	0.039	0.0496	---	0.044	0.054	0.052	0.072	0.021			
sec-Butyl Mercaptan + Thiophene	513-53-1	0.362	---	0.163	<0.006	0.22	0.17	0.11	---	0.163	0.207	---	---	---	---	0.362	0.110			
Styrene	100-42-5	---	<1.62	<0.158	0.256	<0.153	1.697	---	---	0.003	0.0901	---	0.219	0.0279	0.0657	1.70	0.00	20	40	2B
Thiophene	110-02-1	---	0.410	---	---	---	---	---	---	---	---	---	0.200	0.240	0.34	0.41	0.20			
1,1,1,2-Tetrachloroethane	630-20-6	---	<0.00903	<0.000117	<0.0002	<0.0002	<0.020	---	---	<0.0001	<0.0001	---	<0.0001	<0.0001	<0.0044	0.00	0.00			2B
1,1,2,2-Tetrachloroethane	79-34-5	---	<0.204	<0.0306	<0.061	<0.010	<0.041	---	---	<0.0004	<0.0022	---	<0.019	<0.0001	<0.0035	0.00	0.00	1		skin; 2B
Tetrachloroethene (tetrachloroethylene)	127-18-4	---	0.7962	0.104	<0.265	0.081	0.973	---	---	0.006	0.0548	---	0.107	0.038	<0.0885	0.97	0.01	25	100	2A
Tetrahydrothiophene	110-01-0	<0.004	<0.005	<0.004	<0.004	<0.004	<0.004	<0.004	---	<0.004	<0.004	---	<0.025	<0.032	<0.058	0.00	0.00			
Toluene	108-88-3	---	**100.30**	6.820	6.501	7.165	**100.305**	---	---	1.056	5.1214	---	8.518	4.591	7.2973	100.30	1.06	20		R
1,1,1-Trichloroethane (methyl chloroform)	71-55-6	---	<0.075	<0.0099	<0.014	<0.008	<0.128	---	---	0.004	0.0020	---	0.005	0.002	<0.0275	0.01	0.00	350	450	
1,1,2-Trichloroethane	79-00-5	---	<0.220	<0.00178	<0.003	<0.002	<0.068	---	---	<0.0007	<0.0072	---	<0.008	<0.0044	<0.0044	0.00	0.00	10		skin
Trichloroethene (trichloroethylene)	79-01-6	---	0.983	<0.100	0.082	0.077	<1.042	---	---	<0.0223	<0.0428	---	<0.078	<0.0447	<0.0633	0.98	0.08	10	25	A2, 2A
Trichlorofluoromethane	75-69-4	---	3.328	0.388	0.262	<0.231	1.531	---	---	0.091	0.0587	---	0.056	0.046	<0.2670	3.33	0.05		C 1000	
1,2,4-trimethylbenzene	95-63-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	25		
Vinyl Chloride	75-01-4	---	**16.391**	**1.260**	**1.154**	**1.53**	**<8.998**	---	---	**<1.956**	0.8763	---	**<1.878**	**<1.9169**	**<1.7995**	16.39	0.88	1		A1, 1
ortho-Xylene	95-47-6	---	7.002	0.891	1.131	0.693	14.003	---	---	0.024	0.5343	---	1.207	0.27	0.6218	14.00	0.02			
meta-& para-Xylene	108-38-3 & 106-42-3	---	24.874	3.178	3.823	2.464	41.226	---	---	0.103	1.7849	---	4.169	0.70	2.2709	41.23	0.10			
Xylenes	1330-20-7	---	31.777	4.076	4.951	3.155	55.265	---	---	0.127	2.3257	---	5.388	0.97	2.9014	55.27	0.13	100	150	
Methane	74-82-8	439000	436000	454000	447000	437000.00	445000	399000	---	481000	429000	464000	427000	443000	447000.0	481000	399000		simple asphixiant	EX
Carbon Monoxide	630-08-0	<2.5	**<500**	**<500**	**<500**	**<500**	**<500**	**<500**	---	**<500**	**<500**	**<500**	**<500**	**<500**	**<500**	0.0	0.0	25	100	R

Parameter	Date	5-Apr-19	28-May-19	3-Jul-19	27-Jul-19	15-Aug-19	23-Oct-19	31-Oct-19	21-Nov-19	26-Nov-19	9-Dec-19	12-Dec-19	29-Jan-20	28-Feb-20	25-Mar-20	Max.	Min.	TWA (ppm)	STEL/ Ceiling (ppm)	Notations
	CAS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm			
Carbon dioxide	124-38-9	273000	327000	385000	368000	359000	340000	305000	---	381000	313000	380000	292000	356000	343000	385000	273000	5000	15000	
Nitrogen	7727-37-9	149000	188000	167000	181000	168000	169000	251000	---	136000	186000	165000	207000	208000	202000				simple asphixiant	
Oxygen	7782-44-7	14000	14500	10100	10000	11800	11400	36900	---	9300	16600	13600	29700	19300	14100					
Hydrogen sulfide	7783-06-4	37.10	0.60	5.20	<0.004	9.0	14.5	16.9	---	27.8	30.9	---	51	89	27	89.00	0.60		10	ceiling
Total Reduced Sulfur (22) as H2S	30-39-5	38.40	2.50	5.90	0.057	9.8	15.3	17.5	---	28.6	31.7	---	52	90	28					
Aggregate Organics																				
D3(CVMS) Hexamethylcyclotrisiloxane	541-05-9	<0.0632	<0.0256	<0.0256	0.97	0.06	0.057	0.048		0.050	0.0753	---	<0.026	0.06	0.146	0.97	0.05			
D4 (CVMS) Octamethylcyclotetrasiloxane	556-67-2	<0.0140	<0.0140	0.18	0.10	0.41	0.772	0.472		0.325	0.7056	---	0.622	0.29	0.655	0.77	0.10			
D5 (CVMS) Decamethylcyclopentasiloxane	541-02-6	<0.0112	<0.0112	0.12	<0.016	0.15	0.298	0.166		0.066	0.2631	---	0.222	0.03	0.215	0.30	0.03			
D6 (CVMS) Dodecamethylcyclohexasiloxane	540-97-6	<0.0093	<0.0093	<0.00934	<0.092	0.01	<0.009	<0.009		0.009	0.0099	---	<0.009	<0.0093	<0.0093	0.01	0.01			
MM(LVMS) Hexamethyldisiloxane	107-46-0	<0.0256	<0.0256	0.15	0.22	0.19	0.294	0.271		0.468	0.3027	---	0.191	0.41	0.255	0.47	0.15			
MDM (LVMS) Octamethyltrisiloxane	556-67-2	<0.0140	<0.0140	<0.0140	0.02	0.02	0.027	0.022		0.017	0.0313	---	0.015	0.02	0.026	0.03	0.02			
MD2M (LVMS) Decamethyltetrasiloxane	141-62-8	<0.0134	<0.0134	<0.0134	<0.013	<0.013	<0.013	<0.013		0.013	<0.0134	---	<0.013	<0.0134	<0.0134	0.01	0.01			
MD3M (LVMS) Dodecamethylpentasiloxane	541-02-6	<0.0112	<0.0112	<0.0112	<0.011	<0.011	<0.011	<0.011		0.011	0.0132	---	<0.011	<0.0112	<0.0112	0.01	0.01			
Aliphatic hydrocarbon gases																				
Ethane	78-84-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		simple asphixiant	EX
Butane	106-97-8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		1000	EX
Butene	9003-28-5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00			(I)
Pentene	646-04-08	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00			
Propane	74-98-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00		simple asphixiant	EX
Ethene	74-85-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	200 ppm		
Propene	115-07-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	500 ppm		
Pentane	109-66-0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	1000		
Hexene	592-41-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.00	0.00	50 ppm		R

Notes:

- ACGIH notations A1 and A2 and IARC notations 1, 2A and 2B indicate substances designated as carcinogens under section 5.57(1) of the OHS Regulation. The different categories used by the two organizations indicate different levels of certainty of carcinogenic effect, e.g., from confirmed carcinogen to probable or possible. For more information see OHS Guideline G5.57.
- The term "Skin" identifies substances that contribute significantly to the overall exposure by the skin route. For more information see OHS Guideline G5.52.
- The term "R" identifies substances with an adverse reproductive effect under section 5.57(1) of the OHS Regulations.
- The term "EX" identifies substances that are flammable asphixiants or excursion above the exposure limit could approach 10% of the lower explosive limit.

Appendix B

Biomethane Specifications

DOCUMENT NUMBER: 1638
DOCUMENT TYPE: SPECIFICATION
Owner: Gramm, Scott
SML: Wilcock, Chris
CATEGORY: ENGINEERING - ENGINEERING - GENERAL

Utility: Gas
Approved Date: August 06, 2019
Effective Date: August 06, 2019
Next Review Date: August 06, 2024

Document History: This document replaces 1638 Biomethane Specifications dated 06 January 2016.

Summary of Changes

Changed recommended measurement frequency in Table 1 for Inert gasses from Nitrogen periodically to Nitrogen Continuous.

Overview

This is a specification for the composition of Fortis BC biomethane supply. “Biomethane” is defined as pipeline quality “biogas”. “Biogas” is defined as natural gas sourced from non-fossil resources, such as agricultural waste, landfill gas, sewage treatment plant bi-product, etc. These specifications ensure that biomethane supplied to Fortis BC is within the expected operating parameters of Fortis BC infrastructure. These specifications are also used as a basis for negotiating and contracting for new renewable natural gas supply.

Audience

The specification is intended for suppliers of biogas or biomethane, engineers, designers, and planners who are involved with developing biomethane supply either through the development of a biogas plant or a biomethane-specific interconnect. The specification is also intended for managers and business leaders who are negotiating new contract agreements for biogas and/or biomethane suppliers. The specification is not intended for suppliers of conventional natural gas, such as Enbridge, TransCanada, or similar suppliers.

Contents

Biomethane Specifications

Section 1

1. The Biomethane must meet the specifications herein, as may be amended, replaced or superseded from time to time.

   The biomethane must:

   a. not contain sand, dust, gums, oils and other impurities or other objectionable substances in such quantities as may be injurious to pipelines or may interfere with the transmission or commercial utilization of the gas;
   b. not contain more than six milligrams per cubic meter of hydrogen sulphide;
   a. not contain water in the liquid phase and not contain more than 65 milligrams per cubic meter of water vapour;
   b. be free of hydrocarbons in liquid form and not have a hydrocarbon dewpoint in excess of minus 9°C at the delivery pressure;
   c. not contain more than 23 milligrams per cubic meter of total sulphur;
   d. not contain more than two percent by volume of carbon dioxide;
   e. be as free of oxygen as supplier can keep it through the exercise of all reasonable precautions and shall not in any event contain more than 0.4 percent by volume of oxygen;
   f. have a temperature not exceeding 54°C;
   g. have a total heating value of not less than 36.00 megajoules per cubic meter;
   h. not contain more than 1 milligram per cubic meter of total siloxanes;
   i. not contain more than 2.0 percent by volume of carbon monoxide;
   j. not contain more than 4.0 percent by volume of inert gases;
   k. not contain more than 3 milligrams per cubic meter of ammonia; and
   l. be free of bacteria and pathogens.

2. In addition, the biomethane shall be supplied at a pressure not less than 420 kilopascals.

3. For convenience, FEI has provided the specification parameters in a tabular format below (Table 1). If there is a conflict between Table 1 and Section 1, Section 1 shall be used.

Table 1: Recommended Specifications for Biomethane

Contaminant Property	Specification	Recommended Measurement Frequency
Sand, dust, gums, oils and other impurities	*Free from any impurities*	
Hydrogen Sulphide (H_2S)	Less than 6 mg/m^3	Continuous
Water	Less than 65 mg/m^3 of water vapour and no liquid water	Continuous
Hydrocarbon dew point	Be free of hydrocarbons in liquid form and not have a hydrocarbon dewpoint in excess of minus 9°C at the delivery pressure	Periodic
Total Sulphur	Less than 23 mg/m^3	Periodic
Carbon Dioxide (CO_2)	Less than 2% by volume	Continuous

Oxygen (O_2)	Less than 0.4% by volume	Continuous
Temperature	54°C maximum	Continuously
Calorific power	36.00 MJ/m^3 minimum (15°C, 101.3kPa)	Calculated based on data collected continuously
Siloxanes	Less than 1 mg/m^3	Periodic
Carbon monoxide (CO)	Less than 2% by volume	Periodic
Inert gasses	Less than 4% volume	Nitrogen Continuous
Ammonia (NH_3)	3mg/m^3	Periodic – semi-annually
Bacteria and pathogens	Impurity filter (0.3 to 5 microns)	Semi-annually

Communication and Enforcement

Follow as per Specification above.

Related Information

Other References:

- GEN 06-02 Approval record

APPENDIX G

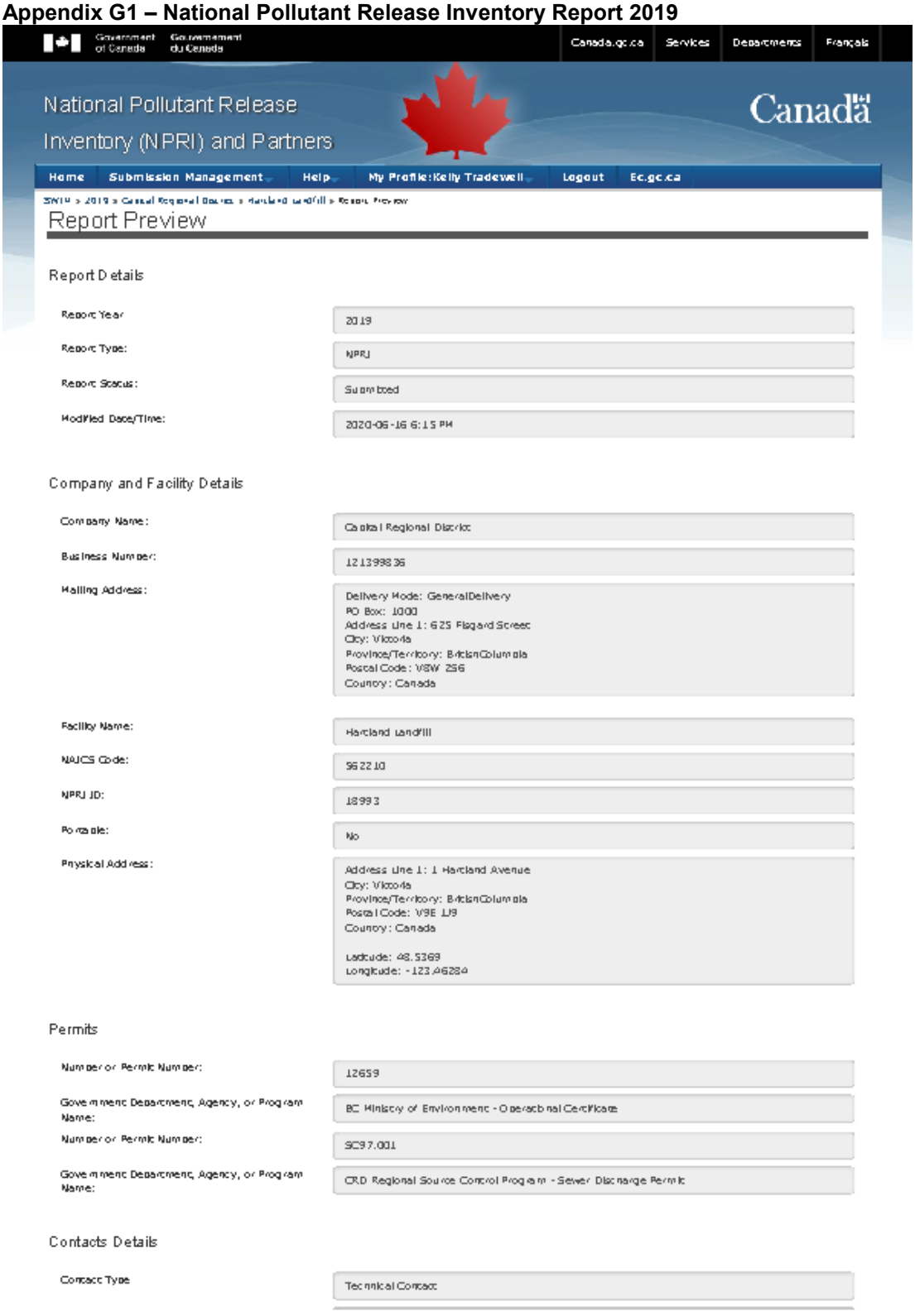
Other Landfill Emissions Reports

G1 National Pollutant Release Inventory Report 2019 (ECCC)

G2 BC Greenhouse Gas Emissions Report 2019 (BC MOE)

G3 Facility Greenhouse Gas Report 2019 (ECCC)

Appendix G1 – National Pollutant Release Inventory Report 2019



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Canada.gc.ca | Services | Departments | Français

National Pollutant Release Inventory (NPRI) and Partners

Canada

Home | Submission Management | Help | My Profile:Kelly Tradewell | Logout | Ec.gc.ca

NPRI > 2019 > Capital Regional District > Hartland Landfill > Report Preview

Report Preview

Report Details

Report Year:	2019
Report Type:	NPRI
Report Status:	Submitted
Modified Date/Time:	2020-06-16 6:15 PM

Company and Facility Details

Company Name:	Capital Regional District
Business Number:	121398836
Mailing Address:	Delivery Mode: GeneralDelivery PO Box: 1000 Address Line 1: 625 Fisgard Street City: Victoria Province/Territory: BritishColumbia Postal Code: V8W 2S6 Country: Canada
Facility Name:	Hartland Landfill
NAICS Code:	562212
NPRI ID:	18993
Portable:	No
Physical Address:	Address Line 1: 1 Hartland Avenue City: Victoria Province/Territory: BritishColumbia Postal Code: V9E 1J9 Country: Canada Latitude: 48.5369 Longitude: -123.46284

Permits

Number or Permit Number:	12659
Government Department, Agency, or Program Name:	BC Ministry of Environment - Operational Certificate
Number or Permit Number:	SC97.001
Government Department, Agency, or Program Name:	CRD Regional Source Control Program - Sewer Discharge Permit

Contacts Details

Contact Type:	Technical Contact

Appendix G1, continued

Name:	Kelly Tradewell
Position:	Environmental Contaminants Officer
Telephone:	2503603154
Email:	ktradewell@crd.bc.ca
Contact Type	Certifying Official
Name:	Andy Liu
Position:	Manager, Environmental Engineering
Telephone:	2503603268
Fax:	2503603270
Email:	aliu@crd.bc.ca

General Information

Number of employees:	20
Activities for Which the 20,000-Hour Employee Threshold Does Not Apply:	None of the above
Activities Relevant to Reporting Dioxins, Furans and Hexachlorobenzene:	None of the above
Activities Relevant to Reporting of Polycyclic Aromatic Hydrocarbons (PAHs):	Wood preservation using creosote: No
Does this facility release less than the reporting threshold for each Part 4 substance AND have one or more light or medium crude oil batteries with a total oil throughput for the battery components of the facility of ≥ 1,900 m3 per year?	No
Did the facility operate one or more electricity generation units that had a capacity of 25 MW or more and that distributed or sold to the grid 33% or more of its potential electrical output in the calendar year?	No
Is this the first time the facility is reporting to the NPRI (under current or past ownership):	No
Is the facility controlled by another Canadian company or companies:	No
Does this facility solely consist of compression equipment in the oil and gas extraction sector?	No
Is the facility required to report one or more NPRI Part 4 substances (Criteria Air Contaminants):	Yes
Was the facility shut down for more than one week during the year:	No
Operating Schedule - Days of the Week:	Mon, Tue, Wed, Thu, Fri, Sat
Usual Number of Operating Hours per day:	10
Usual Daily Start Time (24h) (hh:mm):	07:00

Substance List

CAS RN	Substance Name	Releases	Releases (Speciated VOCs)	Disposals	Recycling	Unit
NA - PAH	PAHs, total 4 substances	116.889000	N/A	N/A	N/A	kg
NA - PM10	PM10 - Particulate Matter <= 10 Microns	15.537300	N/A	N/A	N/A	tonnes
NA - PM25	PM2.5 - Particulate Matter <= 2.5 Microns	11.763600	N/A	N/A	N/A	tonnes
108-88-3	Toluene	1.270000	N/A	N/A	N/A	tonnes
NA - TSP	Total Particulate Matter	27.637700	N/A	N/A	N/A	tonnes

Appendix G1, continued

Applicable Programs

CAS RN	Substance Name	NPRI	ON MECP TRA	First report for this substance to the ON MECP TRA
NA - P/H	PAHs, total unspeciated	Yes		
NA - M09	PM10 - Particulate Matter <= 10 Microns	Yes		
NA - M10	PM2.5 - Particulate Matter <= 2.5 Microns	Yes		
108-88-3	Toluene	Yes		
NA - M08	Total Particulate Matter	Yes		

General Information about the Substance - Releases and Transfers of the Substance

CAS RN	Substance Name	Was the substance released on-site	The substance will be reported as the sum of releases to all media (total of 1 tonne or less)	1 tonne or more of a Part 5 Substance (Speciated VOC) was released to air
NA - P/H	PAHs, total unspeciated	Yes	No	No
108-88-3	Toluene	Yes	No	No

General Information about the Substance - Disposals and Off-site Transfers for Recycling

CAS RN	Substance Name	Was the substance disposed of (on-site or off-site), or transferred for treatment prior to final disposal	Is the facility required to report on disposals of tailings and waste rock for the selected reporting period	Was the substance transferred off-site for recycling
NA - P/H	PAHs, total unspeciated	No	No	No
108-88-3	Toluene	No	No	No

General Information about the Substance - Nature of Activities

CAS RN	Substance Name	Manufacture the Substance	Process the Substance	Otherwise Use of the Substance
NA - P/H	PAHs, total unspeciated	As a by-product		
108-88-3	Toluene	As a by-product		

On-site Releases - Releases to air

CAS RN	Substance Name	Category	Basis of Estimate	Detail Code	Quantity
NA - P/H	PAHs, total unspeciated	Stack or Point Releases	E2 - Published Emission Factors		116.385 kg
NA - M09	PM10 - Particulate Matter <= 10 Microns	Stack or Point Releases	E2 - Published Emission Factors		11.346 tonnes
NA - M09	PM10 - Particulate Matter <= 10 Microns	Storage or Handling Releases	E2 - Published Emission Factors		0.0103 tonnes
NA - M09	PM10 - Particulate Matter <= 10 Microns	Road Dust	E2 - Published Emission Factors		4.181 tonnes
NA - M10	PM2.5 - Particulate Matter <= 2.5 Microns	Stack or Point Releases	E2 - Published Emission Factors		11.346 tonnes
NA - M10	PM2.5 - Particulate Matter <= 2.5 Microns	Storage or Handling Releases	E2 - Published Emission Factors		0.0016 tonnes
NA - M10	PM2.5 - Particulate Matter <= 2.5 Microns	Road Dust	E2 - Published Emission Factors		0.418 tonnes
108-88-3	Toluene	Fugitive Releases	E2 - Published Emission Factors		1.27 tonnes
NA - M08	Total Particulate Matter	Stack or Point Releases	E2 - Published Emission Factors		11.346 tonnes
NA - M08	Total Particulate Matter	Storage or Handling Releases	E2 - Published Emission Factors		0.0217 tonnes
NA - M08	Total Particulate Matter	Road Dust	E2 - Published Emission Factors		16.270 tonnes

On-site Releases - Releases to air - Total

CAS RN	Substance Name	Total - Releases to Air
NA - P/H	PAHs, total unspeciated	116.385 kg
NA - M09	PM10 - Particulate Matter <= 10 Microns	15.5373 tonnes
NA - M10	PM2.5 - Particulate Matter <= 2.5 Microns	11.7656 tonnes
108-88-3	Toluene	1.27 tonnes
NA - M08	Total Particulate Matter	27.6377 tonnes

On-site Releases - Total

CAS RN	Substance Name	Total releases
NA - P/H	PAHs, total unspeciated	116.385 kg
108-88-3	Toluene	1.27 tonnes

Appendix G1, continued

On-site Releases - Quarterly Breakdown of Annual Releases

CAS RN	Substance Name	Quarter 1	Quarter 2	Quarter 3	Quarter 4
NA - P/H	PAHs, total unspeciated	25	25	25	25
108-88-3	Toluene	25	25	25	25

On-site Releases - Monthly Breakdown of Annual Releases

CAS RN	Substance Name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
NA - M09	PM10 - Particulate Matter <= 10 Microns	8.33	8.33	8.34	8.33	8.33	8.34	8.33	8.33	8.34	8.33	8.33	8.34
NA - M10	PM2.5 - Particulate Matter <= 2.5 Microns	8.33	8.33	8.34	8.33	8.33	8.34	8.33	8.33	8.34	8.33	8.33	8.34
NA - M08	Total Particulate Matter	8.33	8.33	8.34	8.33	8.33	8.34	8.33	8.33	8.34	8.33	8.33	8.34

On-site Releases - Reasons for Changes in Quantities Released from Previous Year

CAS RN	Substance Name	Reasons for Changes in Quantities from Previous Year	Comments
108-88-3	Toluene	Nature of activities results in annual variation in releases/disposals/transfers (Describe the activity and how it impacts the reported quantity in the comment field)	Landfill gas generation is variable
NA - M08	Total Particulate Matter	Nature of activities results in annual variation in releases/disposals/transfers (Describe the activity and how it impacts the reported quantity in the comment field)	Unpaved surface vary in length depending on location of active face. Haulers/truck accessing the active face is not a fixed number and varies with waste disposal volumes.
NA - M09	PM10 - Particulate Matter <= 10 Microns	Nature of activities results in annual variation in releases/disposals/transfers (Describe the activity and how it impacts the reported quantity in the comment field)	Unpaved surface vary in length depending on location of active face. Haulers/truck accessing the active face is not a fixed number and varies with waste disposal volumes.
NA - M10	PM2.5 - Particulate Matter <= 2.5 Microns	Nature of activities results in annual variation in releases/disposals/transfers (Describe the activity and how it impacts the reported quantity in the comment field)	Unpaved surface vary in length depending on location of active face. Haulers/truck accessing the active face is not a fixed number and varies with waste disposal volumes.
NA - P/H	PAHs, total unspeciated	Nature of activities results in annual variation in releases/disposals/transfers (Describe the activity and how it impacts the reported quantity in the comment field)	Landfill gas production, collection and utilization is variable.

Disposals - Reasons and Comments

CAS RN	Substance Name	Reasons Why Substance Was Disposed	Reasons for Changes in Quantities from Previous Year	Comments
108-88-3	Toluene		Nature of activities results in annual variation in releases/disposals/transfers (Describe the activity and how it impacts the reported quantity in the comment field)	Landfill gas generation is variable
NA - P/H	PAHs, total unspeciated		Nature of activities results in annual variation in releases/disposals/transfers (Describe the activity and how it impacts the reported quantity in the comment field)	LFG generation, collection and utilization is variable

Recycling - Reasons and Comments

CAS RN	Substance Name	Reasons Why Substance Was Recycled	Reasons for Changes in Quantities Recycled from Previous Year	Comments
108-88-3	Toluene		No significant change (i.e. <10% or no change)	
NA - P/H	PAHs, total unspeciated		No significant change (i.e. <10% or no change)	

Pollution Prevention

Does the facility have a documented pollution prevention plan?	No
Did the facility complete any pollution prevention activities in the current NPRI reporting year	No
If no, please select all applicable reasons from the list below:	Activities were implemented in a previous year; additional activities are either unnecessary or unfeasible at this time Other (please specify): Pollution prevention activities inherent in landfill regulatory framework. Landfill gas collection and destruction ongoing at the landfill, dust controls required and ongoing, etc.

Appendix G1, continued

Feedback

Report Submission and Electronic Certification

NPRI - Electronic Statement of Certification

Specify one language of correspondence

English

Comments (optional)

I hereby certify that I have exercised due diligence to ensure that the submitted information is true and complete. The amounts and values for the facility(ies) identified below are accurate, based on reasonable estimates using available data. The data for the facility(ies) that I represent are hereby submitted to the programs identified below using the Single Window Reporting Application.

I also acknowledge that the data will be made public.

Note: Only one person identified as the Certifying Official or the authorized delegate should submit the report(s) identified below.

Company Name

Capital Regional District

Certifying Official (or authorized delegate)

Andy Liu

Report Submitted by

Kelly Tradewell

I, the Certifying Official or authorized delegate, agree with the statements above and acknowledge that by pressing the 'Submit Report(s)' button, I am electronically certifying and submitting the facility report(s) for the identified company to its affiliated programs.

Submitted Report

Period	Submission Date	Facility Name	Province	City	Programs
2019	2020-06-16	Hartland Landfill	British Columbia	Victoria	NPRI

Note: If there is a change in the contact information for the facility, a change in the owner or operator of the facility, if operations at the facility are terminated, or if information submitted for any previous year was mistaken or inaccurate, please update this information through SWIM or by contacting the National Pollutant Release Inventory directly.

Version: 3.16.0

Appendix G2 – BC Greenhouse Gas Emissions Report 2019

Report Preview

Company Details

Name	Capital Regional District

Report Details

Report Status	Submitted
Facility Name	Hartland Landfill
Facility Type	SFO
Report Type	Standard Report
Report Update Comments	

Activities

SWIM Validation

Please verify the following information.

Company Information

Legal Name *	Capital Regional District
English Trade Name	
Business Number *	121399836
DUNS Number *	209954346

Mailing Address

Street Number **	625
Street Name **	Fisgard
Street Number Suffix	
Street Type	Street
Street Direction	
Unit Number	

PO Box **	1000
Rural Route Number **	
City *	Victoria
Province **	British Columbia
Postal Code **	V8W 2S6
Country *	Canada

Facility Details

Facility Name *	Hartland Landfill
NPRI ID	18993
BCGHG ID **	22211190001 (Assigned by British Columbia MECP)
NAICS Code *	562210

Physical Address

Street Number **	1
Street Name **	Hartland
Street Type **	Avenue
City **	Victoria
Province **	British Columbia
Postal Code **	V9E 1J9
Country *	Canada
Land Survey Short Description	
National Topographic Short Description	

Geographical Address

Latitude (N) (dd.mmmmm) **	48.53690

Longitude (E) (ddd.mmmmm) **	-123.46284

Permits

BC Ministry of Environment - Operational Certificate

Issuing Agency	BC Ministry of Environment - Operational Certificate
Permit Number	12659

CRD Regional Source Control Program - Sewer Discharge Permit

Issuing Agency	CRD Regional Source Control Program - Sewer Discharge Permit
Permit Number	SC97.001

Operator Contact

Given Name *	Kelly Tradewell
Position *	Environmental Contaminants Officer
Email Address *	ktradewell@crd.bc.ca
Telephone Number *	2503603154
Ext	
Fax	

Mailing Address

Street Number **	625
Street Name **	Fisgard
Street Number Suffix	
Street Type	Street
Street Direction	
Unit Number	
PO Box **	1000

Rural Route Number **	
City *	Victoria
Province **	British Columbia
Postal Code **	V8W 2S6
Country *	Canada

Operation Representative

Given Name *	Ian Wiebenga
Position *	Manager, Landfill Operations
Email Address *	Iwiebenga@crd.bc.ca
Telephone Number *	2503603219
Ext	
Fax	

Mailing Address

Street Number **	625
Street Name **	Fisgard
Street Number Suffix	
Street Type	Street
Street Direction	
Unit Number	
PO Box **	1000
Rural Route Number **	
City *	Victoria
Province **	British Columbia

Postal Code **	V8W 2S6
Country *	Canada

Person Primarily Responsible for Preparing the Report

Given Name *	Kelly Tradewell
Position *	Environmental Contaminants Officer
Email Address *	ktradewell@crd.bc.ca
Telephone Number *	2503603154
Ext	
Fax	

Mailing Address

Street Number **	625
Street Name **	Fisgard
Street Number Suffix	
Street Type	Street
Street Direction	
Unit Number	
PO Box **	1000
Rural Route Number **	
City *	Victoria
Province **	British Columbia
Postal Code **	V8W 2S6
Country *	Canada

Parent Company Information

Empty

General Stationary Combustion

(a) general stationary combustion, useful energy

Fuel Groups **

Empty

(b) General stationary combustion, no useful energy

Fuel Groups **

Flares

GSC Unit Name *	Flares
Description	Ground and Candle

Fuels

Landfill Gas (Sm^3)

Fuel *	Landfill Gas (Sm^3)
Fuel Classification	biomass not in Schedule C
Fuel Description	
Units	Sm^3
Annual Fuel Amount *	9055143
HHV Measured/Default **	Default
Annual Weighted Average High Heating Value (GJ/unit fuel) **	0.0359
Annual Weighted Average Carbon Content (weight fraction) **	
Annual Steam Generation (kg) **	
Total Heat Input (GJ) **	
CO2 Measured/Default **	Default
Emission Factor (CO2) **	54.63

Emission Factor Unit (CO2) **	kg/GJ
CH4 Measured/Default **	Default
Emission Factor (CH4) **	1
Emission Factor Unit (CH4) **	g/GJ
N2O Measured/Default **	Default
Emission Factor (N2O) **	0.1
Emission Factor Unit (N2O) **	g/GJ

Emissions for Fuel

N/A	Gas	Methodology **	Emissions (t) **	Emissions (t CO2e)
☐	CO2 bio-nC	Methodology 1 (Default HHV/Default EF)	7891.5727	7891.5727
☐	CH4	Default HHV/Default EF	0.048792	1.2198
☐	N2O	Default HHV/Default EF	0.014172	4.2233

Replacement/Alternative Methodology Description (Mandatory if Replacement Methodology or Alternative Parameter Measurement selected as a methodology above. Otherwise, not saved.) **

Flares

GSC Unit Name *	Flares
Description	Ground and candle pilots

Fuels

Propane (kilolitres)

Fuel *	Propane (kilolitres)
Fuel Classification	non-biomass
Fuel Description	

Units	kilolitres
Annual Fuel Amount *	0.11
HHV Measured/Default **	Default
Annual Weighted Average High Heating Value (GJ/unit fuel) **	25.31
Annual Weighted Average Carbon Content (weight fraction) **	
Annual Steam Generation (kg) **	
Total Heat Input (GJ) **	
CO2 Measured/Default **	Default
Emission Factor (CO2) **	59.66
Emission Factor Unit (CO2) **	kg/GJ
CH4 Measured/Default **	Default
Emission Factor (CH4) **	0.948
Emission Factor Unit (CH4) **	g/GJ
N2O Measured/Default **	Default
Emission Factor (N2O) **	4.267
Emission Factor Unit (N2O) **	g/GJ

Emissions for Fuel

N/A	Gas	Methodology **	Emissions (t) **	Emissions (t CO2e)
☐	CO2 nonbio	Methodology 1 (Default HHV/Default EF)	0.1600	0.1600
☐	CH4	Default HHV/Default EF	0.000003	0.0001

☐	N2O	Default HHV/Default EF	0.000011	0.0033

Replacement/Alternative Methodology Description (Mandatory if Replacement Methodology or Alternative Parameter Measurement selected as a methodology above. Otherwise, not saved.) **

Mobile Combustion

Emissions from fuel combustion by mobile equipment that is part of the facility

Fuel *

Diesel (kilolitres)

Fuel *	Diesel (kilolitres)
Fuel Classification	non-biomass
Fuel Description	
Units	kilolitres

Q1 *	Q2 *	Q3 *	Q4 *	Annual Fuel Amount
61.33	66.62	63.45	71.39	262.79

Emissions for Fuel

N/A	Gas	Emissions (t) **	Emissions (t CO2e)
☐	CO2 nonbio	699.8044	699.8044
☐	CH4	0.0350	0.8750
☐	N2O	0.1051	31.3198

Note: please enter the default emission factor value and units from WCI methodology manual, or enter your own emission factor value and units if they are determined at the site or provided by the supplier, whichever applies. So whichever methodology (i.e. Default EF, Hours of Operation and Site-specific EF) is selected, the emission factors are mandatory.

CO2 Emission Factor **

69.53

CO2 Emission Factor Units **

kg/GJ

CH4 Emission Factor **

3.473

CH4 Emission Factor Unit **

g/GJ

N2O Emission Factor **

10.44

N2O Emission Factor Unit **

g/GJ

Motor Gasoline - Off-Road (kilolitres)

Fuel *	Motor Gasoline - Off-Road (kilolitres)
Fuel Classification	non-biomass
Fuel Description	
Units	kilolitres

Q1 *	Q2 *	Q3 *	Q4 *	Annual Fuel Amount
2.68	2.68	2.68	2.68	10.72

Emissions for Fuel

N/A	Gas	Emissions (t) **	Emissions (t CO2e)
☐	CO2 nonbio	24.5818	24.5818
☐	CH4	0.02899	0.7248
☐	N2O	0.00054	0.1609

Note: please enter the default emission factor value and units from WCI methodology manual, or enter your

own emission factor value and units if they are determined at the site or provided by the supplier, whichever applies. So whichever methodology (i.e. Default EF, Hours of Operation and Site-specific EF) is selected, the emission factors are mandatory.

CO2 Emission Factor **

65.4

CO2 Emission Factor Units **

kg/GJ

CH4 Emission Factor **

77.14

CH4 Emission Factor Unit **

g/GJ

N2O Emission Factor **

1.429

N2O Emission Factor Unit **

g/GJ

Electricity Generation

(a) Emissions from fuel combustion for electricity generation

Non-Cogen Units

The dropdown 'Navigate to' can be used to navigate directly to a specific Unit/Fuel.Navigate To Generator (CAT 1.6MW)Generator (CAT 1.6MW) / Landfill Gas (Sm^3)

Generator (CAT 1.6MW)

Non-Cogen Unit Name *	Generator (CAT 1.6MW)
Nameplate Capacity (MW) *	1.6
Net Power (MWh) *	12000

Fuel

Landfill Gas (Sm^3)

Fuel *	Landfill Gas (Sm^3)
Fuel Classification	biomass not in Schedule C

Appendix G2, continued

Fuel Description	
Units	Sm^3
Annual Fuel Amount *	6387443
HHV Measured/Default **	Default
Annual Weighted Average High Heating Value (GJ/unit fuel) **	0.0359
Annual Weighted Average Carbon Content (weight fraction) **	
Annual Steam Generation (kg) **	
Total Heat Input (GJ) **	
CO2 Measured/Default **	Default
Emission Factor (CO2) **	54.63
Emission Factor Unit (CO2) **	kg/GJ
CH4 Measured/Default **	Default
Emission Factor (CH4) **	1
Emission Factor Unit (CH4) **	g/GJ
N2O Measured/Default **	Default
Emission Factor (N2O) **	0.1
Emission Factor Unit (N2O) **	g/GJ

Emissions for Fuel

N/A	Gas	Methodology **	Emissions (t) **	Emissions (t CO2e)
☐	CO2 bio-nC	Methodology 1 (Default HHV/Default EF)	5974.2325	5974.2325
☐	CH4	Default HHV/Default EF	0.1094	2.7350

☐	N2O	Default HHV/Default EF	0.01094	3.2601

Replacement/Alternative Methodology Description (Mandatory if Replacement Methodology or Alternative Parameter Measurement selected as a methodology above. Otherwise, not saved.) **

Cogen Units

The dropdown 'Navigate to' can be used to navigate directly to a specific Unit/Fuel.Navigate To

Empty

(b) Emissions from acid gas scrubbers and acid gas reagents

N/A	Gas	Methodology **	Emissions (t) **	Emissions (t CO2e)
☒	CO2 nonbio			

Replacement/Alternative Methodology Description (Mandatory if Replacement Methodology or Alternative Parameter Measurement selected as a methodology above. Otherwise, not saved.) **

(c) Emissions from cooling units

N/A	Gas	Methodology **	Emissions (t) **	Emissions (t CO2e)
☒	HFC-23 (CHF3)			
☒	HFC-32 (CH2F2)			
☒	HFC-41 (CH3F)			
☒	HFC-43-10mee (C5H2F10)			
☒	HFC-125 (C2HF5)			
☒	HFC-134 (C2H2F4)			
☒	HFC-134a (C2H2F4)			
☒	HFC-143 (C2H3F3)			

☒	HFC-143a (C2H3F3)			
☒	HFC-152a (C2H4F2)			
☒	HFC-227ea (C3HF7)			
☒	HFC-236fa (C3H2F6)			
☒	HFC-245ca (C3H3F5)			

Replacement/Alternative Methodology Description (Mandatory if Replacement Methodology or Alternative Parameter Measurement selected as a methodology above. Otherwise, not saved.) **

(d) Emissions from geothermal geyser steam or fluids

N/A	Gas	Methodology **	Emissions (t) **	Emissions (t CO2e)
☒	CO2 nonbio			

Replacement/Alternative Methodology Description (Mandatory if Replacement Methodology or Alternative Parameter Measurement selected as a methodology above. Otherwise, not saved.) **

(e) Emissions from installation, maintenance, operation and decommissioning of electrical equipment

N/A	Gas	Methodology **	Emissions (t) **	Emissions (t CO2e)
☒	SF6			

Replacement/Alternative Methodology Description (Mandatory if Replacement Methodology or Alternative Parameter Measurement selected as a methodology above. Otherwise, not saved.) **

Non-attributable emissions

If the facility has emissions that exceed 100 t CO2e and are not captured by one of the reportable activities, describe them here by detailing the activity, source type, broad Source Category and GHG types that apply.

Non-attributable emissions larger than 100 t CO2e

Emissions

Empty

Captured CO2

Note: Captured CO2 means the emissions that otherwise would be released into the atmosphere, that is captured instead for further applications such as geological deposit and as an industrial material."

Total CO2 captured for onsite use or storage, or transferred off-site in the compliance period

N/A	Gas	Emissions (t) **	Emissions (t CO2e)
☒	CO2 nonbio		

Emissions Summary

No input required - GHG totals are calculated automatically.

Total GHG Emissions for the Facility, by gas

Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2 nonbio	724.5462	724.5462
124-38-9	CO2 bio-nC	13865.8052	13865.8052
124-38-9	CO2 bio-C	0	0
74-82-8	CH4	0.222185	5.5546
10024-97-2	N2O	0.130763	38.9674
	HFCs		0
	PFCs		0
2551-62-4	SF6	0	0

Grand Total: 14634.8734

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
	CO2 Captured	0	0

Reporting-only Emissions

Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2 nonbio	724.3862	724.3862
124-38-9	CO2 bio-nC	0	0
124-38-9	CO2 bio-C	0	0
74-82-8	CH4	0.06399	1.5998
10024-97-2	N2O	0.10564	31.4807

Sub Total: 757.4667

Total GHG Emissions for the Facility, by Schedule B category

Stationary Fuel Combustion Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2	5974.2325	5974.2325
74-82-8	CH4	0.1094	2.7350
10024-97-2	N2O	0.01094	3.2601

Sub Total: 5980.2276

Industrial Process Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2	0	0
74-82-8	CH4	0	0
10024-97-2	N2O	0	0
	HFCs		0
	PFCs		0
2551-62-4	SF6	0	0

Sub Total: 0

Flaring Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2	0	0
74-82-8	CH4	0	0
10024-97-2	N2O	0	0

Sub Total: 0

Fugitive Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2	0	0
74-82-8	CH4	0	0

10024-97-2	N2O	0	0
	HFCs		0
	PFCs		0
2551-62-4	SF6	0	0

Sub Total: 0

Venting Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2	0	0
74-82-8	CH4	0	0
10024-97-2	N2O	0	0

Sub Total: 0

On-Site Transportation Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2	724.3862	724.3862
74-82-8	CH4	0.06399	1.5998
10024-97-2	N2O	0.10564	31.4807

Sub Total: 757.4667

Waste Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)

124-38-9	CO2	7891.7327	7891.7327
74-82-8	CH4	0.048795	1.2199
10024-97-2	N2O	0.014183	4.2265

Sub Total: 7897.1791

Wastewater Emissions

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
124-38-9	CO2	0	0
74-82-8	CH4	0	0
10024-97-2	N2O	0	0

Sub Total: 0

Breakdown By Species, for HFCs and PFCs

Hydrofluorocarbons

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
75-46-7	HFC-23 (CHF3)	0	0
75-10-5	HFC-32 (CH2F2)	0	0
593-53-3	HFC-41 (CH3F)	0	0
138495-42-8	HFC-43-10mee (C5H2F10)	0	0
354-33-6	HFC-125 (C2HF5)	0	0

359-35-3	HFC-134 (C2H2F4)	0	0
811-97-2	HFC-134a (C2H2F4)	0	0
430-66-0	HFC-143 (C2H3F3)	0	0
420-46-2	HFC-143a (C2H3F3)	0	0
75-37-6	HFC-152a (C2H4F2)	0	0
431-89-0	HFC-227ea (C3HF7)	0	0
690-39-1	HFC-236fa (C3H2F6)	0	0
679-86-7	HFC-245ca (C3H3F5)	0	0

Sub Total: 0

Perfluorocarbons

CAS Number	Gas	Emissions (t)	Emissions (t CO2e)
75-73-0	Perfluoromethane (CF4)	0	0
76-16-4	Perfluoroethane (C2F6)	0	0
76-19-7	Perfluoropropane (C3F8)	0	0
115-25-3	Perfluorocyclobutane (c-C4F8)	0	0
355-25-9	Perfluorobutane (C4F10)	0	0
678-26-2	Perfluoropentane (C5F12)	0	0

355-42-0	Perfluorohexane (C6F14)	0	0

Sub Total: 0

Note on Reporting to Environment and Climate Change Canada

If you also have an obligation to report greenhouse gas emissions to Environment and Climate Change Canada (ECCC) for this facility, you will be able to preload applicable data where possible from this report into an ECCC report. This BC GHG report must be successfully submitted first in order to use the data prepopulation feature when filling out your ECCC report for the same facility. In your ECCC report, please ensure that you review and modify, where appropriate, the preloaded information to ensure it meets your reporting obligation to ECCC.

Process Flow Diagram

A Process Flow Diagram is required for SFO and LFO (Parent) reports.

File Name	Date
GasPlantFlowDiagram-GHGReporting.docx	2020-04-20T15:06:13-07

Comments

Comments and Supporting Information

Enter any comments you wish to be included regarding the GHG information you have reported. Comments provided are for internal use only and will not be published.
You may provide an additional information file related to the reported GHG emissions to better explain your report (including but not limited to e.g. explanation of any large changes in emissions from the last reporting year).
Enter your company or facility website if you wish to provide more information (e.g. contextual information on production and environmental activities etc.).
In order to facilitate the implementation of the Industrial Incentive Program, supporting information required must be provided here. For details on the required supporting information please contact Industrial Reporting & Control Group at GHGRegulator@gov.bc.ca.

Comments Regarding GHG Reporting

Website

Electricity Consumption (kWh)

Comments: (max 4000 characters)

Additional Information File Related to the Reported GHG Emissions:

File Name	Date

Industrial Incentive Program

Attach a file, using the Industrial Incentive Program Reporting Template, to provide necessary information for the Industrial Incentive Program.

N/A **

☒

File Name	Date

Comments on and brief description of the Industrial Incentive Program information

N/A **	Comments: (max 4000 characters)
☒	

Confidentiality Request

Confidentiality Request

Are you requesting confidentiality of this report under the B.C. Reg. 249/2015 Reporting Regulation? *

No

An operator may claim that disclosure of the information referred to in Section 44(2)(a) to (d) be prohibited under Section 21 of the Freedom of Information and Protection of Privacy Act (FOIPPA), and request that the information be kept confidential.
A claim must be done in accordance with Section 44(5) of the Regulation.
The Ministry of Environment will be in contact with you regarding your request.

File Name	Date

Environment and Climate Change Canada

Report Submission and Electronic Certification

Electronic Statement of Certification

Please note that the Operation Representative retains ultimate responsibility for any and all data submitted into the System, including for certifying and submitting reports. Therefore, the individual physically clicking on the "Submit" button may be the Organization Administrator acting on behalf of the Operation Representative.

Reporting Period

2019

Report Type

R1

Operation Type

SFO

Approval

☒ I hereby certify that: I have examined this report. The report has been prepared in accordance with the BC Greenhouse Gas Emission Reporting Regulation. The contents detailed in the report are complete and accurate. The information provided in this report has been reviewed and approved by the officer. *

Submission Details

Report submitted by	Timestamp
Kelly Tradewell	2020-04-20T15:53:01-07

Page 23 of 23

Printed on 2020-04-21 12:25:39 PM

Appendix G3 – Facility Greenhouse Gas Report

Report Preview

Company Details

Name

Capital Regional District

Report Details

Report Status:

Ready to Submit -

Reporting Period:

2019

Facility Name:

Hartland Landfill

Facility Address:

1 Hartland Avenue Victoria (British Columbia) V9E 1J9Canada

Report Type:

Report (ECCC only)

Report Update Comments:

Verify Facility Information

Please verify the following information.

Company Information

Legal Name *	Capital Regional District
English Trade Name	
French Trade Name	
Business Number	121399836
DUNS Number	209954346

Facility Details

Facility Name *	Hartland Landfill
Physical Address *	1 Hartland Avenue Victoria (British Columbia) V9E 1J9 Canada 48.53690 -123.46284
Primary NAICS Code *	562210
GHGRP ID	G10433 (Assigned by ECCC)
NPRI ID	18993

Reporter

Name *	Kelly Tradewell
Position *	Environmental Contaminants Officer
Mailing Address *	625 Fisgard Street Victoria (British Columbia), V8W 2S6, Canada, 1000
Physical Address *	625 Fisgard Street Victoria (British Columbia), V8W 1R7, Canada
Email Address *	ktradewell@crd.bc.ca
Telephone Number *	2503603154
Ext.	

Authorized Signing Officer (Certifying Official)

Name *	Andy Liu
Position *	Manager, Environmental Engineering
Mailing Address *	625 Fisgard Street Victoria (British Columbia), V8W 2S6, Canada
Physical Address *	625 Fisgard Street Victoria (British Columbia), V8W 1R7, Canada
Email Address *	aliu@crd.bc.ca
Telephone Number *	2503603268
Ext.	

Parent Company Information

Empty

Facility Activities

Activities

You must select at least one activity

Electricity or Heat-Steam Generation

Provincial Report

Would you like to upload your provincial report to Environment and Climate Change Canada's Greenhouse Gas Reporting Program? *

Yes

If yes, you must upload your provincial report to Environment and Climate Change Canada.

Note: After submitting your report, Environment and Climate Change Canada staff will use the information from the provincial report and load the relevant data into the reporting system.

If no, you will proceed to the activity screen.

Uploaded Documents **

File Name	Date
LFG-BCGHGReport-2019.pdf	2020-04-21 12:33:26 PM

Section A

Report the direct greenhouse gas emissions for this facility for the period identified above.
Click Validate to check for errors and Save/Continue to save the information. If there are any errors, they will be flagged. If there are no errors, the page will be Complete.
N/A = Not ApplicableMDM = Monitoring or Direct MeasurementMB = Mass BalanceEF = Emission FactorsEE = Engineering Estimates

Stationary Fuel Combustion Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☐	Methane (CH4)	☐	☐	☒	☐	0.10936	2.73400

☐	Nitrous Oxide (N2O)	☐	☐	☒	☐	0.01094	3.26012

Sub-total 5.99412

Industrial Process Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

Venting Emissions (including vented Formation CO2)

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

Flaring Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)

☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

Leakage Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total

On-site Transportation Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☐	Carbon Dioxide (CO2)	☐	☐	☒	☐	724.3862	724.3862
☐	Methane (CH4)	☐	☐	☒	☐	0.06395	1.59875
☐	Nitrous Oxide (N2O)	☐	☐	☒	☐	0.10561	31.47178

Sub-total	757.45673

Waste Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☐	Methane (CH4)	☐	☐	☒	☐	2703.65	67591.25
☐	Nitrous Oxide (N2O)	☐	☐	☒	☐	0.0142	4.2316

Sub-total	67595.4816

Wastewater Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Carbon Dioxide (CO2)	☐	☐	☐	☐		
☒	Methane (CH4)	☐	☐	☐	☐		
☒	Nitrous Oxide (N2O)	☐	☐	☐	☐		

Sub-total	

Section B

Report the direct greenhouse gas emissions for this facility for the period identified above.Click Validate to check for errors and Save/Continue to save the information. If there are any errors, they will be flagged. If there are no errors, the page will be Complete.

Note: CO2 emissions from biomass combustion are not included in the total reported to Environment and Climate Change Canada.

N/A = Not ApplicableMDM = Monitoring or Direct MeasurementMB = Mass BalanceEF = Emission FactorsEE = Engineering Estimates

Biomass Combustion Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☐	Carbon Dioxide (CO2)	☐	☐	☒	☐	13865.81	13865.81

Section C

Report the direct emissions of HFCs, PFCs and SF6 from industrial processes and industrial product use only for this facility for the period identified above.

Click Validate to check for errors and Save/Continue to save the information. If there are any errors, they will be flagged. If there are no errors, the page will be Complete.

N/A = Not ApplicableMDM = Monitoring or Direct MeasurementMB = Mass BalanceEF = Emission FactorsEE = Engineering Estimates

Hydrofluorocarbon (HFC) Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	HFC-23 (CHF3)	☐	☐	☐	☐		
☒	HFC-32 (CH2F2)	☐	☐	☐	☐		
☒	HFC-41 (CH3F)	☐	☐	☐	☐		
☒	HFC-43-10mee (C5H2F10)	☐	☐	☐	☐		
☒	HFC-125 (C2HF5)	☐	☐	☐	☐		
☒	HFC-134 (C2H2F4)	☐	☐	☐	☐		
☒	HFC-134a (C2H2F4)	☐	☐	☐	☐		
☒		☐	☐	☐	☐		

	HFC-143 (C2H3F3)						
☒	HFC-143a (C2H3F3)	☐	☐	☐	☐		
☒	HFC-152a (C2H4F2)	☐	☐	☐	☐		
☒	HFC-227ea (C3HF7)	☐	☐	☐	☐		
☒	HFC-236fa (C3H2F6)	☐	☐	☐	☐		
☒	HFC-245ca (C3H3F5)	☐	☐	☐	☐		
Total							

Perfluorocarbon (PFC) Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Perfluoromethane (CF4)	☐	☐	☐	☐		
☒	Perfluoroethane (C2F6)	☐	☐	☐	☐		
☒	Perfluoropropane (C3F8)	☐	☐	☐	☐		
☒	Perfluorobutane (C4F10)	☐	☐	☐	☐		
☒	Perfluoroc	☐	☐	☐	☐		

	yclobutane (c-C4F8)						
☒	Perfluoropentane (C5F12)	☐	☐	☐	☐		
☒	Perfluorohexane (C6F14)	☐	☐	☐	☐		
Total							

Sulphur Hexafluoride (SF6) Emissions

N/A	Substance Name	MDM **	MB **	EF **	EE **	Emissions (t) **	Emissions(t CO2e)
☒	Sulphur hexafluoride (SF6)	☐	☐	☐	☐		

Summary

No input required - GHG totals are calculated automatically.

Total GHG Emissions for the Facility

	Emissions (t)	Emissions (t CO2e)
Carbon Dioxide (CO2)	724.3862	724.3862
Methane (CH4)	2703.82331	67595.58275
Nitrous Oxide (N2O)	0.13075	38.96350
Hydrofluorocarbons (HFCs)		
Perfluorocarbons (PFCs)		
Sulphur hexafluoride (SF6)		

Facility Total reported to Environment and Climate Change Canada:	68358.93245
Carbon dioxide (CO2) from biomass combustion:	13865.81

Comments

This section is optional.

Enter any comments you wish to include related to the information you have reported.
General Comments will not be published.

General Comments

Comments: (max 4000 characters)

Reasons for Changes in GHG Emissions from Previous Year

Select the applicable reason or reasons

No significant change (i.e. < 5%) or no change

Additional Information: **

File Name

Date

Confidentiality Request

Environment and Climate Change Canada Confidentiality Request

The Canada Gazette Notice indicated that the Minister of the Environment intends to publish GHG emission totals by gas, by facility. Under the Canadian Environmental Protection Act, 1999 (CEPA 1999), you can request that part or all of the information that you have provided in this report be treated as confidential. You must provide appropriate justification to support this request (see Help for more information).

Are you requesting confidentiality of this report under CEPA 1999? *

No

If yes, you must upload a document containing your written request to Environment and Climate Change

Canada with your report submission that includes:
- Identification of the specific information that you wish to keep confidential
- Appropriate justification and supporting documentation

An Environment and Climate Change Canada representative will be in contact with you regarding your request.

Click on the icon located to the right of your screen to upload your Environment and Climate Change Canada Confidentiality Request.

File Name	Date

APPENDIX H

ENV Letter – Landfill Gas Management Regulation Compliance Status
Hartland Landfill

Report Date: March 22, 2019 File: LG120441

Report Number: 120441

Capital Regional District
625 Fisgard Street
PO Box 1000
Victoria, BC V8W 2S6

Dear Capital Regional District

Re: Notice Letter, Landfill Gas Management Regulation LG120441, Capital Regional District, Saanichton, BC, Hartland Landfill

On March 18, 2019, Ministry of Environment and Climate Change Strategy, Environmental Protection Division staff conducted an inspection of your facility, Capital Regional District Hartland Landfill located at Saanichton, BC,with the Landfill Gas Management Regulation under the *Environmental Management Act*.

Inspection Details:

Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (1): An owner or operator of a regulated landfill site must ensure that a qualified professional conducts an initial landfill gas generation assessment of the landfill site in accordance with subsection (2).

Ministry of Environment and Climate Change Strategy
Compliance
Environmental Protection Division
Mailing Address:
2080-A
Labieux Rd
Nanaimo BC V9E 6J9
Telephone: 250 751 3100
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Details/Findings:	Inspection Overview: On March 18, 2019, Ministry of Environment and Climate Change Strategy (Ministry), Officer Colin Meldrum (Officer Meldrum) conducted an office review inspection of the Capital Regional District (the Permittee), Hartland Landfill, with Operational Certificate 12659. The scope of the inspection was to assess compliance with the Landfill Gas Management Regulation (LFGMR), Environmental Management Act (EMA). The inspection period is from January 1, 2009 to March 18, 2019, and included a review of the following documents: - Initial Report, Landfill Gas Generation Assessment for the Hartland Landfill dated December 2010 and prepared by the Capital Regional District (2010 Initial LFG Report); - Hartland Landfill, Long Term Landfill Gas Management Plan, dated December 2011 and prepared by Conestoga-Rovers & Associates (2011 LFG Design Plan); - Hartland landfill - Landfill Gas Monitoring, Annual Report 2017 dated November 2018 and prepared by Capital Regional District (2017 LFG Monitoring Report); and - Hartland Landfill, Operating and Environmental Monitoring, 2017 Annual Report, Operation Certificate 12659 dated October 2018 and prepared by Capital Regional District (2017 Annual Report). Compliance Assessment: A review of the 2010 Initial LFG Report determined that more than 100,000 tonnes of waste was in place before January 1, 2009 and more than 10,000 tonnes of waste is disposed annually into the landfill site. Therefore, the requirements of the LFGMR are applicable. The 2010 Initial LFG Report provides the results of an initial landfill gas generation assessment that was conducted in accordance with subsection (2) by qualified professional Andy Liu, P.Eng.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (2)(a): The assessment referred to in subsection (1) must be conducted in accordance with the guidelines and include the following: (a) the annual tonnage of municipal solid waste received for disposal into the landfill site in the calendar year immediately preceding the year in which the assessment is conducted;
Details/Findings:	A review of the 2010 Initial LFG Report determined that the annual tonnage of municipal solid waste received for disposal for the year 2009 was estimated to be 168,947 tonnes and that the actual waste received was 161,247 tonnes.
Compliance:	In

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (2)(b): The assessment referred to in subsection (1) must be conducted in accordance with the guidelines and include the following: (b) projections for the annual tonnage of municipal solid waste anticipated to be received for disposal into the landfill site in the calendar year of the assessment and in each of the 4 calendar years following the calendar year of the assessment;
Details/Findings:	A review of the 2010 Initial LFG Report determined that the assessment was conducted in accordance with the guidelines. The 2010 Initial LFG Report included projections for the annual tonnage of municipal solid waste anticipated to be received for disposal into the landfill site in 2010 and in each of the 4 calendar years thereafter. The estimated annual tonnages were: Year Tonnes 2010 170,806 2011 172,685 2012 174,584 2013 176,505 2014 178,446
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (2)(c): The assessment referred to in subsection (1) must be conducted in accordance with the guidelines and include the following: (c) an estimate of the municipal solid waste in place at the landfill site at the end of the calendar year immediately preceding the calendar year in which the assessment is conducted;
Details/Findings:	A review of the 2010 Initial LFG Report determined that the estimated municipal solid waste in place at the end of 2009 was 4,656,617 tonnes.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (2)(d): The assessment referred to in subsection (1) must be conducted in accordance with the guidelines and include the following: (d) an estimate of the quantity of methane generated at the landfill site in the calendar year immediately preceding the calendar year in which the assessment is conducted;

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Details/Findings:	A review of the 2010 Initial LFG Report determined that the estimated methane gas generated in 2009 was 8,195 tonnes.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (2)(e): The assessment referred to in subsection (1) must be conducted in accordance with the guidelines and include the following: (e) projections for methane anticipated to be generated annually at the landfill site in the calendar year of the assessment and in each of the 4 calendar years following the calendar year of the assessment;
Details/Findings:	A review of the 2010 Initial LFG Report determined that projections for methane generated in 2010 and for each of the 4 calendar years following the calendar year thereafter were provided. The projections for methane anticipated to be generated were: Year Tonnes 2010 8,316 2011 8,454 2012 8,594 2013 8,734 2014 8,875
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (3)(a): The qualified professional who conducts the assessment must complete an initial report setting out the following: (a) the findings of the initial assessment, including the information described in subsection (2);
Details/Findings:	The qualified professional, who conducted the 2010 assessment, completed the 2010 Initial LFG Report setting out the findings of the initial assessment, including information described in subsection (2).
Compliance:	In

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (3)(b)(i): The qualified professional who conducts the assessment must complete an initial report setting out the following: (b) copies of relevant records respecting annual tonnage of municipal solid waste received for disposal into the landfill site (i) in the calendar year immediately preceding the year in which the assessment is conducted, and
Details/Findings:	A review of the 2010 Initial LFG Report determined that relevant records were provided respecting annual tonnage of municipal solid waste received for disposal into the landfill site in 2009.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (3)(b)(ii): The qualified professional who conducts the assessment must complete an initial report setting out the following: (b) copies of relevant records respecting annual tonnage of municipal solid waste received for disposal into the landfill site (ii) in all years during which the landfill site has been in operation and for which records have been maintained;
Details/Findings:	A review of the 2010 Initial LFG Report determined that historical waste data dates back 30 years from the calendar year in which the assessment was conducted. With respect to the guidelines, the Permittee is in compliance.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (3)(c): The qualified professional who conducts the assessment must complete an initial report setting out the following: (c) any other information requested in writing by the director;
Details/Findings:	There are no records in the Ministry database indicating that the director requested in writing any other information; therefore, this requirement is not applicable for the inspection period.

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Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (3)(d): The qualified professional who conducts the assessment must complete an initial report setting out the following: (d) any other information required under the guidelines;
Details/Findings:	The qualified professional who conducted the 2010 assessment completed the 2010 Initial LFG Report and provided information about modeling, waste categorization, climate, methane generation rates, etc.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (3)(e): The qualified professional who conducts the assessment must complete an initial report setting out the following: (e) certification by the qualified professional that the assessment meets the requirements set out in subsection (2).
Details/Findings:	A review of the 2010 Initial LFG Report determined that the qualified professional who conducted the 2010 assessment certified that the assessment meets the requirements set out in subsection (2).
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (4): If a landfill gas generation assessment has been conducted for a landfill site before January 1, 2009, the requirement for an assessment under this section may be met if a qualified professional reviews the assessment and completes a report as described in subsection (3).
Details/Findings:	A review of the 2010 Initial LFG Report determined that SCS Engineers conducted landfill gas generation assessments in 1995 and in 2006. The qualified professional who conducted the 2010 Initial LFG Report conducted a new assessment; therefore, this requirement is not applicable for the inspection period.

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Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (5)(a): The owner or operator of the landfill site must submit to the director a report required under this section as follows: (a) if the quantity of municipal solid waste in place at the landfill site is 100 000 tonnes or more on or before January 1, 2009, no later than January 1, 2011;
Details/Findings:	A review of the 2010 Initial LFG Report determined that the landfill site exceeded the 100,000 tonnes of waste in place threshold before January 1, 2009; therefore, the report was required to be submitted on the later date of January 1, 2011. It could not be determined when the 2010 Initial LFG Report was submitted.
Compliance:	Not Determined
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (5)(b): The owner or operator of the landfill site must submit to the director a report required under this section as follows: (b) if the quantity of municipal solid waste in place at the landfill site reaches or exceeds 100 000 tonnes after January 1, 2009, on or before the later of (i) March 31 of the year immediately following the year in which the quantity of municipal solid waste reaches or exceeds 100 000 tonnes, or (ii) January 1, 2011;
Details/Findings:	A review of the 2010 Initial LFG Report determined that the landfill site exceeded the 100,000 tonnes of waste threshold before January 1, 2009; therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 4 (5)(c): The owner or operator of the landfill site must submit to the director a report required under this section as follows: (c) if the annual quantity of municipal solid waste received for disposal into the landfill site reaches or exceeds 10 000 tonnes on or after January 1, 2009, on or before the later of (i) March 31 of the year immediately following the year in which the annual quantity of municipal solid waste received for disposal into the landfill site reaches or exceeds 10 000 tonnes, or (ii) January 1, 2011.

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Details/Findings:	A review of the 2010 Initial LFG Report determined that the landfill site was receiving in excess of 10,000 tonnes annually prior to January 1, 2009; therefore, the report was required to be submitted on the later date of January 1, 2011. It could not be determined when the 2010 Initial LFG Report was submitted.
Compliance:	Not Determined
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 5 (1): The director may, within 60 days after receiving a report under section 4, request that the owner or operator of a landfill site conduct additional assessments of the landfill site for generation of landfill gas.
Details/Findings:	A review of the Ministry database determined that the director had not requested additional assessments within 60 days after receiving a report under section 4. Therefore, this requirement and all other requirements of Section 5 are not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 6 (1)(a): The director may, at any time, request that the owner or operator of a landfill site to which this regulation applies have a qualified professional (a) conduct an assessment of the landfill site in accordance with section 4 (2), and
Details/Findings:	A review of the Ministry database determined that the director has not required the Permittee to have a qualified professional conduct any additional assessment in accordance with Section 4(2). Therefore, this requirement and all other requirements of Section 6 are not applicable for the inspection period.
Compliance:	Not Applicable

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (1): The owner or operator of a regulated landfill site that, as the result of an assessment conducted in accordance with this regulation, is estimated to generate 1 000 tonnes or more of methane in the calendar year immediately preceding the calendar year of the assessment must ensure that a landfill gas management facilities design plan is prepared for the landfill site.
Details/Findings:	A review of the 2010 Initial LFG Report determined that more than 1,000 tonnes of methane was generated in 2009. A landfill gas management facilities design plan was prepared in the 2011 LFG Design Plan.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (2)(a): The plan required under this section must be prepared by a qualified professional in accordance with the guidelines and include the following information: (a) a description of existing or planned methods, management practices and processes for landfill gas management at the landfill site;
Details/Findings:	A review of the 2011 LFG Design Plan determined that the plan required under this section was prepared by a qualified professional in accordance with the guidelines and included planned methods, management practices, and processes for landfill gas management at the landfill site.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (2)(b): The plan required under this section must be prepared by a qualified professional in accordance with the guidelines and include the following information: (b) a plan for the installation, operation and maintenance of landfill gas management facilities at the landfill site, including a contingency plan for disruption in landfill gas management for scheduled or emergency maintenance or replacement of landfill gas management facilities;

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Details/Findings:	A review of the 2011 LFG Design Plan determined that the plan required under this section was prepared by a qualified professional in accordance with the guidelines and included a plan for the installation, operation, and maintenance of landfill gas management facilities at the landfill site. A contingency plan was included for disruption in landfill gas management for scheduled or emergency maintenance or replacement of landfill gas management facilities.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (2)(c): The plan required under this section must be prepared by a qualified professional in accordance with the guidelines and include the following information: (c) recommendations for optimizing landfill gas management at the landfill site;
Details/Findings:	A review of the 2011 LFG Design Plan determined that the plan required under this section was prepared by a qualified professional in accordance with the guidelines and included recommendations for optimizing landfill gas management at the landfill site.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (2)(d): The plan required under this section must be prepared by a qualified professional in accordance with the guidelines and include the following information: (d) any other information required under the guidelines;
Details/Findings:	A review of the 2011 LFG Design Plan determined that the plan required under this section was prepared by a qualified professional in accordance with the guidelines and included any other information required under the guidelines.
Compliance:	In

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (2)(e): The plan required under this section must be prepared by a qualified professional in accordance with the guidelines and include the following information: (e) any other information requested in writing by the director;
Details/Findings:	A review of the Ministry database determined that the director has not requested any other information in writing. Therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (2)(f): The plan required under this section must be prepared by a qualified professional in accordance with the guidelines and include the following information: (f) certification by the qualified professional that the plan was prepared in accordance with the guidelines.
Details/Findings:	A review of the 2011 LFG Design Plan determined that the qualified professional certified that the plan required under this section was prepared in accordance with the guidelines.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (3): The landfill gas management facilities design plan must be submitted to the director no later than one year after the date the report setting out the estimate was required to be submitted to the director.
Details/Findings:	The landfill gas management facilities design plan was required to be submitted by January 1, 2012. The 2011 LFG Design Plan was dated December 2011, but it could not be determined when it was submitted.
Compliance:	Not Determined

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (4): A landfill gas management facilities design plan that has been prepared for a landfill site before January 1, 2009 may be submitted to the director in substitution for the landfill gas management system design plan required under subsection (1) if a qualified professional certifies in writing that the landfill gas management system design plan prepared before January 1, 2009 meets the requirements set out in subsection (2).
Details/Findings:	A review of the Ministry database determined that the 2011 LFG Design Plan was the first landfill gas management system design plan to be submitted to the Ministry. Therefore, this requirement is not applicable.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 7 (5): The owner or operator of a regulated landfill site that, as the result of an assessment conducted in accordance with this regulation, is estimated to generate less than 1 000 tonnes of methane gas in the calendar year immediately preceding the calendar year of the assessment may submit a plan to the director at any time.
Details/Findings:	A review of the 2010 Initial LFG Report determined that more than 1,000 tonnes of methane was generated in 2009; therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (2)(a): The owner or operator of a landfill site for which there is an accepted design plan must (a) install landfill gas management facilities in accordance with the accepted design plan, and
Details/Findings:	A review of the 2011 LFG Design Report and the 2017 LFG Monitoring Report determined that the owner installed landfill gas management facilities in accordance with the accepted design plan.

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Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (2)(b)(i): The owner or operator of a landfill site for which there is an accepted design plan must (b) implement management practices, processes and methods for landfill gas management in accordance with any guidelines respecting (i) migration of landfill gas,
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the owner implemented management practices, processes, and methods for landfill gas management in accordance with the guidelines respecting migration of landfill gas.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (2)(b)(ii): The owner or operator of a landfill site for which there is an accepted design plan must (b) implement management practices, processes and methods for landfill gas management in accordance with any guidelines respecting (ii) use of landfill covers,
Details/Findings:	A review of the 2011 LFG Design Plan and the 2017 LFG Monitoring Report determined that the owner implemented management practices, processes, and methods for landfill gas management in accordance with the guidelines respecting use of landfill covers.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (2)(b)(iii): The owner or operator of a landfill site for which there is an accepted design plan must (b) implement management practices, processes and methods for landfill gas management in accordance with any guidelines respecting (iii) operation of landfill gas management facilities,
Details/Findings:	A review of the 2011 LFG Design Plan determined that the owner implemented management practices, processes, and methods for landfill gas management in accordance with the guidelines respecting operation of landfill gas management facilities.

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Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (2)(b)(iv): The owner or operator of a landfill site for which there is an accepted design plan must (b) implement management practices, processes and methods for landfill gas management in accordance with any guidelines respecting (iv) landfill gas collection equipment,
Details/Findings:	A review of the 2011 LFG Design Plan determined that the owner implemented management practices, processes, and methods for landfill gas management in accordance with the guidelines respecting landfill gas collection equipment.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (2)(b)(v): The owner or operator of a landfill site for which there is an accepted design plan must (b) implement management practices, processes and methods for landfill gas management in accordance with any guidelines respecting (v) landfill gas flaring equipment, and
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the owner implemented management practices, processes, and methods for landfill gas management in accordance with the guidelines respecting landfill gas flaring equipment.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (2)(b)(vi): The owner or operator of a landfill site for which there is an accepted design plan must (b) implement management practices, processes and methods for landfill gas management in accordance with any guidelines respecting (vi) landfill gas management facilities maintenance, including the number of days annually that landfill gas management facilities may be shut down.

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Details/Findings:	A review of the 2017 LFG Monitoring Report does not state any planned maintenance schedule; however, the facilities were shutdown for less than 3 days in 2017, which included power outages, and scheduled and unscheduled maintenance.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (3): The landfill gas management facilities and practices referred to in subsection (2) must be installed and implemented no later than 4 years after the date the landfill gas management facilities design plan is submitted to the director under section 7.
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the landfill gas management facilities were implemented and commissioned as early as 1998 and updated according to the 2011 LFG Design Plan.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (4)(a): The owner or operator of a landfill site where landfill gas management facilities are installed must ensure that (a) a qualified professional certifies in writing to the director that the facilities were installed in accordance with the accepted design plan for the landfill site, and
Details/Findings:	A review of the 2017 LFG Monitoring Report and the 2017 Annual Report determined that a qualified professional certified the facilities, with some minor changes to the 2011 LFG Design Plan, were installed in accordance with the accepted design plan for the landfill site.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 8 (4)(b): The owner or operator of a landfill site where landfill gas management facilities are installed must ensure that (b) the facilities are operated and maintained in accordance with the accepted design plan for the landfill site.

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Details/Findings:	A review of the 2017 LFG Monitoring Report and the 2017 Annual Report determined that a qualified professional certified the facilities, with some minor changes to the 2011 LFG Design Plan, are operated and maintained in accordance with the accepted design plan for the landfill site.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 9 (1): The owner or operator of a landfill site must ensure that landfill gas collected at the landfill site is flared in accordance with the guidelines unless the landfill gas is used for a purpose and in a manner that reduces emissions of methane to the atmosphere in an amount equivalent to the reduction that would be achieved by flaring the landfill gas.
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the Permittee flares the landfill gas in accordance with the guidelines. 57.9% of the collected methane was flared at the landfill site.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 10 (1): The owner or operator of a landfill site where landfill gas management facilities are shut down temporarily for emergency maintenance or replacement must notify the director within 24 hours of the shutdown by phone, fax or other electronic means.
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the Permittee did not experience any emergency shutdowns due to maintenance or replacement of landfill gas management facilities; therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 11 (1): At least 90 days before the date an owner or operator of a landfill site plans to cease operation of landfill gas management facilities, the owner or operator must submit to the director a shutdown report prepared by a qualified professional, setting out the supporting data used to calculate the quantity of methane generated per year at the landfill site.
Details/Findings:	A review of the 2017 LFG Monitoring Report and the 2017 Annual Report determined that the Permittee does not have a planned date to cease the operations of the landfill gas management facilities; therefore, this requirement and all other requirements of Section 11 are not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 12 (1)(a): An owner or operator of a regulated landfill site must monitor and maintain records respecting the following, each in the manner specified by the director: (a) the quantity and sources of municipal solid waste received for disposal into the landfill site;
Details/Findings:	A review of the 2017 Annual Report determined that the Permittee monitors and maintains records. The Permittee reported quantity and sources of the municipal solid waste received for disposal into the landfill site.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 12 (1)(b): An owner or operator of a regulated landfill site must monitor and maintain records respecting the following, each in the manner specified by the director: (b) if the owner or operator has monitored and analyzed the composition of the municipal solid waste received for disposal into the landfill site, the composition of the municipal solid waste received;
Details/Findings:	A review of the 2017 Annual Report determined that the Permittee has conducted multiple composition studies in recent years. The Permittee has reported the composition of the municipal solid waste received based on the results of the most recent composition study.

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Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 12 (1)(c): An owner or operator of a regulated landfill site must monitor and maintain records respecting the following, each in the manner specified by the director: (c) any other matter required under the guidelines.
Details/Findings:	A review of the 2017 Annual Report and the 2017 LFG Monitoring Report determined that the Permittee monitors and maintains records respecting any other matter required under the guidelines.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 12 (2)(a): If installation of landfill gas management facilities is required at the landfill site under section 8, the owner or operator of the landfill site must also maintain records respecting (a) maintenance and shutdown of landfill gas management facilities installed and operated at the landfill site,
Details/Findings:	Installation of landfill gas management facilities is required under section 8 of the LFGMR. A review of the 2017 LFG Monitoring Report determined that the Permittee maintains records of maintenance and shutdown of the landfill gas management facilities.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 12 (2)(b): If installation of landfill gas management facilities is required at the landfill site under section 8, the owner or operator of the landfill site must also maintain records respecting (b) the quantity and composition of gases collected at the landfill site, and
Details/Findings:	Installation of landfill gas management facilities is required under section 8 of the LFGMR. A review of the 2017 Annual Report determined that the Permittee reported the composition of the landfill gas, including methane, carbon dioxide, and oxygen levels.

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Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 12 (2)(c): If installation of landfill gas management facilities is required at the landfill site under section 8, the owner or operator of the landfill site must also maintain records respecting (c) the quantity and composition of landfill gas that is flared or used as an alternative to flaring.
Details/Findings:	Installation of landfill gas management facilities is required under section 8 of the LFGMR. A review of the 2017 LFG Monitoring Report determined that the Permittee maintains records of the quantity and composition of landfill gas that is flared and used as an alternative to power generators.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 12 (3): The owner or operator must ensure that the records required under this section are retained for a period of at least 10 years after they are made.
Details/Findings:	A review of the 2010 Initial LFG Report and the 2017 LFG Monitoring Report determined that the Permittee has retained records for at least 10 years.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 13 (1): On the written request of the director, an owner or operator of a landfill site must, within the time period specified by the director, produce the records referred to in section 12 to the director for inspection or copying.
Details/Findings:	There are no records in the Ministry database of a written request of the director to produce the records referred to in Section 12; therefore, this requirement is not applicable for the inspection period.

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Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (1)(a): An owner or operator of a regulated landfill site must file an annual report with the director, in the manner and form required by the director, setting out the following information for the reporting period: (a) the information described in section 12;
Details/Findings:	A review of the 2017 Annual Report and the 2017 LFG Monitoring Report determined that the Permittee filed an annual report setting out the information described in section 12.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (1)(b): An owner or operator of a regulated landfill site must file an annual report with the director, in the manner and form required by the director, setting out the following information for the reporting period: (b) a description of any organics diversion program used at the landfill site;
Details/Findings:	The 2017 LFG Monitoring Report describes an organics diversion program and ban that took effect on January 1, 2015.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (1)(c): An owner or operator of a regulated landfill site must file an annual report with the director, in the manner and form required by the director, setting out the following information for the reporting period: (c) any additional information requested in writing by the director.
Details/Findings:	There are no records in the Ministry database of a written request of the director for any additional information; therefore, this requirement is not applicable for the inspection period.

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Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(a): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (a) the quantity and composition, determined in accordance with the methodology set out in the guidelines, of gases collected at the landfill site;
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the Permittee reported the quantity and composition of methane, carbon dioxide, and oxygen collected at the landfill site.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(b): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (b) the quantity and composition, determined in accordance with the methodology set out in the guidelines, of landfill gas that is flared or used as an alternative to flaring;
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the Permittee reported the quantity and composition of gases flared and used to power generators at the landfill site in accordance with the methodology set out in the guidelines.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(c): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (c) if landfill gas is used as an alternative to flaring, a description of that use;

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Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the Permittee, in addition to flaring, powers a 1.6-MW generator that produces electricity fed to the BC Hydro grid.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(d): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (d) a description of any periods when the landfill gas management facilities at the landfill site were shut down, and the reasons for the shut down;
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the Permittee provided a description of periods when the landfill gas management facilities were shut down and the reasons for the shutdowns.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(e): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (e) a description of any significant maintenance or operational problems encountered;
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the landfill gas management facilities experienced approximately 3 days time of maintenance or operational problems. The downtime of the facilities were related to power outages, and scheduled and unscheduled maintenance.
Compliance:	In

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(f): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (f) the efficiency of any landfill gas management facilities used at the landfill site, including an evaluation of the existing efficiency of the facilities, the method and supporting data used to calculate the facilities' efficiency and the owner's or operator's plan for increasing the facilities' efficiency;
Details/Findings:	A review of the 2017 LFG Monitoring Report determined that landfill gas management facilities had an efficiency of approximately 67.6% in 2017. The Permittee included evaluations of previous efficiencies in past years, as well as plans to increase the facilities' efficiency.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(g): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (g) municipal solid waste composition studies, if available;
Details/Findings:	A review of the 2017 Annual Report and the 2017 LFG Monitoring Report determined that the Permittee has conducted multiple waste composition studies, with the most recent study having been completed in 2016.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(h)(i): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (h) plans to be implemented at the landfill site in the next reporting year for (i) modifications or other changes to landfill gas management facilities, and

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Details/Findings:	A review of the 2017 LFG Monitoring Report determined that the Permittee planned to change sampling and survey methods of landfill gas, but did not state any planned changes to the landfill gas management facilities. Therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(h)(ii): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (h) plans to be implemented at the landfill site in the next reporting year for (ii) periods when the landfill gas management facilities will be out of operation;
Details/Findings:	A review of the 2017 LFG Monitoring Report and the 2017 Annual Report determined that the Permittee does not have plans to cease operation of landfill gas management facilities; therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (2)(i): If installation of landfill gas management facilities is required at the landfill site under section 8, the annual report must include, in addition to the information required under subsection (1), the following information for the reporting period: (i) any other information requested in writing by the director.
Details/Findings:	There are no records in the Ministry database of a written request of the director for any additional information; therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable

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Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (3)(a): An annual report required under this section must be submitted to the director (a) if an operational certificate or permit has been issued for the landfill site, and the operational certificate or permit for the landfill site specifies a date for submission of an annual report, on or before that date.
Details/Findings:	Operational Certificate 12659 has been issued for the Hartland Landfill and specifies November 30 for the submission of annual reports. The 2017 Annual Report was submitted on October 16, 2018.
Compliance:	In
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 14 (3)(b): An annual report required under this section must be submitted to the director (b) if the operational certificate or permit for the landfill site does not specify a date for submission of an annual report, or an operational certificate or permit has not been issued for the landfill site, on or before March 31 of the year immediately following the year for which the report is prepared.
Details/Findings:	Operational Certificate 12659 has been issued for the Hartland Landfill and specifies November 30 for the submission of annual reports; therefore, this requirement is not applicable for the inspection period.
Compliance:	Not Applicable
Requirement Description:	**Environmental Management Act, Landfill Gas Management Regulation (391/2008) (EMA)** 15 (1)(a)(i): If the estimate of methane generated annually at a landfill site is less than 1 000 tonnes in the calendar year immediately preceding the calendar year of an assessment under section 4, 5 or 6 or a supplementary assessment or review under this section, the owner or operator of the landfill site must, between January 1 and March 31 of the fifth calendar year following the calendar year of the previous assessment or review, ensure that a qualified professional does one of the following: (a) conducts a supplementary assessment that includes (i) the assessments required under section 4 (2) (a) to (c) and (e), and

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Details/Findings:	A review of the 2010 Initial LFG Report determined that 8,195 tonnes of methane was generated in 2009. A supplementary assessment was not required to be conducted; therefore, the requirements of section 15 are not applicable.
Compliance:	Not Applicable

Compliance History:
This is the first electronic compliance inspection report under the Landfill Gas Management Regulation since January 1, 2012.

The findings of this inspection record will become part of a sector compliance audit of the Landfill Gas Management Regulation.

Co-op Level 5 Paramon Koutorjevski assisted with the preparation of this inspection report.

More information about Environmental Compliance, the Non-Compliance Decision Matrix, and reporting and data submission requirements can be found at the links below:

- General compliance information: http://www.gov.bc.ca/environmentalcompliance
- Non-Compliance Decision Matrix information: http://www.gov.bc.ca/environment/how-compliance-is-assessed
- Reporting and data submission requirements (to be sent to EnvAuthorizationsReporting@gov.bc.ca): http://www.gov.bc.ca/submit-waste-authorization-reports

Please be advised that this inspection report may be published on the provincial government website within 7 days.

If you have any questions about this letter, please contact the undersigned.

Yours truly,

Colin Meldrum
Environmental Protection Officer

cc:

Attachments:

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Registered Mail: [ ] **Hand Delivery:** [ ]

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