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Hartland Landfill – Landfill Gas Monitoring

Annual Report 2014

Parks & Environmental Services | Environmental Protection

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HARTLAND LANDFILL – LANDFILL GAS MONITORING
2014 ANNUAL REPORT

EXECUTIVE SUMMARY

The 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 under an Operational Certificate (OC) under the *Environmental Management Act*, issued by the Ministry of Environment (MOE), and follows an Operating Plan required under the OC.

The landfill currently occupies approximately 36 hectares with an estimated 6,800,000 tonnes of municipal solid waste in place as of the end of 2014. Total annual disposal was 128,045 tonnes of residential, commercial and industrial waste.

Landfill gas is primarily made up of methane, carbon dioxide, oxygen, nitrogen, trace gases and water vapour. Methane is a greenhouse gas (GHG) and has 21 times the warming potential of carbon dioxide. In addition, it is explosive at concentrations between 5 and 15% and can be an asphyxiant gas at higher concentrations. Trace gases include hydrogen sulphide, ammonia, nitrous oxide, volatile organic compounds (VOC) and chlorofluorocarbons. Hydrogen sulphide is toxic at high concentrations.

Even with proper landfill gas collection and control, there will be fugitive emissions. A number of factors influence this, such as atmospheric pressure, groundwater level, gas pressure in the refuse mass and permeability of cover systems. Hartland landfill has implemented a landfill gas collection system to minimize fugitive emissions and a monitoring program is maintained to assess the effectiveness of these controls.

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

1. **Modelling of methane production and gas generation rates** given landfill waste volumes and decomposition rates.

2. **Gas collection infrastructure**, including cover systems, collection pipes, wells and blowers to facilitate gas collection and utilization.

3. **Landfill gas utilization facility** that produces electricity for the BC Hydro grid.

In order to monitor the effectiveness of the collection infrastructure, the Hartland landfill has several monitoring programs. The following summarizes the components of the program:

1. **Collection and utilization system monitoring** to evaluate changes in gas quality over time, and evaluates 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 landfill gas migration at the eastern landfill boundary and at onsite buildings for compliance with criteria, and for worker and public health and safety.

3. **Ambient grid and hot spot monitoring** to verify the effectiveness of cover and landfill gas collection systems and identify areas of concern where landfill gas is being released to the atmosphere for protection of worker and public health and safety.

4. **Landfill Gas Speciation** to assess the composition of gas with regard to VOC, sulphur gases and typical landfill gases in order to calculate ambient dilution concentrations for health and safety and infrastructure integrity purposes.

GAS GENERATION

In 2014, Hartland landfill generated 8,229 tonnes of methane, based on a model provided by MOE. This is the equivalent of 1,671 standard cubic feet per minute (scfm) of landfill gas at 50% methane. The BC Landfill Gas Management Regulation requires landfills that generate greater than 1,000 tonnes per year of methane to develop landfill gas management plans. These plans set out design targets for systems to achieve 75% collection efficiency four years after implementation. A plan was completed for Hartland landfill and submitted to the MOE in April 2012 with an implementation target of the end of 2016. The MOE gas generation model is available in-house and is updated annually with waste quantity and composition data to enable annual calculation of collection efficiency and GHG emissions.

An organics diversion program and ban will take effect in January 2015. As a result of the ban and early incentive programs, more than 5,000 tonnes of organics were diverted from the landfill in 2013 and more than 15,000 tonnes in 2014. Diversion of a large portion of highly decomposable waste stream from the landfill will result in a decrease in overall gas production.

GAS COLLECTION AND UTILIZATION

In 2014, the gas collection system consisted of 74 vertical wells, 36 horizontal wells, 15 leachate horizontal gas wells and 5 leachate gas trench wells, for a total of 130 wells. Ten new horizontal wells were installed in completed lifts in Phase 2. The top five collecting wells accounted for 33% of the total volume of gas collected. The well field was balanced monthly in 2014, as recommended by the Landfill Gas Management Facilities Design Guidelines.

Landfill gas is drawn under vacuum to the gas plant where it is directed to a generator and/or to a flare. The gas is then conditioned (cleaned) and the methane and oxygen content is measured. Excess gas is fed back to a candlestick flare, while the groundflare is only used during extended generator downtime.

The CRD has implemented the conceptual design in the plan with limited filling plan changes. In 2014, landfill gas collection efficiency was 56.4%. Modelled methane generation was 1,671 scfm and of that an average of 943 scfm was captured through the gas plant. Current landfill gas collection efficiencies are within estimated ranges according to the Landfill Gas Management Plan (LFGMP).

Total fugitive GHG emissions generated from the landfill for 2014 are estimated at 74,686 tonnes CO_2e, a 20% improvement from 2012 quantities. It is expected that GHG emissions will continue to decline due to the implementation of the organics (kitchen scraps) diversion program in 2015, and continued success of the CRD's waste diversion initiatives.

MONITORING

Perimeter and Building Foundation Probes

Eastern perimeter and foundation gas probes were installed to enable detection of any subsurface gas migration in order to evaluate compliance with the BC MOE Landfill Criteria for Municipal Solid Waste. All probes were monitored according to standard operating procedures four times in 2014. Methane was not detected in any probes. Quarterly monitoring should continue in order to maintain and evaluate compliance with the Landfill Criteria.

Ambient Air Grid and Hot Spot Monitoring

An ambient grid gas monitoring program is in place to evaluate the fugitive emissions of methane and hydrogen sulfide. A 50-by-50 metre grid of monitoring points has been established over the surface of the landfill and is monitored twice annually. Total hydrocarbons (THC) measured as methane levels are recorded at ground level at each grid point using a flame ionization detector. Hydrogen sulphide levels are measured at the grid points for health and safety purposes. No significant hydrogen sulphide concentrations were recorded at the grid points. A total of 12 unique grid points were found to exceed 100 ppm THC.

Hot spots (Z-points) are classified as any point exceeding 1,000 ppm THC. Each active Z-point is monitored during grid sampling. At the end of 2014, there were a total of 22 Z-points identified. Seventeen of these points had been carried over from previous surveys and the remaining points were new. No cover system failures were suspected in the closed area of Phase 1 as all hot spots were clustered in Phase 2 of the landfill where gas collection is more challenging. Hotspots have decreased significantly since the implementation of the LFGMP in 2012.

COMPLIANCE SUMMARY

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

Table ES1. Landfill Gas Compliance Summary 2014

Program	Compliance Location	Criteria	Findings	Actions	Recommendations
Perimeter Probe Monitoring	Probes GP-1A, 1B, 2A, 2B, 3A, 3B, 11A, 11B, 12A and 12B	Maximum 1.25% methane in subsurface soil (MOE Landfill Criteria for Municipal Solid Waste)	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 1.25% methane in any onsite facility (MOE Landfill Criteria for Municipal Solid Waste). Maximum 1% methane inside buildings (Landfill Gas Management Facility Design Guidelines).	No exceedances. Low risk of subsurface gas migration to adjacent building.	None	Continue quarterly monitoring.
Ambient Grid Monitoring	N/A	100 ppm THC (CRD internal guideline)	13 grid locations >100 ppm No cover system failures suspected in the closed area of Phase 1.	Investigated hot spots, mitigated were possible.	Continue biannual monitoring
Hot Spot Monitoring	N/A	1,000 ppm THC (CRD internal guideline).	5 new hot spots >1,000 ppm, 4 hot spots removed. Currently 22 locations for hot spot investigation.	Added new locations of hot spots to the monitoring program.	Continue biannual monitoring. Investigate remediation measures.
Well Field Monitoring and Balancing	N/A	Monitor monthly. Oxygen <3% - gas optimization and reduction of fire potential	Monitoring completed monthly; oxygen did not exceed 3%.	Well field monitoring has been scheduled monthly for 2015.	Continue monthly monitoring at minimum.
Gas Speciation (2013)	N/A	N/A	Undiluted landfill gas exceeded WorkSafeBC criteria for methane, carbon dioxide, hydrogen sulfide, vinyl chloride and benzene; however, ambient concentrations are likely well below WorkSafeBC limits due to dilution with ambient air.	None	Conduct speciation of landfill gas in 2015.
Gas Collection	N/A	75% gas collection efficiency target by the end of 2016 as per LFGMP.	Gas collection efficiency was estimated at 56.4%, based on the MOE gas generation model.	LFGMP submitted to MOE.	Continue to implement the gas management plan.

HARTLAND LANDFILL – LANDFILL GAS MONITORING
2014 ANNUAL REPORT

Table of Contents

Executive Summary i
1.0 Introduction 1
2.0 Site description 2
3.0 Regulatory Requirements 3
3.1 Provincial 3
3.2 WorkSafeBC 3
3.3 Federal 3
4.0 Landfill Gas Generation 4
4.1 Quantity and Sources of Municipal Waste Received 4
4.2 Waste Diversion 5
4.3 Modelling: Inputs 5
4.3.1 Modelling: Outputs 7
5.0 Landfill gas Collection system 8
5.1 System Development 8
5.1.1 Vertical Gas Extraction Wells 8
5.1.2 Horizontal Gas Extraction Wells 9
5.2 Collection and Treatment System Monitoring: Gas Well Field Operation and Data 11
6.0 Landfill Gas Utilization and Flaring 14
6.1 Gas Composition 14
6.2 Collection Efficiency and Utilization 14
6.2.1 Destruction Devices and Usage 19
6.2.2 Landfill Gas Management Plan Implementation Status 19
6.3 System Performance and Maintenance 20
6.3.1 Generator Emissions 21
7.0 Monitoring Programs 23
7.1 Subsurface Gas Monitoring 25
7.2 Ambient Grid and Hot Spot Sampling 29
7.3 Landfill Gas Speciation 33
8.0 Landfill Gas Compliance With Requirements and Guidelines 35
9.0 Conclusions and Recommendations 36
10.0 References 37
11.0 Report Signoff 38

List of Tables

Table 1 Waste Composition Data Source and Years of Application 5
Table 2 Methane Generation Potential and Rate Factors Used for the MOE Landfill Gas Generation Model 7
Table 3 Year and Estimated Quantity of Landfill Gas Generated at Hartland Landfill 7
Table 4 Number and Type of Gas Wells Operating (2010–2014) 11
Table 5 Summary of Gas Well Field Changes (2011–2014) 12
Table 6 Gas Wells with the Highest Collection 2014 13
Table 7 Landfill Gas System Collection Efficiency 1998 to 2014 17
Table 8 Landfill Gas Flows to Destruction Devices (2010 to 2014) 19
Table 9 Summary of 2014 Blower Downtime by Month 20
Table 10 Generator Performance 2014 21
Table 11 Generator Emissions Modelled and Stack Tests 2008 to 2014 21
Table 12 Summary of Generator Emissions 2013–2014 22

Table 13 Summary of Landfill Gas Monitoring Programs 23
Table 14 Average Gas Concentrations in Subsurface Perimeter Probes 2012–2014 26
Table 15 Maximum Value Gas Concentrations in Perimeter Probes 2014 26
Table 16 Average Gas Concentrations in Subsurface Foundation Probes 2012–2014 28
Table 17 Maximum Value Gas Concentrations in Foundation Probes 2014 28
Table 18 Summary of Grid Sampling Results 2014 29
Table 19 Summary of Hot Spot Results 2014 30
Table 20 Summary of Gas Speciation Results and Exposure Limits July 2013 33
Table 21 Summary of Ambient VOC Concentrations (1999–2001) 34
Table 22 Landfill Gas Compliance Summary 2014 35

List of Figures

Figure 1 Annual Waste Tonnages Received or Estimated for Hartland Landfill from 1980 to 2014 4
Figure 2 Hartland Landfill Gas Collection Infrastructure 10
Figure 3 Gas Collection by Individual Wells 15
Figure 4 Hartland Landfill Gas Plan 16
Figure 5 Landfill Gas Collection Efficiency at Hartland Landfill 2004–2014 18
Figure 6 Fugitive Greenhouse Gas Emission at Hartland Landfill 2004–2014 18
Figure 7 Location of Gas Probes 27
Figure 8 Hartland Landfill Ambient Air Monitoring Results, July 2014 31
Figure 9 Historical Z-Point Locations 32

List of Appendices

Appendix A Gas Generation Information
Appendix B Well Field Data
Appendix C 2014 Gas Collection Data
Appendix D Subsurface Perimeter and Foundation Probe Monitoring
Appendix E Grid and Hot Spot Monitoring
Appendix F Volatile Organic Compounds (VOC) Data

HARTLAND LANDFILL – LANDFILL GAS MONITORING
2014 ANNUAL REPORT

1.0 INTRODUCTION

This report has been prepared in accordance with the Landfill Gas Generation Assessment Procedure Guidance Report, prepared for the BC Ministry of Environment (MOE) by Conestoga-Rovers & Associates, dated March 2009, and in accordance with the requirements of the MOE Landfill Gas Management Regulation, approved and ordered on December 8, 2008. This report has been prepared by a qualified professional and meets the requirements of Section 4(3)(e) of the Landfill Gas Management Regulation.

The 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 salvageable items; and disposal services for municipal solid waste and controlled waste. Landfill operations are guided by an Operations Plan, the landfill Operational Certificate issued by the MOE, and the CRD's Solid Waste Management Plan.

The purpose of this report is to fulfill requirements set out in the Landfill Operational Certificate and the Landfill Gas Management Regulation for annual reporting of gas management/controls.

Landfill gas collection/management at Hartland includes the following components:

1. **Modelling of methane production and gas generation rates** given landfill waste volumes and decomposition rates.

2. **Gas collection infrastructure** including cover systems, collection pipes and blowers to facilitate gas collection and utilization.

3. **Landfill gas utilization facility** that produces electricity for the BC Hydro grid.

In order to monitor the effectiveness of the collection infrastructure, the Hartland landfill has several monitoring programs. The following summarizes the components of the program:

1. **Collection and utilization system monitoring** to evaluate changes in gas quality over time, and 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 landfill gas migration at the eastern landfill boundary and at onsite buildings for compliance with criteria, and for worker and public health and safety.

3. **Ambient grid and hot spot monitoring** to verify the effectiveness of cover and landfill gas collection systems and identify areas of concern where landfill gas is being released to the atmosphere for protection of worker and public health and safety.

4. **Landfill Gas Speciation** to assess the composition of gas with regard to VOC, sulphur gases and typical landfill gases in order to calculate ambient dilution concentrations for health and safety and infrastructure integrity purposes.

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, park land 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 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 36 hectares with an estimated 6,800,000 tonnes of municipal solid waste in place as of the end of 2013. When the landfill reaches final capacity, it will occupy approximately 46 hectares and contain approximately 10,000,000 tonnes of municipal solid waste. The annual disposal rate is currently 130,000 tonnes for residential, commercial and industrial waste.

The landfill encompasses two operational areas: Phase 1 is the older, closed area of the landfill that was operational from the 1950s to 1997. 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 a hydraulic trap for leachate containment. Completed portions or interim closures around the perimeter of Phase 2 have been closed with a cover comprised of a 500-mm layer of clay, without a geo-membrane. As the landfill development progresses, final closure of areas will be completed. Development of the Hartland landfill is guided conceptually by the Cell Development Plan from the *Hartland Landfill Phase 2 Long Term Leachate Management Plan* (Sperling Hansen Associates, June 2007).

3.0 REGULATORY REQUIREMENTS

There are a number of provincial and federal regulations that apply to landfill gas management and emissions. Key regulations are listed below.

3.1 Provincial

In January 2009, the BC Landfill Gas Management Regulation came into effect dictating province-wide criteria for landfill gas capture with the primary aim to reduce greenhouse gas (GHG) emissions from landfills. The regulation requires that landfills receiving greater than 10,000 tonnes of refuse per year, or have 100,000 tonnes of refuse in place, must calculate (using a specific landfill gas generation model) the quantity of gas produced for submission to the MOE. Calculated gas generation rates greater than 1,000 tonnes per year requires development of a Landfill Gas Management Plan (LFGMP) that must be completed by a qualified professional. Implementation must be completed within four years and is directed by the Landfill Gas Management Facilities Design Guidelines (The Guidelines), a guidance document, which specifies the design of the gas collection system, to meet 75% collection efficiency. The Guidelines also require monthly balancing of a gas collection well field.

The BC Landfill Criteria for Municipal Solid Waste dictates that combustible gas must not exceed specific limits at the landfill perimeter, and all onsite buildings. As well, it must be managed to ensure there is no public threat or nuisance and that provincial and federal air quality objectives are met. Annual reporting and interpretation of this data is a requirement under the OC.

The BC GHG Reporting Regulation also requires the CRD to report emissions from electricity production and flaring at the onsite landfill gas utilization facility.

3.2 WorkSafeBC

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

3.3 Federal

The Hartland landfill is required to report methane gas emission rates on an annual basis under the GHG Emissions Reporting Program of the *Canadian Environmental Protection Act*.

4.0 LANDFILL GAS GENERATION

Decomposition of refuse creates landfill gas; 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 moisture content. Landfill gas composition and generation rates are discussed in Section 6.0.

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.

Landfill gas is primarily made up of methane and carbon dioxide with small amounts of water vapour, oxygen, nitrogen and trace gases. Methane is an asphyxiant, is explosive at certain concentrations, and is a GHG with 21 times the warming potential of carbon dioxide. Trace gases include hydrogen sulphide, ammonia, nitrous oxide, VOC and chlorofluorocarbons. Hydrogen sulphide is odorous and can be toxic if inhaled at high concentrations. VOC can be classified as carcinogenic or as GHG and also may contribute to smog.

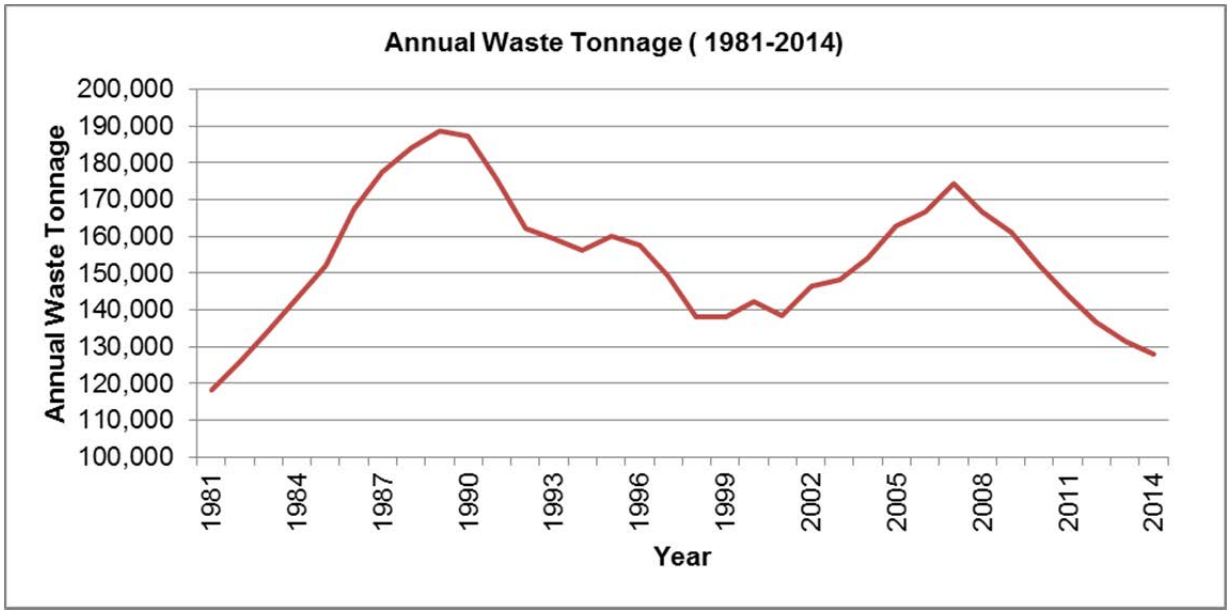
Even with extensive landfill gas collection and control there will be fugitive landfill gas emissions. A number of factors influence this, such as atmospheric pressure, groundwater level, the gas pressure in the refuse mass and permeability of cover systems. Exposure to landfill gas has the potential to cause health and safety issues due to gas toxicity/carcinogenicity, risk of explosion, as well as environmental issues related to GHG, ozone depleting substances and precursors for ground level ozone production.

When gas pressure builds up in the landfill, gas migrates via the path of least resistance to equalize with the surrounding atmosphere. This includes migrating through permeable cover systems or subsurface migration toward adjacent properties. Gas collection system operation and utilization is discussed in Sections 5.0 and 6.0, and monitoring programs are discussed in Section 7.0.

4.1 Quantity and Sources of Municipal Waste Received

Quantity of Landfill gas production is dependent on the amount and type of waste received. In 2014, the Hartland landfill received 128,045 tonnes of waste which includes 119,306 tonnes of general refuse and 8,739 tonnes of controlled waste.

Figure 1 Annual Waste Tonnages Received or Estimated for Hartland Landfill from 1980 to 2014



Waste composition is used to calculate methane generation rates to determine overall landfill gas generation; it is discussed in Section 4.3. In 2010, waste composition was estimated to be 31.5% relatively inert; 39.1% moderately decomposable; and 29.4% decomposable. This is the most recent waste composition study completed at Hartland Landfill; however, actual waste composition has changed with the kitchen scraps diversion program beginning in 2013. Details of the 2010 waste composition study are included with the gas generation data in Appendix A, including a summary of waste sources and diversion as required under the Landfill Gas Management Regulation.

Table 1 Waste Composition Data Source and Years of Application

Waste Composition Studies	Years that Waste Composition Results Were Applied
CRD Solid Waste Stream Analysis, Cameron Advisory Services Ltd., September 1990	1980 to 1995
CRD Solid Waste Stream Analysis Final Report, Cameron Advisory Services Ltd., December 1996	1996 to 2000
CRD 2001 Solid Waste Stream Composition Study, Sperling Hansen Associates, April 2001	2001 to 2004
CRD Solid Waste Stream Composition Study 2004-2005, Sperling Hansen Associates, May 2005	2005 to 2009
CRD Solid Waste Stream Composition Study 2009-2010 Final Report, Sperling Hansen Associates, September 2010	2010 to 2014

It is important to note that the 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. Based on consultant recommendations, 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.

4.2 Waste Diversion

The CRD has implemented an organics (kitchen scraps) diversion program and ban that will take effect January 1, 2015. However, incentive programs were implemented in 2013 and 2014 to encourage compliance 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.

Diversion of a large portion of highly decomposable waste stream from the landfill will result in a decrease in overall gas production. This decrease in gas production will likely be reflected in the first one to three years following the implementation of the ban. A waste composition study will be conducted in 2016 in order to more accurately model gas production once the ban is implemented.

4.3 Modelling: Inputs

Landfill gas generation rates are typically estimated by a model. These models generally use variations of a first-order decay equation developed by the US Environmental Protection Agency.

The MOE requires the use of a specific landfill gas generation model developed by Conestoga-Rovers and Associates. Protocols require the gas generation model input begin at 1980 and run to the present for annual reporting of collection efficiency. The model requires input of site-specific data which is discussed below.

In 2010, a baseline gas generation assessment was run using the model and results predicted greater than 1,000 tonnes of methane generation per year thus prompting the requirement for a gas management plan. The model was run again in 2011 with updated data to support the development of a long-term gas management plan. The plan was submitted to the MOE in April 2012. The gas generation model is run on an annual basis with updated waste quantity and composition data to produce current gas generation rates for calculating collection efficiency.

The following input data are required to run the MOE landfill gas 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

The methane generation rates and estimates were calculated by using the annual tonnage figures from Table 2 and the waste composition data from studies completed in 1990, 1996, 2001, 2005 and 2010 as well as the most recent quantifiable kitchen scraps diversion data. Detailed waste composition information is provided in Appendices A2a, A2b and A4. The waste composition data was compared to *Appendix A* of the *Categorized Waste Types in the Landfill Gas Generation Assessment Procedure Guidance Document* provided by the MOE, to determine the percentages of waste that are relatively inert, moderately decomposable and decomposable. Each of these categories has a different methane generation potential in the model as shown in Table 2. In addition, local rainfall amounts are factored into the model.

Table 2 Methane Generation Potential and Rate Factors Used for the MOE Landfill Gas 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

4.3.1 Modelling: Outputs

Table 3 shows the estimated annual methane production for Hartland landfill. The years selected for the table coincide with the activation of the landfill gas collection system in 1998. Gas generation is predicted to slowly increase and peak at landfill closure.

Table 3 Year and Estimated Quantity of Landfill Gas Generated 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

Notes:
[1]Estimates generated using the MOE model

5.0 LANDFILL GAS COLLECTION SYSTEM

Systems to control fugitive landfill gas 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 onsite buildings
- reduce GHG
- capture gas for energy recovery
- control odour

The current landfill gas management system consists of:

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

5.1 System Development

The landfill gas management system, originally installed in 1990, was upgraded in 1996 in conjunction with the planned closure of Phase 1. A temporary flare was erected and connected to 12 vertical wells. A permanent blower station, header and lateral collectors, and a groundflare were installed and commissioned in 1998. The blower station consists of three 1,300-scfm blowers, two of which have variable frequency drives that offer vacuum control. The vacuum draws gas from connected wells via a series of 150-mm diameter laterals that connect to a header that ranges from 200 mm to 400 mm. The lateral and header pipes are all constructed of high-density polyethylene. Currently, gas is extracted from a network of vertical, horizontal and trench gas collection wells and directed to the generator. Excess gas is directed to a candlestick flare, while the existing groundflare is used during extended generator downtime.

In 2004, Maxim Power Corp., under a contract with the CRD, installed and commenced operation of a 1.6-MW generator to utilize landfill gas to generate electricity which is still in operation today. In September 2013, the CRD took over ownership and operation of the 1.6-MW generator and associated controls. Operation, maintenance and electricity generation has remained the same.

5.1.1 Vertical Gas Extraction Wells

The gas system started with 34 vertical wells, many of them dual zone. Seven dual zone vertical wells were added for the West Crest closure project. By the end of 2014, there were 25 dual zone vertical wells and 23 shallow vertical wells operating. Vertical wells were spaced at 50-metre intervals. The well design includes a 760-mm borehole with either one (shallow) or two (deep) extraction pipes. The dual zone wells are up to 30 m into the waste while the shallow wells are completed to a depth of 10 to 16 m.

5.1.2 Horizontal Gas Extraction Wells

In Phase 2, horizontal wells are constructed during filling operations. Prior to 2012, the horizontal wells were placed every 45 to 50 m on centre extending 100 to 200 m in length, and trenched into the refuse with a vacuum applied at one end. The horizontal wells were laid every 10 to 12 m vertically and off-set from the layer below. Horizontal wells were installed in trenches 1 m wide and 1.2 m deep trenched in garbage with a 150-mm bed of aggregate. The wells were then covered with aggregate and a layer of geo-textile. There is a clay plug and solid pipe at the terminus of the well. The wells slope at 2% to 3% when installed.

Installation of new gas collection infrastructure has changed with the implementation of the LFGMP in 2012. The density of horizontal wells has increased to 20 m on centre. Wells will be placed on each vertical lift, approximately every 4 m, with each layer off-set from the layer below. The horizontal wells were constructed using 6-metre-long slotted pipe sections friction fit, into 3-metre-long solid pipe sections of 150-mm PVC. The pipes overlap by 1 m to allow for articulation during to settlement. All new horizontal wells over 150 m in length will be connected to laterals at both ends. Fourteen new horizontal wells (combined leachate and landfill gas collection) were added in 2014; one was reactivated and five wells were discontinued.

In addition to the vertical and horizontal wells, there are other types of wells in service such as horizontal and trench leachate collectors. See Figure 2 for the general location and layout of the landfill gas infrastructure.

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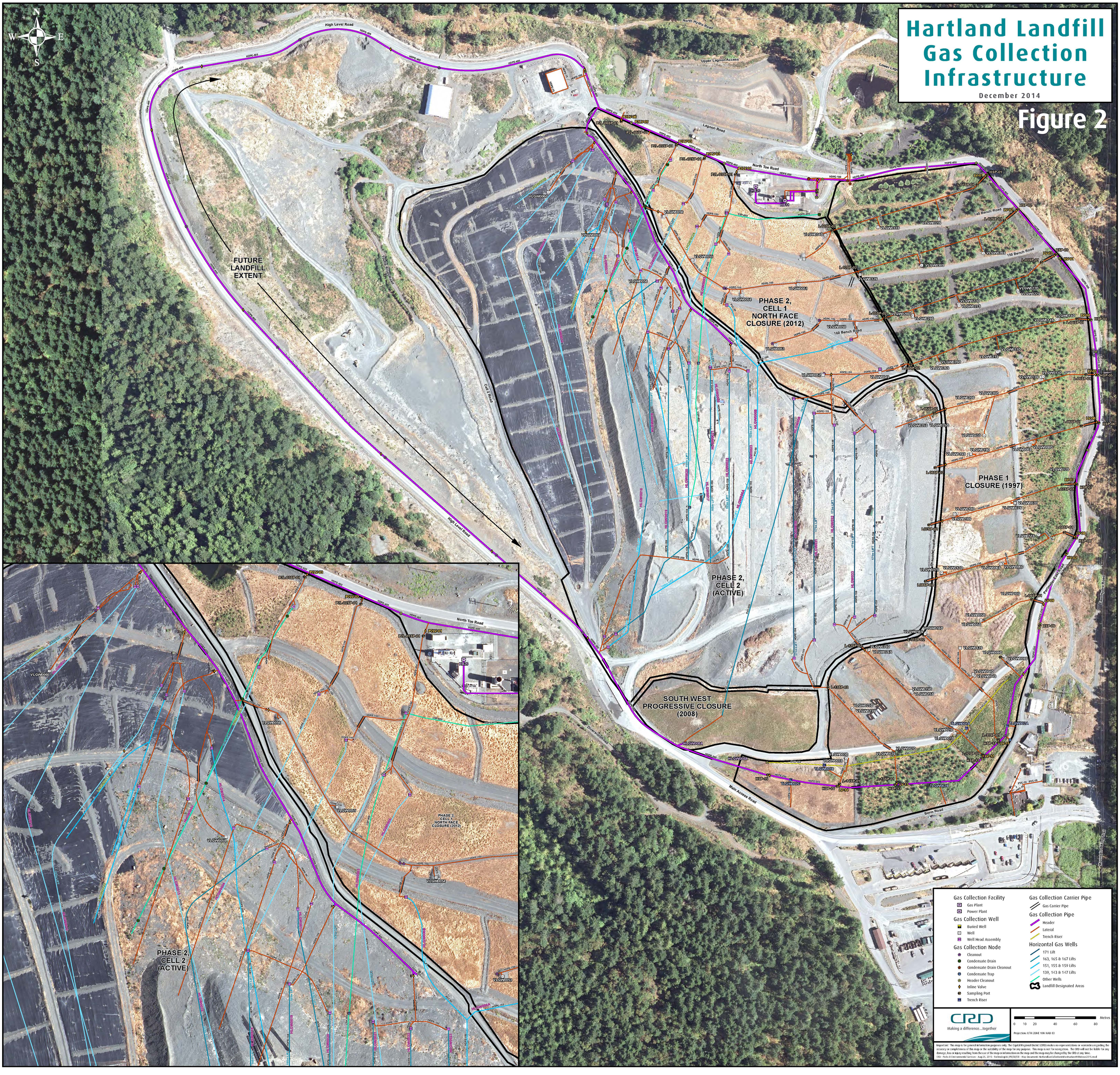
Hartland Landfill Gas Collection Infrastructure

December 2014

Figure 2



Important: This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. This map is not for navigation. The CRD will not be liable for any damage, loss or injury resulting from the use of the map or information on the map and the map may be changed by the CRD at any time.

CRD - Parks & Environmental Services - Aug 25, 2015 - Technologist: JPP/JW/DB - Map Document: HartlandGasCollectionInfrastructureWithAreas2015.mxd

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5.2 Collection and Treatment System Monitoring: Gas Well Field Operation and Data

Due to the high amount of precipitation at the site, leachate management is a key consideration in the design of the Hartland landfill. Phase 2 is designed such that leachate must freely drain through the refuse and out of the bottom of the Phase 2 basin. Therefore, gravel cover is essential to allow for good leachate drainage. However, the permeable nature of the cover material is not conducive to gas capture. For example, drawing a high vacuum on a well near the surface of the landfill could introduce excess oxygen into the well or into the garbage, which can create aerobic conditions within the garbage mass and lead to subsurface fires.

Each gas collection well has a head with a control valve to regulate the vacuum exerted on the individual well. This controls the flow of gas from the well into the gas collection system. Each well requires monitoring on a regular basis to optimize gas flows.

Table 4 shows the number and type of gas wells operating in 2014 and Table 5 summarizes the changes in the gas well field over time. Ten new horizontal wells were installed, and four new leachate horizontals and one vertical well were reconnected to the system. A summary of all gas wells, including installation and deactivation dates is included in Appendix B.

Table 4 Number and Type of Gas Wells Operating (2010–2014)

Type of Gas Well	2011	2012	2013	2014
Vertical Gas Wells	73	73	73	74
Horizontal Gas Wells	15	20	26	36
Leachate Horizontal Gas Wells	8	11	11	15
Leachate Gas Trench	5	5	5	5
Total	**101**	**109**	**115**	**130[1]**

Notes:
[1] Includes wells discontinued part way through 2014

Table 5 Summary of Gas Well Field Changes (2011–2014)

Year	Well Type				Total
	Horizontal	Leachate Horizontal	Vertical	Trench	
Wells added in 2011	HLGW008A, HLGW0014, HLGW0015	LHGW0013 and LHGW0023	VLGW0049 to VLGW0060	-	-
Wells discontinued in 2011	HLGW0002 and HLGW0007	LHGW0001 and LHGW002B	VLGW042s to VLGW048s	-	-
End of 2011	**15**	**8**	**73**	**5**	**101**
Wells added in 2012	HLGW016A, HLGW016B, HLGW017A, HLGW017B, HLGW019C	LHGW0009, LHGW010 and LHGW017	-	-	-
Wells discontinued in 2012	-	-	-	-	-
End of 2012	**20**	**11**	**73**	**5**	**109**
Wells added in 2013	HLGW018, HLGW019B, HLGW020B, HLGW021B, HLGW022B, HLGW023B	-	-	-	-
Wells Discontinued in 2013	-	-	-	-	-
End of 2013	**26**	**11**	**73**	**5**	**115**
Wells added in 2014	HLGW0030A, HLGW0030B, HLGW0031A, HLGW0031B, HLGW0032A, HLGW0032B, HLGW0033A, HLGW0033B, HLGW0034A, HLGW0034B	LHGW0019, LHGW0020, LHGW0021, LHGW0022	VLGW0047S (reactivated)	-	-
Wells Discontinued in 2014	HLGW0009, HLGW0015	LHGW006, LHGW009, LHGW0010	-	-	-
End of 2014	**34**	**12**	**74**	**5**	**125**

CRD staff monitor gas wells for methane, carbon dioxide, oxygen, balance gas, static pressure, differential pressure, temperature and flow, on a monthly basis. It is recommended that the well field be measured and balanced at least once per month and more often if there are changes in gas composition, or if there are swings in the system vacuum measured at the gas plant. There are many factors that impact gas generation, so frequent well adjustments are critical to optimize the 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 <3% oxygen, and <20% nitrogen/balance gas is desirable).

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 2014, as recommended by The Guidelines. The full data set is included in Appendices B4 and B5. Table 6 shows that the five most productive wells contribute almost 40% of the total gas volume. Figure 3 depicts gas collection by well as it contributes to the total gas collected.

Table 6 Gas Wells with the Highest Collection 2014

Name	Average Methane (% by vol)	Average Flow	Well Production (% of Total)	Cumulative Total (%)
HLGW017B	58.6	119.5	8.20%	8.20%
HLGW016B	54.2	128.5	8.16%	16.36%
HLGW0013	52.9	115.7	7.17%	23.53%
HLGW0012	49.3	83.8	4.84%	28.37%
HLGW008B	46.4	87.8	4.77%	33.14%

If a gas well does not produce enough methane, the valve is often turned down or off; in 2014, 21 wells did not produce adequate amounts of methane and, thus, did not contribute to the overall gas volume collected. This number of non-productive wells has decreased over time due to:

- Monthly gas well field balancing which enables ongoing well adjustments to achieve ideal draw.
- New monitoring equipment that is capable of measuring lower flow rates allowing for finer adjustments to each well.
- Gas wells that no longer produce sufficient methane are decommissioned.

In order to continually improve gas collection and optimize staff time, a process is underway to classify wells with the intent of reducing or discontinuing monitoring at non-collecting wells. In addition, staff has identified a number of wells that have been flooded with leachate and/or groundwater. As a trial, these will be dewatered to determine their suitability for long-term gas collection.

6.0 LANDFILL GAS UTILIZATION AND FLARING

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

1. **Conditioning Skid:** Receives the landfill gas from the CRD collection/blower system. The conditioning skid cools the gas and reduces moisture, which drains into the condensate collection system. It also removes 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 landfill gas at 2°C.
3. **Engine:** 20-cylinder, 2,200-HP Caterpillar. The engine runs a direct drive 1,200-rpm, 1.6-MW generator. The engine is innovative as it is one of the first of its kind used in a small power production application and burning a low-grade fuel. 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 due to maintenance or BC Hydro issues.

6.1 Gas Composition

Gas composition is monitored monthly at each individual well and continuously at the gas plant. A comprehensive summary of gas concentration by well is provided in Appendix B3. On average, the landfill gas was comprised of 49.2% methane, 0.4% oxygen and 30% carbon dioxide.

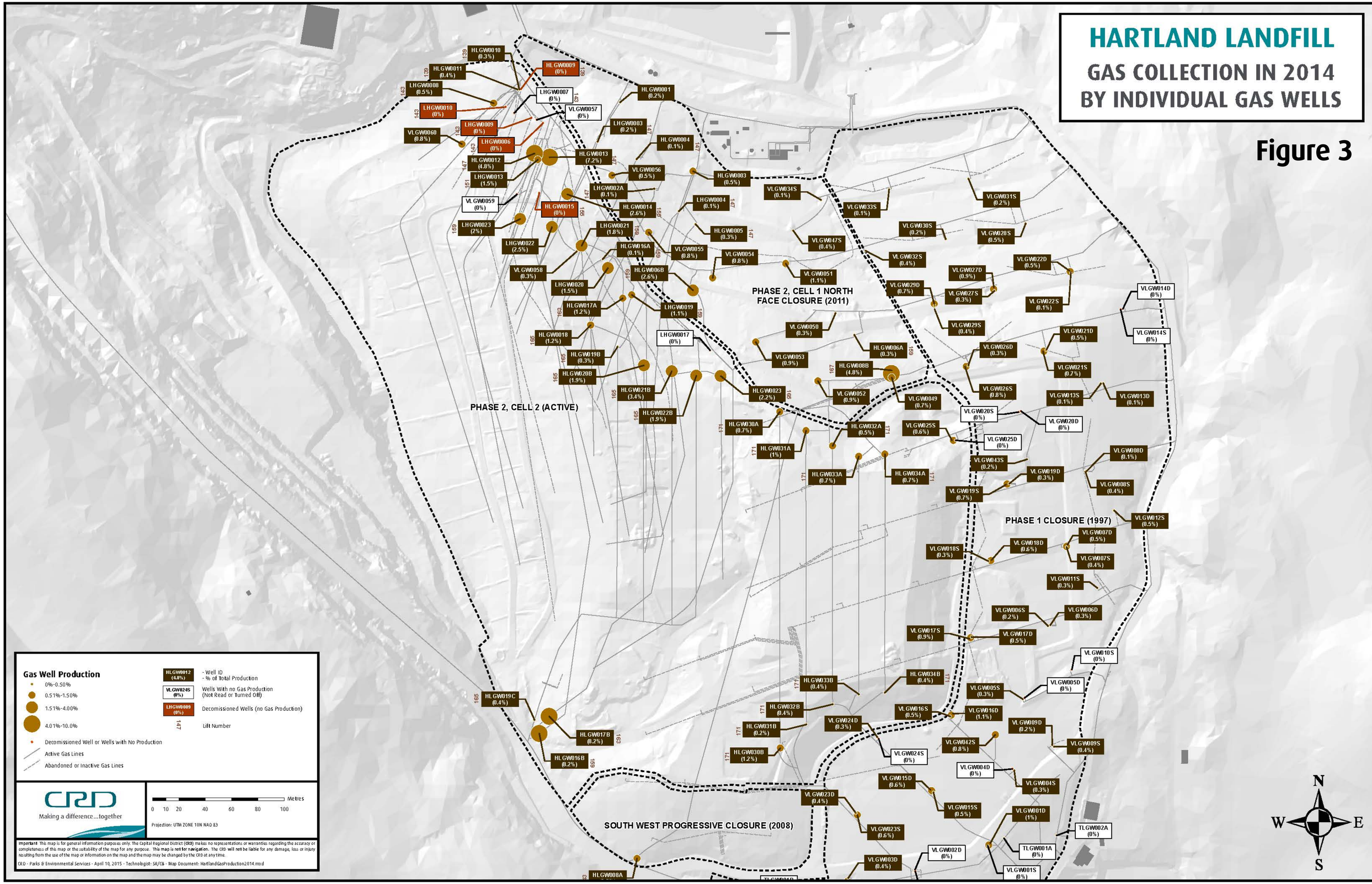
6.2 Collection Efficiency and Utilization

The volume of collected landfill gas is measured by flow meters at the landfill gas 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. Table 7 shows a summary of gas collection, generation, and overall collection efficiency, Figure 5 plots the collection efficiency for the last 10 years (2004–2014) and the full set of data is provided in Appendix C1.

HARTLAND LANDFILL

GAS COLLECTION IN 2014 BY INDIVIDUAL GAS WELLS

Figure 3



Gas Well Production

- 0%-0.50%
- 0.51%-1.50%
- 1.51%-4.00%
- 4.01%-10.0%
- Decommissioned Well or Wells with No Production
- Active Gas Lines
- Abandoned or Inactive Gas Lines

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

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

LHGW0009 (0%) Decommissioned 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

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CRD - Parks & Environmental Services - April 10, 2015 - Technologist: SR/CB - Map Document: HartlandGasProduction2014.mxd

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Figure 4 Hartland Landfill Gas Plan

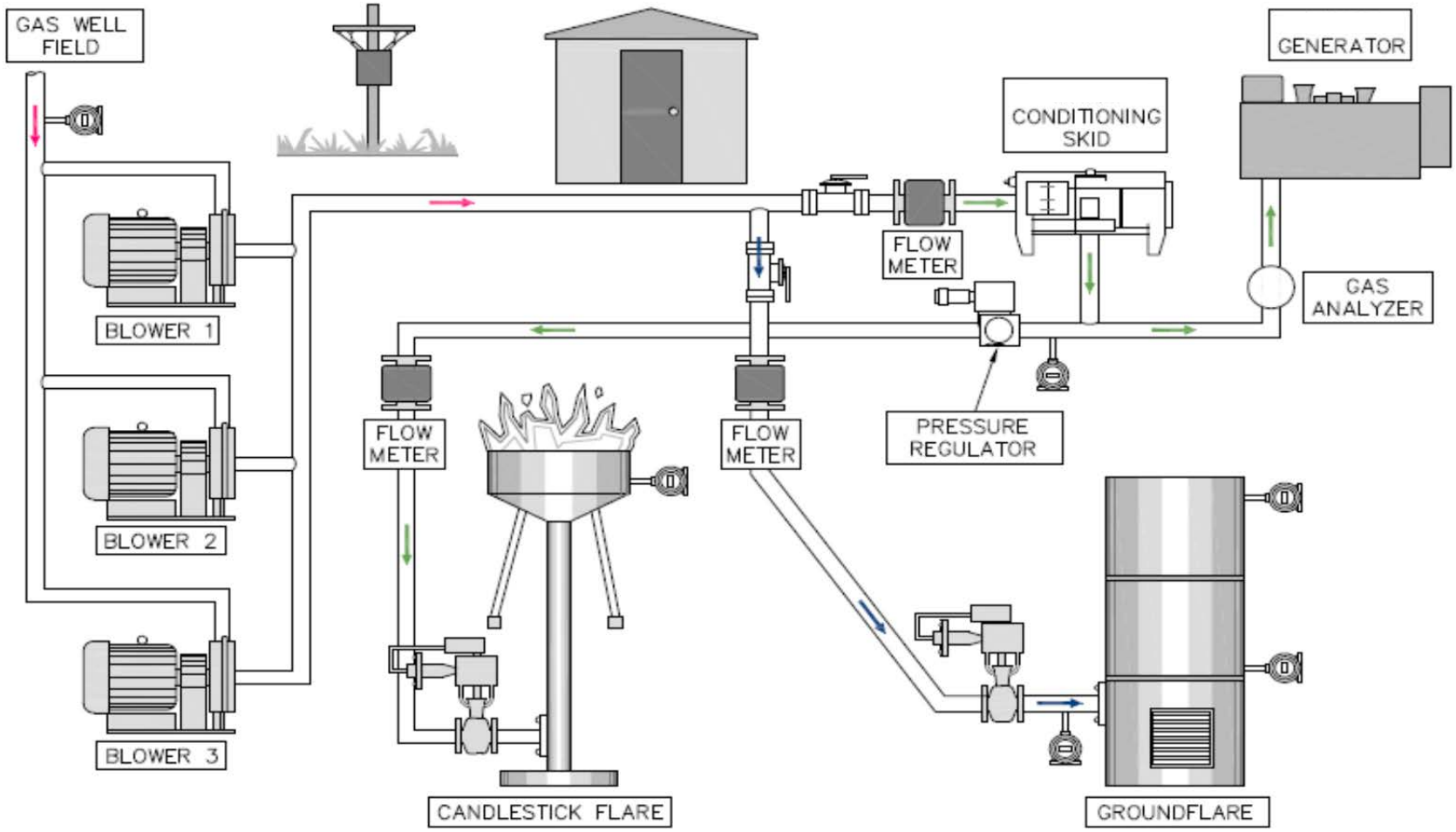

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Table 7 Landfill Gas System Collection Efficiency 1998 to 2014

Year	Estimated Annual[1] Methane Generated (scfm)[3]	Annual Gas[2] Capture (scfm)[3]	Estimated Collection Efficiency (%)	GHG Emissions (tonnes/year CO_2e)
1998	1,461	1,181	80.8	28,680
1999	1,458	937	64.2	53,432
2000	1,457	738	50.6	73,716
2001	1,461	565	38.7	91,768
2002	1,481	499	33.7	100,665
2003	1,508	628	41.6	90,205
2004	1,535	593	38.6	96,589
2005	1,567	517	33.0	107,571
2006	1,590	562	35.3	105,372
2007	1,616	587	36.3	105,431
2008	1,646	504	30.6	117,066
2009	1,669	476	28.5	122,262
2010	1,687	546	32.4	116,878
2011	1,696	581	34.2	114,282
2012	1,700	829	48.8	87,542
2013	1,697	987	58.2	70,779
2014	1,671	943	56.4	74,686

Notes:
[1] Generated using the MOE model
[2] Measured
[3] Normalized to 50% methane

Collection efficiency began declining in 2004 due to deteriorating infrastructure in the Phase 1 of the landfill as well as emerging difficulties in capturing gas within Phase 2. Gas collection in Phase 2 presents difficulties due to the need to limit oxygen intake into gas collection infrastructure. Generally, one to two lifts of refuse are required on top of the horizontal wells before they can be activated, which can take several years depending on the filling plan.

Collection efficiency improved beginning in 2012 due to the installation/connection of several horizontal wells in late 2011, as well as the connection of new wells associated with the Phase 2, Cell 1 closure. Further improvements in collection efficiency were observed in 2013 as a result of installation of six new horizontal collection wells in Phase 2.

In 2014, landfill gas collection efficiency decreased slightly to 56.4%. This decrease can be attributed to inconsistencies in well field balancing and new wells not producing expected volumes of methane. Further detail on collection efficiency is also provided in Section 6.2.2.

Figure 5 Landfill Gas Collection Efficiency at Hartland Landfill 2004–2014

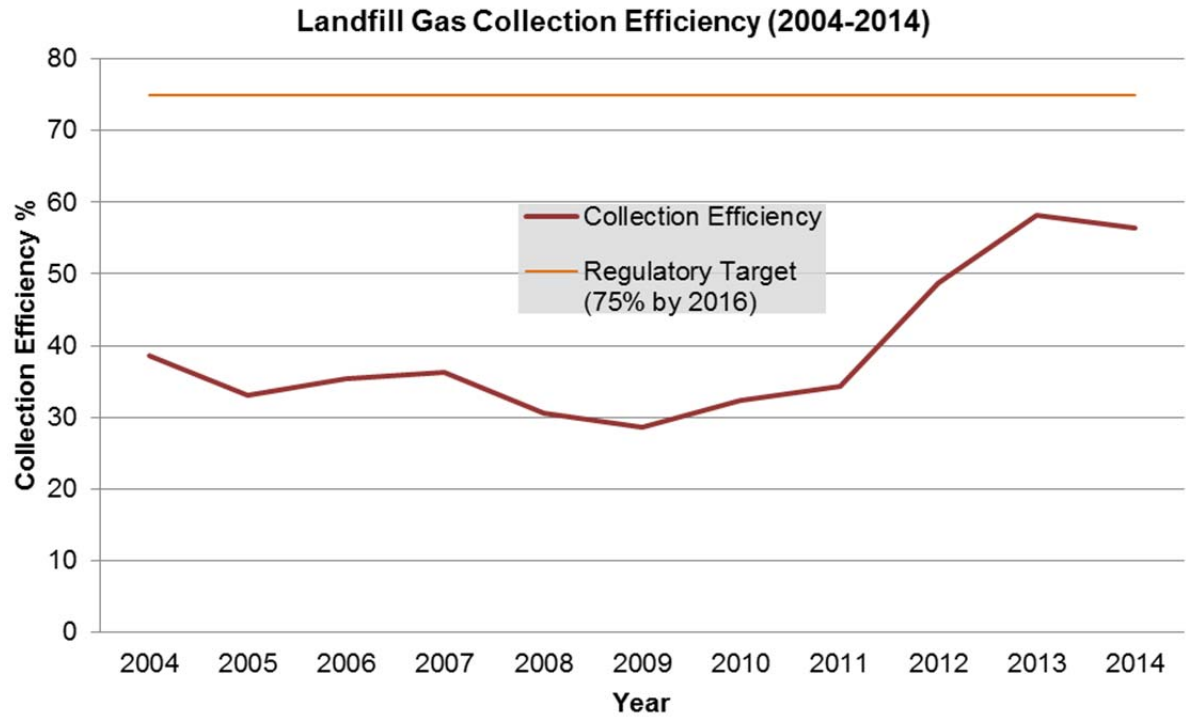
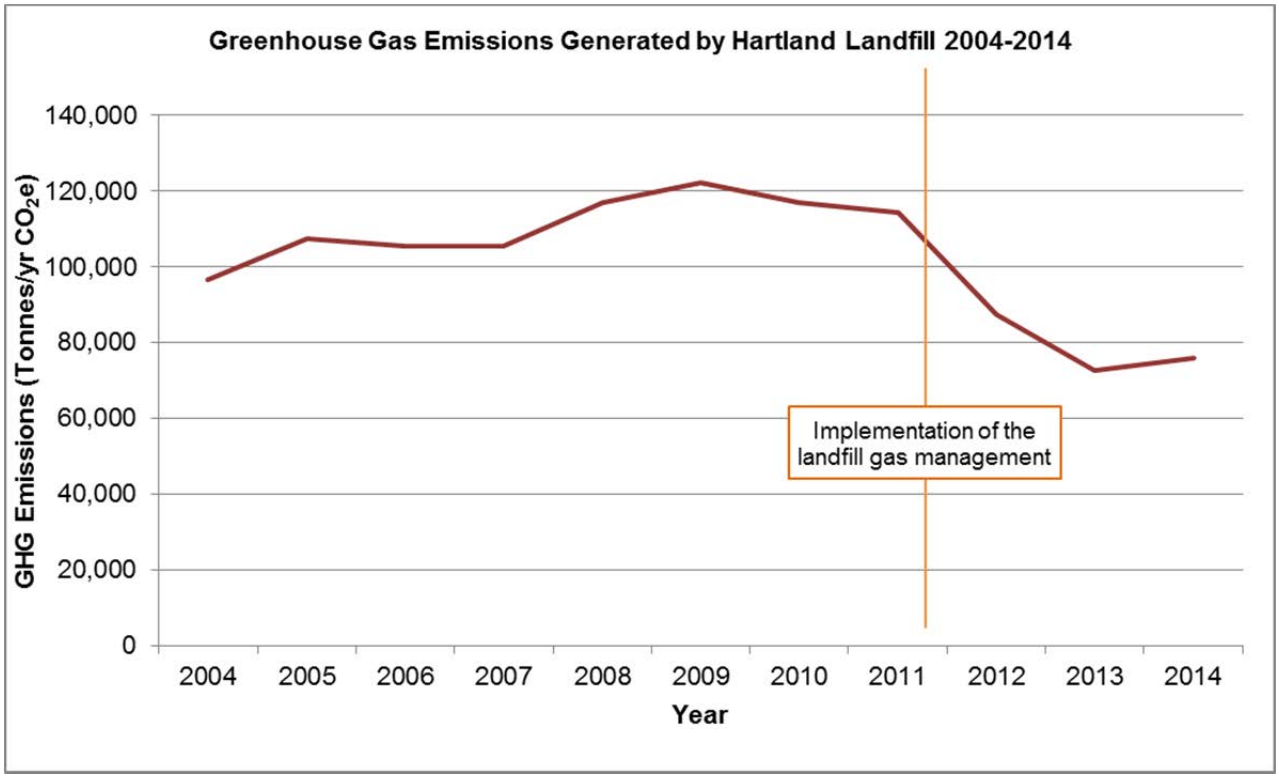


Figure 6 Fugitive Greenhouse Gas Emission at Hartland Landfill 2004–2014



Total fugitive GHG emissions generated from the landfill for 2014 are estimated at 74,686 tonnes CO_2e, a 20% decrease from 2012. Greenhouse gas production over time is plotted in Figure 6. It is expected that GHG emissions will continue to decline due to the implementation of the organics (kitchen scraps) diversion program in 2015, and continued success of the CRD's waste diversion initiatives.

It should be noted, that the Intergovernmental Panel on Climate Change revised the 100-year Global Warming Potential (GWP) for methane to 25 (from 21) in 2014 for specific emissions reports. While the use of this GWP has not been explicitly required for this report, the GWP may be adopted or imposed at a future date.

6.2.1 Destruction Devices and Usage

Table 8 shows the average gas collected from 2004 to 2014 and flows through utilization devices (generator, candlestick or groundflare). Flaring of gas usually occurs when gas collection exceeds generator capacity or during generator downtime.

In 2011, the generator underwent major maintenance and was offline for an extended period, timed to coincide with work conducted for the Phase 2, Cell 1 closure. During 2012, there was significant generator downtime in June and July due to high siloxane concentrations. The groundflare was used extensively during these periods. The groundflare was not used as extensively during 2014 and any downtime can likely be attributed general maintenance, and occasional power failures.

Table 8 Landfill Gas Flows to Destruction Devices (2010 to 2014)

Annual Average	Year				
	2010	2011	2012	2013	2014
Gas Collected (scfm)*	546	581	829	987	953
Gas Burned by Generator (scfm)*	428	359	439	488	492
Gas Burned by Candlestick Flare (scfm)*	81	131	302.9	477	427
Gas Burned by Groundflare (scfm)*	37	91	87.1	28.53	42
Total Gas Flared	21.6%	38.2%	47.04%	51.24%	49.2%
Gas through approved destruction devices	85.1%	77.4%	63.5%	51.65%	55.16%

Notes:
*normalized to 50% methane

The 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 landfill gas collected must be directed through the groundflare or generator. Since 2009, the generator and/or groundflare have been the primary destruction devices. In 2014, 55.16% of the gas was directed through approved destruction devices.

6.2.2 Landfill Gas Management Plan Implementation Status

The LFG collection system is designed to reach 75% collection efficiency as per The Guidelines. The CRD has implemented the conceptual design in the plan. However, since the plan was prepared, some operational changes have occurred which are summarized below:

- Reduced landfill tonnage at Hartland landfill, and better than expected compaction of refuse, has prolonged the timeframe for cell construction and filling. As a result, the current filling schedule varies from the anticipated schedule. Although the schedule has changed somewhat, horizontal wells are being installed as soon as lifts are completed as specified in the plan.

- Filling plan sequencing has changed since the plan was prepared. These changes represent schedule variations rather than whole scale deviations from the LFGMP.

- 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.

- Since implementation of the LFGMP, 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. As a result, this part of the LFGMP 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.

It is anticipated that the decrease in landfill tonnage will have the greatest potential impact on gas collection efficiency. Current landfill gas collection efficiencies are within estimated ranges according to the LFGMP. A number of investigations and actions are planned in advance of 2016 to maximize collection efficiency including calibration of the gas model, equipment calibration, and dewatering of obstructed gas wells.

6.3 System Performance and Maintenance

The gas collection system operates continuously except when there is a power failure or alarms that result in system shutdown. In the event of a stoppage, the system can be remotely restarted by on-call staff. Table 9 summarizes collection system downtime (i.e., no vacuum applied on the collection system).

Table 9 Summary of 2014 Blower Downtime by Month

Month	Downtime (minutes)
January	1,444
February	903
March	48.17
April	419.5
May	79
June	637
July	51
August	60
September	38
October	61
November	644
December	851.1
Total	**5,236 minutes (3.64 days)**

In 2014, the overall collection system downtime was less than four days. The majority of downtime occurred in May as a result of system maintenance. The remaining downtime can be attributed to power failures and minor system malfunction, maintenance and repairs.

Table 10 summarizes the performance of the generator in 2014, including electricity production which compares actual operating hours to available operating hours for each month; for the year, average energy production was 86.2%

Table 10 Generator Performance 2014

Month	Engine Run Hours	Electricity Generated (MW-hour)*	Production (%)
January	691	962.6	83.2
February	632	960.4	91.9
March	628	1,066.5	92.2
April	706	948.1	83.1
May	619	846.2	71.6
June	553	997.5	89.1
July	661	1,107.0	94.3
August	730	1,028.5	87.6
September	730	1,012.5	85.6
October	709	1,089.3	94.5
November	713	876.5	75.8
December	577	998.7	86.0

6.3.1 Generator Emissions

A Generator Emissions survey is conducted annually (Table 11); a full report is included in Appendix C2. The emissions data is compared to a baseline study conducted in 2004 that modelled emissions against applicable limits. The data is reviewed to ensure that current emissions rates are consistent with those used in the model.

In 2014, nitrogen oxide emissions were slightly higher than modelled emissions. Monitoring will continue to see if a trend develops.

Table 11 Generator Emissions Modelled and Stack Tests 2008 to 2014

Date	Gas Flow (m^3/s)	Gas Exit Temp (C)	NOx Emission Rate (mg/s)	Gas Concentration (mg/m^3)					Power Generation (KW)
				NOx	SOx	CO	VOC	PM	
Model 21-Oct-04	1.84	460	715	389	-	-	-	-	1,600
Test 07-Aug-08	1.83	476	644	351	18.7	845	749	1.8	1,600
Test 28/29-Jan-09	1.88	468	635	337	19.8	999	980	2.5	1,600
Test 29-Apr-10	1.8	475	689	384	23.8	1,054	1,011	39.1	1,590
Test 23-Feb-11	1.87	484	633	338	22.7	972	867	4.1	1,550–1,600
Test 03-Apr-12	1.83	476	642	351	18.7	1,052	937	1.1	1,600
Test 16-May-13	1.83	473	657	359	24.3	979	884	4	1,600
Test 17-July-14	1.83	467	750	410	19.4	1,181	851	2.9	1,600

Under the BC Reporting Regulation, electricity generation processes emitting more than 10,000 tonnes of CO_2e in a calendar year must report total emissions to MOE. As the CRD purchased the power generation facility in 2013, the CRD now reports on its emissions. Emissions are calculated using MOE-approved methodologies that rely on total gas flows as well as predetermined emissions factors and high heat values. A summary of emissions is provided in Table 12, but full details are provided through the joint federal-provincial Single Window Emissions Reporting System which are published annually.

Table 12 Summary of Generator Emissions 2013–2014

Year	Total of all emissions (CO_2e)	Tonnes CO_2	Tonnes CH_4	Tonnes N_2O
2013	7,161	7,154	0.1	0.01
2014	7,187	7,180	0.1	0.01

7.0 MONITORING PROGRAMS

Each year, monitoring is conducted to evaluate the performance of landfill gas collection and control systems. This section describes the programs and key findings for data collected in 2014.

Table 13 Summary of Landfill Gas Monitoring Programs

Objectives	Frequency	Primary Parameters	Criteria	Action If Criteria Exceeded	Follow Up	Monitoring By
Program 1—Perimeter subsurface probe monitoring						
To detect potential subsurface landfill gas migrating off site	Quarterly at perimeter probes	CH_4, CO_2, O_2, pressure and/or vacuum	25% of LEL (1.25% Methane)	Increase sampling frequency. Initiate offsite sampling Program 7. Evaluate effectiveness of remedial measures.	Take remedial action if exceedences persist	EP
Program 2—Building foundation trench wells						
To detect potential subsurface landfill gas migration into onsite building foundations	Quarterly	CH_4, CO_2, O_2, pressure and/or vacuum	25% of LEL 10% of LEL—CRD internal standard	Initiate appropriate remedial action.	Evaluate effectiveness of remedial measures	EP
Program 3—Onsite ambient grid sampling						
To assess onsite landfill gas concentrations at known grid locations across the landfill surface	Two times 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 >100 ppm THC for Program 4.		EP
Program 4—Onsite ambient hot spot monitoring						
To identify local hot spots, sources of significant gas concentration, or releases that could create potential health, safety, environmental or operational problems	Two times per year at hot spots	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 (hot spots). Personal gas detectors required in high risk areas.		EP
Program 5—Gas well field monitoring						

Table 13, continued

Objectives	Frequency	Primary Parameters	Criteria	Action If Criteria Exceeded	Follow Up	Monitoring By
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 well head vacuum.		Hartland Staff
Program 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.	Evaluate performance effectiveness of adjustments	Hartland Staff
Program 7—Offsite house and confined space						
To measure concentrations of gases in the event of landfill gas migrating off site	Program 1 exceedance	THC and H_2S	Detectable above air quality guidelines	Initiate appropriate remedial action.	Evaluate effectiveness of remedial measures	Hartland Staff
Program 8—Onsite building and confined space EH&S						
To monitor methane and H_2S levels to protect workers on site and in confined spaces	Program 2 exceedance	Methane and H_2S	10% LEL (5,000 ppm) 5 ppm CRD H_2S 10 ppm WorkSafeBC H_2S	Initiate appropriate remedial action.	Evaluate effectiveness of remedial measures	Hartland Staff
Program 9—Landfill gas speciation						
To measure concentrations of compounds in the landfill gas at the inlet to the gas conditioning and power generation station	Biennial	VOC and H_2S	WorkSafeBC criteria for individual compounds in ambient air	Initiate Program 10.		EP
Program 10—Onsite ambient air quality measurement						
Measure ambient VOC	Program 9 exceedance	VOC	WorkSafeBC criteria for individual compounds in ambient air	Initiate remedial action.	Evaluate effectiveness of remedial measures	EP
Program 11—Flare performance evaluation						
Monitor the performance of the ground flare	During extended use of the ground flare	Various	Acceptable Destruction and Removal Efficiency (i.e., good combustion)	Initiate remedial action.		EP

7.1 Subsurface Gas Monitoring

There are two types of monitoring probes installed at Hartland landfill: perimeter probes and foundation/trench probes. There are five perimeter-monitoring probes installed (drilled into bedrock) along the eastern property line and 12 trench-monitoring probes around onsite buildings (Figure 7).

The property line probes are 150-mm diameter borings with two 10-mm PVC piezometers, one in a shallow zone at 5 m to 6 m and one in a deep zone at 10 m. Each has a screen length of 3 m. The trench probes are typically 19-mm diameter PVC perforated conduits that run along one or all sides of onsite buildings and are installed horizontally approximately 500 mm below grade. The conduit is located in a washed gravel collection trench under a PVC barrier.

Eastern perimeter and foundation gas probes were installed to monitor any subsurface gas migration. The MOE Landfill Criteria for Municipal Solid Waste states that combustible gases in soils at the landfill property boundary must not exceed the lower explosive limit (LEL) and that combustible gas in any onsite or offsite structure and/or facility shall not exceed 25% of the LEL. The LEL for methane is 5%.

Eastern Perimeter Probe Monitoring

Installation and monitoring of the eastern perimeter probes began in 1996 after concern arose over the potential migration of methane to adjacent residential properties as a result of landfilling activities near the eastern property boundary (Phase 1). Though landfilling in this area ceased in 1997, gas production from decomposition of waste and capping of the Phase 1 landfilled area created the potential for offsite gas migration.

Though installation and improvement of the landfill gas collection system has reduced the risk of offsite gas migration to the east, monitoring continues to ensure worker and public health and safety, as well as to maintain compliance with the MOE requirements.

Perimeter probes are monitored quarterly. Pressure readings are recorded for each well and used to determine if a well is under positive pressure, which can be indicative of an offsite driving force. Groundwater elevations are taken to determine if the water level is blocking the inlet screen, which may impact the ability of gas to enter a well.

Foundation Probe Monitoring

In 2014, there were 12 existing foundation probes around onsite buildings to monitor subsurface gas migration around building foundations, including two new probes, GP-18A and GP-17A, which were installed in 2011 for the new contractor's workshop and the Hartland Learning Centre, respectively (Figure 7).

In the fall of 2011, the former contractor's workshop site was abandoned and building removed. The site had been a location of high methane readings in subsurface soils and from extraction fan exhaust that were installed to intercept subsurface gas (GP-10 A to D). Monitoring at this location has been discontinued as the area has been landfilled and gas extraction wells have been installed.

As a second level of protection, the main office building has a gas barrier, or venting layer, located beneath the slab foundation.

Methodology

The perimeter and foundation probes are monitored using a LANDTEC Gas Analyzer and Extraction Monitor GEM 2000+. Each probe is monitored quarterly for pressure, oxygen, carbon dioxide, and methane, as well as groundwater elevation (where applicable). Atmospheric conditions during each monitoring event are also recorded. A complete monitoring methodology, full probe locations and probe completion descriptions, and data from the perimeter and building foundation probes are provided in Appendix D.

RESULTS AND RECOMMENDATIONS

Perimeter Probes

All probes were monitored according to the standard operating procedures four times in 2014 (Table 14), maximum values are shown in Table 15. There was no detectable methane recorded in 2014. 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 landfill gas; however, no unusually high CO_2 levels were observed. Ongoing monitoring will continue to determine if any trends develop. There were no recorded exceedances of the MOE limit of 1.25% methane during the reporting period.

Table 14 Average Gas Concentrations in Subsurface Perimeter Probes 2012–2014

Probe	CH4 (%)			CO2 (%)			O2 (%)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014
GP-1A	0	0	0	0.1	0.0	0.1	20.8	19.8	19.5
GP-1B	0	0	0	2.4	1.5	1.6	18.0	18.0	17.9
GP-2A	0	0	0	0.1	0.0	0	20.7	19.9	19.6
GP-2B	0	0	0	2.1	4.5	2.5	14.7	9.9	12.1
GP-3A	0	0	0	2.0	1.9	1.3	14.1	12.7	14.5
GP-3B	0	0	0	5.5	3.9	4.4	14.3	15.0	14.3
GP-11A	0	0	0	0.1	0.1	0.1	20.6	19.9	19.4
GP-11B	0	0	0	1.6	1.8	1.4	19.3	18.3	18.1
GP-12A	0	0	0	0.8	3.3	1.6	18.6	10.1	14.3
GP-12B	0	0	0	3.8	6.8	3.9	14.7	9.5	14.0

Table 15 Maximum Value Gas Concentrations in Perimeter Probes 2014

Probe	CH_4 (%)	CO_2 (%)
GP-1A	0	0.2
GP-1B	0	1.7
GP-2A	0	0.1
GP-2B	0	3.3
GP-3A	0	2.3
GP-3B	0	6.5
GP-11A	0	0.1
GP-11B	0	2.4
GP-12A	0	3.2
GP-12B	0	4.6

Figure 7

CRD - Parks & Environmental Services - Environmental Engineering - May 15, 2015 - Technologist: SR - Map Document: HartlandGasProbes2014Fig6.mxd

Making a difference...together

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

Discontinued

- Foundation Gas Probe

LOCATION OF GAS PROBES

Foundation Probes

Foundation probes were monitored four times in 2014, which is in compliance with MOE requirements. No methane was detected in any of the probes (Table 16 and Table 17). In December 2013, equipment malfunction resulted in false detection of methane in the probes at very low concentrations (0.05 to 0.2%). Follow-up monitoring revealed no detectable methane in any of the ground probes. Carbon dioxide levels were similar to previous years. There were no recorded exceedances of the MOE limit of 1.25% methane during the reporting period. Ongoing monitoring will continue to determine if any trends develop.

Table 16 Average Gas Concentrations in Subsurface Foundation Probes 2012–2014

Probe	CH_4 (%)			CO_2 (%)			O_2 (%)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014
GP-4A	0	0	0	3.7	5.3	1.3	15.9	8.6	7.4
GP-5A	0	0.025	0	1.0	1.0	0.7	19.9	19.1	18.9
GP-6A	0	0.05	0	0.8	0.7	0.5	20.6	19.0	19.3
GP-6B	0	0.05	0	0.9	0.5	0.3	20.3	19.4	19.4
GP-7A	0	0.05	0	0.3	0.3	0.2	20.6	19.8	19.4
GP-7B	0	0.05	0	0.2	0.0	0.1	20.8	19.9	19.4
GP-8A	0	0.05	0	0.3	0.2	0.2	20.7	19.7	19.3
GP-9A	0	0.05	0	0.3	0.2	0.3	20.7	19.7	19.2
GP-13A	0	0.025	0	2.4	2.4	2.1	18.6	16.4	17.8
GP-14A	0	0.025	0	1.4	1.0	2.8	19.8	19.1	16.8
GP-17A[1]	0	0.025	0	0.1	0.1	0.1	20.9	19.9	19.6
GP-18A[2]	0	0.025	0	0.4	0.2	0.4	19.7	19.4	18.6

Notes:
[1] Probe for Hartland Learning Centre (constructed in 2011);
[2] Probe for new contractor's workshop (constructed 2011)

Table 17 Maximum Value Gas Concentrations in Foundation Probes 2014

Probe	CH_4 (%)	CO_2 (%)
GP-4A	0	2.5
GP-5A	0	0.9
GP-6A	0	0.9
GP-6B	0	0.6
GP-7A	0	0.2
GP-7B	0	0.2
GP-8A	0	0.3
GP-9A	0	0.6
GP-13A	0	4.6
GP-14A	0	19.4
GP-17A	0	0.1
GP-18A	0	0.5
GP-4A	0	2.5
GP-5A	0	0.9
GP-6A	0	0.9
GP-6B	0	0.6

CONCLUSIONS AND RECOMMENDATIONS

Perimeter and foundation probe monitoring results for 2014 were in compliance with the MOE requirements. No methane was detected indicating minimal risk of subsurface methane migration to adjacent properties or buildings. Quarterly monitoring should continue to evaluate public health and safety risk and to ensure regulatory compliance.

7.2 Ambient Grid and Hot Spot Sampling

A program has been established to monitor fugitive emissions from Hartland landfill in order to track the effectiveness of the landfill gas collection network as well as protect worker health and safety. All results and findings are reported to Hartland staff and a map of hot spots is produced to help identify problem areas or system deficiencies.

In 2010, report recommendations advised increasing ambient monitoring frequency from two to four times per year. This recommendation was implemented in 2012 following the completion of the Phase 2, Cell 1 closure in 2011. Monitoring frequency was decreased back to biannual in 2013 after the benefit of quarterly monitoring was not demonstrated.

Methodology

A 50-by-50 metre grid of monitoring points has been developed over the surface of the landfill. These monitoring points have been programed into a Global Positioning System (GPS) unit to ensure a consistent sampling network for the measurement of fugitive landfill gas emissions.

Total Hydrocarbon (THC) levels, reported as methane, are measured at each grid point approximately 10 cm above the ground surface using a flame ionizing detector (FID). Hydrogen sulfide levels are measured simultaneously using a Jerome H_2S Analyzer. The FID is set to alarm at THC levels of 100 ppm and higher. If at any point during the survey the FID alarm sounds, a more detailed search, between grid points, is conducted to determine the source. Any location that exceeds 1,000 ppm is logged as a hot spot (Z-point) and THC concentration and GPS coordinates are recorded. Any Z-points from previous surveys are also monitored. A Z-point is removed after three consecutive monitoring events yield THC results less than 1,000 ppm. Full monitoring methodology is included in Appendix E.

Results

A summary of the results is shown in Table 18, Table 19 and Figure 8. A historical summary of all Z-points is provided in Figure 9.

A total of 13 unique grid points were found to exceed 100 ppm THC in 2014, all clustered within Phase 2. No elevated hydrogen sulphide concentrations were recorded at any grid points.

Table 18 Summary of Grid Sampling Results 2014

Survey date	March 2014	July 2014
Grid Points Monitored	146	151
# Grid Points >100 ppm THC	10	3
Maximum CH_4 (ppm)	26,000	212

Table 19 Summary of Hot Spot Results 2014

Survey date	March 2014	July 2014
Total # hot spots[1]	24	22
New hot spots at end of survey	2	2
Hot spots discontinued[2]	4	0
Maximum CH_4 (ppm)	>50,000	34,400

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

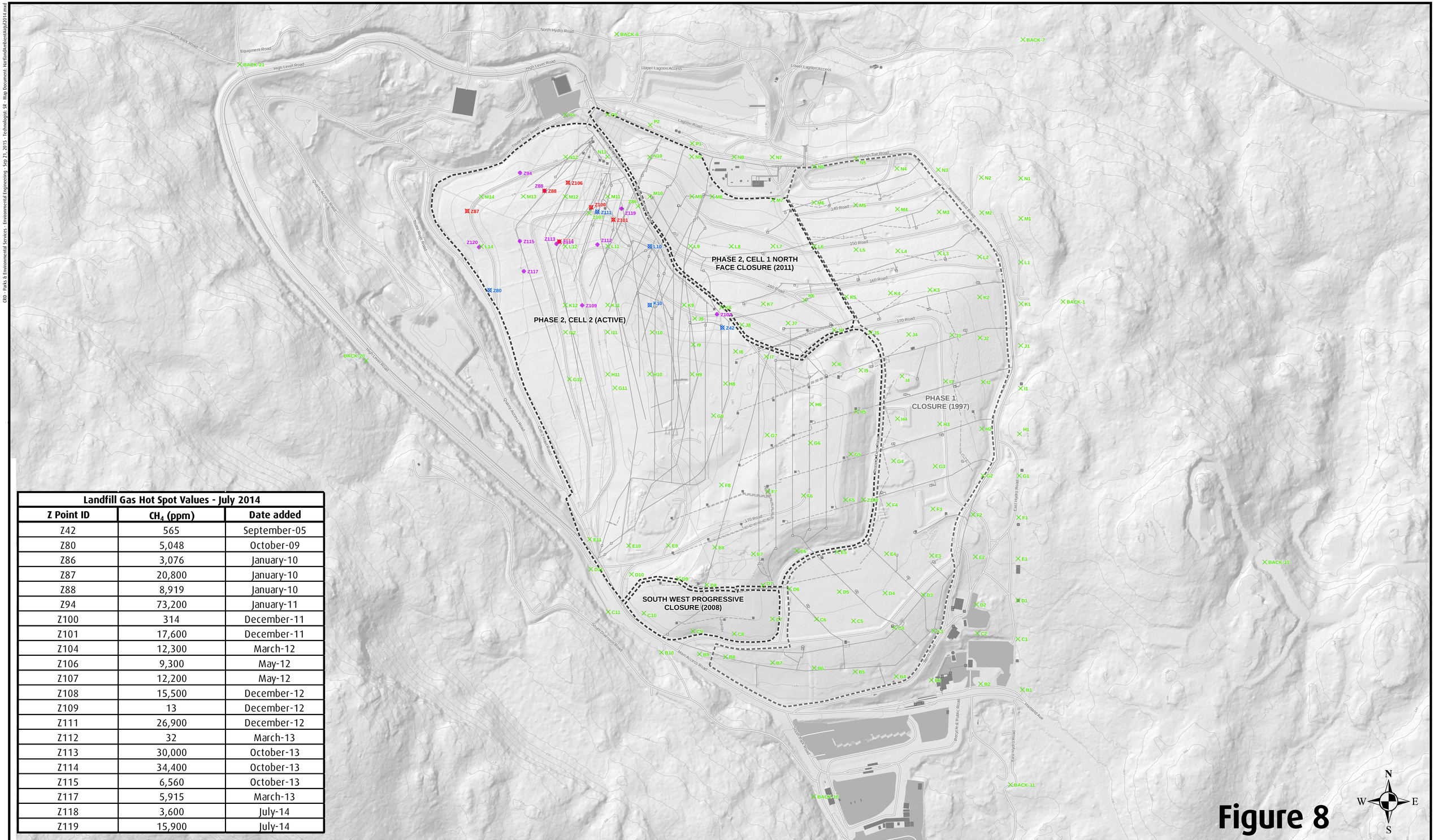
Z-point locations change over time as closures occur, covers are placed, the location of the active face changes, and monitoring equipment is installed. The majority of Z-points are located at breaks or seams of cover systems and near side slopes in Phase 2 where gas collection is a challenge. The locations of all grid points and hot spots as of the end 2014 are shown in Figure 8.

At the end of 2014, there were a total of 22 Z-points identified. Seventeen of these points had been carried over from previous surveys and the remaining points were new. Hotspots have decreased significantly since the implementation of the LFGMP in 2012. The number of hotspots peaked at 37 in 2011 prior to the Phase 2, Cell 1 closure in 2011, as well as an increase in gas well installation density as a result of implementation of the LFGMP.

Conclusions and Recommendations

Landfill gas discharges to the atmosphere in unclosed portions of Phase 2 and along openings in the tarp of the northwest face temporary closure. No hot spots were identified in Phase 1 indicating that the cover and gas collection system in the closed area are effective at preventing fugitive emissions.

Biannual monitoring should continue and hot spot locations discussed with Hartland staff.



Landfill Gas Hot Spot Values - July 2014		
Z Point ID	CH_4 (ppm)	Date added
Z42	565	September-05
Z80	5,048	October-09
Z86	3,076	January-10
Z87	20,800	January-10
Z88	8,919	January-10
Z94	73,200	January-11
Z100	314	December-11
Z101	17,600	December-11
Z104	12,300	March-12
Z106	9,300	May-12
Z107	12,200	May-12
Z108	15,500	December-12
Z109	13	December-12
Z111	26,900	December-12
Z112	32	March-13
Z113	30,000	October-13
Z114	34,400	October-13
Z115	6,560	October-13
Z117	5,915	March-13
Z118	3,600	July-14
Z119	15,900	July-14

Figure 8

CRD
Making a difference...together

Metres
0 20 40 60 80 100

Projection: UTM ZONE 10N NAD 83

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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

Contours (2.5m interval)
- Index
- Index-Depression

- Final Closure Areas
- Progressive Closure Areas
- Structures
- Parking Lots
- Water Bodies

HARTLAND LANDFILL AMBIENT AIR MONITORING RESULTS - JULY 2014

CRD - Parks & Environmental Services - Environmental Engineering - Sep 21, 2015 - Technologist: SR - Map Document: HartlandAmbientAirJul2014.mxd

CRD - Parks & Environmental Services - May 27, 2015 - Technologist: SR - Map Document: Hartland\Gashistorical\Locations2014Fig8.mxd

PHASE 2, CELL 1
NORTH FACE
CLOSURE (2011)

PHASE 2,
CELL 2 (ACTIVE)

PHASE 1 (CLOSED)

SOUTH WEST
PROGRESSIVE
CLOSURE (2008)

Lagoon Road
North Toe Road
Quarry Access Road
Tuttle River Road
Cell 2 Haul Road
High Level Road
South Diversion Road
Main Access Road
Berm Road
Perimeter East Road
East Hydro Road
Hartland Ave
Phase 1 Crest Road
140 Road
150 Road
160 Road
170 Road

Figure 9

HISTORICAL Z-POINT LOCATIONS

CRD
Making a difference...together

Metres
0 20 40 60 80 100
Projection: UTM ZONE 10N NAD 83

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- 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

Contours (5m interval)
- Index
- Index-Depression

- Final Closure Areas
- Progressive Closure Areas
- Structures
- Parking Lots
- Water Bodies

7.3 Landfill Gas Speciation

Decomposition of refuse produces methane, carbon dioxide and many other gases in trace amounts. Many of these trace gases are VOC which may be known carcinogens and/or GHG. In order to evaluate the risk of exposure to VOC by landfill staff, VOC sampling is conducted periodically. Samples are taken at the flare station and represent the average VOC concentrations present at Hartland landfill.

Monitoring for VOC is currently conducted once every two years to assess changes in gas composition over time. Monitoring was done frequently in the late 1990s to establish a baseline of VOC concentrations. Sampling was completed in 2013 (see Table 20) and is scheduled again for 2015.

Results

Gas speciation data from 2013 shows no notable changes from previous years. Table 20 and Table 21 show the maximum concentrations of VOC in undiluted landfill gas and ambient air at landfill hot spots, respectively; both compare data to relevant WorkSafeBC exposure criteria. Historical data is included in Appendix F.

The data indicate that undiluted landfill gas exceeded the WorkSafeBC limits for methane, carbon dioxide, hydrogen sulfide, vinyl chloride and benzene. However, exposure to undiluted landfill gas 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).

Table 20 Summary of Gas Speciation Results and Exposure Limits July 2013

Parameter	Maximum Value (ppm)	WorkSafeBC Exposure Limit TWA[1] (ppm)	WorkSafeBC Exposure Limit STEL[2] (ppm)	Concern
VOC				
Benzene	**1.27**	0.5	2.5	skin contact limit, carcinogen
Ethylbenzene	3.06	20	n/a	carcinogen
Methane	**460,000**	1,000	n/a	
Toluene	4.25	20	n/a	adverse reproductive effect
Vinyl Chloride	**4.40**	1.0	n/a	carcinogen
Xylenes	6.47	100	150	
Other Gases				
Carbon dioxide	**275,000**	5,000	15,000	
Carbon Monoxide	<1	25	100	
Hydrogen Sulfide	**41**	n/a	10	

Notes:
[1] 8-Hour Time Weighted Average (TWA) - concentration must not be exceeded over a normal 8-hour work period
[2] Short Term Exposure Limit (STEL) - the TWA concentration of a substance in air which may not be exceeded over any 15-minute period, limited to no more than four such periods in an 8-hour work shift with at least one hour between any two successive 15-minute excursion periods

Table 21 Summary of Ambient VOC Concentrations (1999–2001)

Parameter	Maximum Value (ppm)	Location	WorkSafeBC Exposure Limit TWA[1] (ppm)	WorkSafeBC Exposure Limit STEL[2] (ppm)	Concern
Benzene	0.00893	North Toe	0.5	2.5	skin contact limit, carcinogen
Ethylbenzene	0.0491	North Toe	20	n/a	carcinogen
Toluene	0.0188	Grid H-8	20	n/a	adverse reproductive effect
Xylenes	0.02719	Grid J-6	1.0	n/a	

Conclusions and Recommendations

Based on ambient grid and hot spot data, there is significant dilution of fugitive landfill gas emissions. Over time, the concentrations of individual VOC have not varied greatly; however, as waste composition changes, regular monitoring of VOC should continue. Results should be compared to baseline data in order to determine whether any individual VOC has the potential to approach WorkSafeBC exposure limits. Sampling for VOC in landfill gas should be conducted again in 2015.

8.0 LANDFILL GAS COMPLIANCE WITH REQUIREMENTS AND GUIDELINES

A table has been prepared to summarize the results of landfill gas monitoring programs, whether the results comply with requirements, actions taken to address non-compliance, and recommendations.

Table 22 Landfill Gas Compliance Summary 2014

Program	Compliance Location	Criteria	Findings	Actions	Recommendations
Perimeter Probe Monitoring	Probes GP-1A, 1B, 2A, 2B, 3A, 3B, 11A, 11B, 12A and 12B	Maximum 1.25% methane in subsurface soil (MOE Landfill Criteria for Municipal Solid Waste)	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 1.25% methane in any onsite facility (MOE Landfill Criteria for Municipal Solid Waste). Maximum 1% methane inside buildings (Landfill Gas Management Facility Design Guidelines).	No exceedances. Low risk of subsurface gas migration to adjacent building.	None	Continue quarterly monitoring.
Ambient Grid Monitoring	N/A	100 ppm THC (CRD internal guideline)	13 grid locations >100 ppm No cover system failures suspected in the closed area of Phase 1.	Investigated hot spots, mitigated were possible.	Continue biannual monitoring
Hot Spot Monitoring	N/A	1,000 ppm THC (CRD internal guideline).	5 new hot spots >1,000 ppm, 4 hot spots removed. Currently 22 locations for hot spot investigation.	Added new locations of hot spots to the monitoring program.	Continue biannual monitoring. Investigate remediation measures.
Well Field Monitoring and Balancing	N/A	Monitor monthly. Oxygen <3% - gas optimization and reduction of fire potential	Monitoring completed monthly; oxygen did not exceed 3%.	Well field monitoring has been scheduled monthly for 2015.	Continue monthly monitoring at minimum.
Gas Speciation (2013)	N/A	N/A	Undiluted landfill gas exceeded WorkSafeBC criteria for methane, carbon dioxide, hydrogen sulfide, vinyl chloride and benzene; however, ambient concentrations are likely well below WorkSafeBC limits due to dilution with ambient air.	None	Conduct speciation of landfill gas in 2015.
Gas Collection	N/A	75% gas collection efficiency target by the end of 2016 as per LFGMP.	Gas collection efficiency was estimated at 56.4%, based on the MOE gas generation model.	LFGMP submitted to MOE.	Continue to implement the gas management plan.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The following section presents the key findings and recommendations developed from reviewing the data collected from 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 *Landfill Gas Management Regulation.* In 2013, the Hartland landfill is estimated to have generated 8,282 tonnes of methane. A long-term gas management plan has been developed by a qualified professional to meet 75% collection efficiency by 2016.

GAS COLLECTION AND UTILIZATION

Overall, GHG emissions for 2014 are estimated at 76,131 tonnes of CO_2e. In 2014, the gas extraction network consisted of 130 wells that captured an average of 943 scfm of landfill gas. This represents an estimated collection efficiency of 56.4%. Well field balancing was completed each month to optimize collection.

It is recommended that well field monitoring and balancing continue at least monthly to fulfill MOE recommendations and to optimize gas collection. There are a number of wells that are not producing sufficient methane to contribute to the system; in some cases, this is due to leachate/water infiltration. Plans are underway to improve production or decommission non-functioning wells.

The CRD is working towards reaching the 75% collection efficiency target. At the end of 2014 the efficiency was 56.4%. The plan has been implemented as intended; however, some schedule delays have occurred as a result of overall waste volume reductions and filling plan changes and consequent gas well installation changes. Continued improvement in collection efficiency is anticipated for 2015 and 2016.

MONITORING

Perimeter and Building Foundation Probes

No elevated methane readings were observed at any foundation or perimeter probes indicating little risk of lateral landfill gas migration. It is recommended that quarterly perimeter probe monitoring and quarterly building foundation probe monitoring continue.

Ambient Air Monitoring

In 2013, 10 separate grid points were found to exceed 100 ppm THC. There were three new hot spots identified and 12 discontinued from the monitoring program due to consistently low readings.

It is recommended that grid monitoring and hot spot monitoring be conducted two times per year and that hot spots be mitigated where possible.

10.0 REFERENCES

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11.0 REPORT SIGNOFF

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(Qualified professional)

APPENDIX A

Gas Generation Information

A1 Hartland Landfill Gas Generation Model (April 2014)

A2a Hartland Landfill Summary of Waste Composition Studies

A2b Methane Generation Potential Based on Composition Studies 1980-2014

A3 Hartland Landfill Annual Waste Tonnage 1986 to 2014

A4 Hartland Landfill Waste Quantity and Adjusted Waste Composition Data

A4a Capital Regional District Waste Diversion Rates

Appendix A1 Hartland Landfill Gas Generation Model

		Relatively Inert	Moderately Decomposable	Decomposable	
Gas Production potential, Lo =		20	120	160	m^3 CH4/tonne
Waste Composition, 1980 to	1995	0.336923897	0.248984582	0.414091521	
Waste Composition, 1996 to	2000	0.338500849	0.405231175	0.256267976	
Waste Composition, 2001 to	2004	0.266023927	0.396320081	0.337655992	
Waste Composition, 2005 to	2009	0.331510177	0.369502343	0.298987479	
Waste Composition, 2010 to	2013	0.314941655	0.391054959	0.294003386	
Waste Composition, 2014 to	future	0.365000000	0.441000000	0.194000000	
lag time before start of gas production, lag =	1	Years			
Historical Data Used (years)	33				
1st Year of Historical Data Used	1981				
4 Years after reporting year	2016				
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)		

Continued…

Appendix A1, continued

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)
1981	118,254	118,254	39,843	29,443	48,968	0.02	0.04	0.09	0.0	0.0	0
1982	125,941	244,195	42,433	31,357	52,151	0.02	0.04	0.09	545.5	189.9	11,456
1983	134,127	378,322	45,191	33,396	55,541	0.02	0.04	0.09	1084.5	377.6	22,775
1984	142,845	521,167	48,128	35,566	59,151	0.02	0.04	0.09	1620.0	564.1	34,020
1985	152,130	673,297	51,256	37,878	62,996	0.02	0.04	0.09	2154.8	750.3	45,251
1986	167,472	840,769	56,425	41,698	69,349	0.02	0.04	0.09	2691.9	937.3	56,530
1987	177,686	1,018,455	59,867	44,241	73,578	0.02	0.04	0.09	3259.1	1134.8	68,442
1988	184,193	1,202,648	62,059	45,861	76,273	0.02	0.04	0.09	3830.7	1333.8	80,445
1989	188,750	1,391,398	63,594	46,996	78,160	0.02	0.04	0.09	4389.4	1528.3	92,177
1990	187,476	1,578,874	63,165	46,679	77,632	0.02	0.04	0.09	4927.3	1715.6	103,473
1991	175,956	1,754,830	59,284	43,810	72,862	0.02	0.04	0.09	5419.3	1886.9	113,805
1992	162,329	1,917,159	54,693	40,417	67,219	0.02	0.04	0.09	5821.8	2027.1	122,258
1993	159,431	2,076,590	53,716	39,696	66,019	0.02	0.04	0.09	6132.1	2135.1	128,774
1994	156,285	2,232,875	52,656	38,913	64,716	0.02	0.04	0.09	6406.8	2230.8	134,543
1995	159,993	2,392,868	53,905	39,836	66,252	0.02	0.04	0.09	6647.6	2314.6	139,600
1996	157,528	2,550,396	53,323	63,835	40,369	0.02	0.04	0.09	6888.8	2398.6	144,665
1997	149,429	2,699,825	50,582	60,553	38,294	0.02	0.04	0.09	6952.4	2420.8	146,001
1998	138,081	2,837,906	46,741	55,955	35,386	0.02	0.04	0.09	6988.2	2433.2	146,753
1999	138,174	2,976,080	46,772	55,992	35,410	0.02	0.04	0.09	6985.9	2432.4	146,703
2000	142,239	3,118,319	48,148	57,640	36,451	0.02	0.04	0.09	6989.5	2433.7	146,780
2001	138,533	3,256,852	36,853	54,903	46,776	0.02	0.04	0.09	7013.1	2441.9	147,276
2002	146,324	3,403,176	38,926	57,991	49,407	0.02	0.04	0.09	7122.3	2479.9	149,569
2003	148,225	3,551,401	39,431	58,745	50,049	0.02	0.04	0.09	7260.7	2528.1	152,475
2004	154,113	3,705,514	40,998	61,078	52,037	0.02	0.04	0.09	7400.3	2576.7	155,407
2005	163,040	3,868,554	54,049	60,244	48,747	0.02	0.04	0.09	7558.5	2631.8	158,727
2006	166,820	4,035,374	55,303	61,640	49,877	0.02	0.04	0.09	7678.9	2673.7	161,258
2007	174,537	4,209,911	57,861	64,492	52,184	0.02	0.04	0.09	7808.9	2719.0	163,987
2008	166,722	4,376,633	55,270	61,604	49,848	0.02	0.04	0.09	7963	2772.7	167,224
2009	161,194	4,537,827	53,437	59,562	48,195	0.02	0.04	0.09	8078	2812.8	169,646
2010	152,062	4,689,889	47,891	59,465	44,707	0.02	0.04	0.09	8167	2843.5	171,499
2011	144,179	4,834,068	45,408	56,382	42,389	0.02	0.04	0.09	8218	2861.4	172,578
2012	136,763	4,970,831	43,072	53,482	40,209	0.02	0.04	0.09	8238	2868.2	172,989
2013	131,472	5,102,303	41,406	51,413	38,653	0.02	0.04	0.09	8282	2883.6	172,816
2014	128,045	5,229,955	46,736	56,468	24,841	0.02	0.04	0.09	8106	2822.4	170,227

Appendix A2a Hartland Landfill Summary of Waste Composition Studies

Year	Refuse Methane Generation Potential				
	Low	Medium	High	Totals	Source
1990	33.53	25.34	41.13	100	CRD Solid Waste Stream Analysis Cameron Advisory Services LTD. September 1990
1996	32.08	42.05	25.87	100	CRD Solid Waste Stream Analysis Final Report Cameron Advisory Services LTD. December 1996
2001	25.6	40.6	33.8	100	CRD 2001 Solid Waste Stream Composition Study Sperling Hansen Associates April 2001
2005	26.4	38.8	34.8	100	CRD Solid Waste Stream Composition Study 2004-2005 Sperling Hansen Associates May 2005
2010	28.2	41.4	30.4	100	CRD Solid Waste Stream Composition Study 2009-2010 Final report Sperling Hansen Associates September 2010

From Conestoga Rovers and Associates Adjusted for Controlled Waste				
		Relatively Inert	Moderately Decomposable	Decomposable
Waste Composition, 1980 to	***1995***	33.7%	24.9%	41.4%
Waste Composition, 1996 to	***2000***	33.9%	40.5%	25.6%
Waste Composition, 2001 to	***2004***	26.6%	39.6%	33.8%
Waste Composition, 2005 to	***2009***	33.2%	37.0%	29.9%
Waste Composition, 2010 to	***Future***	31.5%	39.1%	29.4%

Appendix A2b-2f Methane Generation Potential Based on Waste Composition Study Results

Table 1. 1990 Waste Composition Study Results

YEAR 1990	Methane Generation Potential		
Year Applied 1980 to 1995	**Relatively Inert**	**Moderately Decomposable**	**Decomposable**
Waste Type by Percent Composition			
Organics			41.13
Paper		13.67	
Plastics	11.12		
Wood		4.07	
Construction Debris		0.14	
Textiles		1.6	
Composite			
Diapers		1.16	
Ferrous metal	5.52		
Non-ferrous metal	2.08		
Glass	2.88		
Electronics			
Hazardous waste	0.42		
Rubber	1.19		
Other	10.32	4.7	
Totals	**33.53**	**25.34**	**41.13**

Table 2. 1996 Waste Composition Study Results

YEAR 1996	Methane Generation Potential		
Years Applied 1996 to 2000	**Relatively Inert**	**Moderately Decomposable**	**Decomposable**
Waste Type by Percent Composition			
Organics			25.87
Paper		21.63	
Plastics	13.59		
Wood		5.45	
Construction Debris		9.31	
Textiles		3.25	
Composite	4.19		
Diapers		2.41	
Ferrous metal	2.86		
Non-ferrous metal	0.79		
Glass	2.48		
Electronics			
Hazardous waste	0.38		
Rubber	0.21		
Other	7.58		
Totals	**32.08**	**42.05**	**25.87**

Table 3. 2001 Waste Composition Study Results

YEAR 2001	Methane Generation Potential		
Years Applied 2001 to 2004	**Relatively Inert**	**Moderately Decomposable**	**Decomposable**
Waste Type by Percent Composition			
Organics			33.8
Paper		15.7	
Plastics	13.5		
Wood		9.2	
Construction Debris		8.4	
Textiles		3.8	
Composite	2.7		
Diapers		3.5	
Ferrous metal	3.2		
Non-ferrous metal	0.7		
Glass	2.3		
Electronics			
Hazardous waste	0.4		
Rubber	0.9		
Other	1.9		
Totals	**25.6**	**40.6**	**33.8**

Table 4. 2005 Waste Composition Study Results

YEAR 2005	Methane Generation Potential		
Years Applied 2005 to 2009	**Relatively Inert**	**Moderately Decomposable**	**Decomposable**
Waste Type by Percent Composition			
Organics			30.2
Paper		15.8	
Plastics	13.8		
Wood		9.6	
Construction Debris		6.3	
Textiles		4.7	
Composite	5.2		
Diapers		2.4	
Ferrous metal	2.9		
Non-ferrous metal	0.9		
Glass	2		
Electronics			
Hazardous waste	1.1		
Rubber	0.5		
Other	4.6		
Totals	**31**	**38.8**	**30.2**

Table 5. 2010 Waste Composition Study Results

YEAR 2010	Methane Generation Potential		
Years Applied 2010 to 2014	**Relatively Inert**	**Moderately Decomposable**	**Decomposable**
Waste Type by Percent Composition			
Organics			30.41
Paper		16.55	
Plastics	13.09		
Wood		9.93	
Construction Debris		6.12	
Textiles		5.51	
Composite	1.9		
Diapers		3.28	
Ferrous metal	2.37		
Non-ferrous metal	0.64		
Glass	1.94		
Electronics	1.91		
Hazardous waste	0.77		
Rubber	0.71		
Other	4.87		
Totals	**28.2**	**41.39**	**30.41**

Appendix A3 Hartland Landfill Annual Waste Tonnage (1986 to 2014)

Year	Type of Waste Declared			Controlled Waste							Total
	General Refuse	Asphalt Shingles	Sub-Total	Misc.[1]	Liquid[2]	Asbestos[3]	Screenings/ sludge	Biosolids	Contaminated Soils	Sub-Total	
1986	166,862	0	166,862	103	507					610	167,472
1987	177,086	0	177,086	208	392					600	177,686
1988	181,454	0	181,454	1,894	845					2,739	184,193
1989	185,409	0	185,409	3,084	257					3,341	188,750
1990	183,590	0	183,590	3,661	225					3,886	187,476
1991	173,634	0	173,634	2,123	199					2,322	175,956
1992	156,399	0	156,399	3,803	161	450	1,516			5,930	162,329
1993	156,255	0	156,255	1,474	224	382	1,096			3,176	159,431
1994	153,614	0	153,614	500	60	285	1,826			2,671	156,285
1995	155,305	0	155,305	274	200	388	1,670		2,156	4,688	159,993
1996	153,351	0	153,351	855	203	362	1,737		1,020	4,177	157,528
1997	145,513	929	146,442	434	312	257	1,782	NA	202	2,987	149,429
1998	130,079	525	130,604	615	239	239	1,727	NA	5,182	8,002	138,606
1999	134,018	239	134,257	807	154	322	1,805	NA	829	3,917	138,174
2000	136,654	0	136,654	2,343	315	441	2,408	NA	78	5,585	142,239
2001	135,425	0	135,425	440	425	362	1,551	NA	330	3,108	138,533
2002	142,940	0	142,940	820	204	413	1,077	NA	870	3,384	146,324
2003	144,043	0	144,043	1,941	205	672	940	30	394	4,182	148,225
2004	150,787	0	150,787	1,329	146	837	977	37	0	3,326	154,113
2005	158,848	0	158,848	1,436	689	432	970	266	399	4,192	163,040
2006	160,260	0	160,260	1,465	494	585	2,734	1,077	205	6,560	166,820
2007	165,381	0	165,381	1,425	289	641	3,337	2,825	639	9,156	174,537
2008	154,881	0	154,881	3,776	267	601	5,371	1,628	198	11,841	166,722
2009	153,263	0	153,263	1,374	364	572	5,555	0	66	7,931	161,194
2010	143,669	0	143,669	1,017	464	1,313	5,512	0	87	8,393	152,062
2011	136,414	0	136,414	711	614	1,012	5,337	0	91	7,765	144,179
2012	129,279	0	136,763	687	721	1,417	4,668	0	0	7,493	136,763
2013	123,210	0	123,210	735	676	1,711	5,086	0	0	8,208	131,418
2014	119,306	0	119,306	849	611	1,572	5,707	0	151	8739	128,045

Notes:

[1] Miscellaneous includes spoiled food, contaminated drywall, dead animals, surface coating waste, soot/ash, food processing waste, health hazardous waste, soot and animal feces.

[2] Liquid waste includes pumpings from catch basins, car wash sumps and other sumps containing non-hazardous waste.

[3] Asbestos also includes material from outside of region.

Appendix A4 Hartland Landfill Waste Quantity and Waste Composition Data

Year Annual Total (tonnes)	Refuse	% Relatively Inert	% Moderately Decomposable	% Decomposable	Total Controlled Waste	Misc.	% Decomposable	% Relatively Inert	Total Waste
Average Composition for Period (1986 to 1995)									
1986	166,862	33.53	25.34	41.13	610	103	16.89	83.11	167,472
1987	177,086	33.53	25.34	41.13	600	208	34.67	65.33	177,686
1988	181,454	33.53	25.34	41.13	2,739	1,894	69.15	30.85	184,193
1989	185,409	33.53	25.34	41.13	3,341	3,084	92.31	7.69	188,750
1990	183,590	33.53	25.34	41.13	3,886	3,661	94.21	5.79	187,476
1991	173,634	33.53	25.34	41.13	2,322	2,123	91.43	8.57	175,956
1992	156,399	33.53	25.34	41.13	5,930	3,803	64.13	35.87	162,329
1993	156,255	33.53	25.34	41.13	3,176	1,474	46.41	53.59	159,431
1994	153,614	33.53	25.34	41.13	2,671	500	18.72	81.28	156,285
1995	155,305	33.53	25.34	41.13	4,688	274	5.84	94.16	159,993
Average Composition for Period (1996 to 2000)									
1996	153,351	32.08	42.05	25.87	4,177	855	20.47	79.53	157,528
1997	146,442	32.08	42.05	25.87	2,987	434	14.53	85.47	149,429
1998	130,604	32.08	42.05	25.87	8,002	615	7.69	92.31	138,606
1999	134,257	32.08	42.05	25.87	3,917	807	20.60	79.40	138,174
2000	136,654	32.08	42.05	25.87	5,585	2,343	41.95	58.05	142,239
Average Composition for Period (2001 to 2004)									
2001	135,425	25.6	40.06	33.8	3,108	440	14.16	85.84	138,533
2002	142,940	25.6	40.06	33.8	3,384	820	24.23	75.77	146,324
2003	144,043	25.6	40.06	33.8	4,182	1,941	46.41	53.59	148,225
2004	150,787	25.6	40.06	33.8	3,326	1,329	39.96	60.04	154,113
Average Composition for Period (2005 to 2009)									
2005	158,848	31	38.8	30.2	4,192	1,436	34.26	65.74	163,040
2006	160,260	31	38.8	30.2	6,560	1,465	22.33	77.67	166,820
2007	165,381	31	38.8	30.2	9,156	1,425	15.56	84.44	174,537
2008	154,881	31	38.8	30.2	11,841	3,776	31.89	68.11	166,722
2009	153,263	31	38.8	30.2	7,931	1,374	17.32	82.68	161,194
Average Composition for Period (2010 to 2013)									
2010	143,669	28.2	41.4	30.4	8,393	1,017	12.12	87.88	152,062
2011	136,414	28.2	41.4	30.4	7,765	711	9.16	90.84	144,179
2012	129,280	28.2	41.4	30.4	7,483	169	2.2	97.8	136,763
2013	123,210	28.2	41.4	30.4	8,252	735	8.9	91.1	131,418
Average Composition for Period (2014 to present)									
2014	119,306	36.5	44.1	19.4	8,739	849	9.8	90.2	128,045

Appendix A4a Capital Regional District Waste Diversion Rates

Year	CRD[1] Population	Projected Tonnage[2]	Actual Landfilled Tonnage	Diverted Tonnage[3] (quantitative)	Diverted Tonnage[4] (qualitative)	Diversion Per Capita (tonnes)	Diversion Rate	Waste Disposal Per capita (tonnes)
1989	284,730	196,763	185,128	6,243	5,392	0.041	6%	-
1990	291,880	197,076	180,118	10,549	6,409	0.058	9%	-
1991	299,133	199,608	169,419	11,809	18,380	0.101	15%	-
1992	304,200	203,416	159,634	22,134	21,648	0.144	22%	-
1993	308,720	206,826	148,341	27,700	30,785	0.189	28%	-
1994	321,585	214,017	145,585	31,263	37,169	0.213	32%	-
1995	326,010	217,310	138,303	32,342	46,665	0.242	36%	-
1996	328,880	218,643	135,869	33,190	49,584	0.252	38%	-
1997	329,135	220,850	146,442	39,634	34,774	0.226	34%	-
1998	334,871	224,698	130,604	35,310	58,784	0.281	42%	-
1999	339,643	227,900	134,257	30,643	63,000	0.276	41%	-
2000	342,718	229,964	136,654	29,537	63,773	0.272	41%	-
2001	344,567	231,204	135,425	24,010	71,769	0.278	41%	-
2002	347,095	232,901	142,940	23,636	66,325	0.259	39%	-
2003	345,223	231,645	144,043	24,116	63,486	0.254	38%	-
2004	349,638	234,607	150,787	25,580	58,240	0.240	36%	-
2005	354,206	237,672	158,848	26,132	52,692	0.223	33%	-
2006	359,439	241,184	160,260	27,261	53,663	0.225	34%	-
2007	364,121	244,325	165,381	28,802	50,142	0.217	32%	-
2008	366,934	246,213	153,263	27,315	65,635	0.253	38%	-
2009	369,791	248,130	153,263	26,674	68,193	0.257	38%	-
2010	372,565	249,991	143,669	27,878	78,444	0.285	43%	-
2011	376,222	252,445	136,414	27,388	88,643	0.308	46%	-
2012	373,709	250,759	129,279	26,269	95,211	0.325	48%	-
2013	382,252	256,491	123,210	27,493	105,788	0.349	52%	-
2014[5]	385,312	n/a	128,045	n/a	n/a	n/a	n/a	0.309

Notes:

[1] Population data provided by CRD Regional Planning Services.

[2] Projected annual waste based upon the 1989 waste generation rate of 0.671 tonnes per capita.

[3] Diversion tonnage see other table.

[4] Qualitative Diverted Tonnage = actual material landfilled at Hartland - quantitative tonnage diverted.

[5] Waste quantification and diversion calculations changed to BC MOE standardized reporting system

[6] Population data provided by BC Stats (as required by BC MOE reporting system)

APPENDIX B

Well Field Data

B1 Hartland Landfill Gas Well Operation

B2 2014 Hartland Landfill Gas Well Field Data

B3 2014 Hartland Landfill Gas Well Field Data Summary

Appendix B1 Hartland Landfill Gas Well Operation

Well Information					Gas Well Readings																Comments
Old Well Name	New Well Name	Install-ation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
BLGW0001		2002	2003	2005						x	x	x										
BLGW0002		2002	2003	2005						x	x	x										
BLGW0003		2002	2003	2007						x	x	x	x	x								
BLGW0004		2002	2003	2007						x	x	x	x	x								
BLGW0005		2002	2003	2007						x	x	x	x	x								
BLGW0006		2002	2003	2007						x	x	x	x	x								
BLGW0007		2002	2003	2007						x	x	x	x	x								
BLGW0008		2002	2003	2004						x	x											
BLGW0009		2002	2003	2004						x	x											
BLGW0010		2002	2003	2004						x	x											
BLGW0011		2002	2003	2004						x	x											
BLGW0012		2002	2003	2004						x	x											
BLGW0013		2002	2003	2004						x	x											
BLGW0014		2002	2003	2004						x	x											
BLGW0015		2002	2003	2004						x	x											
BLGW0016		2002	2003	2008						x	x	x	x	x	x							
BLGW0017		2002	2003	2008						x	x	x	x	x	x							
BLGW0018		2002	2003	2008						x	x	x	x	x	x							
BLGW0019		2002	2003	2006						x	x	x	x									
BLGW0020		2002	2003	2006						x	x	x	x									
BLGW0021		2002	2003	2006						x	x	x	x					Abandoned				Converted to vertical well OLGW0048s
LHGW0001	LHGW0001	1999	2003	2011						x	x	x	x	x	x	x	x	x				Abandoned May 2011
LHGW002A	LHGW002A	1999	2007											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				Abandoned in May 2011
LHGW0003	LHGW0003	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure reconnected Jan. 2013
LHGW0004	LHGW0004	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	
LHGW0005																						
LHGW0006	LHGW0006	2008	2009													x	x	x	x	x	x	
LHGW0007	LHGW0007	2008	2009													x	x	x	x	x	x	
LHGW0008	LHGW0008	2008	2009													x	x	x	x	x	x	

Appendix B1, continued

Well Information					Gas Well Readings																Comments
Old Well Name	New Well Name	Install-ation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
LHGW0009			2012																x	x	x	Start Feb. 2012 abandoned May 2014
LHGW0010			2012																x	x	x	Start Feb. 2012, was 11 abandoned May 2014
LHGW0013			2011															x	x	x	x	Start Sep. 2011
LHGW0017			2012																x	x	x	Start Jan. 2012
LHGW0019																					X	Started May 2014
LHGW0020																					x	Started May 2014
LHGW0021																					x	Started May 2014
LHGW0022																					x	Started May 2014
LHGW0023			2011															x	x	x	x	Start Sep. 2011, was 21
OHGW0001	HLGW0001	1999	2001					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				Abandoned May 2011
OHGW0003	HLGW0003	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW0004	HLGW0004	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW0005	HLGW0005	1999	2003							x	x	x	x	x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW006A	HLGW006A	1999	2005									x	x	x	x	x	x	x	x	x	x	
OHGW006B	HLGW006B	1999	2005									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				Abandoned in May 2011
OHGW008A	HLGW008A	1999	2006										x	x	x	x		x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW008B	HLGW008B	1999	2006										x	x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW0009	HLGW0009	2007	2008											x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW0010	HLGW0010	2007	2008											x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW0011	HLGW0011	2007	2008											x	x	x	x	x	x	x	x	Disconnected for Cell 1 closure - reconnected Jan. 2013
OHGW0012	HLGW0012		2010														x	x	x	x	x	

Appendix B1, continued

Well Information					Gas Well Readings																Comments
Old Well Name	New Well Name	Install-ation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
OHGW0013	HLGW0013		2010														x	x	x	x	x	
OHGW0014	HLGW0014		2011															x	x	x	x	
OHGW0015	HLGW0015		2011															x	x	x	x	Abandoned May 2014
	HLGW016A																		x	x	x	Started Dec. 2012
OHGW0016/ HLGW0016	HLGW016B		2012																x	x	x	Started Jan. 2012
	HLGW017A		2013																x	x	x	Started Dec. 2012
OHGW0017/ HLGW0017	HLGW017B		2012																x	x	x	Started Jan. 2012
	HLGW0018		2013																	x	x	Started Jan. 2013
	HLGW019B		2013																	x	x	Started Jan. 2013
	HLGW019C		2012																x	x	x	Started Dec. 2012
	HLGW020B		2013																	x	x	Started Jan. 2013
	HLGW021B		2013																	x	x	Started Jan. 2013
	HLGW022B		2013																	x	x	Started Jan. 2013
	HLGW0023		2013																	x	x	Started Jan. 2013
	HLGW030A		2014																		x	Started Jan. 2014
	HLGW031A		2014																		x	Started Jan. 2014
	HLGW032A		2014																		x	Started Jan. 2014
	HLGW033A		2014																		x	Started Jan. 2014
	HLGW034A		2014																		x	Started Jan. 2014
	HLGW030B		2014																		x	Started Jan. 2014
	HLGW031B		2014																		x	Started Jan. 2014
	HLGW032B		2014																		x	Started Jan. 2014
	HLGW033B		2014																		x	Started Jan. 2014
	HLGW034B		2014																		x	Started Jan. 2014
OLGT001A	TLGW001A	1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGT001B	TLGW001B	1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGT002A	TLGW002A	1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGT002B	TLGW002B	1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGT002C	TLGW002C	1996			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGT0003				2002	x	x	x	x	x													
OLGT0004				2002	x	x	x	x	x													
OLGT0005				2002	x	x	x	x	x													
OLGT0006				2002	x	x	x	x	x													

Appendix B1, continued

Well Information					Gas Well Readings																Comments
Old Well Name	New Well Name	Install-ation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
OLGT0007				2002	x	x	x	x	x													
OLGT0008				2002	x	x	x	x	x													
OLGT0009				2002	x	x	x	x	x													
OLGT0010				2002	x	x	x	x	x													
OLGT0011				2002	x	x	x	x	x													
OLGT0012				2002	x	x	x	x	x													
OLGT0013				2002	x	x	x	x	x													
OLGT0014				2002	x	x	x	x	x													
OLGT0015				2002	x	x	x	x	x													
OLGT0016				2002	x	x	x	x	x													
OLGT0017				2002	x	x	x	x	x													
OLGT0018				2002	x	x	x	x	x													
OLGT0019				2002	x	x	x	x	x													
OLGW001D	VLGW001D	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW001S	VLGW001S	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
OLGW002D	VLGW002D	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW002S	VLGW002S	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
OLGW003D	VLGW003D	1996	1996		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	
OLGW004D	VLGW004D	1996	1996		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
OLGW004S	VLGW004S	1996	1996		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	
OLGW005S	VLGW005S	1996	1996		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	
OLGW006S	VLGW006S	1996	1996		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	
OLGW007S	VLGW007S	1996	1996		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	
OLGW008S	VLGW008S	1996	1996		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	
OLGW009S	VLGW009S	1996	1996		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	
OLGW011S	VLGW011S	1996	1996		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	

Appendix B1, continued

Well Information					Gas Well Readings																Comments
Old Well Name	New Well Name	Install-ation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
OLGW013D	VLGW013D	1997	1997		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	
OLGW014D	VLGW014D	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW014S	VLGW014S	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW015D	VLGW015D	1997	1997		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	
OLGW016D	VLGW016D	1997	1997		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	
OLGW017D	VLGW017D	1997	1997		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	
OLGW018D	VLGW018D	1997	1997		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	
OLGW019D	VLGW019D	1997	1997		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	
OLGW020D	VLGW020D	1997	1997		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	
OLGW021D	VLGW021D	1997	1997		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	
OLGW022D	VLGW022D	1997	1997		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	
OLGW023D	VLGW023D	1997	1997		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	
OLGW024D	VLGW024D	1997	1997		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	
OLGW025D	VLGW025D	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
OLGW025S	VLGW025S	1997	1997		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	
OLGW026S	VLGW026S	1997	1997		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	
OLGW027S	VLGW027S	1997	1997		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	
OLGW029D	VLGW029D	1997	1997		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	
OLGW030S	VLGW030S	1997	1997		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Appendix B1, continued

Well Information					Gas Well Readings																Comments
Old Well Name	New Well Name	Install-ation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
OLGW031S	VLGW031S	1997	1997		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	
OLGW033S	VLGW033S	1997	1997		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	
OLGW035S		1997	1998	2004	x	x	x	x	x	x	x											
OLGW035D		1997	1998	2004	x	x	x	x	x	x	x											
OLGW036S		1997	1998	2004	x	x	x	x	x	x	x											
OLGW036D		1997	1998	2004	x	x	x	x	x	x	x											
OLGW037S		1997	1998	2005	x	x	x	x	x	x	x	x										
OLGW037D		1997	1998	2005	x	x	x	x	x	x	x	x										
OLGW038S		1997	1998	2004	x	x	x	x	x	x	x											
OLGW038D		1997	1998	2004	x	x	x	x	x	x	x											
OLGW039S		1997	1998	2004	x	x	x	x	x	x	x											
OLGW039D		1997	1998	2004	x	x	x	x	x	x	x											
OLGW040S		1997	1998	2004	x	x	x	x	x	x	x											
OLGW040D		1997	1998	2004	x	x	x	x	x	x	x											
OLGW041D		1997	1998	2008	x	x	x	x	x	x	x	x	x	x	x							
OLGW041S		1997	1998	2008	x	x	x	x	x	x	x	x	x	x	x							
OLGW042S	VLGW042S	2002	2003							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	
OLGW044S	VLGW044S	2002	2003	2011						x	x	x	x	x	x	x	x	x				Abandoned in May 2011
OLGW045S	VLGW045S	2002	2003	2011						x	x	x	x	x	x	x	x	x				Abandoned in May 2011
OLGW046S	VLGW046S	2002	2003	2011						x	x	x	x	x	x	x	x	x				Abandoned in May 2011
OLGW047S	VLGW047S	2002	2003	2011						x	x	x	x	x	x	x	x	x				Abandoned in May 2011 – reactivated May 2014
OLGW048S	VLGW048S	2002	2002	2011										x	x	x	x	x				Abandoned in May 2011
OLGW049	VLGW049	2011	2011															x	x	x	x	
OLGW050	VLGW050	2011	2011															x	x	x	x	
OLGW051	VLGW051	2011	2011															x	x	x	x	
OLGW052	VLGW052	2011	2011															x	x	x	x	
OLGW053	VLGW053	2011	2011															x	x	x	x	
OLGW054	VLGW054	2011	2011															x	x	x	x	
OLGW055	VLGW055	2011	2011															x	x	x	x	
OLGW056	VLGW056	2011	2011															x	x	x	x	

Appendix B1, continued

Well Information					Gas Well Readings																Comments
Old Well Name	New Well Name	Install-ation Date	Activation Date	Deactivation Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
OLGW057	VLGW057	2011	2011															x	x	x	x	
OLGW058	VLGW058	2011	2011															x	x	x	x	
OLGW059	VLGW059	2011	2011															x	x	x	x	
OLGW060	VLGW060	2011	2011															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**	**122**	

Notes:

x	indicates active during the year		**Count**
BLGW0001		Buried	**0**
LHGW0001	LHGW0001	Leachate Horizontal	**15**
OHGW0001	HLGW0001	Horizontal	**36**
OLGT001A	TLGW001A	Trench	**5**
OLGW001D	VLGW001D	Vertical	**74**

Appendix B2 2014 Hartland Landfill Gas Well Field Data

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW0001							
January	1/17/14 1:50 PM	26.4	27.3	1.9	44.4	2	5
February	02/28/2014 10:22	39.5	33.7	0.1	26.7	4	5
March	3/27/14 10:50 AM	28.6	28	1.3	42.1	0	1
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	7/31/14 9:26 AM	43.4	33.1	0.2	23.3	3	2
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	10/23/14 10:31 AM	35.3	30.6	0.5	33.6	6	7
November	---	---	---	---	---	---	
December	12/31/2014 9:20	58	38.8	0	3.2	5	6
Average		**38.5**	**---**	**---**	**---**	**---**	**4.3**
HLGW0003							
January	1/17/14 1:57 PM	58.9	37.1	1.1	2.9	<<>>	11
February	02/28/2014 10:28	56.7	36	1.6	5.7	16	17
March	3/27/14 10:45 AM	54.5	34.7	1.9	8.9	5	5
April	4/30/14 8:49 AM	55.3	36.2	1.2	7.3	3	7
May	5/30/14 9:12 AM	53.5	35.2	0.9	10.4	<<>>	9.0
June	06/10/2014 7:02 AM	44.2	32.5	1.7	21.6	10	12
July	7/31/14 9:29 AM	62.4	37.4	0	0.2	6	7
August	08/28/2014 13:35	56.4	35.9	0.9	6.8	2	13
September	9/30/14 12:31 PM	46.3	32.2	3.1	18.4	0	2
October	10/23/14 9:50 AM	30.5	23.3	7.5	38.7	5	7
November	11/26/2014 12:00	29.7	25.1	4.3	40.9	3	5
December	12/31/2014 9:17	56	34.2	1.4	8.4	<<>>	7
Average		**50.4**	**33.3**	**2.1**	**14.2**	**5.6**	**8.5**
HLGW0004							
January	1/17/14 1:32 PM	24	27.5	0	48.5	0	0
February	02/28/2014 9:43	31	28.9	0	40.1	2	2
March	3/27/14 10:33 AM	42.4	32	0	25.6	4	4
April	4/30/14 8:40 AM	25.7	28.3	0	46	6	3
May	5/30/14 9:01 AM	47.2	34.0	0.0	18.8	2.0	3.0
June	---	---	---	---	---	---	
July	7/31/14 8:56 AM	52.8	35.5	0	11.7	2	4
August	---	---	---	---	---	---	
September	9/30/14 2:25 PM	35.3	31.2	0	33.5	4	4
October	10/23/14 10:13 AM	28	28.6	0	43.4	4	4
November	---	---	---	---	---	---	
December	12/31/2014 9:10	61.8	38	0	0.2	0	0
Average		**38.7**	**---**	**---**	**---**	**---**	**2.7**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW0005							
January	1/17/14 1:45 PM	39	32	0	29	4	4
February	02/28/2014 10:07	38.3	30.7	0	31	2	3
March	3/27/14 10:41 AM	52	35.3	0	12.7	4	3
April	4/30/14 8:46 AM	46.7	33.8	0	19.5	3	9
May	5/30/14 9:09 AM	50.1	33.8	0.0	16.1	4.0	4.0
June	06/10/2014 7:05 AM	40.6	32.1	0	27.3	7	6
July	7/31/14 9:01 AM	46.1	33.5	0	20.4	6	6
August	08/28/2014 13:32	47.4	33.4	0	19.2	5	8
September	9/30/14 2:30 PM	50.2	34.6	0	15.2	4	7
October	10/23/14 10:22 AM	42.9	32.6	0	24.5	7	7
November	---	---	---	---	---	---	
December	12/31/2014 9:14	51.3	33.8	0	14.9	2	10
Average		**45.9**	**---**	**---**	**---**	**---**	**6.1**
HLGW006A							
January	1/17/14 11:11 AM	27.4	30.5	0	42.1	6	5
February	02/27/2014 11:20	35.8	31.9	0	32.3	80	78
March	3/27/14 9:20 AM	29.3	29.2	0	41.5	7	6
April	4/30/14 7:27 AM	29.1	30.2	0.2	40.5	5	3
May	5/30/14 6:58 AM	37.3	31.7	0.0	31.0	3.0	3.0
June	06/10/2014 6:27 AM	33.2	30.8	0	36	4	3
July	7/30/14 10:43 AM	37.1	31.9	0	31	2	1
August	08/27/2014 7:49	23.2	28.1	0	48.7	3	3
September	9/30/14 10:02 AM	29.8	29.7	0	40.5	2	1
October	10/22/14 12:02 PM	38.1	31.9	0	30	3	3
November	11/29/2014 12:27	24.4	27.9	0.2	47.5	3	3
December	12/31/2014 14:49	30.2	29.5	0	40.3	3	3
Average		**31.2**	**30.3**	**0.0**	**38.5**	**10.1**	**9.3**
HLGW006B							
January	1/17/14 12:14 PM	59.7	40.2	0	0.1	35	37
February	02/28/2014 9:04	59.1	40.7	0	0.2	35	34
March	3/27/14 10:21 AM	60.6	39.3	0	0.1	37	37
April	4/30/14 8:29 AM	60.2	39.7	0	0.1	35	37
May	5/30/14 8:50 AM	61.3	38.6	0.0	0.1	39.0	36.0
June	06/10/2014 6:54 AM	60.8	39.1	0	0.1	37	38
July	7/31/14 8:47 AM	60.6	38.4	0	1	36	36
August	08/28/2014 13:22	61.2	38.7	0	0.1	36	36
September	9/30/14 2:16 PM	42.2	33.3	0	24.5	52	49
October	10/23/14 7:28 AM	55.5	37.5	0	7	37	38
November	11/26/2014 11:46	48.3	34.3	0.7	16.7	37	47
December	12/31/2014 9:00	46.5	33.3	1.1	19.1	49	52
Average		**56.3**	**37.8**	**0.2**	**5.8**	**38.8**	**39.8**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW008A							
January	1/15/14 12:27 PM	32.9	30.5	1.9	34.7	29	27
February	02/26/2014 9:31	29.3	28.5	1.1	41.1	27	27
March	3/26/14 9:47 AM	35.8	30.7	0.6	32.9	<<>>	<<>>
April	4/26/14 6:40 AM	36.5	30.7	0.5	32.3	<<>>	13
May	5/29/14 7:47 AM	37.6	31.0	0.9	30.5	10.0	8.0
June	06/07/2014 10:26 AM	31.4	28.5	1	39.1	13	6
July	7/29/14 7:23 AM	40	32.5	0.3	27.2	<<>>	7
August	08/26/2014 6:54	41.5	33.4	0.1	25	8	8
September	9/27/14 11:42 AM	37.4	32.3	0	30.3	8	7
October	10/21/14 8:39 AM	41.6	33.7	0	24.7	9	13
November	---	---	---	---	---	---	
December	12/31/2014 10:16	42.2	32.3	0.7	24.8	1	3
Average		**36.9**	**---**	**---**	**---**	**---**	**11.9**
HLGW008B							
January	1/17/14 10:53 AM	44.8	35.4	0	19.8	100	100
February	02/27/2014 10:47	50.8	36.3	0	12.9	110	106
March	3/27/14 8:49 AM	50.9	36.4	0	12.7	103	106
April	4/30/14 7:38 AM	41.6	34.3	0	24.1	108	107
May	5/30/14 6:44 AM	47.6	35.5	0.0	16.9	78.0	78.0
June	06/10/2014 8:27 AM	47.2	35	0.2	17.6	76	77
July	7/30/14 10:31 AM	47.6	35.1	0	17.3	81	80
August	08/27/2014 7:18	44.3	34.6	0	21.1	77	78
September	9/30/14 9:55 AM	44.2	33.5	0.7	21.6	74	75
October	10/22/14 7:55 AM	48.5	35.5	0	16	78	80
November	11/25/2014 12:44	42.6	33.6	0	23.8	80	80
December	12/31/2014 14:42	47.2	34.4	0	18.4	85	87
Average		**46.4**	**35.0**	**0.1**	**18.5**	**87.5**	**87.8**
HLGW0009							
January	12/18/13 3:09 PM	14.3	11.9	10.7	63.1	<<>>	<<>>
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	Decommissioned May 2014						
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**14.3**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW0010							
January	1/21/14 1:15 PM	0.9	1.9	20.2	77	<<>>	9
February	---	---					
March	---	---					
April	4/30/14 12:03 PM	35.9	31.6	6	26.5	9	<<>>
May	5/31/14 11:46 AM	59.7	39.9	0.2	0.2	<<>>	10.0
June	06/07/2014 1:45 PM	59.7	39.8	0.4	0.1	17	20
July	7/31/14 7:35 AM	52.7	37.4	0	9.9	<<>>	6
August	08/29/2014 13:36	58.3	39.8	0.3	1.6	2	8
September	9/30/14 3:35 PM	22	15.3	11.9	50.8	7	4
October	10/23/14 10:26 AM	25.7	17.8	9.9	46.6	<<>>	0
November	11/25/2014 13:13	22.2	19.1	8.8	49.9	2	2
December	12/31/2014 9:38	17.8	17.4	9.5	55.3	<<>>	<<>>
Average		**35.5**	**26.0**	**6.7**	**31.8**	**7.4**	**7.4**
HLGW0011							
January	1/21/14 1:19 PM	50.2	38.4	1.1	10.3	4	12
February	---	---	---	---	---	---	
March	3/29/14 11:44 AM	39.2	31.7	1.6	27.5	24	
April	4/30/14 12:05 PM	44.2	34.9	0.1	20.8	<<>>	11
May	5/31/14 11:45 AM	59.7	39.4	0.0	0.9	1.0	9.0
June	06/07/2014 1:44 PM	50.7	37.3	0	12	14	15
July	7/31/14 7:37 AM	51.5	35.3	2.8	10.4	7	8
August	08/29/2014 13:37	33.8	25.3	6.6	34.3	<<>>	<<>>
September	9/30/14 3:39 PM	31.9	29.2	1.5	37.4	<<>>	2
October	10/23/14 10:27 AM	32.6	31.8	0	35.6	6	7
November	11/25/2014 13:12	33.5	32.7	0	33.8	14	9
December	12/31/2014 9:40	4.6	4.3	18.1	73	<<>>	<<>>
Average		**39.3**	**---**	**---**	**---**	**---**	**9.1**
HLGW0012							
January	1/20/14 2:28 PM	50.2	36.2	1.4	12.2	101	104
February	---	---	---	---	---	---	
March	3/29/14 11:18 AM	57.4	42.2	0.3	0.1	15	18
April	4/30/14 11:46 AM	49.4	35.2	1.5	13.9	<<>>	62
May	5/31/14 11:00 AM	48.2	33.9	1.8	16.1	141.0	143.0
June	06/10/2014 1:31 PM	48.1	33.8	1.9	16.2	111	115
July	7/31/14 7:24 AM	46.6	33.8	1.8	17.8	113	118
August	08/29/2014 13:25	49.9	35.1	1.1	13.9	99	98
September	9/30/14 3:21 PM	50	35.6	1.1	13.3	105	110
October	10/28/14 7:14 AM	48.1	34.5	2.1	15.3	73	74
November	11/25/2014 12:58	45.8	32.9	2.9	18.4	72	78
December	12/31/2014 9:25	48.1	35.6	1.3	15	1	2
Average		**49.3**	**---**	**---**	**---**	**---**	**83.8**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW0013							
January	1/20/14 2:38 PM	53.6	38.9	0.4	7.1	133	135
February	---	---	---	---	---	---	
March	3/29/14 11:22 AM	48	35	2.1	14.9	143	141
April	4/30/14 11:53 AM	53.8	38.2	0.3	7.7	138	
May	5/31/14 11:04 AM	52.9	37.3	0.3	9.5	137.0	140.0
June	06/10/2014 1:35 PM	54.5	38.3	0.1	7.1	139	135
July	7/31/14 7:27 AM	53.7	38.5	0.1	7.7	131	135
August	08/29/2014 13:28	55.3	39.3	0.1	5.3	118	113
September	9/30/14 3:25 PM	56.6	38.9	0.1	4.4	126	125
October	10/28/14 7:20 AM	54	38	0.2	7.8	70	70
November	11/25/2014 13:05	49.4	36.4	0.5	13.7	79	78
December	12/31/2014 9:29	50.2	36.2	0.3	13.3	87	85
Average		**52.9**	**---**	**---**	**---**	**---**	**115.7**
HLGW0014							
January	1/20/14 2:22 PM	54.3	40.5	0	5.2	15	<<>>
February	---	---	---	---	---	---	
March	3/29/14 11:14 AM	48.2	37.2	0.2	14.4	39	<<>>
April	4/30/14 9:48 AM	57.5	42.3	0	0.2	49	48
May	5/31/14 10:19 AM	54.5	39.0	0.1	6.4	61.0	79.0
June	06/10/2014 9:18 AM	50.9	37.8	0	11.3	25	36
July	7/31/14 7:14 AM	48.5	37	0	14.5	51	52
August	08/29/2014 9:37	46.3	36.6	0	17.1	38	49
September	9/30/14 3:09 PM	45.9	36.3	0	17.8	41	42
October	10/25/14 10:29 AM	48.4	37.8	0	13.8	45	42
November	11/25/2014 12:21	40.2	34.6	0	25.2	58	47
December	12/31/2014 9:47	48.6	36.4	0.1	14.9	8	13
Average		**49.4**	**---**	**---**	**---**	**---**	**45.3**
HLGW0015							
January	1/20/14 2:19 PM	44.4	39.7	1.1	14.8	1	
February	---	---	---	---	---	---	
March	3/29/14 11:12 AM	46.3	37.6	1.5	14.6	<<>>	<<>>
April	4/30/14 9:46 AM	51.9	35.9	1.8	10.4	3	10
May	Decommissioned May 2014						
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**47.5**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW016A							
January	1/15/14 9:04 AM	25.5	23.4	6.6	44.5	12	10
February	02/26/2014 9:23	22.1	19.9	8.4	49.6	0	9
March	3/26/14 9:37 AM	16.5	17	8.9	57.6	11	11
April	4/26/14 6:35 AM	24.5	22.5	5.9	47.1	1	<<>>
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**22.2**	**---**	**---**	**---**	**---**	**10.0**
HLGW016B							
January	1/20/14 2:00 PM	57.2	40.3	0.3	2.2	121	119
February	---	---	---	---	---	---	
March	3/27/14 1:22 PM	53.2	37.9	0.8	8.1	126	126
April	4/30/14 9:35 AM	56.3	39.7	0.3	3.7	130	129
May	5/31/14 10:07 AM	52.7	37.7	0.7	8.9	136.0	136.0
June	06/10/2014 9:04 AM	54.5	38.5	0.3	6.7	132	134
July	7/31/14 6:46 AM	52.3	37.9	0.5	9.3	134	133
August	08/29/2014 8:57	55.3	38.6	0.6	5.5	124	124
September	9/30/14 3:12 PM	56.7	39.4	0.1	3.8	122	124
October	10/25/14 10:13 AM	57.3	39.5	0.3	2.9	122	122
November	11/25/2014 12:05	50.8	36.7	1.3	11.2	127	129
December	12/30/2014 14:05	50.2	35.4	1.2	13.2	137	138
Average		**54.2**	**---**	**---**	**---**	**---**	**128.5**
HLGW017A							
January	1/15/14 8:45 AM	49.9	37.4	1	11.7	45	41
February	02/26/2014 9:14	52.4	37.6	1.3	8.7	<<>>	44
March	3/26/14 9:32 AM	45	34.2	1.6	19.2	49	45
April	4/26/14 6:31 AM	29.7	27	3.2	40.1	16	6
May	---	---	---	---	---	---	
June	06/07/2014 10:20 AM	36.7	30.4	2.1	30.8	28	15
July	7/29/14 7:16 AM	22.8	24	4.1	49.1	12	12
August	08/26/2014 6:50	35.3	29.9	3	31.8	41	39
September	9/27/14 11:38 AM	37.5	30.9	2.6	29	44	27
October	10/21/14 8:31 AM	31.6	27.8	3.6	37	28	28
November	---	---	---	---	---	---	
December	12/31/2014 10:21	37.1	28.5	2.9	31.5	<<>>	5
Average		**37.8**	**---**	**---**	**---**	**---**	**26.2**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW017B							
January	1/20/14 1:56 PM	58.5	39.9	0.4	1.2	114	114
February	---	---	---	---	---	---	
March	3/27/14 1:25 PM	59.4	40.5	0	0.1	122	122
April	4/30/14 9:31 AM	58.9	40.5	0	0.6	120	120
May	5/30/14 12:33 PM	58.5	39.8	0.0	1.7	111.0	111.0
June	06/10/2014 8:59 AM	58.7	40	0	1.3	126	128
July	7/31/14 6:53 AM	56.7	39.6	0.1	3.6	125	124
August	08/29/2014 9:05	57.5	39.5	0.2	2.8	118	117
September	9/30/14 3:17 PM	58.7	39.6	0	1.7	115	114
October	10/25/14 10:07 AM	58.3	39.8	0.3	1.6	113	114
November	11/25/2014 11:57	58.8	39.4	0.2	1.6	120	121
December	12/30/2014 8:46	60.4	39.3	0	0.3	132	130
Average		**58.6**	**---**	**---**	**---**	**---**	**119.5**
HLGW0018							
January	1/20/14 10:29 AM	45.4	37.5	1.1	16	47	23
February	02/28/2014 13:04	43.4	44.1	0.5	12	19	29
March	3/27/14 1:09 PM	57.5	42	0	0.5	<<>>	15
April	4/30/14 9:16 AM	51.5	40.7	0.3	7.5	15	13
May	5/30/14 12:23 PM	40.3	35.3	0.9	23.5	18.0	20.0
June	06/07/2014 1:31 PM	35.8	32.9	1.5	29.8	23	25
July	7/31/14 6:39 AM	56	40.7	0.1	3.2	20	33
August	08/29/2014 9:23	54.1	40.3	0	5.6	15	16
September	9/30/14 2:56 PM	56.6	40.1	0	3.3	7	42
October	10/24/14 8:16 AM	44.4	35.5	1.3	18.8	17	18
November	11/25/2014 11:55	47.8	36.7	1	14.5	8	4
December	12/30/2014 8:40	42.5	34.3	1.6	21.6	23	8
Average		**47.9**	**38.3**	**0.7**	**13.0**	**19.3**	**20.5**
HLGW019B							
January	1/20/14 10:37 AM	13.3	18.4	8.4	59.9	6	5
February	02/28/2014 13:20	26.9	36.4	5.8	30.9	12	3
March	3/27/14 1:06 PM	30.9	32.4	2.5	34.2	<<>>	<<>>
April	4/30/14 9:20 AM	14.2	24.2	8.2	53.4	28	7
May	5/30/14 12:20 PM	37.6	37.4	1.8	23.2	<<>>	<<>>
June	06/07/2014 1:33 PM	6.8	9.6	12	71.6	7	7
July	7/31/14 6:34 AM	21.4	23.1	3.4	52.1	5	5
August	08/29/2014 9:19	37.5	33.9	1.4	27.2	28	30
September	9/30/14 2:53 PM	26.8	25.3	3.4	44.5	1	
October	10/24/14 8:14 AM	42.6	35.8	2.6	19	6	6
November	11/25/2014 11:52	44.7	35	1.7	18.6	4	4
December	12/30/2014 8:38	11.7	9.7	8	70.6	<<>>	11
Average		**26.2**	**26.8**	**4.9**	**42.1**	**10.8**	**8.7**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW019C							
January	1/15/14 8:34 AM	45.7	39.1	0.8	14.4	16	11
February	02/26/2014 9:08	45.3	36.5	1.8	16.4	11	10
March	3/26/14 9:29 AM	49	40	0.8	10.2	7	0
April	4/26/14 6:29 AM	52	41.2	0.6	6.2	9	9
May	5/29/14 7:36 AM	44.8	38.5	1.2	15.5	11.0	9.0
June	06/07/2014 10:18 AM	38	34.7	1.9	25.4	11	3
July	7/29/14 7:13 AM	54.7	40.9	0.3	4.1	9	4
August	08/26/2014 6:47	57.6	42.1	0.1	0.2	7	7
September	9/27/14 11:36 AM	53.4	39.8	0.6	6.2	6	16
October	10/21/14 8:16 AM	54.2	39.7	0.8	5.3	18	12
November	---	---	---	---	---	---	
December	12/31/2014 10:19	45.3	33.8	1.5	19.4	0	3
Average		**49.1**	**---**	**---**	**---**	**---**	**7.6**
HLGW020B							
January	1/20/14 10:49 AM	30.8	43.7	0.5	25	18	16
February	02/28/2014 13:25	47	38.1	1.7	13.2	44	36
March	3/27/14 1:04 PM	58.3	41.5	0	0.2	20	33
April	4/30/14 9:22 AM	52.5	40.9	0.3	6.3	11	41
May	5/30/14 12:16 PM	47.2	37.1	0.5	15.2	23.0	
June	06/07/2014 1:35 PM	42.7	34.8	1.5	21	33	25
July	7/31/14 6:32 AM	51	39	0.1	9.9	14	15
August	08/29/2014 9:17	53.7	39	0	7.3	32	25
September	9/30/14 2:51 PM	46.7	35.9	1.2	16.2	27	
October	10/24/14 8:07 AM	52	38.3	1	8.7	117	117
November	11/25/2014 11:45	30.5	28.3	2.4	38.8	13	11
December	---	---	---	---	---	---	
Average		**46.6**	**---**	**---**	**---**	**---**	**35.4**
HLGW021B							
January	1/20/14 10:59 AM	57	41	0	2	43	42
February	02/28/2014 13:30	54.8	41.8	0.6	2.8	65	51
March	3/27/14 1:00 PM	56.1	39.9	0	4	34	40
April	4/30/14 9:24 AM	54	40.3	0.1	5.6	45	45
May	5/30/14 12:11 PM	48.0	38.2	0.1	13.7	43.0	41.0
June	06/07/2014 1:36 PM	41.2	35.8	0.9	22.1	73	60
July	7/31/14 6:30 AM	49.3	38.4	0.3	12	53	54
August	08/29/2014 9:14	53	38.8	0.3	7.9	54	60
September	9/30/14 2:49 PM	48.5	36.5	0.9	14.1	73	71
October	10/24/14 8:00 AM	47.8	35.6	1.8	14.8	76	80
November	11/25/2014 11:42	48	36.1	1	14.9	75	72
December	12/30/2014 8:35	56	38.1	0.2	5.7	59	64
Average		**51.1**	**38.4**	**0.5**	**10.0**	**57.8**	**56.7**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW022B							
January	1/20/14 11:04 AM	53	39	0.7	7.3	22	22
February	02/28/2014 13:34	56.6	40.4	0.3	2.7	20	23
March	3/27/14 12:57 PM	50.5	39.5	0.6	9.4	73	76
April	4/30/14 9:26 AM	53.9	40.4	0.2	5.5	<<>>	38
May	5/30/14 12:09 PM	49.8	38.5	0.5	11.2	38.0	39.0
June	06/07/2014 1:38 PM	49.2	36.6	1.3	12.9	39	35
July	7/31/14 6:29 AM	48.3	36.8	1.5	13.4	39	30
August	08/29/2014 9:10	51	37.6	0.9	10.5	26	29
September	9/30/14 2:47 PM	47.5	35.4	1.7	15.4	31	31
October	10/25/14 10:01 AM	30.2	25.1	5.9	38.8	3	4
November	11/25/2014 11:40	54.5	37.5	0.9	7.1	29	42
December	12/30/2014 8:33	48.4	34.1	2	15.5	63	28
Average		**49.4**	**36.7**	**1.4**	**12.5**	**34.8**	**33.1**
HLGW0023							
January	1/20/14 11:10 AM		40.9	0.1	4.8	24	22
February	02/28/2014 13:38	57.5	42.2	0.1	0.2	26	25
March	3/27/14 12:55 PM	53.1	40	0	6.9	20	24
April	4/30/14 9:28 AM	52.8	40	0	7.2	25	26
May	5/30/14 12:06 PM	53.1	39.6	0.0	7.3	19.0	21.0
June	06/07/2014 1:40 PM	52.9	38.8	0.1	8.2	24	24
July	7/31/14 6:26 AM	53.2	40.5	0.2	6.1	22	30
August	08/29/2014 9:08	54.3	39.9	0	5.8	24	27
September	9/30/14 2:45 PM	54.9	39.9	0	5.2	<<>>	50
October	10/24/14 7:50 AM	50.3	37.4	1	11.3	33	47
November	11/25/2014 11:35	50	35.8	0.7	13.5	2	87
December	---	---	---	---	---	---	
Average		**53.2**	**---**	**---**	**---**	**---**	**34.8**
HLGW030A							
January	1/15/14 12:44 PM	39.5	34.4	5.1	21	4	4
February	---	---	---	---	---	---	
March	3/26/14 9:57 AM	55.4	44.5	0	0.1	6	<<>>
April	4/26/14 6:56 AM	56.5	43.2	0.2	0.1	2	5
May	5/29/14 8:05 AM	42.2	38.3	1.0	18.5	8.0	9.0
June	06/07/2014 10:34 AM	56.7	43.2	0	0.1	11	10
July	7/29/14 7:34 AM	50.3	49.6	0	0.1	12	20
August	08/26/2014 7:11	50.1	49.8	0	0.1	14	17
September	9/27/14 11:53 AM	51.2	48.7	0	0.1	9	12
October	10/21/14 10:16 AM	52.3	47.6	0	0.1	8	10
November	11/25/2014 13:37	55.5	44.1	0.3	0.1	10	20
December	12/30/2014 7:52	43	34.5	2	20.5	21	15
Average		**50.2**	**---**	**---**	**---**	**---**	**12.2**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW030B							
January	1/20/14 9:55 AM	53.3	46.4	0.2	0.1	39	38
February	---	---	---	---	---	---	
March	3/27/14 12:41 PM	56.6	42.5	0.5	0.4	12	17
April	4/30/14 6:58 AM	54.9	43.6	0.2	1.3	16	19
May	5/30/14 11:48 AM	44.0	39.8	1.7	14.5	25.0	14.0
June	06/10/2014 8:40 AM	47.4	52.5	0.0	0.1	18.0	17.0
July	7/30/14 7:59 AM	48.6	51.1	0.1	0.2	16.0	16.0
August	08/27/2014 7:26	47.3	52.6	0.0	0.1	14.0	15.0
September	9/30/14 2:34 PM	49.7	50.2	0.0	0.1	15.0	15.0
October	10/23/14 11:25 AM	50.7	49.0	0.2	0.1	15.0	18.0
November	11/25/2014 12:30	53.4	46.3	0.2	0.1	10.0	16.0
December	12/30/2014 8:21	56.9	42.5	0.5	0.1	20.0	34.0
Average		**51.2**	**---**	**---**	**---**	**---**	**19.9**
HLGW031A							
January	1/15/14 12:49 PM	54.9	44.7	0.2	0.2	9.0	11.0
February	---	---	---	---	---	---	
March	3/26/14 9:59 AM	55.2	44.7	0.0	0.1	5.0	8.0
April	4/26/14 6:58 AM	55.8	44.0	0.1	0.1	10.0	13.0
May	5/29/14 9:16 AM	55.4	44.4	0.1	0.1	12.0	13.0
June	06/07/2014 10:36 AM	51.8	48.1	0.0	0.1	15.0	14.0
July	7/29/14 7:38 AM	49.5	50.4	0.0	0.1	18.0	19.0
August	08/26/2014 7:13	50.4	49.5	0.0	0.1	13.0	15.0
September	9/27/14 11:56 AM	50.4	49.5	0.0	0.1	15.0	16.0
October	10/21/14 10:14 AM	51.0	48.9	0.0	0.1	15.0	21.0
November	11/25/2014 13:39	52.3	47.4	0.1	0.2	17.0	25.0
December	12/30/2014 7:54	48.2	42.1	0.4	9.3	24.0	24.0
Average		**52.3**	**---**	**---**	**---**	**---**	**16.3**
HLGW031B							
January	1/20/14 10:02 AM	45.1	46.7	0.3	7.9	4.0	5.0
February	---	---	---	---	---	---	
March	3/27/14 12:43 PM	48.4	40.1	0.1	11.4	9.0	10.0
April	4/30/14 7:00 AM	35.7	37.6	0.1	26.6	5.0	5.0
May	5/30/14 11:50 AM	36.1	54.7	0.0	9.2	4.0	5.0
June	06/10/2014 8:43 AM	34.3	65.6	0.0	0.1	<<>>	<<>>
July	7/30/14 8:01 AM	24.8	75.0	0.0	0.2	6.0	5.0
August	08/27/2014 7:28	34.0	65.9	0.0	0.1	1.0	3.0
September	9/30/14 2:35 PM	34.3	65.6	0.0	0.1	5.0	5.0
October	10/23/14 11:27 AM	35.9	64.0	0.0	0.1	8.0	8.0
November	11/25/2014 12:33	49.6	49.9	0.4	0.1	0.0	2.0
December	12/30/2014 8:23	39.3	37.9	0.2	22.6	<<>>	<<>>
Average		**38.0**	**---**	**---**	**---**	**---**	**5.3**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW032A							
January	1/15/14 1:20 PM	51.4	48.4	0.1	0.1	4.0	9.0
February	---	---	---	---	---	---	
March	3/26/14 10:03 AM	52.7	47.2	0.0	0.1	3.0	6.0
April	4/26/14 7:01 AM	48.0	51.9	0.0	0.1	6.0	6.0
May	5/29/14 9:18 AM	44.7	55.2	0.0	0.1	6.0	4.0
June	06/07/2014 10:38 AM	44.4	55.5	0.0	0.1	10.0	10.0
July	7/29/14 7:43 AM	45.0	54.9	0.0	0.1	9.0	9.0
August	08/26/2014 7:15	46.4	53.5	0.0	0.1	9.0	8.0
September	9/27/14 11:58 AM	48.8	51.1	0.0	0.1	9.0	10.0
October	10/21/14 10:12 AM	49.8	50.1	0.0	0.1	8.0	9.0
November	11/25/2014 13:42	50.9	49.0	0.0	0.1	6.0	11.0
December	12/30/2014 7:57	54.9	44.8	0.1	0.2	10.0	15.0
Average		**48.8**	**---**	**---**	**---**	**---**	**8.8**
HLGW032B							
January	1/20/14 10:09 AM	44.6	52.7	0.1	2.6	3.0	3.0
February	---	---	---	---	---	---	
March	3/27/14 12:46 PM	51.8	48.1	0.0	0.1	10.0	10.0
April	4/30/14 7:03 AM	45.5	47.7	0.1	6.7	7.0	7.0
May	5/30/14 11:54 AM	36.9	63.0	0.0	0.1	4.0	4.0
June	06/10/2014 8:44 AM	30.7	69.2	0.0	0.1	3.0	2.0
July	7/30/14 8:04 AM	43.6	56.3	0.0	0.1	<<>>	<<>>
August	08/27/2014 7:30	45.9	54.0	0.0	0.1	3.0	1.0
September	9/30/14 2:37 PM	48.6	51.3	0.0	0.1	7.0	7.0
October	10/23/14 11:30 AM	50.6	49.3	0.0	0.1	9.0	10.0
November	11/25/2014 12:35	51.8	48.1	0.0	0.1	3.0	5.0
December	12/30/2014 8:25	51.2	48.5	0.1	0.2	17.0	25.0
Average		**45.6**	**---**	**---**	**---**	**---**	**7.4**
HLGW033A							
January	1/15/14 1:25 PM	51.2	48.6	0.0	0.2	5.0	9.0
February	---	---	---	---	---	---	
March	3/26/14 10:05 AM	50.4	49.5	0.0	0.1	3.0	3.0
April	4/26/14 7:03 AM	50.1	49.7	0.0	0.2	7.0	8.0
May	5/29/14 9:20 AM	48.6	51.3	0.0	0.1	9.0	9.0
June	06/07/2014 10:40 AM	48.7	51.2	0.0	0.1	11.0	11.0
July	7/29/14 7:46 AM	51.4	48.5	0.0	0.1	10.0	11.0
August	08/26/2014 7:18	49.4	50.5	0.0	0.1	11.0	11.0
September	9/27/14 12:01 PM	50.4	49.5	0.0	0.1	13.0	13.0
October	10/21/14 10:09 AM	50.1	49.8	0.0	0.1	11.0	12.0
November	11/25/2014 13:44	51.2	48.7	0.0	0.1	12.0	14.0
December	12/30/2014 7:59	53.3	46.6	0.0	0.1	15.0	22.0
Average		**50.4**	**---**	**---**	**---**	**---**	**11.2**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
HLGW033B							
January	1/20/14 10:15 AM	43.4	50.3	0.1	6.2	6.0	4.0
February	---	---	---	---	---	---	
March	3/27/14 12:48 PM	48.2	44.7	0.0	7.1	13.0	13.0
April	4/30/14 7:06 AM	45.7	54.1	0.0	0.2	8.0	8.0
May	5/30/14 11:55 AM	38.2	61.7	0.0	0.1	5.0	5.0
June	06/10/2014 8:46 AM	35.4	64.5	0.0	0.1	<<>>	0.0
July	7/30/14 8:06 AM	42.0	57.9	0.0	0.1	1.0	3.0
August	08/27/2014 7:32	42.2	57.7	0.0	0.1	4.0	3.0
September	9/30/14 2:39 PM	44.3	55.6	0.0	0.1	8.0	8.0
October	10/23/14 11:32 AM	46.6	53.0	0.3	0.1	10.0	10.0
November	11/25/2014 12:38	54.9	44.8	0.1	0.2	4.0	3.0
December	12/30/2014 8:27	53.9	46.0	0.0	0.1	29.0	36.0
Average		**45.0**	**---**	**---**	**---**	**---**	**8.5**
HLGW034A							
January	1/15/14 1:29 PM	52.8	47.1	0.0	0.1	6.0	9.0
February	---	---	---	---	---	---	
March	3/26/14 10:09 AM	35.8	64.1	0.0	0.1	1.0	<<>>
April	4/26/14 7:06 AM	47.8	52.1	0.0	0.1	<<>>	1.0
May	5/29/14 9:24 AM	56.1	43.8	0.0	0.1	9.0	9.0
June	06/07/2014 10:44 AM	56.2	43.7	0.0	0.1	11.0	11.0
July	7/29/14 7:49 AM	55.6	44.3	0.0	0.1	9.0	11.0
August	08/26/2014 7:20	53.7	46.2	0.0	0.1	11.0	12.0
September	9/27/14 12:03 PM	53.7	46.2	0.0	0.1	11.0	16.0
October	10/21/14 10:07 AM	51.9	48.0	0.0	0.1	13.0	17.0
November	11/25/2014 13:46	53.8	46.0	0.1	0.1	20.0	24.0
December	12/30/2014 8:01	54.5	41.7	0.0	3.8	24.0	26.0
Average		**52.0**	**---**	**---**	**---**	**---**	**13.6**
HLGW034B							
January	1/20/14 10:19 AM	44.3	55.6	0.0	0.1	4.0	3.0
February	---	---	---	---	---	---	
March	3/27/14 12:50 PM	39.4	60.5	0.0	0.1	<<>>	<<>>
April	4/30/14 7:09 AM	49.0	50.8	0.0	0.2	<<>>	<<>>
May	5/30/14 11:57 AM	44.9	55.0	0.0	0.1	2.0	1.0
June	06/10/2014 8:48 AM	41.1	58.8	0.0	0.1	1.0	2.0
July	7/30/14 8:08 AM	47.6	52.3	0.0	0.1	2.0	1.0
August	08/27/2014 7:34	49.5	50.4	0.0	0.1	3.0	2.0
September	9/30/14 2:40 PM	53.2	46.7	0.0	0.1	9.0	10.0
October	---	---	---	---	---	---	
November	11/25/2014 12:40	56.6	42.2	0.2	1.0	3.0	8.0
December	12/30/2014 8:29	43.8	35.4	0.0	20.8	29.0	27.0
Average		**46.9**	**---**	**---**	**---**	**---**	**6.8**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
LHGW002A							
January	1/17/14 1:37 PM	39.1	33.3	0	27.6	2	2
February	02/28/2014 9:50	39.2	32.5	0	28.3	1	2
March	3/27/14 10:36 AM	47.7	33.4	0	18.9	3	3
April	4/30/14 8:42 AM	27.9	29	0	43.1	3	2
May	5/30/14 9:03 AM	44.0	33.3	0.0	22.7	2.0	2.0
June	---	---	---	---	---	---	
July	7/31/14 8:58 AM	43.9	33.4	0	22.7	<<>>	<<>>
August	---	---	---	---	---	---	
September	9/30/14 2:27 PM	35.2	31.6	0	33.2	1	1
October	10/23/14 10:18 AM	31.5	30	0	38.5	1	0
November	11/26/2014 11:54	35.2	29.8	0	35	2	1
December	---	---	---	---	---	---	
Average		**38.2**	**---**	**---**	**---**	**---**	**1.625**
LHGW0003							
January	1/17/14 1:27 PM	31.6	29.4	0	39	<<>>	<<>>
February	02/28/2014 9:31	31.9	29.4	0	38.7	5	5.0
March	3/27/14 10:30 AM	40.6	30.9	0	28.5	6	5.0
April	4/30/14 8:38 AM	31.4	29.7	0	38.9	9	4.0
May	5/30/14 8:58 AM	46.5	33.9	0.0	19.6	4.0	4.0
June	---	---	---	---	---	---	
July	7/31/14 8:54 AM	48.5	34.2	0	17.3	3	3
August	---	---	---	---	---	---	
September	9/30/14 2:23 PM	33.8	30.4	0	35.8	2	3
October	10/23/14 10:15 AM	25.1	27.3	0	47.6	4	3
November	---	---	---	---	---	---	
December	12/31/2014 9:06	35.7	29.5	0	34.8	<<>>	<<>>
Average		**36.1**	**---**	**---**	**---**	**---**	**3.9**
LHGW0004							
January	1/17/14 1:41 PM	22.4	26.3	0	51.3	1	1
February	02/28/2014 9:55	53.4	36.9	0	9.7	1	4
March	3/27/14 10:38 AM	60.6	39.3	0	0.1	3	3
April	4/30/14 8:44 AM	23.5	26.5	0	50	1	1
May	5/30/14 9:05 AM	40.9	32.4	0.0	26.7	1.0	1.0
June	---	---	---	---	---	---	
July	7/31/14 8:59 AM	43.3	33	0	23.7	2	0
August	---	---	---	---	---	---	
September	9/30/14 2:28 PM	34.9	31	0	34.1	2	2
October	10/23/14 10:20 AM	33.2	30.4	0	36.4	<<>>	0
November	11/26/2014 11:56	35.1	30.3	0	34.6	6	5
December	12/31/2014 9:13	61.4	38.4	0	0.2	<<>>	5
Average		**40.9**	**---**	**---**	**---**	**---**	**2.2**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
LHGW0006							
January	1/21/14 1:07 PM	20	30.7	2.1	47.2	<<>>	<<>>
February	---	---	---	---	---	---	
March	3/29/14 11:41 AM	17.7	29.7	3.7	48.9	<<>>	
April	Decommissioned May 2014						
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**18.9**	**---**	**---**	**---**	**---**	
LHGW0007							
January	1/21/14 12:57 PM	21.6	24.5	3.8	50.1	1	2
February	---	---	---	---	---	---	---
March	3/29/14 11:34 AM	39.2	29.8	3.1	27.9	<<>>	<<>>
April	---	---	---	---	---	---	---
May	---	---	---	---	---	---	---
June	---	---	---	---	---	---	---
July	7/31/14 7:33 AM	45.7	33.9	0.4	20	<<>>	<<>>
August	---	---	---	---	---	---	---
September	9/30/14 3:31 PM	39.3	33.6	0	27.1	0	0
October	---	---	---	---	---	---	---
November	---	---	---	---	---	---	---
December	12/31/2014 9:34	32	28.3	0.1	39.6	79	<<>>
Average		**35.6**	**---**	**---**	**---**	**---**	
LHGW0008							
January	1/21/14 12:51 PM	11.9	16.8	8.1	63.2	4	4
February	---	---	---	---	---	---	
March	3/29/14 11:27 AM	48.9	33.1	0.7	17.3	12	12
April	4/30/14 11:59 AM	58.6	37.5	0.1	3.8	3	
May	5/31/14 11:39 AM	61.0	38.6	0.1	0.3	0.0	2.0
June	06/10/2014 1:40 PM	21.3	24.1	1.7	52.9	<<>>	<<>>
July	7/31/14 7:31 AM	46.9	37.7	0	15.4	33	36
August	08/29/2014 13:33	53.6	37.7	0.1	8.6	39	34
September	9/30/14 3:29 PM	26.7	27.2	0.8	45.3	<<>>	1
October	10/28/14 7:25 AM	34.6	26.7	0.7	38	3	4
November	11/25/2014 13:11	56.6	35.4	0.1	7.9	5	9
December	12/31/2014 9:33	52.2	33.3	0.1	14.4	<<>>	12
Average		**42.9**	**---**	**---**	**---**	**---**	**12.7**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
LHGW0009							
January	1/21/14 1:00 PM	24.9	25.6	3.8	45.7	<<>>	<<>>
February	---	---	---	---	---	---	
March	3/29/14 11:37 AM	16.6	19.3	5.7	58.4	<<>>	
April	Decommissioned May 2014						
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**20.8**	**---**	**---**	**---**	**---**	
LHGW0010							
January	1/21/14 12:54 PM	2.5	9.4	12.9	75.2	<<>>	
February	---	---	---	---	---	---	
March	3/29/14 11:30 AM	25.9	27	0.3	46.8	<<>>	<<>>
April	Decommissioned May 2014						
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**14.2**	**---**	**---**	**---**	**---**	
LHGW0013							
January	1/20/14 2:32 PM	48.1	34.9	3.3	13.7	2	
February	---	---	---	---	---	---	
March	3/29/14 11:20 AM	57	38.9	0.9	3.2	23	36
April	4/30/14 11:50 AM	45.1	32.4	4	18.5	18	17
May	5/31/14 11:02 AM	36.7	26.8	6.1	30.4	<<>>	45.0
June	06/10/2014 1:33 PM	59.3	40.5	0.1	0.1	<<>>	40
July	---	---	---	---	---	---	
August	08/29/2014 13:27	58.9	40.8	0.1	0.2	32	31
September	9/30/14 3:23 PM	51.7	36.2	2.1	10	12	12
October	10/28/14 7:17 AM	59.4	40.5	0	0.1	<<>>	0
November	---	---	---	---	---	---	
December	12/31/2014 9:27	58.4	41.5	0	0.1	10	10
Average		**52.7**	**---**	**---**	**---**	**---**	**23.9**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
LHGW0017							
January	1/20/14 1:52 PM	26	26.3	2.9	44.8	10	13
February	02/28/2014 13:50	28.1	27.1	2.6	42.2	13	13
March	3/27/14 1:29 PM	21.3	22.2	4.8	51.7	<<>>	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	06/10/2014 8:56 AM	54.6	38.7	0	6.7	14	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**32.5**	**---**	**---**	**---**	**---**	
LHGW0019							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	5/30/14 12:36 PM	59.4	40.5	0	0.1	4	12
June	06/10/2014 9:00 AM	53.9	38.6	0	7.5	17	13
July	7/31/14 6:50 AM	56.8	39.8	0	3.4	<<>>	14
August	08/29/2014 9:03	56.7	39.7	0	3.6	19	24
September	9/30/14 3:15 PM	52.6	38	0	9.4	15	19
October	10/25/14 10:09 AM	47.8	36.4	0.6	15.2	88	91
November	11/25/2014 12:00	42.6	33.9	1.7	21.8	18	18
December	12/30/2014 14:09	51.9	36.5	0.2	11.4	<<>>	25
Average		**52.7**	**---**	**---**	**---**	**---**	**27.0**
LHGW0020							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	5/31/14 10:05 AM	50.8	37.2	0.2	11.8	32	33
June	06/10/2014 9:02 AM	52.4	38.2	0	9.4	16	17
July	7/31/14 6:48 AM	49.3	37.3	0	13.4	11	13
August	08/29/2014 8:59	49.7	37.1	0	13.2	15	15
September	9/30/14 3:13 PM	48.7	36.8	0	14.5	36	35
October	10/25/14 10:11 AM	56.1	37.8	0	6.1	26	58
November	11/25/2014 12:03	41.2	33.8	0.2	24.8	<<>>	46
December	12/30/2014 14:07	58.9	37	0.1	4	35	91
Average		**50.9**	**---**	**---**	**---**	**---**	**38.5**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
LHGW0021							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	5/31/14 10:09 AM	49.2	36.6	0	14.2	43	42
June	06/10/2014 9:09 AM	51.5	37.5	0	11	40	44
July	7/31/14 6:44 AM	42.5	35.3	0	22.2	33	24
August	08/29/2014 9:29	53	37.6	0	9.4	37	40
September	9/30/14 3:01 PM	57.3	39	0	3.7	34	30
October	10/25/14 10:17 AM	50.4	36.2	0	13.4	31	35
November	11/25/2014 12:09	34	30.9	0	35.1	<<>>	15
December	12/30/2014 14:03	47.5	34.9	0.1	17.5	240	146
Average		**48.2**	**---**	**---**	**---**	**---**	**47.0**
LHGW0022							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	5/31/14 10:13 AM	59	39.6	0	1.4	20	27
June	06/10/2014 9:12 AM	59.4	38.7	0	1.9	38	38
July	7/31/14 7:07 AM	57.6	39.5	0.1	2.8	68	74
August	08/29/2014 9:31	59.2	39.2	0	1.6	30	35
September	9/30/14 3:03 PM	59.2	39.6	0	1.2	42	55
October	10/25/14 10:19 AM	57.6	39.2	0	3.2	85	99
November	11/25/2014 12:13	49.5	36.4	0	14.1	72	68
December	12/30/2014 8:52	45.7	34.5	0.3	19.5	72	71
Average		**55.9**	**---**	**---**	**---**	**---**	**58.4**
LHGW0023							
January	1/20/14 2:08 PM	44.5	34.2	2.3	19	32	29
February	---	---	---	---	---	---	
March	3/27/14 1:35 PM	59.1	40.7	0.1	0.1	15	23
April	4/30/14 9:40 AM	46.8	35.6	1.1	16.5	26	19
May	5/31/14 10:15 AM	49.9	36.4	0.4	13.3	32.0	32.0
June	06/10/2014 9:14 AM	48.2	36.1	0.3	15.4	35	37
July	7/31/14 7:10 AM	47.7	36.2	0.5	15.6	27	27
August	08/29/2014 9:34	52.6	37.6	0.1	9.7	16	18
September	9/30/14 3:05 PM	50.9	37.2	0.2	11.7	30	42
October	10/25/14 10:23 AM	49.8	36.4	0	13.8	39	39
November	11/25/2014 12:16	41	33.2	0.2	25.6	67	67
December	12/30/2014 14:00	49.2	35	1.2	14.6	42	42
Average		**49.1**	**---**	**---**	**---**	**---**	**34.1**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
TLGW001A							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	
TLGW001B							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	
TLGW002A							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
TLGW002B							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	
TLGW002C							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	
VLGW001D							
January	1/15/14 2:49 PM	40.4	17.1	0.6	41.9	5	<<>>
February	02/26/2014 11:02	44.6	17.2	0.7	37.5	5	<<>>
March	3/26/14 10:51 AM	44.7	16.6	1	37.7	7	26
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	7/29/14 8:09 AM	52.8	15.2	0.5	31.5	13	21
August	08/26/2014 8:02	48.2	15.4	0.4	36	<<>>	27
September	9/27/14 12:10 PM	39.5	12.8	3.9	43.8	22	8
October	10/21/14 9:43 AM	60.3	15	0.2	24.5	2	11
November	---	---	---	---	---	---	
December	12/31/2014 10:00	47.4	15.5	0.8	36.3	10	10
Average		**47.2**	**---**	**---**	**---**	**---**	**17.2**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW001S							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	3/26/14 10:49 AM	8.6	18.6	1.3	71.5	<<>>	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**8.6**	**---**	**---**	**---**	**---**	
VLGW002D							
January	1/15/14 2:44 PM	4.3	3	18.1	74.6	<<>>	
February	02/26/2014 10:56	14.6	5.7	15.3	64.4	0	
March	3/26/14 10:56 AM	45.2	12.4	2	40.4	6	
April	---	---	---	---	---	---	
May	5/29/14 9:58 AM	31.4	20.5	0.3	47.8	3.0	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**23.9**	**---**	**---**	**---**	**---**	
VLGW002S							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	3/26/14 10:54 AM	23.2	19.2	2.2	55.4	3	
April	---	---	---	---	---	---	
May	5/29/14 9:56 AM	27.7	21.8	1.1	49.4	<<>>	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**25.5**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW003D							
January	1/15/14 2:39 PM	25.7	17.3	0	57	6	4
February	02/26/2014 10:50	23.1	15.4	0.3	61.2	3	4
March	3/26/14 11:01 AM	18.3	15.2	0	66.5	5	6
April	4/26/14 7:57 AM	39.2	11.4	0.2	49.2	0	<<>>
May	5/29/14 10:02 AM	79.5	8.7	0.0	11.8	<<>>	1
June	06/07/2014 10:30 AM	33.7	12.6	0	53.7	11	10
July	7/29/14 8:28 AM	82.9	12.9	0.1	4.1	7	8
August	08/26/2014 6:59	83.9	16	0	0.1	8	9
September	9/27/14 12:13 PM	75.6	19	0	5.4	8	10
October	10/21/14 8:47 AM	65.7	18.9	0	15.4	33	8
November	11/26/2014 11:24	49.6	20.4	0.1	29.9	8	13
December	12/31/2014 10:14	22.9	15.8	0	61.3	13	9
Average		**50.0**	**15.3**	**0.1**	**34.6**	**9.3**	**7.5**
VLGW003S							
January	1/15/14 2:36 PM	60.8	23.3	1.2	14.7	2	<<>>
February	02/26/2014 10:46	40.7	23.5	0.4	35.4	<<>>	<<>>
March	3/26/14 10:59 AM	35.2	21.8	0.1	42.9	5	5
April	4/26/14 7:55 AM	49.5	22	0.1	28.4	<<>>	2
May	5/29/14 10:01 AM	49.6	22.1	0.0	28.3	<<>>	2.0
June	06/07/2014 10:29 AM	49	21.3	0.2	29.5	12	11
July	7/29/14 8:26 AM	44.8	21.2	0	34	4	6
August	08/26/2014 6:57	51.1	22	0	26.9	7	7
September	9/27/14 12:15 PM	54.4	21.8	0.1	23.7	7	8
October	10/21/14 8:43 AM	40.4	21.6	0.2	37.8	5	10
November	11/26/2014 11:22	29	20.9	0.3	49.8	8	6
December	12/31/2014 10:13	52.9	22.4	0.1	24.6	36	36
Average		**46.5**	**22.0**	**0.2**	**31.3**	**9.6**	**9.3**
VLGW004D							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW004S							
January	1/15/14 2:21 PM	19.1	11.5	11	58.4	<<>>	0
February	02/26/2014 10:37	41.7	23.7	0.4	34.2	2	5
March	3/26/14 10:26 AM	28.2	23.6	0	48.2	5	<<>>
April	4/26/14 7:33 AM	38	21	2.2	38.8	2	2
May	5/29/14 9:48 AM	73.1	16.3	0.4	10.2	7.0	9
June	06/07/2014 10:58 AM	46.6	22.3	0.3	30.8	10	10
July	7/29/14 8:06 AM	41.6	22.7	0.5	35.2	9	8
August	08/26/2014 7:32	40.3	22.9	0.7	36.1	8	8
September	9/30/14 8:25 AM	42.7	26	0.1	31.2	1	2
October	10/21/14 9:45 AM	45	23.6	0.2	31.2	6	5
November	11/29/2014 12:11	36.2	24.2	0.1	39.5	9	9
December	12/31/2014 9:54	47.8	23.9	0.2	28.1	10	10
Average		**41.7**	**21.8**	**1.3**	**35.2**	**6.3**	**6.2**
VLGW005D							
January	1/16/14 2:03 PM	3.8	2.9	19.2	74.1	1	<<>>
February	02/26/2014 14:30	3.2	2.1	19.7	75	6	
March	3/26/14 10:41 AM	8	5.5	17.6	68.9	7	
April	4/26/14 7:25 AM	24.9	18.7	7.1	49.3	1	
May	5/29/14 9:40 AM	33.3	18.6	4.6	43.5	<<>>	<<>>
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**14.6**	**---**	**---**	**---**	**---**	
VLGW005S							
January	1/16/14 2:01 PM	33	22.5	0.2	44.3	2	2
February	02/26/2014 14:28	36	23	0.2	40.8	4	4
March	3/26/14 10:39 AM	33.7	23.6	0	42.7	3	4
April	4/26/14 7:23 AM	44.9	23.8	0.1	31.2	5	6
May	5/29/14 9:39 AM	61.3	21.5	0.0	17.2	<<>>	0
June	---	---	---	---	---	---	
July	7/29/14 7:56 AM	39.4	25.2	0.2	35.2	7	9
August	08/26/2014 7:54	45.7	26.8	0.2	27.3	8	7
September	9/30/14 8:35 AM	54.6	28.1	0.2	17.1	<<>>	3
October	10/21/14 9:56 AM	54.2	29.1	0	16.7	10	10
November	11/29/2014 12:15	47.9	28.4	0.2	23.5	9	8
December	12/31/2014 14:56	39.2	25.9	0	34.9	<<>>	0
Average		**44.5**	**---**	**---**	**---**	**---**	**4.8**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW006D							
January	1/16/14 2:34 PM	25.4	19.8	0.4	54.4	2	3
February	02/26/2014 14:52	25.3	19.5	0	55.2	2	2
March	3/26/14 12:20 PM	26.2	18.8	0.1	54.9	2	4
April	4/26/14 11:02 AM	49.9	20.7	0.1	29.3	<<>>	20
May	5/29/14 12:27 PM	55.2	20.4	0.0	24.4	4.0	3.0
June	06/07/2014 11:09 AM	43.1	18.4	0	38.5	8	8
July	7/30/14 7:45 AM	33.2	18.8	0	48	<<>>	2
August	08/26/2014 7:51	29.4	19.1	0	51.5	7	4
September	9/30/14 8:10 AM	76.8	23	0	0.2	8	7
October	10/22/14 8:11 AM	40.8	19.8	0.1	39.3	3	4
November	11/29/2014 12:19	26.5	18.8	0	54.7	7	5
December	12/31/2014 14:01	77.8	21.9	0.1	0.2	9	9
Average		**42.5**	**19.9**	**0.1**	**37.6**	**5.2**	**5.9**
VLGW006S							
January	1/16/14 2:25 PM	21.5	20	0.5	58	<<>>	2
February	02/26/2014 14:50	22.4	18.9	1.1	57.6	<<>>	1
March	3/26/14 12:18 PM	23.1	18.8	0.7	57.4	2	3
April	4/26/14 11:00 AM	40.6	20.2	0.3	38.9	17	16
May	5/29/14 12:26 PM	55.0	21.2	0.1	23.7	3.0	3.0
June	06/07/2014 11:08 AM	37.8	19.2	0.2	42.8	7	7
July	7/30/14 7:43 AM	30.2	18.9	0.2	50.7	4	4
August	08/26/2014 7:49	31.1	19.2	0.4	49.3	6	7
September	9/30/14 8:07 AM	52.8	18.3	1.2	27.7	4	3
October	10/22/14 8:10 AM	37.1	19.4	0.4	43.1	<<>>	1
November	11/29/2014 12:18	20.8	19	0.8	59.4	7	7
December	12/31/2014 13:59	69.7	20.1	0.4	9.8	7	8
Average		**36.8**	**19.4**	**0.5**	**43.2**	**6.3**	**5.2**
VLGW007D							
January	1/16/14 2:56 PM	33.1	21.8	0.3	44.8	<<>>	12
February	02/27/2014 9:05	47.2	23	0.3	29.5	7	5
March	3/26/14 12:38 PM	22.1	13	10.3	54.6	<<>>	16
April	4/26/14 11:38 AM	70	29.9	0	0.1	6	6
May	5/29/14 12:21 PM	69.8	25.7	0.2	4.3	5.0	5.0
June	06/07/2014 11:15 AM	65.8	24.7	0.4	9.1	7	7
July	7/30/14 6:59 AM	64.3	24.6	0.5	10.6	8	9
August	08/27/2014 6:56	64.3	25	0.2	10.5	7	7
September	9/30/14 8:46 AM	67.9	25.3	0.2	6.6	<<>>	6
October	10/21/14 12:31 PM	67.5	24.5	0.3	7.7	11	9
November	11/29/2014 11:27	50.3	22.2	0.6	26.9	11	9
December	12/31/2014 14:13	57.1	21.6	0.4	20.9	<<>>	1
Average		**56.6**	**23.4**	**1.1**	**18.8**	**7.8**	**7.7**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW007S							
January	1/16/14 2:53 PM	24.8	22.1	0.4	52.7	6	5
February	02/27/2014 9:01	29.6	23	0.1	47.3	5	7
March	3/26/14 12:36 PM	30.6	23	0	46.4	5	6
April	4/26/14 11:36 AM	51.8	24.8	0	23.4	5	6
May	5/29/14 12:19 PM	51.3	22.5	0.1	26.1	23.0	6.0
June	06/07/2014 11:14 AM	44.4	22	0	33.6	10	10
July	7/30/14 6:58 AM	41.4	22.7	0.3	35.6	7	6
August	08/27/2014 6:55	38.3	23.3	0.2	38.2	25	25
September	9/30/14 8:44 AM	48.2	24.3	0	27.5	24	10
October	10/21/14 12:29 PM	38.4	23.2	0.5	37.9	11	8
November	11/29/2014 11:25	22.8	21	2.2	54	8	5
December	12/31/2014 14:12	52.8	24	0.2	23	7	7
Average		**39.5**	**23.0**	**0.3**	**37.1**	**11.3**	**8.4**
VLGW008D							
January	1/17/14 8:37 AM	15.4	20.5	0.2	63.9	3	4
February	02/27/2014 9:22	0.2	0.1	20.7	79	<<>>	<<>>
March	3/26/14 12:46 PM	3.2	6.9	14.2	75.7	<<>>	<<>>
April	4/26/14 11:46 AM	2.7	11.5	8.2	77.6	<<>>	<<>>
May	5/29/14 12:13 PM	4.5	15.3	4.4	75.8	3.0	4.0
June	---	---	---	---	---	---	
July	7/30/14 7:06 AM	75.9	24	0	0.1	8	6
August	08/27/2014 7:09	60.9	21.1	0	18	<<>>	3
September	9/30/14 9:24 AM	56.9	20.5	0.2	22.4	6	6
October	10/21/14 12:38 PM	57.7	21	0	21.3	7	21
November	11/29/2014 11:40	29.1	20.5	0.1	50.3	9	8
December	12/31/2014 14:20	66.4	25.3	1.3	7	<<>>	5
Average		**33.9**	**---**	**---**	**---**	**---**	**7.1**
VLGW008S							
January	1/17/14 8:35 AM	35.2	23.5	0.3	41	2	1
February	02/27/2014 9:16	38	23.7	0.2	38.1	4	4
March	3/26/14 12:44 PM	47.5	24.6	0	27.9	2	6
April	4/26/14 11:44 AM	52.1	23.9	0	24	2	3
May	5/29/14 12:11 PM	49.6	22.9	0.2	27.3	<<>>	1.0
June	06/07/2014 11:19 AM	47.5	22.3	0	30.2	7	9
July	7/30/14 7:05 AM	47.1	21.9	0	31	9	9
August	08/27/2014 7:07	44.6	22.3	0	33.1	<<>>	5
September	9/30/14 9:14 AM	44.2	22.4	0	33.4	7	5
October	10/21/14 12:36 PM	40.9	22.2	0	36.9	8	8
November	11/29/2014 11:39	34.7	22	0.1	43.2	12	11
December	12/31/2014 14:18	65.3	24.5	0	10.2	<<>>	26
Average		**45.6**	**23.0**	**0.1**	**31.4**	**5.9**	**7.3**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW009D							
January	1/16/14 1:56 PM	16.6	20	0.1	63.3	2	
February	02/26/2014 13:09	17.8	20.1	0.4	61.7	1	1
March	3/26/14 10:45 AM	19.8	19.7	0.1	60.4	<<>>	2
April	4/26/14 7:30 AM	86.6	13.3	0	0.1	4	5
May	5/29/14 9:45 AM	65.1	21.5	0.2	13.2	6.0	6.0
June	06/07/2014 10:56 AM	32.9	19.5	0.8	46.8	9	8
July	7/29/14 8:04 AM	53.3	23.9	0	22.8	8	8
August	08/26/2014 7:59	10	18.6	0.6	70.8	2	5
September	9/30/14 8:32 AM	80.7	12.8	6.3	0.2	7	5
October	10/21/14 9:50 AM	20.6	20.7	0	58.7	5	5
November	11/26/2014 11:29	23.1	20.3	0.1	56.5	7	7
December	12/31/2014 9:57	87	12.6	0.2	0.2	12	14
Average		**42.8**	**18.6**	**0.7**	**37.9**	**5.7**	**6.0**
VLGW009S							
January	1/16/14 1:54 PM	29.3	15.6	4.4	50.7	3	4
February	02/26/2014 12:50	22.2	11.1	8.8	57.9	5	2
March	3/26/14 10:44 AM	47.7	17.4	6.4	28.5	<<>>	10
April	4/26/14 7:28 AM	47.7	16.9	3.8	31.6	6	17
May	5/29/14 9:43 AM	60.4	17.4	2.3	19.9	4.0	7.0
June	06/07/2014 10:54 AM	45.6	14.1	6	34.3	9	8
July	7/29/14 8:00 AM	76.3	23.5	0	0.2	10	7
August	08/26/2014 7:58	29.7	12.7	6.4	51.2	<<>>	<<>>
September	---	---	---	---	---	---	
October	10/21/14 9:49 AM	52.6	17	3.2	27.2	8	16
November	11/26/2014 11:28	42.8	16.8	4.8	35.6	2	17
December	12/31/2014 9:56	34.9	14.3	5.6	45.2	17	10
Average		**44.5**	**---**	**---**	**---**	**---**	**9.8**
VLGW010S							
January	1/16/14 2:08 PM	0.9	2	18.6	78.5	<<>>	<<>>
February	02/26/2014 14:38	20.5	21.6	0.6	57.3	2	2
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**10.7**	**---**	**---**	**---**	**---**	**2.0**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW011S							
January	1/16/14 2:20 PM	10.3	19.3	2.1	68.3	4	4
February	02/26/2014 14:46	6.3	17.7	1.6	74.4	2	4
March	3/26/14 12:15 PM	8.9	16.4	1.3	73.4	2	1
April	4/26/14 10:55 AM	33.3	17.8	0.3	48.6	3	5
May	5/29/14 12:24 PM	47.4	22.0	0.0	30.6	5.0	6.0
June	06/07/2014 11:11 AM	40.1	21	0	38.9	8	8
July	7/30/14 6:55 AM	50.5	26.9	0.2	22.4	<<>>	4
August	08/27/2014 6:59	45.6	27.6	0	26.8	4	7
September	9/30/14 8:04 AM	58.2	32.1	0.2	9.5	20	27
October	10/21/14 12:04 PM	46.4	28.9	2.3	22.4	22	37
November	11/29/2014 12:22	12.9	20.2	0.6	66.3	9	2
December	12/31/2014 14:53	26.8	20.5	0	52.7	<<>>	<<>>
Average		**32.2**	**22.5**	**0.7**	**44.5**	**7.9**	**9.5**
VLGW012S							
January	1/17/14 8:30 AM	8.6	19.2	0.4	71.8	7	
February	02/27/2014 9:11	8.4	19	0.4	72.2	3	2
March	3/26/14 12:41 PM	42.7	20.7	0.1	36.5	<<>>	1
April	4/26/14 11:42 AM	39.6	19.7	0.2	40.5	16	12
May	5/29/14 12:16 PM	46.5	19.9	0.2	33.4	<<>>	3.0
June	06/07/2014 11:17 AM	42.4	18.9	0.2	38.5	6	6
July	7/30/14 7:01 AM	53.7	22.9	0.2	23.2	7	8
August	08/27/2014 7:04	48.8	24.4	0	26.8	6	24
September	9/30/14 8:48 AM	38	24.1	0.1	37.8	28	28
October	10/21/14 12:33 PM	51.7	25.6	0	22.7	6	8
November	11/29/2014 11:29	17	20.6	0.3	62.1	4	2
December	12/31/2014 14:15	43.3	19.8	0.2	36.7	45	45
Average		**36.7**	**21.2**	**0.2**	**41.9**	**12.8**	**12.6**
VLGW013D							
January	1/17/14 9:11 AM	10.6	20.7	0	68.7	3	5
February	02/27/2014 10:06	8.7	19.6	0.1	71.6	2	5
March	3/26/14 1:22 PM	20.8	18.2	0	61	<<>>	0
April	4/26/14 11:51 AM	37.2	19	0	43.8	<<>>	0
May	5/30/14 6:24 AM	46.1	19.3	0.9	33.7	4.0	4.0
June	06/07/2014 11:26 AM	43.7	16.8	1.2	38.3	8	8
July	7/30/14 7:16 AM	51.1	17.8	0.6	30.5	5	5
August	08/27/2014 6:28	46.3	20.1	0.5	33.1	9	10
September	9/30/14 11:41 AM	46.5	20.9	0.1	32.5	3	5
October	10/21/14 12:47 PM	43.4	21.3	0	35.3	3	10
November	11/29/2014 11:45	19	20.9	0.1	60	8	7
December	12/31/2014 14:30	42.9	19.1	0	38	2	0
Average		**34.7**	**19.5**	**0.3**	**45.5**	**4.7**	**4.9**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW013S							
January	1/17/14 9:07 AM	11.5	19.4	0.2	68.9	3	6
February	02/27/2014 10:03	12.3	18.4	0.5	68.8	3	4
March	3/26/14 1:20 PM	21.7	18.2	0.1	60	<<>>	<<>>
April	4/26/14 11:49 AM	40.3	19.4	0.1	40.2	<<>>	0
May	5/30/14 6:22 AM	47.8	19.3	0.6	32.3	<<>>	2.0
June	06/07/2014 11:24 AM	45.6	17.3	0	37.1	9	9
July	7/30/14 7:14 AM	51.1	18.7	0	30.2	5	4
August	08/27/2014 6:25	45.2	19.6	0.2	35	10	10
September	9/30/14 11:39 AM	44.2	20.1	0	35.7	3	6
October	10/21/14 12:44 PM	38.7	20.1	0	41.2	2	0
November	11/29/2014 11:44	21.8	20.2	0.3	57.7	8	7
December	12/31/2014 14:29	45.1	18.8	0	36.1	3	4
Average		**35.4**	**19.1**	**0.2**	**45.3**	**5.1**	**4.7**
VLGW014D							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	
VLGW014S							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW015D							
January	1/15/14 1:57 PM	42.1	17.7	0.2	40	7	14
February	02/26/2014 9:53	45.8	17.4	0.7	36.1	2	3
March	3/26/14 10:23 AM	39.7	17.2	0.6	42.5	10	12
April	4/26/14 7:37 AM	45.1	17.1	0.2	37.6	11	8
May	5/29/14 9:53 AM	54.9	15.6	0.1	29.4	<<>>	1
June	06/07/2014 11:01 AM	51.4	15.6	0.3	32.7	5	7
July	7/29/14 8:14 AM	53.2	16.6	0.4	29.8	7	6
August	08/26/2014 7:28	62	18	0	20	9	7
September	9/27/14 12:07 PM	35.3	16	0	48.7	10	8
October	10/21/14 9:39 AM	70.4	16.8	0	12.8	37	38
November	11/25/2014 13:54	54.2	17.7	0.1	28	5	8
December	12/31/2014 10:03	49.9	16.2	0.3	33.6	12	10
Average		**50.3**	**16.8**	**0.2**	**32.6**	**10.5**	**10.2**
VLGW015S							
January	1/15/14 1:54 PM	31	24	0.6	44.4	6	<<>>
February	02/26/2014 9:50	30.9	24.2	0.7	44.2	6	5
March	3/26/14 10:20 AM	26.8	23	1	49.2	<<>>	<<>>
April	4/26/14 7:35 AM	54.8	27.9	0.1	17.2	3	4
May	5/29/14 9:52 AM	50.0	26.4	0.0	23.6	<<>>	2.0
June	06/07/2014 11:00 AM	41.1	22.3	1.6	35	9	9
July	7/29/14 8:12 AM	41.4	24.2	1.3	33.1	7	6
August	08/26/2014 7:27	62.2	31.1	0	6.7	9	8
September	9/27/14 12:06 PM	43.1	25	0	31.9	33	32
October	10/21/14 9:37 AM	44.2	26	0	29.8	21	10
November	11/25/2014 13:53	31.7	24.8	0.2	43.3	8	4
December	12/31/2014 10:02	66.9	33	0	0.1	9	10
Average		**43.7**	**26.0**	**0.5**	**29.9**	**11.1**	**9.0**
VLGW016D							
January	1/15/14 2:14 PM	44.6	23.6	0	31.8	<<>>	<<>>
February	02/26/2014 10:26	49.6	23.7	0	26.7	<<>>	4
March	3/26/14 10:35 AM	45.3	22.9	0	31.8	39	39
April	4/26/14 7:17 AM	59.8	21.9	0.1	18.2	7	6
May	5/29/14 9:32 AM	37.0	19.9	0.0	43.1	7.0	3.0
June	06/07/2014 10:50 AM	65.4	21.4	0	13.2	45	45
July	7/29/14 7:53 AM	52.8	21.9	0	25.3	10	11
August	08/26/2014 7:41	35.1	21.1	0	43.8	<<>>	5
September	9/30/14 8:20 AM	68	23	0	9	1	5
October	10/21/14 10:03 AM	57.8	23.2	0	19	8	9
November	11/29/2014 12:08	21.2	20	0	58.8	71	73
December	12/30/2014 8:08	63.8	23	0	13.2	<<>>	10
Average		**50.0**	**22.1**	**0.0**	**27.8**	**23.5**	**19.1**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW016S							
January	1/15/14 2:11 PM	42	29.4	0.3	28.3	<<>>	<<>>
February	02/26/2014 10:24	51.9	30.6	0.4	17.1	4	4
March	3/26/14 10:33 AM	18.2	19.8	3.6	58.4	6	2
April	4/26/14 7:10 AM	41	26.4	0.4	32.2	31	7
May	5/29/14 9:30 AM	75.8	24.1	0.0	0.1	6.0	8.0
June	06/07/2014 10:48 AM	45.4	27.5	0.6	26.5	10	10
July	7/29/14 7:52 AM	66.9	32.5	0	0.6	10	11
August	08/26/2014 7:38	32.4	27.3	1.1	39.2	<<>>	<<>>
September	9/30/14 8:17 AM	73.9	25.9	0	0.2	7	8
October	10/21/14 10:00 AM	42	30.8	0.5	26.7	8	7
November	11/29/2014 12:06	35.7	28.7	0.7	34.9	5	6
December	12/30/2014 8:05	45.6	29	0.9	24.5	19	19
Average		**47.6**	**27.7**	**0.7**	**24.1**	**10.6**	**8.2**
VLGW017D							
January	1/16/14 2:42 PM	67.4	32.4	0	0.2	<<>>	<<>>
February	02/27/2014 8:23	64.7	35.1	0.1	0.1	0	4
March	3/26/14 12:27 PM	11.8	8.2	14.7	65.3	1	4
April	4/26/14 11:26 AM	68.4	31.4	0.1	0.1	<<>>	3
May	5/29/14 12:31 PM	49.1	23.5	3.9	23.5	38.0	37.0
June	06/07/2014 11:46 AM	27.4	14.5	9.1	49	36	7
July	7/30/14 7:41 AM	72.8	27	0	0.2	4	3
August	08/26/2014 7:46	73.3	26.6	0	0.1	9	9
September	9/30/14 8:15 AM	22.6	16.1	6.3	55	6	5
October	10/22/14 7:29 AM	72.4	27.4	0.1	0.1	3	5
November	11/29/2014 12:03	43.8	20.8	5.4	30	26	<<>>
December	12/31/2014 14:05	70.2	29.6	0.1	0.1	2	2
Average		**53.7**	**24.4**	**3.3**	**18.6**	**12.5**	**7.9**
VLGW017S							
January	1/16/14 2:39 PM	69	29.7	0.2	1.1	<<>>	10
February	02/27/2014 8:19	69.7	29.5	0.6	0.2	<<>>	7
March	3/26/14 12:24 PM	56.9	25.2	4	13.9	<<>>	8
April	4/26/14 11:24 AM	69.7	29.9	0.2	0.2	23	12
May	5/29/14 12:30 PM	70.1	29.7	0.0	0.2	4.0	10.0
June	06/07/2014 11:45 AM	68.9	29.2	0.4	1.5	12	13
July	7/30/14 7:40 AM	69.6	30.2	0	0.2	<<>>	7
August	08/26/2014 7:44	69.2	30.6	0.1	0.1	2	5
September	9/30/14 8:13 AM	66.3	28.8	0.7	4.2	<<>>	16
October	10/22/14 7:27 AM	68.6	30.9	0.3	0.2	16	17
November	11/29/2014 12:01	69.4	30	0.4	0.2	12	16
December	12/31/2014 14:03	70.4	29.2	0.2	0.2	10	15
Average		**68.2**	**29.4**	**0.6**	**1.9**	**11.3**	**11.3**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW018D							
January	1/16/14 2:49 PM	24.9	24.8	0.2	50.1	4	3
February	02/27/2014 8:32	26.5	24.6	0.3	48.6	4	3
March	3/26/14 12:32 PM	25.5	24.2	0.1	50.2	3	3
April	4/26/14 11:31 AM	63.3	36.6	0	0.1	2	5
May	5/29/14 12:35 PM	65.5	34.4	0.0	0.1	5.0	7.0
June	06/07/2014 11:43 AM	44.6	28.8	0	26.6	6	6
July	---	---	---	---	---	---	
August	08/27/2014 6:53	49.1	30.2	0	20.7	19	24
September	9/30/14 8:41 AM	55.4	31.2	0	13.4	33	35
October	10/22/14 7:35 AM	45.9	30.3	0	23.8	7	8
November	11/29/2014 11:58	39.8	28.8	0.1	31.3	3	4
December	12/31/2014 14:10	44.8	28.6	0.2	26.4	24	24
Average		**44.1**	**---**	**---**	**---**	**---**	**11.1**
VLGW018S							
January	1/16/14 2:46 PM	25.2	25.2	0.1	49.5	3	2
February	02/27/2014 8:28	25.2	24.1	0.2	50.5	2	0
March	3/26/14 12:31 PM	23.3	23.1	0.1	53.5	3	7
April	4/26/14 11:29 AM	65	34.8	0	0.2	2	4
May	5/29/14 12:34 PM	64.6	30.2	0.0	5.2	4.0	7.0
June	06/07/2014 11:42 AM	42	26.9	0	31.1	6	7
July	7/30/14 7:36 AM	37.1	27.5	0	35.4	5	1
August	08/27/2014 6:51	43.9	27.9	0	28.2	4	4
September	9/30/14 8:39 AM	51.1	28.8	0	20.1	35	34
October	10/22/14 7:32 AM	43.2	28.7	0	28.1	2	7
November	11/29/2014 11:57	35.2	27.6	0	37.2	8	5
December	12/31/2014 14:09	43.1	27.4	0.2	29.3	<<>>	4
Average		**41.6**	**27.7**	**0.1**	**30.7**	**6.7**	**6.8**
VLGW019D							
January	1/17/14 8:46 AM	31.9	29.9	0.2	38	<<>>	3
February	02/27/2014 9:30	31.9	28.3	0.6	39.2	3	5
March	3/26/14 12:56 PM	31.8	28.8	0	39.4	4	3
April	4/26/14 12:02 PM	49.5	32	0	18.5	<<>>	2
May	5/29/14 12:40 PM	58.7	33.7	0.1	7.5	6.0	5.0
June	06/07/2014 11:38 AM	52.6	32.9	0	14.5	1	10
July	7/30/14 7:32 AM	39.2	30.5	0	30.3	9	8
August	08/27/2014 6:48	52	34	0	14	2	3
September	9/30/14 9:37 AM	59.3	36.4	0	4.3	9	10
October	10/22/14 7:42 AM	50.9	34.8	0	14.3	19	10
November	11/29/2014 11:33	45	33.5	0	21.5	6	8
December	12/31/2014 14:23	48.6	32.6	0.1	18.7	<<>>	1
Average		**46.0**	**32.3**	**0.1**	**21.7**	**6.6**	**5.7**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW019S							
January	1/17/14 8:43 AM	22.2	25.1	0.8	51.9	<<>>	3
February	02/27/2014 9:27	25.6	25.7	0.6	48.1	3	2
March	3/26/14 12:54 PM	26	26.1	0	47.9	24	<<>>
April	4/26/14 12:01 PM	45.2	28.2	0	26.6	38	3
May	5/29/14 12:38 PM	57.8	30.6	0.0	11.6	25.0	27.0
June	06/07/2014 11:39 AM	51.8	30.1	0	18.1	25	22
July	7/30/14 7:30 AM	41.1	31.1	0	27.8	8	6
August	08/27/2014 6:46	50.2	33.3	0	16.5	5	5
September	9/30/14 9:32 AM	53.8	33.3	0	12.9	8	9
October	10/22/14 7:39 AM	49.6	34	0	16.4	25	25
November	11/29/2014 11:32	39.6	31.6	0	28.8	23	22
December	12/31/2014 14:22	45.6	32.2	0.2	22	24	22
Average		**42.4**	**30.1**	**0.1**	**27.4**	**18.9**	**13.3**
VLGW020D							
January	1/17/14 8:58 AM	17.1	24.1	0.8	58	5	4
February	02/27/2014 9:40	20.6	24.5	0.5	54.4	4	4
March	3/26/14 1:05 PM	23	25.7	0.6	50.7	<<>>	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	08/27/2014 6:38	45.8	33.1	0	21.1	2	4
September	9/30/14 11:34 AM	51.1	34.2	0	14.7	<<>>	8
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**31.5**	**---**	**---**	**---**	**---**	
VLGW020S							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	3/26/14 1:03 PM	11.8	19.8	2.2	66.2	1	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**11.8**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW021D							
January	1/17/14 9:28 AM	33.4	22.7	0.5	43.4	4	7
February	02/27/2014 10:23	35.1	22.8	0.4	41.7	7	11
March	3/26/14 1:30 PM	40.2	24.4	0.2	35.2	3	10
April	4/26/14 12:07 PM	39.8	22.9	0.2	37.1	1	3
May	5/30/14 6:29 AM	67.4	32.5	0.0	0.1	5.0	7.0
June	06/07/2014 11:30 AM	56.1	25.3	0.1	18.5	8	8
July	7/30/14 7:20 AM	46.1	22	0.2	31.7	9	7
August	08/27/2014 6:34	45.5	22	0.3	32.2	12	11
September	9/30/14 11:45 AM	47.3	22	0.1	30.6	21	22
October	10/21/14 12:52 PM	48.1	21.8	0.1	30	1	6
November	11/29/2014 11:49	43	21.3	0.2	35.5	10	10
December	12/31/2014 14:34	38.7	21.5	0.1	39.7	6	2
Average		**45.1**	**23.4**	**0.2**	**31.3**	**7.3**	**8.7**
VLGW021S							
January	1/17/14 9:25 AM	23	22.6	0.2	54.2	2	5
February	02/27/2014 10:20	26	21.9	0.1	52	6	5
March	3/26/14 1:27 PM	47.1	24.6	0	28.3	<<>>	5
April	4/26/14 12:06 PM	44.7	22.9	0	32.4	2	4
May	5/30/14 6:27 AM	53.2	23.8	0.0	23.0	4.0	7.0
June	06/07/2014 11:29 AM	47.4	22.5	0	30.1	7	7
July	7/30/14 7:19 AM	42.2	22.4	0	35.4	6	5
August	08/27/2014 6:32	44.1	23.8	0	32.1	33	33
September	9/30/14 11:43 AM	47.9	23.7	0	28.4	4	9
October	10/21/14 12:51 PM	48.9	23.8	0	27.3	40	25
November	11/29/2014 11:47	35.9	23.9	0	40.2	31	30
December	12/31/2014 14:32	49.5	23.1	0	27.4	37	39
Average		**42.5**	**23.3**	**0.0**	**34.2**	**15.6**	**14.5**
VLGW022D							
January	1/17/14 11:38 AM	40	25.4	0.5	34.1	5	5
February	02/27/2014 13:20	40.9	24	1.1	34	3	2
March	3/27/14 9:52 AM	0.2	7.1	9.5	83.2	<<>>	<<>>
April	4/30/14 7:58 AM	65.9	32	0	2.1	<<>>	6
May	5/30/14 7:12 AM	44.2	24.2	0.0	31.6	6.0	17.0
June	06/10/2014 6:38 AM	41	24.2	0.1	34.7	<<>>	17.0
July	7/30/14 10:56 AM	41.5	22.7	1.4	34.4	5	4.0
August	08/27/2014 8:09	46.4	24.4	0.8	28.4	3	12
September	9/30/14 12:11 PM	46.2	24.6	0	29.2	7	8
October	10/22/14 12:14 PM	49.2	24.5	0.3	26	37	41
November	11/29/2014 12:42	33.8	24.1	0.2	41.9	8	3
December	12/31/2014 8:38	31.1	18.6	9.6	40.7	5	5
Average		**40.0**	**23.0**	**2.0**	**35.0**	**8.8**	**10.9**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW022S							
January	1/17/14 11:34 AM	21.5	15.5	6.9	56.1	<<>>	<<>>
February	02/27/2014 13:17	19.4	10.7	10.3	59.6	<<>>	<<>>
March	3/27/14 9:49 AM	27.1	14.4	6.2	52.3	<<>>	<<>>
April	4/30/14 7:55 AM	39.9	20.4	0.1	39.6	<<>>	<<>>
May	5/30/14 7:11 AM	55.5	20.1	0.0	24.4	0.0	3.0
June	06/10/2014 6:36 AM	45.9	22	0	32.1	4	6.0
July	7/30/14 10:54 AM	35.2	21.8	0	43	7	9
August	08/27/2014 8:07	32.2	22.1	0.1	45.6	14	8
September	9/30/14 12:10 PM	36.6	21.3	0.2	41.9	4	1
October	10/22/14 12:12 PM	40.4	22	0.2	37.4	6	6
November	11/29/2014 12:40	32.2	22.9	0.2	44.7	<<>>	<<>>
December	12/31/2014 8:37	31.5	24.1	0.2	44.2	5	5
Average		**34.8**	**19.8**	**2.0**	**43.4**	**5.7**	**5.4**
VLGW023D							
January	1/15/14 1:49 PM	44.2	19.5	1.2	35.1	6	7
February	02/26/2014 9:43	44.3	18.8	1.2	35.7	9	9
March	3/26/14 11:06 AM	44.8	18.5	0.3	36.4	6	5
April	4/26/14 7:46 AM	52.8	18.2	0.1	28.9	4	5
May	5/29/14 10:08 AM	51.6	17.6	0.0	30.8	7.0	1.0
June	06/07/2014 11:04 AM	51.6	17.5	0.1	30.8	1	7
July	7/29/14 8:19 AM	50.5	17.5	0.4	31.6	16	17
August	08/26/2014 7:04	52.1	18.6	0.2	29.1	<<>>	8
September	9/27/14 12:18 PM	48.3	18.1	0.3	33.3	<<>>	7
October	10/21/14 9:30 AM	49.1	20.4	0.2	30.3	5	11
November	11/25/2014 13:59	37.7	18.3	0.1	43.9	3	2
December	12/31/2014 10:09	69.7	16.4	0	13.9	10	11
Average		**49.7**	**18.3**	**0.3**	**31.7**	**6.7**	**7.5**
VLGW023S							
January	1/15/14 1:46 PM	29.8	23.3	2.9	44	3	6
February	02/26/2014 9:39	31.1	23	3	42.9	16	1
March	3/26/14 11:04 AM	31.2	23.1	0	45.7	<<>>	0
April	4/26/14 7:45 AM	60.9	27.4	0.2	11.5	46	47
May	5/29/14 10:06 AM	48.6	28.7	0.0	22.7	3.0	5.0
June	06/07/2014 11:03 AM	45.2	29.1	0	25.7	8	9
July	7/29/14 8:17 AM	41.9	30.2	0.7	27.2	<<>>	7
August	08/26/2014 7:02	54.9	34.9	0	10.2	7	9
September	9/27/14 12:16 PM	45.2	33	0	21.8	9	7
October	10/21/14 8:52 AM	48.7	21.2	0.2	29.9	5	10
November	11/25/2014 13:58	25.4	24.2	0.1	50.3	7	5
December	12/31/2014 10:07	69.6	30.3	0	0.1	11	28
Average		**44.4**	**27.4**	**0.6**	**27.7**	**11.5**	**11.2**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW024D							
January	1/15/14 2:06 PM	67.2	23.7	1.6	7.5	<<>>	<<>>
February	02/26/2014 10:09	75.4	23.1	1	0.5	<<>>	<<>>
March	3/26/14 10:16 AM	77.6	22.1	0.2	0.1	<<>>	28
April	4/26/14 7:42 AM	69.3	19.7	0.5	10.5	<<>>	9
May	5/29/14 9:27 AM	54.7	18.5	3.5	23.3	5.0	4.0
June	06/07/2014 10:46 AM	47.4	17.7	4.6	30.3	8	7
July	7/29/14 8:23 AM	53.9	20.9	3.1	22.1	5	6
August	08/26/2014 7:23	56	22.4	2.7	18.9	9	11
September	9/27/14 12:20 PM	48.5	21.4	3.9	26.2	32	28
October	10/21/14 9:33 AM	74.4	25.5	0	0.1	6	8
November	11/25/2014 13:50	50.1	21.5	4.3	24.1	6	5
December	12/30/2014 8:03	82.7	17.2	0	0.1	9	9
Average		**63.1**	**21.1**	**2.1**	**13.6**	**10.0**	**11.5**
VLGW024S							
January	1/15/14 2:03 PM	27.6	17.2	9.1	46.1	<<>>	1
February	02/26/2014 10:05	42.4	22.2	6.2	29.2	2	7
March	3/26/14 10:13 AM	60.2	27.9	1.9	10	<<>>	5
April	4/26/14 7:40 AM	22.5	18.7	1.5	57.3	1	<<>>
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**38.2**	**---**	**---**	**---**	**---**	
VLGW025D							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	---	---	---	---	---	---	
June	---	---	---	---	---	---	
July	---	---	---	---	---	---	
August	---	---	---	---	---	---	
September	---	---	---	---	---	---	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	---	---	---	---	---	---	
Average		**---**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW025S							
January	1/17/14 8:51 AM	23.5	25.9	0.1	50.5	4	1
February	02/27/2014 9:35	25.5	26	0.1	48.4	4	1
March	3/26/14 1:00 PM	25.5	26.2	0.1	48.2	10	11
April	4/26/14 11:58 AM	30.5	26.5	0.1	42.9	11	2
May	5/30/14 6:36 AM	66.0	33.9	0.0	0.1	5.0	18.0
June	06/07/2014 11:35 AM	61.8	34.5	0	3.7	7	8
July	7/30/14 7:28 AM	46.2	32.7	0	21.1	<<>>	3
August	08/27/2014 6:44	54.6	34.9	0	10.5	36	39
September	9/30/14 9:42 AM	50.1	34.5	0	15.4	5	4
October	10/22/14 8:05 AM	45	34.1	0.1	20.8	8	11
November	11/26/2014 12:16	31.6	29.8	0.4	38.2	23	26
December	12/31/2014 14:25	62.8	35.2	0.1	1.9	16	20
Average		**43.6**	**31.2**	**0.1**	**25.1**	**11.7**	**12.0**
VLGW026D							
January	1/17/14 9:45 AM	38	30.4	0.3	31.3	2	3
February	02/27/2014 10:34	59	40.9	0	0.1	<<>>	0
March	3/26/14 1:36 PM	59.6	40.3	0	0.1	5	6
April	4/26/14 12:11 PM	51.1	32	0	16.9	2	6
May	---	---	---	---	---	---	
June	06/07/2014 11:33 AM	47.4	30.8	0	21.8	7	9
July	7/30/14 7:25 AM	60.9	39	0	0.1	6	5
August	08/27/2014 7:42	60.3	39.6	0	0.1	2	
September	9/30/14 11:51 AM	42.2	31.2	0	26.6	<<>>	5
October	10/22/14 7:48 AM	55.4	34.3	0	10.3	3	7
November	11/29/2014 11:53	44.1	30.6	0	25.3	9	9
December	12/31/2014 14:37	48.8	31.3	0.1	19.8	2	5
Average		**51.5**	**---**	**---**	**---**	**---**	**5.5**
VLGW026S							
January	1/17/14 9:42 AM	36.2	28.5	0.3	35	5	3
February	02/27/2014 10:28	61.3	33.3	0	5.4	4	5
March	3/26/14 1:33 PM	64.3	35.6	0	0.1	2	3
April	4/26/14 12:09 PM	49.6	28.8	0	21.6	2	3
May	5/30/14 6:31 AM	48.1	29.1	0.0	22.8	26.0	26.0
June	06/07/2014 11:32 AM	47.8	28.8	0	23.4	9	8
July	7/30/14 7:23 AM	46.5	30.3	0	23.2	30	29
August	08/27/2014 7:40	46.3	30.5	0	23.2	<<>>	8
September	9/30/14 11:50 AM	38.1	27.9	0	34	18	6
October	10/22/14 7:46 AM	56.7	31.7	0	11.6	29	30
November	11/29/2014 11:52	45	29.1	0	25.9	7	7
December	12/31/2014 14:36	44.7	27.9	0	27.4	35	35
Average		**48.7**	**30.1**	**0.0**	**21.1**	**15.2**	**13.6**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW027D							
January	1/17/14 11:28 AM	47.2	26.8	0.3	25.7	4	9
February	02/27/2014 13:13	43	25.8	0.7	30.5	6	37
March	3/27/14 9:42 AM	39.3	24	0.2	36.5	11	8
April	4/30/14 7:52 AM	50.6	24.6	0.1	24.7	9	7
May	5/30/14 7:07 AM	59.6	24.7	0.0	15.7	23.0	22.0
June	06/10/2014 6:35 AM	54.3	24.8	0	20.9	10	
July	7/30/14 10:52 AM	50.6	25.1	0	24.3	15	14
August	08/27/2014 8:04	56.6	26	0	17.4	16	18
September	9/30/14 12:08 PM	60.8	26	0	13.2	8	19
October	10/22/14 12:10 PM	64.6	26.8	0	8.6	9	7
November	11/29/2014 12:36	53.1	26.8	0	20.1	6	9
December	12/31/2014 8:35	44.2	24.8	0.1	30.9	6	8
Average		**52.0**	**25.5**	**0.1**	**22.4**	**10.3**	**14.4**
VLGW027S							
January	1/17/14 11:25 AM	27.4	20.9	0	51.7	<<>>	<<>>
February	02/27/2014 13:09	54.3	21.5	1.2	23	<<>>	<<>>
March	---	---	---	---	---	---	
April	4/30/14 7:51 AM	36.8	21.9	0	41.3	6	5
May	5/30/14 7:06 AM	71.5	24.4	0.0	4.1	<<>>	5.0
June	06/10/2014 6:34 AM	25.7	20.4	0	53.9	36	2.0
July	7/30/14 10:50 AM	19.3	20.7	0	60	6	5
August	08/27/2014 8:03	70	24.5	0.2	5.3	4	9
September	---	---	---	---	---	---	
October	10/22/14 12:08 PM	60.3	22.6	0.1	17	5	6
November	11/29/2014 12:35	14.1	19.1	0.2	66.6	4	4
December	12/31/2014 8:34	68.1	22.2	0.3	9.4	7	7
Average		**44.8**	**---**	**---**	**---**	**---**	**5.4**
VLGW028S							
January	1/17/14 11:49 AM	29.1	26.1	0.1	44.7	3	4
February	02/28/2014 8:33	29.8	25.7	0.2	44.3	3	3
March	3/27/14 10:07 AM	26.9	24.2	0.2	48.7	1	4
April	4/30/14 8:15 AM	40	27.5	0	32.5	1	2
May	5/30/14 8:34 AM	47.4	26.7	0.0	25.9	3.0	4.0
June	06/10/2014 6:40 AM	39.6	26.3	0	34.1	33	32.0
July	7/30/14 10:59 AM	33.5	25.6	0	40.9	5	6
August	08/28/2014 13:06	45.9	27.9	0.3	25.9	<<>>	4
September	9/30/14 12:15 PM	66	27.9	0	6.1	<<>>	14
October	10/23/14 7:12 AM	22.6	24.3	0.1	53	8	3
November	11/29/2014 12:56	66.4	28.4	0	5.2	4	5
December	12/31/2014 8:48	42.3	29.2	0	28.5	39	39
Average		**40.8**	**26.7**	**0.1**	**32.5**	**10.0**	**10.0**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW029D							
January	1/17/14 11:21 AM	51	27.8	0.4	20.8	3	5
February	02/27/2014 13:05	56.2	27.8	0.4	15.6	6	11
March	3/27/14 9:33 AM	46.9	27.4	0.5	25.2	3	12
April	4/30/14 7:49 AM	51.1	27.3	0.2	21.4	12	14
May	5/30/14 7:03 AM	57.0	28.0	0.0	15.0	<<>>	11.0
June	06/10/2014 6:31 AM	55.9	27.8	0	16.3	13	11.0
July	7/30/14 10:48 AM	51	26.7	0.1	22.2	2	10
August	08/27/2014 7:53	62.1	28.8	0	9.1	21	25
September	9/30/14 12:05 PM	57.2	27.1	0	15.7	<<>>	8
October	10/22/14 12:06 PM	58.5	27.6	0	13.9	5	6
November	11/29/2014 12:33	57.3	26.9	0	15.8	6	12
December	12/31/2014 8:32	53.3	27.8	0.2	18.7	7	7
Average		**54.8**	**27.6**	**0.2**	**17.5**	**7.8**	**11.0**
VLGW029S							
January	1/17/14 11:18 AM	38.6	27.7	0	33.7	<<>>	<<>>
February	02/27/2014 13:02	41.3	27.3	0.2	31.2	4	3
March	3/27/14 9:28 AM	35.7	26.3	0	38	0	4
April	4/30/14 7:47 AM	37.4	25.8	0.1	36.7	7	7
May	5/30/14 7:01 AM	57.9	29.6	0.0	12.5	<<>>	14.0
June	06/10/2014 6:30 AM	35.5	25.5	0	39	4	8.0
July	7/30/14 10:46 AM	21.4	24	0	54.6	8	8
August	08/27/2014 7:52	64.4	35.5	0	0.1	2	6
September	9/30/14 12:04 PM	25.3	23.1	0	51.6	8	4
October	10/22/14 12:04 PM	40.9	27.4	0	31.7	5	4
November	11/29/2014 12:31	30.5	24.6	0.1	44.8	34	34
December	12/31/2014 8:30	64.7	34.7	0.4	0.2	1	3
Average		**41.1**	**27.6**	**0.1**	**31.2**	**7.3**	**8.6**
VLGW030S							
January	1/17/14 11:56 AM	39.1	31	0.3	29.6	<<>>	0
February	02/28/2014 8:39	48.4	32.6	0.1	18.9	1	1
March	3/27/14 10:10 AM	19.9	23.3	0.5	56.3	3	1
April	4/30/14 8:18 AM	30.1	22.9	4.1	42.9	<<>>	<<>>
May	5/30/14 8:37 AM	52.7	30.4	0.2	16.7	3.0	4
June	06/10/2014 6:42 AM	42.7	28.2	0.2	28.9	2	1
July	7/30/14 11:03 AM	35.8	27	0.2	37	<<>>	6
August	08/28/2014 13:08	43.5	28.9	0.2	27.4	5	5
September	9/30/14 12:18 PM	40.6	28.1	0	31.3	<<>>	1
October	10/23/14 7:15 AM	23.9	26	0.1	50	2	2
November	11/29/2014 12:54	29.9	26.6	0	43.5	15	15
December	12/31/2014 8:50	36.2	28.2	0	35.6	8	7
Average		**36.9**	**27.8**	**0.5**	**34.8**	**4.9**	**3.9**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW031S							
January	1/17/14 2:19 PM	30.8	23.1	0.8	45.3	<<>>	<<>>
February	02/28/2014 10:47	30.7	23.4	0.6	45.3	<<>>	<<>>
March	3/27/14 10:59 AM	26.2	22.1	0.5	51.2	<<>>	2
April	---	---	---	---	---	---	
May	5/30/14 9:36 AM	32.6	21.3	0.4	45.7	<<>>	<<>>
June	---	---	---	---	---	---	
July	7/31/14 12:52 PM	65.6	21.8	0.3	12.3	10	9
August	---	---	---	---	---	---	
September	9/30/14 6:51 AM	48.9	23.5	0.6	27	9	9
October	10/23/14 10:08 AM	46.2	24.2	0	29.6	8	9
November	11/29/2014 12:49	32.3	24	0.2	43.5	2	4
December	12/31/2014 8:46	27.7	23.9	0.1	48.3	8	8
Average		**37.9**	**---**	**---**	**---**	**---**	**6.8**
VLGW032S							
January	1/17/14 11:59 AM	44.9	30.6	0	24.5	<<>>	0
February	02/28/2014 8:43	44.7	30.4	0	24.9	<<>>	<<>>
March	3/27/14 10:12 AM	37.8	28.3	0	33.9	6	3
April	4/30/14 8:20 AM	36.3	27.6	0	36.1	33	8
May	5/30/14 8:40 AM	56.5	30.3	0.0	13.2	5.0	7.0
June	06/10/2014 6:46 AM	46.4	28.2	0	25.4	<<>>	17.0
July	7/30/14 11:07 AM	44.7	26.8	0	28.5	<<>>	1
August	08/28/2014 13:10	45.2	27.6	0.1	27.1	6	6
September	9/30/14 12:21 PM	44.4	28.4	0	27.2	2	2
October	10/23/14 7:17 AM	45	29.1	0	25.9	40	41
November	11/29/2014 12:52	35.1	27.9	0	37	4	4
December	12/31/2014 8:52	35	27.3	0.1	37.6	8	7
Average		**43.0**	**28.5**	**0.0**	**28.4**	**13.0**	**8.7**
VLGW033S							**1.0**
January	1/17/14 2:15 PM	21.5	27.3	0	51.2	2	3.0
February	02/28/2014 10:44	14.8	25	0	60.2	<<>>	2.0
March	3/27/14 10:57 AM	13.5	23.3	0	63.2	<<>>	<<>>
April	---	---	---	---	---	---	
May	5/30/14 9:33 AM	38.1	28.7	0.0	33.2	1.0	1.0
June	---	---	---	---	---	---	
July	7/31/14 12:50 PM	40.7	31.2	0	28.1	9	9
August	---	---	---	---	---	---	
September	9/30/14 6:47 AM	42.2	31.1	0	26.7	5	6.0
October	10/23/14 10:05 AM	41.9	31.4	0	26.7	6	8.0
November	11/29/2014 12:47	16.9	27	0	56.1	14	12
December	12/31/2014 8:43	23.9	25.7	0.1	50.3	7	6
Average		**28.2**	**---**	**---**	**---**	**---**	**5.9**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW034S							
January	1/17/14 2:10 PM	26	28.8	0	45.2	<<>>	2
February	02/28/2014 10:37	27.6	28.4	0	44	<<>>	0
March	3/27/14 10:55 AM	36.2	30.1	0.1	33.6	<<>>	1
April	---	---	---	---	---	---	
May	5/30/14 9:31 AM	36.2	28.3	0.2	35.3	<<>>	<<>>
June	---	---	---	---	---	---	
July	7/31/14 12:47 PM	49	34.5	0.2	16.3	7	7
August	---	---	---	---	---	---	
September	9/30/14 6:44 AM	35.8	30.7	0.1	33.4	2	3
October	10/23/14 10:03 AM	35.9	30.8	0.2	33.1	6	5
November	11/29/2014 12:45	26.6	29.1	0	44.3	5	5
December	12/31/2014 8:42	50.1	34.9	0.1	14.9	5	6
Average		**35.9**	**---**	**---**	**---**	**---**	**3.6**
VLGW042S							
January	1/15/14 2:18 PM	45	25.1	0.2	29.7	7	
February	02/26/2014 10:30	45.5	25.5	0.2	28.8	4	18
March	3/26/14 10:31 AM	42.8	24.8	0.1	32.3	6	17
April	4/26/14 7:20 AM	46	24	0	30	13	1
May	5/29/14 9:35 AM	69.4	20.0	0.4	10.2	<<>>	5.0
June	06/07/2014 10:52 AM	53.8	22.9	0	23.3	<<>>	14
July	7/29/14 7:58 AM	48.7	24	0	27.3	<<>>	9
August	08/26/2014 7:34	47.7	24.4	0	27.9	13	15
September	9/30/14 8:22 AM	52.2	24.8	0	23	14	16
October	10/21/14 9:58 AM	52.8	25.2	0	22	18	23
November	11/29/2014 12:13	47.1	25.2	0.1	27.6	20	29
December	12/31/2014 14:58	50.6	25.3	0.2	23.9	<<>>	5
Average		**50.1**	**24.3**	**0.1**	**25.5**	**11.9**	**13.8**
VLGW043S							
January	1/17/14 9:02 AM	22.3	25.7	0.6	51.4	3	2
February	02/27/2014 9:44	23.6	25.3	0.5	50.6	3	2
March	3/26/14 12:50 PM	23	24.6	1.4	51	<<>>	<<>>
April	4/26/14 11:55 AM	50.5	33.1	3.5	12.9	3	3
May	5/29/14 12:42 PM	49.5	28.6	0.0	21.9	7.0	8
June	06/07/2014 11:21 AM	39.6	27.6	0	32.8	9	9
July	7/30/14 7:11 AM	34.3	28.5	0.3	36.9	7	8
August	08/27/2014 6:41	33.5	19.5	9.8	37.2	<<>>	<<>>
September	9/30/14 11:37 AM	61.2	38.6	0	0.2	2	5
October	10/21/14 12:41 PM	44.7	32.7	0	22.6	8	6
November	11/29/2014 11:35	36.8	31.3	0.1	31.8	8	7
December	12/31/2014 14:27	41.1	32.1	0.1	26.7	4	1
Average		**38.3**	**29.0**	**1.4**	**31.3**	**5.4**	**5.1**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW047S							
January	---	---	---	---	---	---	
February	---	---	---	---	---	---	
March	---	---	---	---	---	---	
April	---	---	---	---	---	---	
May	5/30/14 8:42 AM	46.7	33.1	0.0	20.2	7.0	7
June	06/10/2014 7:07 AM	41.9	32.4	0	25.7	<<>>	14
July	7/31/14 8:37 AM	50.7	34.1	0.1	15.1	7	7
August	08/28/2014 13:15	43.9	33.1	0.3	22.7	1	4
September	9/30/14 12:23 PM	35.8	31.7	0	32.5	3	12
October	10/23/14 7:21 AM	61.7	36.9	1.2	0.2	<<>>	14
November	11/26/2014 12:06	61.1	37.6	1.1	0.2	4	3
December	12/31/2014 8:54	62.9	35.4	1.5	0.2	8	11
Average		**50.6**	**---**	**---**	**---**	**---**	**9.0**
VLGW0049							
January	1/17/14 10:48 AM	50.3	29.1	4.4	16.2	11	8
February	02/27/2014 10:42	47.6	26.1	5.4	20.9	4	11
March	3/27/14 8:41 AM	50.2	26.8	4.9	18.1	8	5
April	4/30/14 7:44 AM	63.9	33.6	1	1.5	<<>>	7
May	5/30/14 6:41 AM	38.8	22.4	7.7	31.1	<<>>	4.0
June	06/10/2014 8:52 AM	65.2	34.7	0	0.1	<<>>	15
July	7/30/14 10:33 AM	48.7	28.7	4.2	18.4	4	5
August	08/27/2014 7:15	59.8	35	1.3	3.9	9	11
September	9/30/14 11:54 AM	61.5	35.1	1.1	2.3	6	8
October	10/22/14 7:58 AM	48.3	29.5	4.6	17.6	17	15
November	11/26/2014 12:19	57.4	31.6	2.5	8.5	<<>>	28
December	12/31/2014 14:40	63.4	32.7	1.3	2.6	10	13
Average		**54.6**	**30.4**	**3.2**	**11.8**	**8.6**	**10.8**
VLGW0050							
January	1/17/14 11:07 AM	32.4	29.7	0.4	37.5	4	2
February	02/27/2014 11:08	34.6	28.6	0.3	36.5	5	7
March	3/27/14 9:14 AM	33.9	28.9	0	37.2	<<>>	3
April	4/30/14 7:24 AM	31.5	29.2	0.2	39.1	3	5
May	5/30/14 6:53 AM	42.2	31.8	0.0	26.0	5.0	2.0
June	06/10/2014 6:25 AM	40.8	31.2	0.2	27.8	<<>>	7
July	7/30/14 10:41 AM	42	31.7	0	26.3	8	8
August	08/27/2014 7:46	40.9	31.1	0.3	27.7	3	4
September	9/30/14 12:02 PM	37.1	29.9	0	33	8	5
October	10/22/14 11:59 AM	41.1	30.1	0.3	28.5	<<>>	1
November	11/29/2014 12:29	30.6	26.9	0.3	42.2	6	7
December	12/31/2014 14:47	33.1	27.2	0.1	39.6	27	26
Average		**36.7**	**29.7**	**0.2**	**33.5**	**7.7**	**6.4**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW0051							
January	1/17/14 12:05 PM	47.2	32	0	20.8	16	16
February	02/28/2014 8:54	47.8	31.9	0.1	20.2	13	19
March	3/27/14 10:17 AM	46.5	31	0	22.5	22	23
April	4/30/14 8:24 AM	44.2	31.1	0	24.7	20	11
May	5/30/14 8:45 AM	54.0	31.5	0.0	14.5	17.0	26.0
June	06/10/2014 6:49 AM	48.3	31.4	0	20.3	20	24
July	7/31/14 8:41 AM	50.2	31.4	0	18.4	24	26
August	08/28/2014 13:17	46.8	30.9	0	22.3	24	20
September	9/30/14 2:12 PM	45.5	30.9	0.1	23.5	17	22
October	10/23/14 7:24 AM	45.2	31.1	0	23.7	17	21
November	11/26/2014 11:42	41	29.5	0.1	29.4	20	18
December	12/31/2014 8:56	39.9	29.7	0	30.4	23	19
Average		**46.4**	**31.0**	**0.0**	**22.6**	**19.4**	**20.4**
VLGW0052							
January	1/17/14 10:57 AM	41.6	33.8	0	24.6	12	8
February	02/27/2014 10:55	45	34	0	21	35	16
March	3/27/14 8:57 AM	41.7	31.9	0.4	26	13	14
April	4/30/14 7:35 AM	40	33.1	0	26.9	41	10
May	5/30/14 6:47 AM	52.1	35.3	0.0	12.6	21.0	44.0
June	06/10/2014 8:35 AM	49.4	34.9	0	15.7	37	38
July	7/30/14 10:28 AM	48.5	34.5	0.1	16.9	11	12
August	08/27/2014 7:20	42.2	33.5	0	24.3	32	30
September	9/30/14 11:56 AM	50.9	34.8	0	14.3	8	9
October	10/22/14 7:53 AM	51.5	35.2	0	13.3	6	10
November	11/25/2014 12:46	37.1	31.4	0	31.5	4	4
December	12/31/2014 14:43	46.3	33.5	0.1	20.1	4	9
Average		**45.5**	**33.8**	**0.1**	**20.6**	**18.7**	**17.0**
VLGW0053							
January	1/17/14 11:02 AM	31.9	31.1	0	37	32	7
February	02/27/2014 11:02	33.7	30.3	0	36	5	7
March	3/27/14 9:04 AM	33.5	30	0	36.5	2	6
April	4/30/14 7:32 AM	29.6	29.8	0	40.6	31	19
May	5/30/14 6:50 AM	54.8	36.0	0.0	9.2	26.0	26.0
June	06/10/2014 8:37 AM	42.2	33.2	0	24.6	37	36
July	7/30/14 10:37 AM	44.1	33.2	0	22.7	8	9
August	08/27/2014 7:23	41.9	33.1	0	25	30	28
September	9/30/14 11:59 AM	43.1	33	0	23.9	5	6
October	10/22/14 8:02 AM	45.2	33.7	0	21.1	5	7
November	11/25/2014 12:49	29.9	29.4	0	40.7	<<>>	27
December	12/31/2014 14:45	55.2	34.5	0	10.3	41	41
Average		**40.4**	**32.3**	**0.0**	**27.3**	**20.2**	**18.3**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW0054							
January	1/17/14 12:09 PM	37.1	32.4	0	30.5	<<>>	6
February	02/28/2014 9:00	42.1	33	0.1	24.8	3	7
March	3/27/14 10:19 AM	43.3	32.3	0	24.4	34	34
April	4/30/14 8:27 AM	38.5	31.7	0	29.8	33	33
May	5/30/14 8:47 AM	46.3	32.8	0.0	20.9	36.0	36.0
June	06/10/2014 6:53 AM	40.2	32.2	0	27.6	5	4
July	7/31/14 8:45 AM	43.7	32.8	0	23.5	10	10
August	08/28/2014 13:21	48.8	34	0	17.2	9	9
September	9/30/14 2:14 PM	42.6	32.9	0	24.5	8	7
October	10/23/14 7:26 AM	41.4	32.3	0	26.3	7	7
November	11/26/2014 11:44	36.7	30.2	0	33.1	38	9
December	12/31/2014 8:58	46.1	32.8	0	21.1	26	26
Average		**42.2**	**32.5**	**0.0**	**25.3**	**19.0**	**15.7**
VLGW0055							
January	1/17/14 12:18 PM	44.3	34.8	0	20.9	5	5
February	02/28/2014 9:10	46.8	34.9	0	18.3	4	7
March	3/27/14 10:24 AM	49.9	34.3	0	15.8	32	31
April	4/30/14 8:31 AM	42.2	33.7	0	24.1	24	25
May	5/30/14 8:52 AM	55.1	35.5	0.0	9.4	32.0	32.0
June	06/10/2014 6:56 AM	46.3	34.7	0	19	5	3
July	7/31/14 8:49 AM	50.2	35.3	0	14.5	11	11
August	08/28/2014 13:24	48.8	34.9	0	16.3	8	9
September	9/30/14 2:18 PM	51.2	35.5	0	13.3	13	16
October	10/23/14 9:44 AM	43.9	33.8	0.2	22.1	12	6
November	11/26/2014 11:49	41.8	32.1	0	26.1	13	9
December	12/31/2014 9:02	51.1	34.1	0	14.8	18	21
Average		**47.6**	**34.5**	**0.0**	**17.9**	**14.8**	**14.6**
VLGW0056							
January	1/17/14 1:22 PM	36.7	31.1	0.1	32.1	<<>>	<<>>
February	02/28/2014 9:18	37.5	31.3	0	31.2	6	6
March	3/27/14 10:27 AM	42.3	31.2	0	26.5	32	30
April	4/30/14 8:35 AM	33.9	30.6	0	35.5	0	2
May	5/30/14 8:55 AM	52.2	33.5	0.0	14.3	5.0	9
June	06/10/2014 6:58 AM	45.8	33.5	0	20.7	34	34
July	7/31/14 8:51 AM	49.4	34	0	16.6	8	8
August	08/28/2014 13:27	35.5	31.2	0	33.3	8	8
September	9/30/14 2:21 PM	38.5	31.6	0	29.9	9	7
October	10/23/14 9:46 AM	33.2	30	0	36.8	7	3
November	11/26/2014 11:51	35.3	29.3	0	35.4	7	4
December	12/31/2014 9:04	64.6	35.3	0	0.1	7	9
Average		**42.1**	**31.9**	**0.0**	**26.0**	**11.2**	**10.9**

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW0057							
January	1/21/14 1:04 PM	33.2	31.4	0	35.4	1	0
February	---	---	---	---	---	---	
March	3/29/14 11:39 AM	38.3	32.4	0.9	28.4	<<>>	
April	---	---	---	---	---	---	
May	5/31/14 11:42 AM	27.2	20.6	6.6	45.6	0.0	<<>>
June	06/10/2014 1:44 PM	27.3	19.9	7.5	45.3	<<>>	<<>>
July	7/31/14 7:40 AM	40.6	31.5	0.9	27	<<>>	
August	---	---	---	---	---	---	
September	9/30/14 3:32 PM	30.8	28.1	2.1	39	7	
October	---	---	---	---	---	---	
November	---	---	---	---	---	---	
December	12/31/2014 9:36	40.2	30	2.7	27.1	1	1
Average		**33.9**	**---**	**---**	**---**	**---**	
VLGW0058							
January	1/20/14 2:04 PM	33.5	31.7	0	34.8	7	10
February	---	---	---	---	---	---	
March	3/27/14 1:19 PM	40.5	32.2	0	27.3	1	9
April	4/30/14 9:37 AM	51.1	38.6	0	10.3	9	9
May	5/31/14 10:11 AM	42.9	34.0	0.0	23.1	<<>>	0.0
June	06/10/2014 9:06 AM	39.9	32.8	0	27.3	8	8
July	7/31/14 6:41 AM	41.7	33.3	0	25	11	
August	08/29/2014 9:26	32.7	32.2	0	35.1	10	9
September	9/30/14 2:58 PM	35.2	31.2	0	33.6	5	5
October	10/25/14 10:15 AM	30.8	33.7	0.1	35.4	<<>>	<<>>
November	11/25/2014 12:07	24.6	28.4	0.2	46.8	7	7
December	12/30/2014 8:47	30.2	29.7	0.3	39.8	4	3
Average		**36.6**	**---**	**---**	**---**	**---**	**6.7**
VLGW0059							
January	1/20/14 2:15 PM	4.4	4.5	18.5	72.6	<<>>	<<>>
February	---	---	---	---	---	---	---
March	3/27/14 1:37 PM	5.6	5.3	17.3	71.8	<<>>	<<>>
April	4/30/14 9:42 AM	5.4	4.9	17	72.7	1	<<>>
May	5/31/14 10:17 AM	5.3	4.6	17.3	72.8	<<>>	<<>>
June	06/10/2014 9:16 AM	49.1	33.5	3.3	14.1	<<>>	0
July	7/31/14 7:12 AM	32.8	22.2	8.3	36.7	1	0
August	---	---	---	---	---	---	
September	9/30/14 3:07 PM	54.7	36.2	1.7	7.4	2	2
October	10/25/14 10:26 AM	56.9	37.7	1.4	4	8	8
November	---	---	---	---	---	---	
December	12/31/2014 9:44	13.5	10.9	14.5	61.1	<<>>	0
Average		**25.3**	**---**	**---**	**---**	**---**	

Appendix B2, continued

Month	Date	CH4 %	CO2 %	O2 %	Balance %	Init. Flow SCFM	Adj. Flow SCFM
VLGW0060							
January	1/20/14 2:42 PM	37.2	33	0	29.8	25	4
February	---	---	---	---	---	---	
March	3/29/14 11:25 AM	40.7	32.1	0.5	26.7	14	13
April	4/30/14 11:56 AM	59.8	40	0	0.2	8	9
May	5/31/14 11:07 AM	60.6	39.2	0.0	0.2	11.0	16.0
June	06/10/2014 1:37 PM	54.8	37.2	0	8	32	31
July	7/31/14 7:29 AM	60.3	39.6	0	0.1	23	26
August	08/29/2014 13:31	51	37.1	0	11.9	<<>>	7
September	9/30/14 3:27 PM	39.2	34.8	0	26	25	18
October	10/28/14 7:23 AM	38.7	31.8	0	29.5	26	15
November	11/25/2014 13:07	46.1	35	0.3	18.6	12	11
December	12/31/2014 9:31	49.9	34.5	0	15.6	13	13
Average		**48.9**	**35.8**	**0.1**	**15.1**	**18.9**	**14.8**

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

Appendix B3 2014 Hartland Landfill Gas Well Field Data Summary

Name	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Energy (BTU)	Well Production (% of total)	Cumulative Total (%)
HLGW017B	58.6	119.5	12	36,786,023	39,384,955,979	8.20%	8.20%
HLGW016B	54.2	128.5	12	36,586,405	39,171,234,368	8.16%	16.36%
HLGW0013	52.9	115.7	12	32,151,879	34,423,408,773	7.17%	23.53%
HLGW0012	49.3	83.8	12	21,702,425	23,235,701,092	4.84%	28.37%
HLGW008B	46.4	87.8	12	21,400,791	22,912,756,488	4.77%	33.14%
HLGW021B	51.1	56.7	12	15,220,232	16,295,541,706	3.39%	36.54%
HLGW006B	56.3	39.8	12	11,770,876	12,602,488,506	2.62%	39.16%
HLGW0014	49.4	45.3	12	11,755,537	12,586,065,687	2.62%	41.78%
LHGW0022	55.9	58.4	8	11,432,750	12,240,474,092	2.55%	44.33%
HLGW0023	53.2	34.8	12	9,725,416	10,412,516,901	2.17%	46.50%
LHGW0023	49.1	34.1	12	8,795,351	9,416,742,920	1.96%	48.46%
HLGW020B	46.6	35.4	12	8,665,757	9,277,992,600	1.93%	50.39%
HLGW022B	49.4	33.1	12	8,589,587	9,196,440,933	1.92%	52.31%
LHGW0021	48.2	47.0	8	7,933,612	8,494,121,722	1.77%	54.08%
LHGW0020	50.9	38.5	8	6,862,851	7,347,711,500	1.53%	55.61%
LHGW0013	52.7	23.9	12	6,616,462	7,083,915,290	1.48%	57.08%
HLGW030B	51.2	19.9	12	5,352,299	5,730,438,823	1.19%	58.28%
HLGW017A	37.8	26.2	12	5,202,480	5,570,035,130	1.16%	59.44%
HLGW0018	47.9	20.5	12	5,158,301	5,522,735,163	1.15%	60.59%
VLGW016D	50.0	19.1	12	5,016,730	5,371,161,546	1.12%	61.71%
LHGW0019	52.7	27.0	8	4,983,110	5,335,166,328	1.11%	62.82%
VLGW0051	46.4	20.4	12	4,972,393	5,323,692,852	1.11%	63.93%
HLGW031A	52.3	16.3	12	4,478,232	4,794,619,379	1.00%	64.92%
VLGW001D	47.2	17.2	12	4,264,693	4,565,993,497	0.95%	65.88%
VLGW0052	45.5	17.0	12	4,063,288	4,350,359,640	0.91%	66.78%
VLGW017S	68.2	11.3	12	4,048,369	4,334,386,761	0.90%	67.68%
VLGW027D	52.0	14.4	12	3,933,536	4,211,440,592	0.88%	68.56%
VLGW0053	40.4	18.3	12	3,883,737	4,158,122,675	0.87%	69.43%
VLGW0060	48.9	14.8	12	3,801,788	4,070,384,329	0.85%	70.28%
VLGW0055	47.6	14.6	12	3,650,708	3,908,630,815	0.81%	71.09%
VLGW042S	50.1	13.8	12	3,631,902	3,888,495,989	0.81%	71.90%
VLGW0054	42.2	15.7	12	3,480,402	3,726,292,535	0.78%	72.68%
VLGW026S	48.7	13.6	12	3,479,246	3,725,055,199	0.78%	73.45%
HLGW030A	50.2	12.2	12	3,217,221	3,444,517,463	0.72%	74.17%

Appendix B3, continued

Name	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Energy (BTU)	Well Production (% of total)	Cumulative Total (%)
VLGW021S	42.2	14.5	12	3,214,384	3,441,480,367	0.72%	74.89%
VLGW029D	54.8	11.0	12	3,166,581	3,390,299,665	0.71%	75.59%
VLGW0049	54.6	10.8	12	3,097,660	3,316,509,467	0.69%	76.28%
HLGW034A	52.0	13.6	10	3,095,839	3,314,559,726	0.69%	76.97%
HLGW033A	50.4	11.2	12	2,965,281	3,174,778,293	0.66%	77.63%
VLGW019S	42.4	13.3	12	2,962,339	3,171,628,711	0.66%	78.29%
VLGW025S	43.6	12.0	12	2,748,432	2,942,609,132	0.61%	78.91%
VLGW015D	50.3	10.2	12	2,695,166	2,885,579,207	0.60%	79.51%
VLGW023S	44.4	11.2	12	2,612,272	2,796,828,496	0.58%	80.09%
VLGW018D	44.1	11.1	12	2,571,455	2,753,128,051	0.57%	80.66%
VLGW0056	42.1	10.9	12	2,410,604	2,580,913,426	0.54%	81.20%
LHGW0008	42.9	12.7	10	2,385,048	2,553,551,436	0.53%	81.73%
VLGW022D	40.0	10.9	12	2,290,360	2,452,174,277	0.51%	82.24%
VLGW007D	56.6	7.7	12	2,289,415	2,451,161,911	0.51%	82.75%
HLGW008A	36.9	11.8	12	2,287,314	2,448,912,210	0.51%	83.26%
VLGW003S	46.5	9.3	12	2,271,712	2,432,208,179	0.51%	83.77%
HLGW032A	48.8	8.8	12	2,255,900	2,415,279,177	0.50%	84.27%
HLGW0003	50.4	8.5	12	2,250,437	2,409,429,954	0.50%	84.78%
VLGW017D	53.7	7.9	12	2,228,531	2,385,976,820	0.50%	85.27%
VLGW028S	40.8	10.0	12	2,143,273	2,294,695,195	0.48%	85.75%
VLGW015S	43.7	9.0	12	2,066,052	2,212,018,677	0.46%	86.21%
VLGW021D	45.1	8.7	12	2,061,167	2,206,788,121	0.46%	86.67%
VLGW016S	47.6	8.2	12	2,050,398	2,195,258,403	0.46%	87.13%
VLGW012S	36.7	12.6	10	2,024,290	2,167,305,866	0.45%	87.58%
HLGW033B	45.0	8.5	12	2,009,318	2,151,276,745	0.45%	88.03%
VLGW003D	50.0	7.5	12	1,969,920	2,109,094,848	0.44%	88.47%
VLGW032S	43.0	8.7	12	1,965,192	2,104,033,020	0.44%	88.91%
HLGW019C	49.1	7.6	12	1,960,254	2,098,746,223	0.44%	89.34%
VLGW023D	49.7	7.5	12	1,958,100	2,096,440,279	0.44%	89.78%
VLGW009S	45.5	9.8	10	1,951,972	2,089,878,650	0.44%	90.21%
VLGW029S	41.1	8.6	12	1,856,768	1,987,948,440	0.41%	90.63%
HLGW032B	45.6	7.4	12	1,772,613	1,897,847,908	0.40%	91.02%
VLGW008S	45.6	7.3	12	1,748,659	1,872,201,315	0.39%	91.41%
VLGW007S	39.5	8.4	12	1,742,985	1,866,127,122	0.39%	91.80%
HLGW0011	39.3	9.1	11	1,722,117	1,843,784,777	0.38%	92.19%
HLGW034B	46.9	6.8	12	1,675,325	1,793,686,744	0.37%	92.56%

Appendix B3, continued

Name	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Energy (BTU)	Well Production (% of total)	Cumulative Total (%)
VLGW047S	50.6	9.0	8	1,594,847	1,707,523,189	0.36%	92.92%
HLGW006A	31.2	9.3	12	1,524,245	1,631,933,230	0.34%	93.26%
VLGW026D	51.5	5.5	12	1,487,946	1,593,069,642	0.33%	93.59%
VLGW018S	41.6	6.8	12	1,486,003	1,590,988,668	0.33%	93.92%
HLGW0005	45.9	6.1	12	1,470,821	1,574,734,577	0.33%	94.25%
VLGW019D	46.0	5.7	12	1,377,368	1,474,679,118	0.31%	94.55%
VLGW006D	42.5	5.9	12	1,317,220	1,410,281,422	0.29%	94.85%
VLGW0058	36.6	6.7	12	1,288,170	1,379,179,303	0.29%	95.13%
VLGW027S	44.8	5.4	12	1,270,835	1,360,619,268	0.28%	95.42%
VLGW024D	63.1	11.5	4	1,270,642	1,360,413,046	0.28%	95.70%
VLGW0050	36.7	6.4	12	1,233,853	1,321,024,528	0.28%	95.98%
VLGW011S	32.2	9.5	9	1,205,197	1,290,344,228	0.27%	96.25%
HLGW019B	26.2	8.7	12	1,197,396	1,281,992,212	0.27%	96.51%
HLGW0010	35.5	7.4	10	1,149,996	1,231,242,703	0.26%	96.77%
VLGW004S	41.7	6.2	10	1,131,785	1,211,745,293	0.25%	97.02%
VLGW005S	44.5	4.8	12	1,122,066	1,201,340,425	0.25%	97.27%
HLGW031B	38.0	5.3	12	1,057,978	1,132,724,540	0.24%	97.51%
VLGW043S	38.3	5.1	12	1,026,092	1,098,585,324	0.23%	97.74%
VLGW009D	42.8	6.0	9	1,011,751	1,083,231,114	0.23%	97.96%
VLGW006S	36.8	5.2	12	1,005,237	1,076,257,040	0.22%	98.19%
HLGW0001	38.5	4.3	12	869,654	931,095,072	0.19%	98.38%
VLGW031S	37.9	6.8	7	789,737	845,531,438	0.18%	98.56%
VLGW030S	36.9	3.9	12	755,976	809,386,239	0.17%	98.72%
LHGW0003	36.1	3.9	12	739,587	791,838,570	0.16%	98.89%
VLGW022S	34.8	5.4	8	658,111	704,606,407	0.15%	99.04%
VLGW008D	33.9	7.1	6	632,187	676,850,719	0.14%	99.18%
VLGW013D	34.7	4.9	8	595,459	637,527,817	0.13%	99.31%
VLGW033S	28.2	5.9	8	582,676	623,842,135	0.13%	99.44%
VLGW013S	35.4	4.7	8	582,676	623,842,135	0.13%	99.57%
VLGW034S	35.9	3.6	9	509,185	545,158,836	0.11%	99.68%
HLGW0004	38.7	2.7	11	503,157	538,705,006	0.11%	99.80%
LHGW0004	40.9	2.2	9	354,507	379,552,709	0.08%	99.87%
HLGW016A	22.2	10.0	3	291,548	312,146,038	0.07%	99.94%
LHGW002A	38.2	1.6	10	271,740	290,937,917	0.06%	100.00%
VLGW025D	not read	0.0	0	0	0	0.00%	0.00%
VLGW024S	turned off	0.0	0	0	0	0.00%	0.00%

Appendix B3, continued

Name	Average Methane (% by vol)	Average Flow (scfm)	Months in Operation	Methane Annual Flow (scf)	Energy (BTU)	Well Production (% of total)	Cumulative Total (%)
VLGW020S	turned off	0.0	0	0	0	0.00%	0.00%
VLGW020D	turned off	0.0	0	0	0	0.00%	0.00%
VLGW014S	not read	0.0	0	0	0	0.00%	0.00%
VLGW014D	not read	0.0	0	0	0	0.00%	0.00%
VLGW010S	turned off	0.0	0	0	0	0.00%	0.00%
VLGW005D	turned off	0.0	0	0	0	0.00%	0.00%
VLGW0059	turned off	0.0	0	0	0	0.00%	0.00%
VLGW0057	turned off	0.0	0	0	0	0.00%	0.00%
VLGW004D	not read	0.0	0	0	0	0.00%	0.00%
VLGW002S	turned off	0.0	0	0	0	0.00%	0.00%
VLGW002D	turned off	0.0	0	0	0	0.00%	0.00%
VLGW001S	turned off	0.0	0	0	0	0.00%	0.00%
TLGW002C	not read	0.0	0	0	0	0.00%	0.00%
TLGW002B	not read	0.0	0	0	0	0.00%	0.00%
TLGW002A	not read	0.0	0	0	0	0.00%	0.00%
TLGW001B	not read	0.0	0	0	0	0.00%	0.00%
TLGW001A	not read	0.0	0	0	0	0.00%	0.00%
LHGW0017	turned off	0.0	0	0	0	0.00%	0.00%
LHGW0010	decommissioned	0.0	0	0	0	0.00%	0.00%
LHGW0009	decommissioned	0.0	0	0	0	0.00%	0.00%
LHGW0007	turned off	0.0	0	0	0	0.00%	0.00%
LHGW0006	decommissioned	0.0	0	0	0	0.00%	0.00%
HLGW0015	decommissioned	0.0	0	0	0	0.00%	0.00%
HLGW0015	decommissioned	0.0	0	0	0	0.00%	0.00%
HLGW0009	decommissioned	0.0	0	0	0	0.00%	0.00%

APPENDIX C

2013 Gas Collection Data

C1 2014 Hartland Landfill Gas Collection Data

C2 Hartland Landfill Powerhouse Emission Monitoring Report

Appendix C1 2014 Hartland Landfill Gas Collection Data

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Jan-14	46.48		-24.81	86.83	275.26	0	694,878	1,503,082	808,204	1,503,082
2-Jan-14	48.05	0.80	-24.81	87.97	277.51	0	687,995	1,510,774	822,779	1,510,774
3-Jan-14	46.50	0.95	-24.83	84.87	320.04	0	711,608	1,513,123	801,515	1,513,123
4-Jan-14	46.70		-24.83	78.21	302.35	0	675,073	1,490,028	814,955	1,490,028
5-Jan-14	45.91		-24.83	78.20	289.15	0	818,040	1,487,795	669,755	1,487,795
6-Jan-14	47.10	0.90	-24.84	77.65	350.07	0	682,540	1,496,609	814,069	1,496,609
7-Jan-14	47.35	0.85	-24.83	82.60	303.90	0	689,220	1,500,749	811,529	1,500,749
8-Jan-14	48.30	0.70	-24.75	84.49	280.85	0	701,196	1,508,346	807,150	1,508,346
9-Jan-14	51.95	0.55	-21.57	579.75	152.61	289,990	476,264	812,287	336,023	1,102,277
10-Jan-14	49.00	0.70	-15.60	935.21	59.39	504,012	124,418	133,189	8,771	637,201
11-Jan-14	---		-19.91	1,274.68	32.68	699,306	0	27	27	699,333
12-Jan-14	---		-20.65	677.97	227.48	348,370	511,694	748,758	237,064	1,097,128
13-Jan-14	45..95	0.95	-24.24	86.31	383.13	0	675,460	1,463,428	787,968	1,463,428
14-Jan-14	46.85	0.85	-24.71	88.71	416.16	0	660,181	1,464,784	804,603	1,464,784
15-Jan-14	47.00	0.85	-24.85	89.20	320.97	0	704,257	1,504,019	799,762	1,504,019
16-Jan-14	47.10	0.85	-24.94	86.10	300.87	0	741,264	1,544,632	803,368	1,544,632
17-Jan-14	47.25	0.80	-24.95	84.89	322.74	0	747,347	1,547,696	800,349	1,547,696
18-Jan-14	45.44		-23.12	82.17	332.60	0	735,085	1,477,683	742,598	1,477,683
19-Jan-14	---		-14.16	78.43	216.38	0	526,695	959,469	432,774	959,469
20-Jan-14	46.45	1.00	-24.78	86.83	326.76	0	677,704	1,468,425	790,721	1,468,425
21-Jan-14	46.05	1.05	-23.32	80.32	318.06	0	774,828	1,538,047	763,219	1,538,047
22-Jan-14	44.55	1.15	-22.82	87.15	277.05	0	757,632	1,580,408	822,776	1,580,408
23-Jan-14	44.47	1.85	-24.29	85.72	276.99	0	833,102	1,582,363	749,261	1,582,363
24-Jan-14	45.30	1.20	-24.80	82.72	301.19	0	746,591	1,578,255	831,664	1,578,255
25-Jan-14	44.70	0.95	-24.60	83.15	260.58	0	745,537	1,575,355	829,818	1,575,355
26-Jan-14	44.81	1.77	-24.44	82.54	214.41	0	739,028	1,564,947	825,919	1,564,947
27-Jan-14	45.00	0.95	-23.99	81.40	261.10	0	744,771	1,550,101	805,330	1,550,101
28-Jan-14	44.80	1.25	-23.86	86.74	246.23	0	763,177	1,540,799	777,622	1,540,799
29-Jan-14	48.35	0.80	-23.78	86.63	296.72	0	724,681	1,546,456	821,775	1,546,456
30-Jan-14	47.54	0.93	-22.09	85.14	261.10	0	983,561	1,485,130	501,569	1,485,130
31-Jan-14	46.43	0.71	-22.24	84.54	334.18	0	682,217	1,483,470	801,253	1,483,470

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Feb-14	44.94	0.88	-23.47	78.91	291.62	0.00	700,850.00	1,517,915.00	817,065	1,517,915
2-Feb-14	44.83	0.78	-23.95	84.78	271.97	0.00	711,754.00	1,532,385.00	820,631	1,532,385
3-Feb-14	45.37	0.74	-23.37	83.93	310.08	0.00	717,468.00	1,531,103.00	813,635	1,531,103
4-Feb-14	44.40	0.94	-24.13	76.65	384.78	0.00	700,417.00	1,520,315.00	819,898	1,520,315
5-Feb-14	43.55	1.06	-24.77	74.49	416.31	0.00	913,508.00	1,496,104.00	582,596	1,496,104
6-Feb-14	43.58	0.96	-24.77	73.59	473.55	0.00	690,843.00	1,500,963.00	810,120	1,500,963
7-Feb-14	42.36	0.50	-23.92	78.14	321.62	0.00	933,640.00	1,477,338.00	543,698	1,477,338
8-Feb-14	45.88	0.86	-23.32	78.71	343.32	0.00	654,894.00	1,454,495.00	799,601	1,454,495
9-Feb-14	44.75	0.89	-23.68	76.60	404.15	0.00	659,815.00	1,463,989.00	804,174	1,463,989
10-Feb-14	45.51	0.95	-23.83	82.33	314.15	0.00	657,199.00	1,475,950.00	818,751	1,475,950
11-Feb-14	46.38	0.80	-23.39	82.53	345.45	0.00	671,499.00	1,483,248.00	811,749	1,483,248
12-Feb-14	47.07	0.71	-23.96	84.26	314.73	0.00	692,855.00	1,502,513.00	809,658	1,502,513
13-Feb-14	47.63	---	-23.15	83.15	358.77	0.00	678,282.00	1,451,238.00	772,956	1,451,238
14-Feb-14	46.49	0.81	-24.31	81.80	348.33	0.00	688,888.00	1,518,921.00	830,033	1,518,921
15-Feb-14	47.58	0.76	-24.19	81.90	402.28	0.00	699,958.00	1,515,378.00	815,420	1,515,378
16-Feb-14	49.42	0.52	-21.85	84.99	317.01	0.00	740,458.00	1,432,481.00	692,023	1,432,481
17-Feb-14	49.79	0.49	-19.24	78.91	345.36	0.00	834,602.00	1,326,613.00	492,011	1,326,613
18-Feb-14	48.31	0.64	-24.25	80.16		0.00	694,877.00	1,488,789.00	793,912	1,488,789
19-Feb-14	46.60	---	-22.61	81.86	326.86	0.00	671,307.00	1,420,778.00	749,471	1,420,778
20-Feb-14	46.89	0.80	-24.66	77.67	376.10	0.00	687,274.00	1,497,827.00	810,553	1,497,827
21-Feb-14	46.83	0.78	-24.60	77.45	377.92	0.00	680,103.00	1,497,923.00	---	---
22-Feb-14	45.79	0.91	-24.69	81.98	317.71	0.00	674,820.00	1,508,825.00	834,005	1,508,825
23-Feb-14	46.70	0.80	-24.66	81.64	247.44	0.00	690,489.00	1,514,361.00	823,872	1,514,361
24-Feb-14	---	---	-14.01	74.95	238.47	0.00	467,533.00	919,829.00	452,296	919,829
25-Feb-14	42.10	---	-20.91	78.22	320.03	0.00	638,631.00	1,300,691.00	662,060	1,300,691
26-Feb-14	47.56	0.77	-24.69	72.21	348.42	0.00	689,009.00	1,504,618.00	815,609	1,504,618
27-Feb-14	48.95	0.73	-24.59	77.79	329.18	0.00	673,095.00	1,470,171.00	797,076	1,470,171
28-Feb-14	48.57	0.71	-23.77	82.14	307.76	0.00	674,079.00	1,487,400.00	813,321	1,487,400

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Mar-14	47.40	0.74	-23.13	78.86	329.59	0.00	686,742.00	1,514,496.00	827,754	1,514,496
2-Mar-14	44.01	2.13	-22.49	81.30	398.88	0.00	682,455.00	1,548,950.00	866,495	1,548,950
3-Mar-14	44.03	2.11	-23.14	82.09	307.51	0.00	703,472.00	1,565,788.00	862,316	1,565,788
4-Mar-14	45.07	1.20	-24.23	84.40	361.95	0.00	688,942.00	1,547,734.00	858,792	1,547,734
5-Mar-14	44.82	0.78	-24.69	81.71	308.55	0.00	757,398.00	1,530,444.00	773,046	1,530,444
6-Mar-14	47.65	0.51	-25.49	82.53	298.02	0.00	705,677.00	1,527,149.00	821,472	1,527,149
7-Mar-14	46.29	0.72	-24.52	86.54	364.50	0.00	667,062.00	1,500,990.00	833,928	1,500,990
8-Mar-14	44.96	0.91	-24.48	86.85	341.63	0.00	612,756.00	1,457,164.00	844,408	1,457,164
9-Mar-14	48.62	0.64	-24.45	86.62	307.56	0.00	629,939.00	1,436,642.00	806,703	1,436,642
10-Mar-14	49.51	0.79	-25.45	88.58	379.69	0.00	571,529.00	1,351,775.00	780,246	1,351,775
11-Mar-14	46.31	0.91	-24.45	82.15	371.46	0.00	585,134.00	1,414,920.00	829,786	1,414,920
12-Mar-14	45.16	0.90	-24.48	78.06	303.92	0.00	591,543.00	1,431,723.00	840,180	1,431,723
13-Mar-14	47.10	0.74	-24.50	79.32	329.64	0.00	617,733.00	1,440,570.00	822,837	1,440,570
14-Mar-14	47.67	0.72	-24.51	82.11	340.85	0.00	621,321.00	1,437,643.00	816,322	1,437,643
15-Mar-14	47.17	0.79	-24.48	82.24	381.34	0.00	649,850.00	1,427,040.00	777,190	1,427,040
16-Mar-14	47.06	0.73	-24.48	85.29	339.60	0.00	621,151.00	1,436,359.00	815,208	1,436,359
17-Mar-14	47.94	0.67	-24.50	83.10	394.10	0.00	679,442.00	1,426,557.00	747,115	1,426,557
18-Mar-14	46.78	0.83	-24.52	79.94	334.91	0.00	657,628.00	1,418,466.00	760,838	1,418,466
19-Mar-14	46.25	---	-23.62	84.87	285.78	0.00	757,574.00	1,411,497.00	653,923	1,411,497
20-Mar-14	48.02	0.70	-24.53	79.17	391.38	0.00	687,541.00	1,486,509.00	798,968	1,486,509
21-Mar-14	46.57	0.81	-24.51	79.41	334.58	0.00	645,927.00	1,464,493.00	818,566	1,464,493
22-Mar-14	47.41	0.70	-24.47	77.04	371.80	0.00	597,231.00	1,402,592.00	805,361	1,402,592
23-Mar-14	48.46	0.49	-24.31	238.75	310.49	94,586.00	505,552.00	1,182,389.00	676,837	1,276,975
24-Mar-14	46.37	0.53	-23.91	653.46	227.85	334,090.00	395,188.00	822,435.00	427,247	1,156,525
25-Mar-14	50.32	0.49	-24.48	81.52	359.48	0.00	639,429.00	1,376,355.00	736,926	1,376,355
26-Mar-14	52.12	0.39	-24.45	86.01	309.74	0.00	857,106.00	1,370,762.00	513,656	1,370,762
27-Mar-14	51.86	0.44	-24.46	83.47	389.91	0.00	576,381.00	1,352,121.00	775,740	1,352,121
28-Mar-14	51.19	0.50	-24.47	84.25	347.50	0.00	600,498.00	1,375,685.00	775,187	1,375,685
29-Mar-14	51.54	0.46	-24.52	86.37	351.56	0.00	645,891.00	1,428,866.00	782,975	1,428,866
30-Mar-14	50.19	0.56	-24.44	83.30	303.56	0.00	820,182.00	1,435,508.00	615,326	1,435,508
31-Mar-14	47.79	0.69	-24.54	82.34	378.30	0.00	645,486.00	1,446,375.00	800,889	1,446,375

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Apr-14	48.27	0.60	-24.44	83.26	326.36	0.00	690,540.00	1,495,024.00	804,484	1,495,024
2-Apr-14	47.66	0.68	-24.27	82.94	344.61	0.00	678,733.00	1,486,546.00	807,813	1,486,546
3-Apr-14	46.77	0.72	-24.37	84.86	304.32	0.00	680,804.00	1,503,289.00	822,485	1,503,289
4-Apr-14	47.45	0.64	-23.93	88.12	281.19	0.00	683,373.00	1,494,715.00	811,342	1,494,715
5-Apr-14	47.01	0.73	-23.97	83.71	376.40	0.00	674,341.00	1,498,326.00	823,985	1,498,326
6-Apr-14	46.64	0.71	-24.19	87.70	303.76	0.00	674,341.00	1,504,225.00	829,884	1,504,225
7-Apr-14	45.31	0.80	-24.54	86.55	341.11	0.00	682,320.00	1,517,521.00	835,201	1,517,521
8-Apr-14	46.11	0.68	-24.37	90.83	285.69	0.00	693,991.00	1,521,231.00	827,240	1,521,231
9-Apr-14	47.24	0.60	-24.42	88.94	377.03	0.00	710,347.00	1,459,214.00	748,867	1,459,214
10-Apr-14	46.87	0.62	-24.53	83.32	334.37	0.00	820,021.00	1,436,546.00	616,525	1,436,546
11-Apr-14	47.39	0.52	-24.49	82.22	348.68	0.00	606,561.00	1,413,825.00	---	---
12-Apr-14	48.85	0.13	-24.51	81.68	376.68	0.00	585,787.00	1,375,156.00	789,369	1,375,156
13-Apr-14	48.81	0.01	-24.43	80.13	369.63	0.00	543,899.00	1,331,419.00	787,520	1,331,419
14-Apr-14	48.96	0.02	-24.38	80.29	438.87	0.00	529,952.00	1,294,266.00	764,314	1,294,266
15-Apr-14	49.86	0.02	-24.20	129.81	389.91	29,220.00	557,208.00	1,243,362.00	686,154	1,272,582
16-Apr-14	48.49		-22.97	530.32	285.74	259,130.00	395,424.00	864,365.00	468,941	1,123,495
17-Apr-14	50.87	0.39	-23.95	83.10	397.54	0.00	525,226.00	1,285,372.00	760,146	1,285,372
18-Apr-14	52.17	0.33	-23.03	82.17	455.10	0.00	552,773.00	1,301,212.00	748,439	1,301,212
19-Apr-14	50.02	0.54	-24.53	80.32	412.17	0.00	583,075.00	1,373,040.00	789,965	1,373,040
20-Apr-14	50.91	0.46	-24.20	82.54	410.29	0.00	565,744.00	1,326,242.00	760,498	1,326,242
21-Apr-14	49.39	0.47	-24.49	83.59	394.08	0.00	554,540.00	1,331,532.00	776,992	1,331,532
22-Apr-14	50.81	0.39	-24.48	84.28	360.17	0.00	561,844.00	1,334,487.00	772,643	1,334,487
23-Apr-14	51.13	0.41	-24.46	78.84	421.72	0.00	557,909.00	1,327,316.00	769,407	1,327,316
24-Apr-14	51.09	0.41	-24.24	82.89	406.70	0.00	557,558.00	1,317,658.00	760,100	1,317,658
25-Apr-14	51.81	0.37	-23.86	81.69	437.78	0.00	545,220.00	1,294,682.00	749,462	1,294,682
26-Apr-14	50.95	0.41	-24.46	82.06	389.01	0.00	547,984.00	1,311,765.00	763,781	1,311,765
27-Apr-14	51.87	0.28	-23.94	130.70	400.95	29,770.00	527,685.00	1,246,395.00	718,710	1,276,165
28-Apr-14			-17.54	602.89	191.29	303,860.00	246,507.00	488,920.00	242,413	792,780
29-Apr-14			-24.33	789.08	161.76	404,310.00	619,191.00	694,436.00	75,245	1,098,746
30-Apr-14			-24.50	1,598.68	30.86	1,300,000.00	0.00	0.00	-	1,300,000

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-May-14	---	---	-23.58	974.13	170.60	499,450.00	217,160.00	494,323.00	277,163	993,773
2-May-14	50.61	0.27	-24.22	361.26	346.37	158,270.00	488,418.00	1,026,275.00	537,857	1,184,545
3-May-14	45.67	0.16	-23.73	1,596.09	30.08	1,300,000.00	0.00	0.00	-	1,300,000
4-May-14	44.98	0.15	-24.79	1,602.16	30.88	1,300,000.00	0.00	0.00	-	1,300,000
5-May-14	44.91	0.15	-25.73	1,581.45	30.02	1,300,000.00	0.00	0.00	-	1,300,000
6-May-14	45.62	0.28	-25.20	1,201.81	95.55	638,440.00	269,193.00	322,411.00	53,218	960,851
7-May-14	43.40	0.35	-25.74	1,588.34	29.61	1,300,000.00	0.00	0.00	-	1,300,000
8-May-14	43.33	0.33	-25.74	1,590.91	30.09	1,300,000.00	0.00	0.00	-	1,300,000
9-May-14	43.13	0.33	-25.73	1,579.10	32.07	1,300,000.00	0.00	0.00	-	1,300,000
10-May-14	46.05	0.53	-24.58	876.73	209.01	453,340.00	307,418.00	603,912.00	296,494	1,057,252
11-May-14	48.32	1.17	-24.87	88.08	385.03	0.00	525,476.00	1,313,523.00	788,047	1,313,523
12-May-14	49.97	0.38	-25.71	87.76	368.73	0.00	544,192.00	1,312,907.00	768,715	1,312,907
13-May-14	50.29	0.35	-25.65	88.13	386.65	0.00	536,638.00	1,311,575.00	774,937	1,311,575
14-May-14	50.59	0.35	-25.71	86.37	419.10	0.00	539,544.00	1,305,429.00	765,885	1,305,429
15-May-14	51.26	0.30	-25.69	86.86	414.26	0.00	546,343.00	1,307,070.00	760,727	1,307,070
16-May-14	52.55	0.24	-24.50	86.96	426.86	0.00	527,062.00	1,277,941.00	750,879	1,277,941
17-May-14	51.78	0.29	-24.67	85.75	421.44	0.00	532,058.00	1,294,488.00	762,430	1,294,488
18-May-14	52.04	0.29	-25.24	87.19	403.83	0.00	557,898.00	1,327,605.00	769,707	1,327,605
19-May-14	52.07	0.31	-25.41	87.36	374.39	0.00	552,416.00	1,328,563.00	776,147	1,328,563
20-May-14	51.16	0.35	-25.69	86.79	343.65	0.00	548,842.00	1,327,978.00	779,136	1,327,978
21-May-14	51.02	0.33	-25.74	87.79	374.56	0.00	549,720.00	1,329,884.00	780,164	1,329,884
22-May-14	51.01	0.33	-25.77	87.29	400.48	0.00	549,720.00	1,330,432.00	780,712	1,330,432
23-May-14	51.46	0.32	-25.96	87.75	361.86	0.00	551,216.00	1,339,584.00	788,368	1,339,584
24-May-14	51.37	0.33	-26.07	87.22	422.35	0.00	564,367.00	1,339,266.00	774,899	1,339,266
25-May-14	50.86	0.36	-25.40	86.86	357.91	0.00	580,737.00	1,368,771.00	788,034	1,368,771
26-May-14	51.00	0.39	-22.42	86.49	364.63	0.00	582,706.00	1,351,866.00	769,160	1,351,866
27-May-14	50.64	0.48	-22.53	84.38	414.86	0.00	566,621.00	1,350,180.00	783,559	1,350,180
28-May-14	50.48	0.45	-22.39	85.36	385.68	0.00	567,018.00	1,347,773.00	780,755	1,347,773
29-May-14	48.58	0.47	-22.93	85.55	358.03	0.00	622,970.00	1,343,034.00	720,064	1,343,034
30-May-14	49.29	0.59	-25.87	85.71	367.87	0.00	646,946.00	1,437,229.00	790,283	1,437,229
31-May-14	50.29	0.42	-25.60	86.47	332.00	0.00	662,186.00	1,453,058.00	790,872	1,453,058

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Jun-14	49.57	0.44	-25.85	87.77	289.69	0.00	684,071.00	1,494,702.00	810,631	1,494,702
2-Jun-14	49.38	0.42	-25.77	88.89	290.86	0.00	682,278.00	1,495,231.00	812,953	1,495,231
3-Jun-14	50.08	0.38	-24.82	88.98	312.09	0.00	671,128.00	1,462,942.00	791,814	1,462,942
4-Jun-14	47.97	0.93	-22.90	90.14	323.66	0.00	627,212.00	1,359,795.00	732,583	1,359,795
5-Jun-14	48.66	0.42	-24.99	88.93	300.30	0.00	701,213.00	1,471,998.00	770,785	1,471,998
6-Jun-14	48.85	0.43	-25.40	88.92	320.67	0.00	659,903.00	1,476,075.00	816,172	1,476,075
7-Jun-14	49.02	0.43	-25.47	88.32	330.51	0.00	649,074.00	1,468,269.00	819,195	1,468,269
8-Jun-14	49.32	0.38	-25.87	89.53	338.46	0.00	634,327.00	1,443,971.00	809,644	1,443,971
9-Jun-14	50.18	0.29	-25.94	88.67	329.63	0.00	746,606.00	1,423,605.00	676,999	1,423,605
10-Jun-14	50.31	0.29	-25.78	87.62	352.53	0.00	624,011.00	1,419,504.00	795,493	1,419,504
11-Jun-14	50.51	0.27	-24.96	83.50	326.96	0.00	757,571.00	1,396,311.00	638,740	1,396,311
12-Jun-14	51.35	0.21	-23.97	86.60	358.58	0.00	587,448.00	1,368,658.00	781,210	1,368,658
13-Jun-14	52.38	0.18	-22.16	86.81	404.46	0.00	654,772.00	1,314,244.00	659,472	1,314,244
14-Jun-14	51.57	0.24	-22.42	85.41	455.25	0.00	546,497.00	1,322,697.00	776,200	1,322,697
15-Jun-14	50.90	0.23	-23.06	86.78	428.04	0.00	559,600.00	1,340,992.00	781,392	1,340,992
16-Jun-14	52.24	0.16	-21.64	84.95	467.15	0.00	546,631.00	1,295,041.00	748,410	1,295,041
17-Jun-14	52.13	0.18	-21.33	86.69	429.46	0.00	579,340.00	1,284,901.00	705,561	1,284,901
18-Jun-14	51.60	0.22	-21.84	87.19	425.79	0.00	571,977.00	1,294,195.00	722,218	1,294,195
19-Jun-14	51.55	0.20	-21.96	86.74	426.45	0.00	530,375.00	1,304,204.00	773,829	1,304,204
20-Jun-14	52.11	0.17	-20.87	87.69	410.96	0.00	573,443.00	1,270,173.00	696,730	1,270,173
21-Jun-14	51.41	0.21	-21.48	84.88	394.35	0.00	691,260.00	1,281,166.00	589,906	1,281,166
22-Jun-14	51.84	0.17	-21.13	86.37	393.43	0.00	563,610.00	1,269,841.00	706,231	1,269,841
23-Jun-14	52.43	0.14	-20.61	87.69	378.93	0.00	526,192.00	1,259,422.00	733,230	1,259,422
24-Jun-14	52.54	0.15	-20.45	86.99	367.44	0.00	530,231.00	1,249,246.00	719,015	1,249,246
25-Jun-14	52.34	0.16	-20.43	87.49	399.10	0.00	501,671.00	1,251,990.00	750,319	1,251,990
26-Jun-14	53.65	0.07	-19.32	88.29	480.24	0.00	480,468.00	1,217,954.00	737,486	1,217,954
27-Jun-14	54.37	0.06	-18.39	86.51	519.34	0.00	446,414.00	1,183,527.00	737,113	1,183,527
28-Jun-14	46.61	0.22	-20.31	754.10	189.29	374,330.00	296,072.00	556,359.00	260,287	930,689
29-Jun-14	48.74	0.15	-25.51	734.86	219.44	366,770.00	402,898.00	786,894.00	383,996	1,153,664
30-Jun-14	49.54	0.31	-26.21	88.23	344.26	0.00	619,337.00	1,395,778.00	776,441	1,395,778

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Jul-14	50.33	0.24	-26.24	87.99	360.66	0.00	609,418.00	1,389,647.00	780,229	1,389,647
2-Jul-14	51.89	0.19	-26.15	87.75	329.26	0.00	697,991.00	1,396,297.00	698,306	1,396,297
3-Jul-14	50.94	0.22	-24.72	182.36	322.64	50,990.00	601,523.00	1,269,060.00	667,537	1,320,050
4-Jul-14	49.84	0.30	-26.47	85.77	370.01	0.00	628,203.00	1,421,949.00	793,746	1,421,949
5-Jul-14	50.16	0.28	-26.24	85.55	325.28	0.00	615,459.00	1,400,961.00	785,502	1,400,961
6-Jul-14	49.94	0.31	-26.93	87.06	341.49	0.00	624,398.00	1,411,118.00	786,720	1,411,118
7-Jul-14	49.93	0.30	-27.17	87.54	321.27	0.00	624,363.00	1,417,256.00	792,893	1,417,256
8-Jul-14	50.50	0.27	-27.22	89.95	325.61	0.00	618,220.00	1,415,009.00	796,789	1,415,009
9-Jul-14	49.66	0.25	-26.35	401.17	240.68	174,497.00	520,888.00	1,116,092.00	595,204	1,290,589
10-Jul-14	50.64	0.28	-26.84	89.20	316.95	0.00	622,557.00	1,418,360.00	795,803	1,418,360
11-Jul-14	50.96	0.26	-26.75	87.26	328.46	0.00	621,937.00	1,418,578.00	796,641	1,418,578
12-Jul-14	50.78	0.29	-26.43	87.52	335.89	0.00	609,617.00	1,407,853.00	798,236	1,407,853
13-Jul-14	50.87	0.33	-26.46	87.80	324.38	0.00	607,996.00	1,397,842.00	789,846	1,397,842
14-Jul-14	51.17	0.30	-26.29	87.10	343.45	0.00	604,569.00	1,398,169.00	793,600	1,398,169
15-Jul-14	51.20	0.31	-26.12	87.57	350.50	0.00	601,395.00	1,389,521.00	788,126	1,389,521
16-Jul-14	51.31	0.29	-25.90	87.63	353.15	0.00	604,664.00	1,382,119.00	777,455	1,382,119
17-Jul-14	51.84	0.25	-26.26	87.77	336.02	0.00	606,110.00	1,398,448.00	792,338	1,398,448
18-Jul-14	51.16	0.28	-27.30	90.17	338.21	0.00	669,619.00	1,431,146.00	761,527	1,431,146
19-Jul-14	50.89	0.28	-26.34	89.15	387.69	0.00	604,128.00	1,399,587.00	795,459	1,399,587
20-Jul-14	51.35	0.26	-26.40	89.86	405.67	0.00	653,140.00	1,406,160.00	753,020	1,406,160
21-Jul-14	50.90	0.28	-27.25	90.12	352.42	0.00	629,977.00	1,427,213.00	797,236	1,427,213
22-Jul-14	50.66	0.29	-27.26	90.49	341.08	0.00	630,854.00	1,426,878.00	796,024	1,426,878
23-Jul-14	50.58	0.28	-27.26	89.34	332.67	0.00	606,656.00	1,413,279.00	806,623	1,413,279
24-Jul-14	50.48	0.27	-27.23	89.35	309.35	0.00	623,946.00	1,423,789.00	799,843	1,423,789
25-Jul-14	49.88	0.31	-26.85	86.35	387.29	0.00	600,345.00	1,403,171.00	802,826	1,403,171
26-Jul-14	50.31	0.29	-26.83	89.25	334.45	0.00	600,645.00	1,397,410.00	796,765	1,397,410
27-Jul-14	50.41	0.29	-26.44	89.21	340.51	0.00	589,214.00	1,385,790.00	796,576	1,385,790
28-Jul-14	50.82	0.25	-25.98	88.60	358.66	0.00	585,845.00	1,376,421.00	790,576	1,376,421
29-Jul-14	51.32	0.25	-25.41	88.57	349.19	0.00	573,495.00	1,371,565.00	798,070	1,371,565
30-Jul-14	51.11	0.28	-26.03	89.24	323.14	0.00	626,515.00	1,429,322.00	802,807	1,429,322
31-Jul-14	50.58	0.33	-26.46	90.04	325.81	0.00	643,955.00	1,460,133.00	816,178	1,460,133

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Aug-14	50.62	0.34	-24.40	89.93	319.67	0.00	633,511.00	1,446,498.00	812,987	1,446,498
2-Aug-14	51.36	0.28	-23.06	89.43	332.72	0.00	602,947.00	1,396,938.00	793,991	1,396,938
3-Aug-14	51.50	0.29	-24.20	89.68	317.63	0.00	640,774.00	1,428,056.00	787,282	1,428,056
4-Aug-14	51.07	0.29	-25.07	89.37	308.20	0.00	719,115.00	1,453,554.00	734,439	1,453,554
5-Aug-14	51.32	0.29	-24.72	89.64	251.56	0.00	724,862.00	1,441,428.00	716,566	1,441,428
6-Aug-14	50.88	0.32	-24.94	89.64	280.13	0.00	789,309.00	1,445,665.00	656,356	1,445,665
7-Aug-14	50.66	0.32	-24.05	90.74	269.04	0.00	811,101.00	1,413,786.00	602,685	1,413,786
8-Aug-14	50.57	0.30	-23.04	191.64	279.36	53,910.00	659,801.00	1,294,283.00	634,482	1,348,193
9-Aug-14	50.56	0.31	-23.82	89.14	346.85	0.00	618,889.00	1,425,260.00	806,371	1,425,260
10-Aug-14	50.29	0.33	-24.86	90.31	301.17	0.00	777,548.00	1,443,460.00	665,912	1,443,460
11-Aug-14	51.11	0.27	-23.00	88.99	322.76	0.00	676,540.00	1,380,759.00	704,219	1,380,759
12-Aug-14	52.51	0.20	-21.50	89.12	354.40	0.00	632,482.00	1,342,505.00	710,023	1,342,505
13-Aug-14	52.84	0.23	-20.95	91.43	344.60	0.00	624,053.00	1,327,736.00	703,683	1,327,736
14-Aug-14			-22.23	336.80	261.47	135,350.00	566,813.00	1,122,542.00	555,729	1,257,892
15-Aug-14	50.51	0.31	-24.66	91.61	343.85	0.00	647,405.00	1,456,341.00	808,936	1,456,341
16-Aug-14	50.51	0.32	-23.79	91.56	340.37	0.00	613,527.00	1,410,201.00	796,674	1,410,201
17-Aug-14	50.83	0.30	-23.14	92.50	328.51	0.00	583,716.00	1,374,400.00	790,684	1,374,400
18-Aug-14	50.84	0.28	-23.97	89.29	331.99	0.00	606,617.00	1,407,263.00	800,646	1,407,263
19-Aug-14	51.90	0.22	-22.85	89.07	352.55	0.00	582,905.00	1,373,868.00	790,963	1,373,868
20-Aug-14	52.55	0.21	-22.01	111.73	381.97	14,150.00	582,658.00	1,327,836.00	745,178	1,341,986
21-Aug-14	48.97	0.30	-24.87	551.07	254.95	252,530.00	480,185.00	995,523.00	515,338	1,248,053
22-Aug-14	49.97	0.34	-24.79	89.22	331.56	0.00	642,723.00	1,377,554.00	734,831	1,377,554
23-Aug-14	49.85	0.35	-25.07	89.96	287.97	0.00	807,364.00	1,372,799.00	565,435	1,372,799
24-Aug-14	50.14	0.32	-24.74	89.33	332.62	0.00	619,845.00	1,432,557.00	812,712	1,432,557
25-Aug-14	50.93	0.29	-23.90	89.00	338.04	0.00	609,459.00	1,409,657.00	800,198	1,409,657
26-Aug-14	50.82	0.30	-24.01	88.81	334.09	0.00	602,765.00	1,408,558.00	805,793	1,408,558
27-Aug-14	50.68	0.30	-23.82	88.33	321.47	0.00	596,534.00	1,398,786.00	802,252	1,398,786
28-Aug-14	50.80	0.30	-23.77	87.78	339.39	0.00	594,506.00	1,398,656.00	804,150	1,398,656
29-Aug-14	50.59	0.31	-23.87	89.08	350.52	0.00	597,319.00	1,403,512.00	806,193	1,403,512
30-Aug-14	50.63	0.33	-23.78	90.92	351.02	0.00	610,566.00	1,414,166.00	803,600	1,414,166
31-Aug-14	50.56	0.35	-23.51	90.34	350.60	0.00	603,894.00	1,406,425.00	802,531	1,406,425

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Sep-14	49.84	0.39	-24.02	90.06	351.42	0.00	613,555.00	1,418,414.00	804,859	1,418,414
2-Sep-14	49.67	0.38	-24.32	88.39	345.48	0.00	611,866.00	1,419,513.00	807,647	1,419,513
3-Sep-14	50.36	0.33	-23.33	88.14	310.17	0.00	636,839.00	1,401,309.00	764,470	1,401,309
4-Sep-14	48.20	0.37	-22.87	85.25	295.60	0.00	630,872.00	1,460,481.00	829,609	1,460,481
5-Sep-14	47.31	0.31	-22.56	84.29	284.09	0.00	724,061.00	1,495,204.00	771,143	1,495,204
6-Sep-14	47.32	0.30	-22.42	85.20	280.77	0.00	704,653.00	1,500,910.00	796,257	1,500,910
7-Sep-14	47.66	0.29	-20.74	207.78	254.82	63,280.00	804,237.00	1,379,391.00	575,154	1,442,671
8-Sep-14	46.27	0.39	-20.95	88.20	220.82	0.00	800,200.00	1,583,742.00	783,542	1,583,742
9-Sep-14	46.61	0.41	-19.17	86.06	258.50	0.00	732,979.00	1,507,695.00	774,716	1,507,695
10-Sep-14	46.97	0.47	-18.09	85.96	337.49	0.00	590,939.00	1,424,831.00	833,892	1,424,831
11-Sep-14	49.15	0.38	-17.60	83.50	461.55	0.00	518,100.00	1,312,866.00	794,766	1,312,866
12-Sep-14	49.52	0.38	-18.20	81.87	425.02	0.00	557,480.00	1,332,872.00	775,392	1,332,872
13-Sep-14	50.47	0.35	-18.74	81.21	344.82	0.00	564,330.00	1,353,715.00	789,385	1,353,715
14-Sep-14	50.90	0.36	-18.81	82.61	365.12	0.00	567,262.00	1,355,801.00	788,539	1,355,801
15-Sep-14	50.97	0.36	-18.59	82.31	364.59	0.00	553,996.00	1,339,546.00	785,550	1,339,546
16-Sep-14	51.30	0.34	-18.33	82.59	342.16	0.00	547,459.00	1,324,824.00	777,365	1,324,824
17-Sep-14	51.29	0.36	-18.36	87.24	340.53	0.00	546,748.00	1,326,010.00	779,262	1,326,010
18-Sep-14	51.52	0.34	-18.26	90.33	356.66	0.00	541,556.00	1,320,378.00	778,822	1,320,378
19-Sep-14	51.03	0.37	-19.04	89.55	376.53	0.00	568,237.00	1,333,142.00	764,905	1,333,142
20-Sep-14	49.73	0.44	-19.80	90.44	344.69	0.00	554,120.00	1,351,034.00	796,914	1,351,034
21-Sep-14	50.50	0.38	-19.42	85.47	355.91	0.00	604,948.00	1,341,144.00	736,196	1,341,144
22-Sep-14	51.55	0.33	-18.57	85.13	286.22	0.00	650,642.00	1,306,983.00	656,341	1,306,983
23-Sep-14	49.85		-17.70	89.65	290.55	0.00	665,891.00	1,256,084.00	590,193	1,256,084
24-Sep-14	48.89	0.33	-19.51	550.64	226.92	260,950.00	429,446.00	936,350.00	506,904	1,197,300
25-Sep-14	50.45	0.39	-20.15	89.50	323.86	0.00	580,576.00	1,356,854.00	776,278	1,356,854
26-Sep-14	50.16	0.41	-20.41	89.12	341.36	0.00	580,576.00	1,363,189.00	782,613	1,363,189
27-Sep-14	49.70	0.45	-20.75	86.97	378.99	0.00	575,315.00	1,360,287.00	784,972	1,360,287
28-Sep-14	49.52	0.44	-20.98	80.29	330.52	0.00	577,134.00	1,366,300.00	789,166	1,366,300
29-Sep-14	50.67	0.35	-21.00	81.20	330.12	0.00	587,580.00	1,369,604.00	782,024	1,369,604
30-Sep-14	50.53	0.37	-20.93	86.53	374.36	0.00	591,607.00	1,361,992.00	770,385	1,361,992

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Oct-14	48.28		-20.18	434.54	261.09	201,380.00	488,328.00	1,049,016.00	560,688	1,250,396
2-Oct-14	49.49	0.50	-20.97	85.79	322.20	0.00	648,785.00	1,448,498.00	799,713	1,448,498
3-Oct-14	49.38	0.53	-21.27	85.29	321.04	0.00	640,453.00	1,443,837.00	803,384	1,443,837
4-Oct-14	50.71	0.46	-21.48	85.28	311.79	0.00	656,277.00	1,453,177.00	796,900	1,453,177
5-Oct-14	50.84	0.46	-21.45	91.15	305.54	0.00	649,626.00	1,441,397.00	791,771	1,441,397
6-Oct-14	51.10	0.43	-21.50	90.09	316.57	0.00	640,671.00	1,435,520.00	794,849	1,435,520
7-Oct-14	51.46	0.43	-21.49	83.98	308.49	0.00	634,637.00	1,437,661.00	803,024	1,437,661
8-Oct-14	51.63	0.44	-21.42	90.03	289.30	0.00	638,233.00	1,436,893.00	798,660	1,436,893
9-Oct-14	51.15	0.48	-21.44	90.21	286.83	0.00	631,131.00	1,423,972.00	792,841	1,423,972
10-Oct-14	50.41	0.43	-21.17	196.73	264.94	61,740.00	588,388.00	1,316,013.00	727,625	1,377,753
11-Oct-14	50.77	0.46	-21.40	89.00	310.87	0.00	632,943.00	1,437,293.00	804,350	1,437,293
12-Oct-14	50.70	0.50	-21.44	84.61	373.01	0.00	632,943.00	1,433,103.00	800,160	1,433,103
13-Oct-14	50.51	0.51	-21.41	87.42	317.34	0.00	632,943.00	1,430,569.00	797,626	1,430,569
14-Oct-14	52.91	0.39	-21.12	86.45	320.29	0.00	638,688.00	1,417,938.00	779,250	1,417,938
15-Oct-14	50.81		-20.13	86.54	307.76	0.00	675,044.00	1,360,114.00	685,070	1,360,114
16-Oct-14	51.64	0.50	-20.99	85.25	347.82	0.00	616,665.00	1,410,593.00	793,928	1,410,593
17-Oct-14	50.53	0.47	-21.46	85.55	320.77	0.00	612,504.00	1,431,188.00	818,684	1,431,188
18-Oct-14	51.67	0.45	-21.60	86.42	284.21	0.00	669,774.00	1,440,858.00	771,084	1,440,858
19-Oct-14	50.90	0.50	-21.96	87.80	298.07	0.00	631,109.00	1,449,129.00	818,020	1,449,129
20-Oct-14	52.31	0.42	-21.98	85.73	314.89	0.00	650,414.00	1,442,796.00	792,382	1,442,796
21-Oct-14	49.62	0.48	-21.41	471.79	262.10	220,630.00	464,076.00	1,046,009.00	581,933	1,266,639
22-Oct-14	51.31	0.48	-21.74	84.55	334.28	0.00	668,156.00	1,465,589.00	797,433	1,465,589
23-Oct-14	51.79	0.38	-21.80	86.58	326.08	0.00	688,060.00	1,484,543.00	796,483	1,484,543
24-Oct-14	50.70	0.44	-21.89	82.11	316.24	0.00	777,531.00	1,472,559.00	695,028	1,472,559
25-Oct-14	49.44	0.57	-22.00	85.37	306.26	0.00	694,969.00	1,517,890.00	822,921	1,517,890
26-Oct-14	51.50	0.48	-21.05	83.37	334.93	0.00	705,807.00	1,507,128.00	801,321	1,507,128
27-Oct-14	47.80	0.72	-21.96	80.13	310.71	0.00	704,517.00	1,544,316.00	839,799	1,544,316
28-Oct-14	47.73	0.72	-21.92	86.16	235.23	0.00	888,958.00	1,554,805.00	665,847	1,554,805
29-Oct-14	50.18	0.43	-21.96	86.54	283.63	0.00	869,541.00	1,466,380.00	596,839	1,466,380
30-Oct-14	49.95	0.33	-21.98	81.73	340.51	0.00	618,388.00	1,405,255.00	786,867	1,405,255
31-Oct-14	51.60	0.24	-21.46	85.99	322.84	0.00	634,876.00	1,405,504.00	770,628	1,405,504

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Nov-14	51.32	0.27	-21.54	83.34	292.67	0.00	635,245.00	1,401,123.00	765,878	1,401,123
2-Nov-14	50.34	0.30	-21.94	80.14	310.33	0.00	626,970.00	1,416,494.00	789,524	1,416,494
3-Nov-14	49.69	0.32	-21.91	84.42	302.37	0.00	737,097.00	1,486,303.00	749,206	1,486,303
4-Nov-14	50.17	0.29	-21.92	86.38	306.61	0.00	638,438.00	1,437,667.00	799,229	1,437,667
5-Nov-14	50.00	0.29	-22.01	83.21	359.74	0.00	621,635.00	1,413,819.00	792,184	1,413,819
6-Nov-14	50.17	0.27	-21.94	86.21	306.70	0.00	634,447.00	1,420,767.00	786,320	1,420,767
7-Nov-14	49.40	0.26	-20.49	504.63	277.83	242,860.00	453,480.00	959,135.00	505,655	1,201,995
8-Nov-14	46.44	0.40	-21.56	545.40	180.84	267,330.00	579,214.00	967,632.00	388,418	1,234,962
9-Nov-14	49.37	0.28	-21.95	81.08	306.14	0.00	646,950.00	1,437,711.00	790,761	1,437,711
10-Nov-14	50.56	0.28	-21.94	81.82	317.29	0.00	671,075.00	1,431,679.00	760,604	1,431,679
11-Nov-14	48.53	0.39	-21.93	75.89	343.85	0.00	651,160.00	1,425,761.00	774,601	1,425,761
12-Nov-14	48.20	0.40	-21.96	73.65	434.13	0.00	893,631.00	1,443,472.00	549,841	1,443,472
13-Nov-14	48.81	0.36	-21.98	69.81	364.08	0.00	635,536.00	1,444,591.00	809,055	1,444,591
14-Nov-14	49.58	0.36	-21.94	69.75	359.37	0.00	641,785.00	1,439,213.00	797,428	1,439,213
15-Nov-14	48.20	0.43	-21.98	68.86	304.98	0.00	829,975.00	1,427,900.00	597,925	1,427,900
16-Nov-14	45.40	0.45	-21.75	521.26	202.83	262,870.00	845,913.00	990,748.00	144,835	1,253,618
17-Nov-14	41.98	0.41	-21.94	1,575.99	27.75	1,300,000.00	0.00	0.00	-	1,300,000
18-Nov-14	45.90	0.25	-17.97	1,023.15	112.87	534,260.00	346,455.00	386,812.00	40,357	921,072
19-Nov-14	46.55	0.27	-20.98	758.83	179.90	381,350.00	373,776.00	768,563.00	394,787	1,149,913
20-Nov-14	49.28	0.36	-21.95	87.15	304.85	0.00	646,470.00	1,445,411.00	798,941	1,445,411
21-Nov-14	49.15	0.40	-21.95	88.20	300.57	0.00	635,979.00	1,428,470.00	792,491	1,428,470
22-Nov-14	51.37	0.28	-22.47	88.55	313.86	0.00	667,769.00	1,457,403.00	789,634	1,457,403
23-Nov-14	48.89	0.45	-22.43	85.50	360.93	0.00	669,995.00	1,435,642.00	765,647	1,435,642
24-Nov-14	47.36		-22.09	82.97	357.01	0.00	629,273.00	1,409,689.00	780,416	1,409,689
25-Nov-14	48.22	0.37	-22.45	89.00	309.73	0.00	643,935.00	1,443,787.00	799,852	1,443,787
26-Nov-14	48.61	0.35	-22.47	88.28	320.49	0.00	651,717.00	1,442,510.00	790,793	1,442,510
27-Nov-14	50.30	0.25	-22.42	89.16	333.41	0.00	664,129.00	1,436,428.00	772,299	1,436,428
28-Nov-14	50.90		-18.15	87.39	321.02	0.00	721,848.00	1,199,232.00	477,384	1,199,232
29-Nov-14	0.00		-16.94	255.36	223.63	90,010.00	510,730.00	1,003,855.00	493,125	1,093,865
30-Nov-14	48.85	0.48	-22.42	83.58	405.36	0.00	651,112.00	1,415,797.00	764,685	1,415,797

Appendix C1, continued

Date	Methane Daily Avg	Oxygen Daily Avg	Field Pressure ("H20)	Flare 1 Temp Avg	Flare 2 Temp Avg	Groundflare Daily Flow	Candlestick Flare 2 Daily Flow	Conditioning Skid Flow (Total scf/day)	Gen Use	Total Flow
1-Dec-14	48.21	0.44	-22.53	81.24	363.20	0.00	627,499.00	1,423,232.00	795,733	1,423,232
2-Dec-14	48.04	0.43	-22.90	75.32	285.14	0.00	656,072.00	1,451,173.00	795,101	1,451,173
3-Dec-14	46.50		-21.99	81.26	333.61	0.00	640,500.00	1,402,969.00	762,469	1,402,969
4-Dec-14	49.05	0.39	-22.97	81.53	338.65	0.00	651,480.00	1,443,775.00	792,295	1,443,775
5-Dec-14	48.57	0.43	-22.99	85.18	331.40	0.00	641,987.00	1,444,516.00	802,529	1,444,516
6-Dec-14	48.72	0.41	-22.75	88.15	313.06	0.00	647,450.00	1,438,852.00	791,402	1,438,852
7-Dec-14	48.37	0.46	-22.38	88.62	323.95	0.00	627,467.00	1,423,129.00	795,662	1,423,129
8-Dec-14	49.37	0.35	-21.93	87.56	299.21	0.00	626,658.00	1,414,629.00	787,971	1,414,629
9-Dec-14	50.63	0.33	-21.96	90.01	308.07	0.00	657,192.00	1,421,096.00	763,904	1,421,096
10-Dec-14	51.68	0.29	-22.27	89.92	384.40	0.00	632,221.00	1,403,937.00	771,716	1,403,937
11-Dec-14	48.10	0.13	-23.76	1,139.41	118.82	595,965.00	300,982.00	439,323.00	138,341	1,035,288
12-Dec-14	45.86	0.09	-22.44	1,605.56	32.41	1,300,000.00	0.00	0.00	-	1,300,000
13-Dec-14	46.73	0.44	-20.79	880.41	137.12	456,825.00	365,423.00	654,121.00	288,698	1,110,946
14-Dec-14	48.64	0.64	-23.08	90.34	310.30	0.00	589,770.00	1,349,868.00	760,098	1,349,868
15-Dec-14	51.52	0.32	-25.51	84.35	376.26	0.00	556,832.00	1,325,042.00	768,210	1,325,042
16-Dec-14	52.00	0.34	-25.87	86.21	344.27	0.00	565,588.00	1,331,653.00	766,065	1,331,653
17-Dec-14	51.86	0.39	-25.98	88.15	341.96	0.00	588,061.00	1,322,284.00	734,223	1,322,284
18-Dec-14	51.60	0.40	-26.05	88.83	309.90	0.00	558,257.00	1,326,657.00	768,400	1,326,657
19-Dec-14	52.03	0.37	-25.93	89.67	341.78	0.00	558,362.00	1,326,813.00	768,451	1,326,813
20-Dec-14	51.43	0.44	-25.97	85.55	366.58	0.00	549,211.00	1,312,892.00	763,681	1,312,892
21-Dec-14	45.92		-24.68	84.18	357.32	0.00	496,080.00	1,144,077.00	647,997	1,144,077
22-Dec-14	50.50		-13.75	297.16	193.71	123,560.00	292,451.00	588,758.00	296,307	712,318
23-Dec-14	49.99	0.41	-6.66	84.29	346.36	0.00	560,851.00	1,316,190.00	755,339	1,316,190
24-Dec-14	51.25	0.28	-6.45	83.71	378.70	0.00	568,590.00	1,313,529.00	744,939	1,313,529
25-Dec-14	51.64	0.31	-7.49	77.87	338.99	0.00	570,140.00	1,322,864.00	752,724	1,322,864
26-Dec-14	49.99	0.41	-6.24	78.59	305.47	0.00	542,197.00	1,314,448.00	772,251	1,314,448
27-Dec-14	49.85	0.39	-6.15	83.71	335.51	0.00	538,181.00	1,311,416.00	773,235	1,311,416
28-Dec-14	51.31	0.31	-10.16	79.65	350.61	0.00	663,555.00	1,315,240.00	651,685	1,315,240
29-Dec-14	50.51	0.39	-6.77	78.09	323.23	0.00	660,490.00	1,309,925.00	649,435	1,309,925
30-Dec-14	48.56	0.53	-5.61	75.66	509.95	0.00	576,749.00	1,288,452.00	711,703	1,288,452
31-Dec-14	48.53	0.43	-4.28	73.36	428.14	0.00	562,451.00	1,326,959.00	764,508	1,326,959
Annual Total (scf/yr)	**49.2**	**0.5**	**-22.9**			**21,931681**	**221,446,844**	**481,645,397**	**258,573,469**	**500,665,330**
Avg/day (scf/day)						**60,252**	**606,461**	**1,319,072**	**712,059**	**1,378,901**
Avg scfm						**41.84**	**421.15**	**916.02**	**494.49**	**957.57**
Avg scfm (at 50% methane)						**41.00**	**413.1**	**898.4**	**485.0**	**939.15**

Hartland Landfill Powerhouse Emission Monitoring Report
(July 7, 2014 Survey)

HARTLAND LANDFILL POWERHOUSE
EMISSION MONITORING REPORT
(July 17, 2014 Survey)

Prepared for

Capital Regional District
#1 Hartland Avenue
Victoria, BC

Prepared by

Mark Lanfranco

A. Lanfranco & Associates Inc.
#101 – 9488 189th Street
Surrey, BC
V4N 4W7

July 24, 2014

Table of Contents

1. SUMMARY 1

2. INTRODUCTION 2

3. SAMPLING LOCATION 2

4. TEST METHODOLOGY 2

4.1 DISCHARGE RATE 2
4.2 PARTICULATE MATTER 3
4.3 SULPHUR OXIDES (AS SO_2) 3
4.4 NITROGEN OXIDES (AS NO_2) 3
4.5 CARBON MONOXIDE (CO) 3
4.6 TVOCS 3
4.7 OXYGEN 5

5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) 5

6. TEST RESULTS 5

7. PROCESS PRODUCTION 7

8. DISCUSSION 7

1. SUMMARY

A. Lanfranco & Associates performed an emission survey at the Hartland Landfill Powerhouse operated by the Capital Regional district. The tests were conducted on a Caterpillar G3520C engine purposes on July 17, 2014.

The triplicate test averages are summarized below. Detailed test results are presented in the result section of this report.

Emission Parameters		Test Results	Caterpillar Specification
Cat G3520C Engine			
Engine Load	(%)	100	-
Power Generation	(KW)	1600	-
Discharge Rate	(m^3/min)	110	-
Particulate Matter (PM)	(mg/m^3)	2.9	-
Sulphur Oxides (SOx as SO_2)	(mg/m^3)	19.4	-
Nitrogen Oxides (NOx as NO_2)	(mg/m^3)	410	426
Carbon Monoxide (CO)	(mg/m^3)	1181	-
Total Volatile Organic Compounds (TVOC as CH_4)	(mg/m^3)	851	-

% - percent
KW - kilowatts
m^3/min - cubic meters per minute
mg/m^3 - milligrams per cubic meter

All data is reported at standard flue gas conditions of 293.15 K, 101.3 kPa and dry basis.

2. INTRODUCTION

The Hartland Landfill, located on the Saanich Peninsula of Vancouver Island, British Columbia, produces a gas that is a byproduct created from the breakdown of municipal waste. The gas contains sufficient concentrations of methane for it to be utilized as an engine fuel. The gas is collected and piped to a Caterpillar G3520C generator package that produces electricity by utilizing the landfill gas as fuel.

Maxim retained A. Lanfranco & Associates Inc. to conduct an emission survey at the Hartland Powerhouse facility for information purposes. The survey was performed on July 17, 2014.

Tests were performed for the following parameters:

- Discharge Rate
- Particulate Matter (PM)
- Sulphur Oxides (SOx as SO_2)
- Nitrogen Oxides (NOx as NO_2)
- Carbon Monoxide (CO)
- Total Volatile Organic Compounds (TVOCs as CH_4)
- Oxygen (O_2)

This report contains details of the emission survey and describes the sampling and analysis methodologies utilized.

3. SAMPLING LOCATION

Sampling was conducted at the engine stack. The engine emissions are discharged into the atmosphere through a 15-inch diameter vertical duct. The stack has two sample ports located 90^0 apart from each other. They are situated above the muffler elevation. Both sample ports were utilized to gain access to the flue gas. The sample ports are located more than 7-duct diameters down-stream from any flow disturbance and more than 2-duct diameters up-stream from the discharge point to the atmosphere. The port locations meet test code criteria and provide adequate access to collect representative emission samples.

4. TEST METHODOLOGY

The survey was conducted according to standard stack sampling test methods commonly accepted by Metro Vancouver and the British Columbia Ministry of Environment (BC MOE). The BC MOE "Field Sampling Manual, 2003" was used to supplement the following methods utilized:

4.1 Discharge Rate

The discharge rate was determined according to US EPA Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate, CFR 40 Part 60." This method utilized a calibrated S-type pitot tube coupled to an inclined oil manometer.

4.2 Particulate Matter

The particulate matter concentration was determined according to US EPA Method 5, "Determination of Particulate Emissions From Stationary Sources, CFR 40 Part 60." Particulate matter was withdrawn isokinetically from the gas stream and collected on a glass fiber filter maintained at a temperature of 120 ± 14^{0}C. Acetone and deionized distilled water were used to rinse the glass probe liner and connecting glassware. The particulate mass was determined gravimetrically after the removal of uncombined water. The sampling was conducted by traversing a total of 12 points, each for a 5-minute duration. Triplicate tests were conducted, with a total sampling time of 60 minutes per test. See Figure 1 for a diagram of the sampling train.

4.3 Sulphur Oxides (as SO_2)

Sulphur oxide emissions were determined according to US EPA Method 6, "Determination of Sulphur Dioxide Emissions from Stationary Sources, CFR 40 Part 60." Emissions were sampled simultaneously with particulate. The sampling train had four impingers; with the first two containing 3% hydrogen peroxide solution. The hydrogen peroxide absorbed the sulphur oxides as the flue gas passed through the solutions. Sulphur oxides were then quantified by the barium-thorin titration method. See Figure 1 for a diagram of the sampling train.

4.4 Nitrogen Oxides (as NO_2)

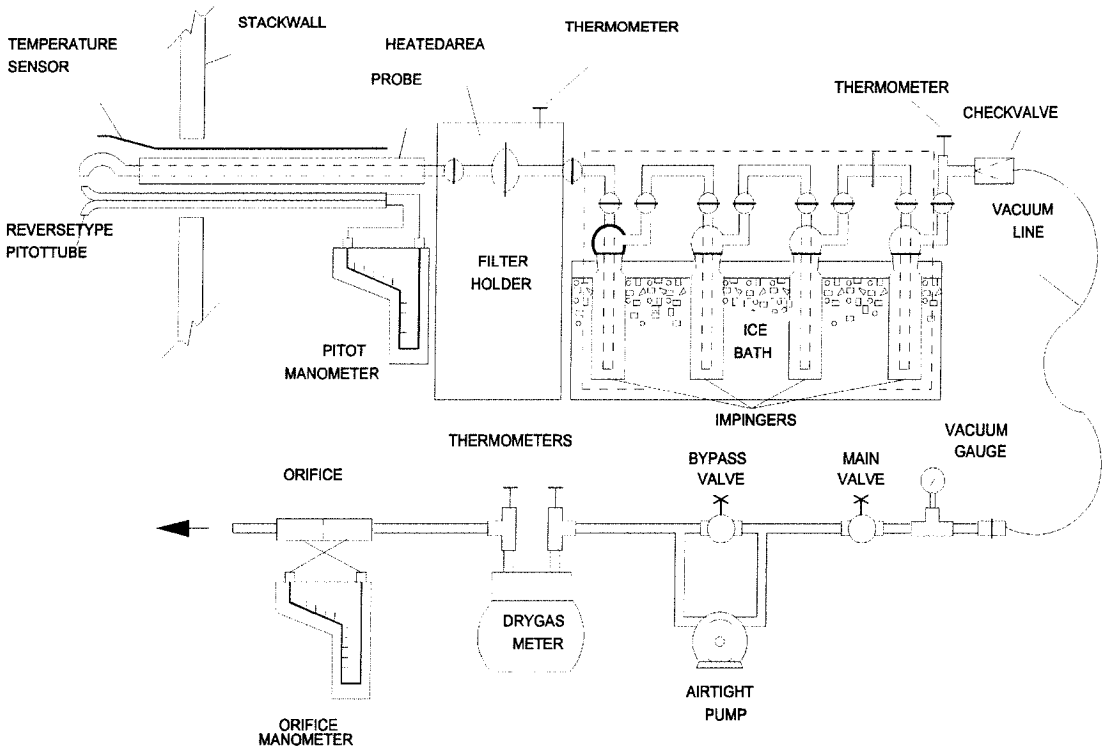
Nitrogen oxide emissions were determined according to US EPA Method 7E, "Determination of Nitrogen Oxide Emissions from Stationary Sources (Instrumental Analyzer Procedure), CFR 40 Part 60." Gas samples were continuously extracted from the source through a heated sample line and glass fiber filter. A portion of the gas was then dried to remove moisture and conveyed to an Advanced Pollution Instrumentation (API) Model 200EH chemiluminescence analyzer. Calibrations were conducted by using standard certified gases. NOx results are expressed as NO_2. Three sequential tests were conducted, each for a continuous 60-minute duration.

4.5 Carbon Monoxide (CO)

Carbon monoxide (CO) was determined according to US EPA Method 10, "Determination of Carbon Monoxide Emissions from Stationary Sources, CFR 40, Part 60." Gas samples were continuously extracted from the source through a heated sample line and glass fiber filter. A portion of the gas was then dried to remove moisture and conveyed to a CAI Model 300 analyzer. The analyzer operates on the principle of Infra-Red (IR) absorption. Calibrations were conducted by using standard certified gases. Results are expressed as carbon monoxide. Three sequential tests were conducted, each for a continuous 60-minute duration.

4.6 TVOCs

The Total Volatile Organic Compounds (TVOCs) were determined according to US EPA Method 25A, "Determination of Total Gaseous Organic Concentration Using a Flame Ionization (FID) Analyzer, CFR 40, Part 60." Gas samples were continuously extracted from the source through a heated sample line and glass fiber filter. A portion of the gas was then conveyed to a FID analyzer. A JUM J3-500 heated hydrocarbon analyzer was utilized for the tests. Calibrations were conducted by using standard certified gases. Results are expressed as methane equivalent. Three sequential tests were conducted, each for a continuous 60-minute duration.



Impinger Contents:

1. 100 ml 3% Hydrogen Peroxide
2. 100 ml 3% Hydrogen Peroxide
3. Empty
4. 200 g Silica Gel

Note: Image shown is not an exact representation of the actual sampling train utilized

Figure 1 Particulate and Sulphur Oxides Sampling Train

4.7 Oxygen/Carbon Dioxide

The Oxygen and Carbon Dioxide concentrations were determined according to US EPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions From Stationary Sources (Instrumental Analyzer Procedure), CFR 40, Part 60." Gas samples were continuously extracted from the source through a heated sample line and glass fiber filter. A portion of the gas was then dried to remove moisture and conveyed to a CAI Model 300 analyzer. Calibrations were conducted by using standard certified gases. Three sequential tests were conducted, each for a continuous 60-minute duration.

5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The sampling and analysis were performed with adherence to practices and procedures that ensured emissions data are of known and acceptable precision, accuracy and completeness. The QA/QC program included activities such as:

- Initial and final test calibrations – multi-point
- Response time determination
- Data correction for zero and span drift
- NOx converter efficiency test
- Calibrations conducted by utilizing Protocol 1 gases.
- Equipment calibration (dry gas meter, pitot tube, nozzle & thermocouple)
- Test apparatus performance inspection
- Use of sample blanks
- Preparation, cleaning and proofing of glassware, fittings, filters, unions, bottles, probe brushes, reagents, etc.
- System leak checks before and after each test
- Detailed chain of custody documentation and field data sheet inspection
- Contaminant-free sample recovery and equipment clean-up
- Review of adherence to test protocols.

The emission monitoring program was conducted in a capacity to meet emission test criteria performance objectives. Corroborating QA/QC activities are documented on various data sheets included in the Appendices.

6. TEST RESULTS

The emission test results are summarized in Table 1. Unless otherwise noted, the data is reported at standard flue gas conditions of 293.15 K, 101.3 kPa and dry basis.

Table 1 **Hartland Landfill Powerhouse Emission Test Results (July 17, 2014) (Caterpillar G3520C Engine)**

Parameter	Test 1	Test 2	Test 3	Average
Test Time (Particulate / SOx) **Test Time** (CEM's)	09:25-10:28 930-1030	11:06-12:10 1050-1149	12:30-13:34 1205-1305	- -
Particulate Matter				
(mg/m^3)	3.6	1.8	3.3	2.9
(Kg/hr.)	0.024	0.011	0.022	0.019
Sulphur Oxides (as SO_2)				
(mg/m^3)	19.5	18.7	20.0	19.4
(Kg/hr.)	0.129	0.123	0.131	0.128
Nitrogen Oxides (as NO_2)				
(mg/m^3)	422	408	400	410
(Kg/hr.)	2.79	2.67	2.63	2.70
Carbon Monoxide				
(mg/m^3)	1185	1183	1174	1181
(Kg/hr.)	7.83	7.74	7.70	7.76
Total Volatile Organics (as CH_4)				
(mg/m^3)	841	859	854	851
(Kg/hr.)	5.56	5.62	5.60	5.59
Flow Rate (m^3/min)	110	109	109	110
O_2 (Vol. %)	7.5	7.6	7.6	7.6
CO_2 (Vol. %)	11.5	11.5	11.5	11.5
Moisture (Vol. %)	12.0	12.7	12.8	12.5
Temperature (^oC)	468	467	468	467

^0C - degrees Centigrade
% vol - percent, volume basis
m^3/min - cubic meters per minute
mg/m^3 - milligrams per dry standard cubic meter
kg/hr - kilograms per hour

7. PROCESS PRODUCTION

The emission tests were conducted during normal process operating conditions. The following operating conditions were reported to have been maintained during the emission survey:

Engine ID	Power Output (MW)	Engine Load (% of full)
Cat G3520C	1.60	100

MW - megawatts

8. DISCUSSION

The engine ran at a steady state during all three tests.

The test results are reported with confidence and represent the emission characteristics of the process operating conditions maintained on the test date.

Field data sheets, laboratory reports, computer spreadsheets, calibration certificates and other relevant information are included in the Appendix.

Appendix I

Spreadsheet Data Sheets

Method 5 Test Results - A. Lanfranco and Associates Inc.

Client	CRD	**Date:**	17-Jul-14	**Process Info:**	1600 KW
Source	Hartland	**Test:**	1		
		Time:	09:25-10:28		

Test Results:

Particulate	(mg/Sm^3):	3.6	**Flow Rate**	(Sm^3/min):	110	Moisture	(Vol. %):	12.0
	(mg/Sm^3 @ 6.3% O_2):	3.9		(Actual m^3/min):	322	Stack Temp.	(°C):	467.6
	(kg/hr):	0.024				Isokinetic	(%):	100.8
Sulphur Oxides	(mg/Sm^3):	19.5						
	(mg/Sm^3 @ 6.3% O_2):	21.3						
	(kg/hr):	0.129						

Stack Data:		
Diameter	(in.):	15.00
Height	(ft.):	75
Points (Total):		12
No. of Ports:		2
Minutes/Point	(min.):	5.0
Barometric Pressure	(in. Hg):	29.50
Static Pressure	(in. Hg):	-1.42
Oxygen	(Vol. %):	7.5
Carbon Dioxide	(Vol. %):	11.5

Equipment Data:		
Control Unit	(Y):	1.0109
Pitot Factor	(Cp):	0.8393
Nozzle Dia.	(in.):	0.2097

Stack Area	(ft^2):	1.23
Nozzle Area	(ft^2):	0.0002398
Mol. Wt. Dry	(g/g mol.):	30.135
Mol. Wt. Wet	(g/g mol.):	28.675
Stack Press.	(in. Hg):	29.40
Sample Vol.	(Sm^3):	1.3014

Moisture Collection:		
Impinger Gain	(ml):	123.0
Silica Gel Gain	(g):	10.5

Particulate Data:		
Filter	(g):	0.0008
Rinses	(g):	0.0039

Sulphur Oxides Data:		
SO_x as SO_2	(mg):	25.41

Point	Wall Distance	DGM Volume (ft^3)		Pitot ΔP	Orifice ΔH	Temperatures (°F)			DGM Vol.	Velocity	Isokinetic
	(in.)	Initial	Final	(in. H_20)	(in. H_20)		DGM Out	Stack	(ft^3 Std.)	(ft/sec.)	(%)
1	0.7	917.728	921.680	2.950	2.07		88	892	3.815	156.06	100.7
2	2.2	921.680	925.690	3.150	2.25		88	882	3.872	160.66	98.5
3	4.4	925.690	929.720	3.050	2.15		86	880	3.905	157.97	100.9
4	10.6	929.720	933.640	2.850	2.03		85	865	3.804	151.85	101.1
5	12.8	933.640	937.500	2.800	2.00		83	865	3.760	150.51	100.8
6	14.3	937.500	941.230	2.650	1.87		82	871	3.639	146.76	100.5
7		941.230	945.370	3.200	2.28		81	875	4.050	161.51	102.0
8		945.370	949.520	3.300	2.31		80	876	4.068	164.08	100.9
9		949.520	953.480	3.000	2.10		79	873	3.887	156.26	101.0
10		953.480	957.370	2.900	2.05		78	873	3.825	153.64	101.1
11		957.370	961.160	2.750	1.95		77	866	3.732	149.22	101.0
12		961.160	964.820	2.600	1.82		77	866	3.603	145.09	100.3
		964.820									

Standard Conditions:	20.0 oC	101.325 kPa	0.04706 ft3 water vapour/ml
	527.7 oR	29.92 in. Hg.	

Method 5 Test Results - A. Lanfranco and Associates Inc.

Client	CRD	**Date:**	17-Jul-14	**Process Info:**	1600 KW
Source	Hartland	**Test:**	2		
		Time:	11:06-12:10		

Test Results:

Particulate	(mg/Sm^3):	1.8	**Flow Rate**	(Sm^3/min):	109	Moisture	(Vol. %):	12.7
	(mg/Sm^3 @ 6.3% O_2):	1.9		(Actual m^3/min):	321	Stack Temp.	(°C):	466.7
	(kg/hr):	0.011				Isokinetic	(%):	102.7
Sulphur Oxides	(mg/Sm^3):	18.7						
	(mg/Sm^3 @ 6.3% O_2):	20.5						
	(kg/hr):	0.123						

Stack Data:		
Diameter	(in.):	15.00
Height	(ft.):	75
Points (Total):		12
No. of Ports:		2
Minutes/Point	(min.):	5.0
Barometric Pressure	(in. Hg):	29.50
Static Pressure	(in. Hg):	-1.4
Oxygen	(Vol. %):	7.6
Carbon Dioxide	(Vol. %):	11.5

Equipment Data:		
Control Unit	(Y):	1.0109
Pitot Factor	(Cp):	0.8393
Nozzle Dia.	(in.):	0.2097

Stack Area	(ft^2):	1.23
Nozzle Area	(ft^2):	0.0002398
Mol. Wt. Dry	(g/g mol.):	30.141
Mol. Wt. Wet	(g/g mol.):	28.598
Stack Press.	(in. Hg):	29.40
Sample Vol.	(Sm^3):	1.3126

Moisture Collection:		
Impinger Gain	(ml):	132.0
Silica Gel Gain	(g):	11.4

Particulate Data:		
Filter	(g):	0.0010
Rinses	(g):	0.0013

Sulphur Oxides Data:		
SO_x as SO_2	(mg):	24.60

Point	Wall Distance	DGM Volume (ft^3)		Pitot ΔP	Orifice ΔH	Temperatures (°F)			DGM Vol.	Velocity	Isokinetic
	(in.)	Initial	Final	(in. H_20)	(in. H_20)		DGM Out	Stack	(ft^3 Std.)	(ft/sec.)	(%)
1	0.7	99.512	103.620	3.250	2.20		73	872	4.078	162.80	102.4
2	2.2	103.620	107.710	3.200	2.15		74	880	4.052	162.03	102.9
3	4.4	107.710	111.620	2.900	1.96		74	870	3.872	153.67	102.9
4	10.6	111.620	115.500	2.850	1.93		75	871	3.835	152.40	102.8
5	12.8	115.500	119.260	2.700	1.84		75	867	3.716	148.11	102.2
6	14.3	119.260	123.050	2.700	1.84		75	863	3.745	147.89	102.9
7		123.050	127.020	3.000	2.03		75	873	3.925	156.47	102.7
8		127.020	131.100	3.150	2.15		77	876	4.020	160.52	102.7
9		131.100	135.080	3.000	2.05		77	877	3.920	156.71	102.7
10		135.080	138.930	2.800	1.91		78	872	3.784	151.11	102.4
11		138.930	142.760	2.750	1.87		78	872	3.764	149.76	102.8
12		142.760	146.470	2.600	1.77		78	872	3.645	145.62	102.4
		146.470									

Standard Conditions:	20.0 oC	101.325 kPa	0.04706 ft3 water vapour/ml
	527.7 oR	29.92 in. Hg.	

Method 5 Test Results - A. Lanfranco and Associates Inc.

Client	CRD	**Date:**	17-Jul-14	**Process Info:**	1600 KW
Source	Hartland	**Test:**	3		
		Time:	12:30-13:34		

Test Results:

Particulate	(mg/Sm^3):	3.3	**Flow Rate**	(Sm^3/min):	109	Moisture	(Vol. %):	12.8
	(mg/Sm^3 @ 6.3% O_2):	3.7		(Actual m^3/min):	323	Stack Temp.	(^oC):	468.1
	(kg/hr):	0.022				Isokinetic	(%):	102.7
Sulphur Oxides	(mg/Sm^3):	20.0						
	(mg/Sm^3 @ 6.3% O_2):	21.9						
	(kg/hr):	0.131						

Stack Data:		
Diameter	(in.):	15.00
Height	(ft.):	75
Points (Total):		12
No. of Ports:		2
Minutes/Point	(min.):	5.0
Barometric Pressure	(in. Hg):	29.50
Static Pressure	(in. Hg):	-1.4
Oxygen	(Vol. %):	7.6
Carbon Dioxide	(Vol. %):	11.5

Equipment Data:		
Control Unit	(Y):	1.0109
Pitot Factor	(Cp):	0.8393
Nozzle Dia.	(in.):	0.2097

Stack Area	(ft^2):	1.23
Nozzle Area	(ft^2):	0.0002398
Mol. Wt. Dry	(g/g mol.):	30.137
Mol. Wt. Wet	(g/g mol.):	28.584
Stack Press.	(in. Hg):	29.40
Sample Vol.	(Sm^3):	1.3162

Moisture Collection:		
Impinger Gain	(ml):	133.0
Silica Gel Gain	(g):	11.9

Particulate Data:		
Filter	(g):	0.0013
Rinses	(g):	0.0031

Sulphur Oxides Data:		
SO_x as SO_2	(mg):	26.34

Point	Wall Distance	DGM Volume (ft^3)		Pitot ΔP	Orifice ΔH	Temperatures (^oF)			DGM Vol.	Velocity	Isokinetic
	(in.)	Initial	Final	(in. H_20)	(in. H_20)		DGM Out	Stack	(ft^3 Std.)	(ft/sec.)	(%)
1	0.7	146.843	151.020	3.250	2.22		80	873	4.093	162.90	102.9
2	2.2	151.020	155.120	3.150	2.15		79	875	4.025	160.50	102.9
3	4.4	155.120	159.100	3.000	2.05		79	875	3.906	156.63	102.3
4	10.6	159.100	163.020	2.900	1.97		80	883	3.839	154.46	102.6
5	12.8	163.020	166.880	2.800	1.91		80	877	3.780	151.43	102.6
6	14.3	166.880	170.720	2.750	1.88		80	872	3.760	149.79	102.8
7		170.720	174.800	3.100	2.13		80	870	3.997	158.92	102.8
8		174.800	178.920	3.150	2.16		82	874	4.022	160.44	102.8
9		178.920	182.900	2.950	2.03		84	877	3.870	155.44	102.3
10		182.900	186.840	2.850	1.96		85	879	3.823	152.89	102.9
11		186.840	190.690	2.700	1.87		86	872	3.728	148.43	102.8
12		190.690	194.450	2.600	1.80		86	868	3.640	145.43	102.2
		194.450									

Standard Conditions:	20.0 oC	101.325 kPa	0.04706 ft3 water vapour/ml
	527.7 oR	29.92 in. Hg.	

A. Lanfranco and Associates Inc. - CEM Report

Client: CRD
Source: Hartland
Run: 1

Moisture % = 12.03

Date	Time	O_2 (Vol. %)	CO_2 (Vol. %)	CO (ppm)	THC (ppm) (as CH4)	NO_x (ppm)
17-Jul	931	7.36	11.61	1130	1008	324.6
17-Jul	932	7.46	11.54	1095	1048	285.2
17-Jul	933	7.48	11.53	1084	1041	267.0
17-Jul	934	7.50	11.51	1062	1055	266.8
17-Jul	935	7.60	11.42	999	1124	224.2
17-Jul	936	7.58	11.44	999	1109	205.0
17-Jul	937	7.55	11.46	1009	1101	204.2
17-Jul	938	7.52	11.49	1010	1063	203.9
17-Jul	939	7.49	11.52	1032	1059	203.2
17-Jul	940	7.49	11.51	1035	1078	207.7
17-Jul	941	7.53	11.47	1028	1118	213.9
17-Jul	942	7.61	11.42	1002	1145	234.2
17-Jul	943	7.57	11.44	1013	1111	248.2
17-Jul	944	7.58	11.44	1001	1098	255.7
17-Jul	945	7.58	11.44	989	1120	233.3
17-Jul	946	7.60	11.43	981	1131	207.0
17-Jul	947	7.56	11.46	996	1107	203.2
17-Jul	948	7.55	11.46	999	1110	201.3
17-Jul	949	7.52	11.47	1010	1092	202.2
17-Jul	950	7.52	11.49	1016	1107	204.8
17-Jul	951	7.52	11.49	1017	1103	206.0
17-Jul	952	7.56	11.45	1003	1141	211.9
17-Jul	953	7.53	11.47	1017	1118	206.2
17-Jul	954	7.50	11.51	1040	1082	214.9
17-Jul	955	7.53	11.47	1016	1097	214.2
17-Jul	956	7.53	11.47	1019	1117	208.4
17-Jul	957	7.54	11.46	1018	1114	212.2
17-Jul	958	7.52	11.47	1026	1066	212.2
17-Jul	959	7.54	11.46	1027	1101	218.0
17-Jul	1000	7.55	11.45	1015	1102	243.8
17-Jul	1001	7.56	11.45	1012	1102	246.0
17-Jul	1002	7.59	11.42	993	1136	243.2
17-Jul	1003	7.56	11.45	1003	1105	224.3
17-Jul	1004	7.54	11.46	1005	1105	208.3
17-Jul	1005	7.53	11.47	1006	1094	204.8
17-Jul	1006	7.51	11.49	1024	1095	204.7
17-Jul	1007	7.57	11.42	1002	1144	210.9
17-Jul	1008	7.55	11.43	1010	1134	206.9
17-Jul	1009	7.53	11.45	1015	1113	207.7
17-Jul	1010	7.53	11.46	1015	1092	208.3
17-Jul	1011	7.51	11.46	1027	1108	203.8
17-Jul	1012	7.55	11.44	1008	1138	209.4
17-Jul	1013	7.55	11.43	1011	1153	208.7
17-Jul	1014	7.55	11.43	1011	1127	206.7
17-Jul	1015	7.53	11.45	1013	1119	209.1
17-Jul	1016	7.52	11.46	1031	1088	206.7
17-Jul	1017	7.55	11.43	1017	1125	240.4
17-Jul	1018	7.59	11.40	1002	1151	247.6
17-Jul	1019	7.59	11.40	997	1136	244.0
17-Jul	1020	7.54	11.43	1008	1086	234.5
17-Jul	1021	7.52	11.44	1011	1088	221.0
17-Jul	1022	7.56	11.41	998	1131	208.1
17-Jul	1023	7.54	11.43	1010	1120	206.2
17-Jul	1024	7.54	11.43	1006	1135	209.3
17-Jul	1025	7.50	11.46	1025	1100	209.1
17-Jul	1026	7.52	11.45	1024	1121	212.0
17-Jul	1027	7.58	11.40	1004	1172	207.5
17-Jul	1028	7.57	11.40	1010	1153	211.6
17-Jul	1029	7.54	11.43	1016	1132	216.3
17-Jul	1030	7.54	11.43	1012	1119	210.4
	Average	7.54	11.46	1017	1108	220.5
	Minimum	7.36	11.40	981	1008	201.3
	Maximum	7.61	11.61	1130	1172	324.6
Mass Concentration (mg/m3 dry)		**n/a**	**n/a**	**1185**	**841**	**422**
Mass Concentration (@ 6.3% O_2)		**n/a**	**n/a**	**1295**	**919**	**461**
Flow Rate (m3/min)		**110**				
Emission Rate (Kg/hr)		**n/a**		**7.83**	**5.56**	**2.79**

Calibration Summary					
Analyzer Range	25.00	20.00	1000.0	3000.0	500.0
Cylinder Value	10.90	9.90	491.0	924.0	243.0
Analyzer Calibration Span	10.98	9.90	487.0		242.5
Analyzer Calibration Zero	0.04	0.02	4.4		2.7
Initial System Span Response	10.92	9.88	485.0	929.0	243.6
Final System Span Response	10.90	9.85	484.0	934.0	240.6
Initial System Zero Response	0.07	0.08	2.2	8.8	2.8
Final System Zero Response	0.03	0.10	1.5	14.3	1.8

Error Summary					
Initial Span Bias (% of Span)	-0.2%	-0.1%	-0.2%		0.2%
Final Span Bias (% of Span)	-0.3%	-0.3%	-0.3%		-0.4%
Initial Zero Bias (% of Span)	0.1%	0.3%	-0.2%		0.0%
Final Zero Bias (% of Span)	0.0%	0.4%	-0.3%		-0.2%
Test Span Drift (% of Span)	-0.1%	-0.2%	-0.1%	0.2%	-0.6%
Test Zero Drift (% of Span)	-0.2%	0.1%	-0.1%	0.2%	-0.2%

Source Test Ltd. - CEM Report

Client: CRD
Source: Hartland
Run: 2

Moisture % = 12.71

Date	Time	O_2 (Vol. %)	CO_2 (Vol. %)	CO (ppm)	THC (ppm) (as CH4)	NO_x (ppm)
17-Jul	1051	7.58	11.41	999	1172	227.1
17-Jul	1052	7.56	11.44	1003	1143	205.8
17-Jul	1053	7.56	11.44	1005	1127	203.6
17-Jul	1054	7.54	11.45	1016	1124	203.9
17-Jul	1055	7.55	11.45	1007	1127	200.3
17-Jul	1056	7.54	11.46	1020	1119	198.8
17-Jul	1057	7.55	11.45	1015	1125	204.1
17-Jul	1058	7.55	11.46	1021	1134	203.5
17-Jul	1059	7.55	11.45	1019	1115	204.6
17-Jul	1100	7.55	11.46	1021	1136	204.7
17-Jul	1101	7.53	11.48	1020	1109	202.4
17-Jul	1102	7.55	11.47	1020	1128	222.7
17-Jul	1103	7.61	11.42	1002	1152	235.2
17-Jul	1104	7.59	11.44	1007	1121	239.0
17-Jul	1105	7.56	11.46	1011	1121	235.7
17-Jul	1106	7.58	11.47	999	1115	218.1
17-Jul	1107	7.58	11.51	1003	1158	204.0
17-Jul	1107	7.57	11.56	1020	1139	200.1
17-Jul	1108	7.59	11.52	1006	1154	201.9
17-Jul	1109	7.57	11.55	1014	1147	206.4
17-Jul	1110	7.55	11.57	1016	1101	207.1
17-Jul	1111	7.53	11.60	1021	1101	201.3
17-Jul	1112	7.52	11.60	1027	1096	200.3
17-Jul	1113	7.56	11.57	1015	1144	199.6
17-Jul	1114	7.54	11.58	1028	1114	197.9
17-Jul	1115	7.53	11.60	1034	1107	203.6
17-Jul	1116	7.55	11.59	1030	1132	201.6
17-Jul	1117	7.55	11.58	1036	1130	206.4
17-Jul	1118	7.59	11.55	1025	1133	241.9
17-Jul	1119	7.62	11.53	1003	1149	244.0
17-Jul	1120	7.58	11.57	1016	1099	237.9
17-Jul	1121	7.56	11.50	1010	1119	222.0
17-Jul	1122	7.54	11.47	1007	1091	201.9
17-Jul	1123	7.54	11.51	1019	1108	201.4
17-Jul	1124	7.55	11.54	1021	1121	200.7
17-Jul	1125	7.50	11.56	1042	1094	206.7
17-Jul	1126	7.51	11.56	1035	1105	206.5
17-Jul	1127	7.53	11.52	1031	1101	204.1
17-Jul	1128	7.57	11.45	1020	1150	205.2
17-Jul	1129	7.59	11.43	1012	1141	204.1
17-Jul	1130	7.56	11.46	1021	1126	206.3
17-Jul	1131	7.54	11.47	1028	1114	205.9
17-Jul	1132	7.55	11.46	1020	1096	204.8
17-Jul	1133	7.54	11.47	1027	1104	227.9
17-Jul	1134	7.61	11.42	1007	1140	246.1
17-Jul	1135	7.61	11.42	999	1143	245.2
17-Jul	1136	7.58	11.44	1005	1109	239.3
17-Jul	1137	7.59	11.44	993	1134	217.8
17-Jul	1138	7.55	11.46	1010	1104	202.1
17-Jul	1139	7.57	11.45	1002	1132	203.1
17-Jul	1140	7.57	11.45	1007	1140	201.4
17-Jul	1141	7.57	11.45	1011	1134	207.7
17-Jul	1142	7.55	11.46	1018	1110	200.0
17-Jul	1143	7.54	11.47	1020	1120	206.5
17-Jul	1144	7.51	11.49	1035	1092	206.7
17-Jul	1145	7.56	11.45	1019	1135	210.3
17-Jul	1146	7.56	11.46	1028	1098	208.2
17-Jul	1147	7.60	11.42	1011	1143	244.6
17-Jul	1148	7.60	11.42	1003	1145	247.3
17-Jul	1149	7.57	11.44	1008	1098	241.4
	Average	7.56	11.49	1016	1123	213.1
	Minimum	7.50	11.41	993	1091	197.9
	Maximum	7.62	11.60	1042	1172	247.3
Mass Concentration (mg/m3 dry)		**n/a**	**n/a**	**1183**	**859**	**408**
Mass Concentration (@ 6.3% O_2)		**n/a**	**n/a**	**1295**	**940**	**447**
Flow Rate (m3/min)		**109**				
Emission Rate (Kg/hr)		**n/a**		**7.74**	**5.62**	**2.67**

Calibration Summary					
Analyzer Range	25.00	20.00	1000.0	3000.0	500.0
Cylinder Value	10.90	9.90	491.0	924.0	243.0
Analyzer Calibration Span	10.98	9.90	487.0		242.5
Analyzer Calibration Zero	0.04	0.02	4.4		2.7
Initial System Span Response	10.90	9.85	484.0	934.0	240.6
Final System Span Response	10.87	9.87	482.7	936.0	241.3
Initial System Zero Response	0.03	0.10	1.5	14.3	1.8
Final System Zero Response	0.02	0.11	-3.7	12.6	0.8

Error Summary					
Initial Span Bias (% of Span)	-0.3%	-0.3%	-0.3%		-0.4%
Final Span Bias (% of Span)	-0.4%	-0.2%	-0.4%		-0.2%
Initial Zero Bias (% of Span)	0.0%	0.4%	-0.3%		-0.2%
Final Zero Bias (% of Span)	-0.1%	0.5%	-0.8%		-0.4%
Test Span Drift (% of Span)	-0.1%	0.1%	-0.1%	0.1%	0.1%
Test Zero Drift (% of Span)	0.0%	0.1%	-0.5%	-0.1%	-0.2%

Source Test Ltd. - CEM Report

Client: CRD
Source: Hartland
Run: 3

Moisture % = 12.79

Date	Time	O_2 (Vol. %)	CO_2 (Vol. %)	CO (ppm)	THC (ppm) (as CH4)	NO_x (ppm)
17-Jul	1206	7.57	11.44	1005	1196	198.6
17-Jul	1207	7.58	11.43	1001	1164	201.3
17-Jul	1208	7.59	11.43	999	1152	199.3
17-Jul	1209	7.55	11.46	1011	1118	198.7
17-Jul	1210	7.54	11.48	1017	1091	201.9
17-Jul	1211	7.55	11.47	1010	1112	200.8
17-Jul	1212	7.54	11.48	1023	1089	199.4
17-Jul	1213	7.55	11.47	1024	1113	205.4
17-Jul	1214	7.57	11.45	1014	1132	204.3
17-Jul	1215	7.59	11.44	1011	1131	208.6
17-Jul	1216	7.55	11.47	1025	1089	206.3
17-Jul	1217	7.55	11.47	1015	1106	236.7
17-Jul	1218	7.57	11.46	1007	1107	231.8
17-Jul	1219	7.60	11.43	995	1117	233.6
17-Jul	1220	7.59	11.45	989	1151	218.9
17-Jul	1221	7.57	11.46	1003	1137	204.1
17-Jul	1222	7.57	11.46	1008	1128	204.6
17-Jul	1223	7.58	11.45	1003	1107	206.1
17-Jul	1224	7.55	11.47	1012	1097	202.0
17-Jul	1225	7.57	11.46	1002	1126	207.5
17-Jul	1226	7.54	11.48	1013	1091	197.1
17-Jul	1227	7.54	11.49	1016	1101	195.4
17-Jul	1228	7.54	11.48	1018	1092	196.0
17-Jul	1229	7.55	11.48	1022	1109	202.7
17-Jul	1230	7.58	11.45	1012	1141	201.0
17-Jul	1231	7.62	11.42	1003	1165	216.5
17-Jul	1232	7.59	11.44	1005	1107	235.8
17-Jul	1233	7.59	11.44	1000	1106	234.7
17-Jul	1234	7.59	11.45	989	1104	228.7
17-Jul	1235	7.57	11.47	994	1088	203.9
17-Jul	1236	7.54	11.49	1000	1099	195.9
17-Jul	1237	7.50	11.52	1022	1088	195.1
17-Jul	1238	7.53	11.49	1020	1090	199.8
17-Jul	1239	7.56	11.46	1007	1123	202.4
17-Jul	1240	7.57	11.46	1008	1130	198.1
17-Jul	1241	7.58	11.45	1002	1141	203.3
17-Jul	1242	7.59	11.45	1004	1146	203.7
17-Jul	1243	7.56	11.46	1002	1123	199.2
17-Jul	1244	7.54	11.48	1009	1090	196.7
17-Jul	1245	7.54	11.49	1012	1093	197.0
17-Jul	1246	7.56	11.47	1009	1101	223.4
17-Jul	1247	7.60	11.44	995	1138	233.6
17-Jul	1248	7.60	11.43	996	1130	232.8
17-Jul	1249	7.57	11.45	999	1102	227.1
17-Jul	1250	7.55	11.47	1010	1098	208.9
17-Jul	1251	7.54	11.48	1010	1090	209.8
17-Jul	1252	7.54	11.48	1007	1102	198.8
17-Jul	1253	7.55	11.48	1005	1114	199.3
17-Jul	1254	7.52	11.50	1015	1090	202.0
17-Jul	1255	7.52	11.50	1021	1109	203.2
17-Jul	1256	7.53	11.50	1017	1129	201.1
17-Jul	1257	7.54	11.48	1020	1104	201.3
17-Jul	1258	7.56	11.47	1009	1135	203.9
17-Jul	1259	7.58	11.46	1007	1120	209.7
17-Jul	1300	7.57	11.46	1002	1110	228.5
17-Jul	1301	7.56	11.47	999	1109	234.8
17-Jul	1302	7.57	11.47	996	1127	230.4
17-Jul	1303	7.58	11.46	991	1121	218.2
17-Jul	1304	7.56	11.47	1001	1115	211.2
17-Jul	1305	7.55	11.48	1004	1111	204.7
	Average	7.56	11.47	1008	1116	209.3
	Minimum	7.50	11.42	989	1088	195.1
	Maximum	7.62	11.52	1025	1196	236.7
Mass Concentration (mg/m3 dry)		**n/a**	**n/a**	**1174**	**854**	**400**
Mass Concentration (@ 6.3% O_2)		**n/a**	**n/a**	**1285**	**935**	**438**
Flow Rate (m3/min)		**109**				
Emission Rate (Kg/hr)		**n/a**		**7.70**	**5.60**	**2.63**

Calibration Summary					
Analyzer Range	25.00	20.00	1000.0	3000.0	500.0
Cylinder Value	10.90	9.90	491.0	924.0	243.0
Analyzer Calibration Span	10.98	9.90	487.0		242.5
Analyzer Calibration Zero	0.04	0.02	4.4		2.7
Initial System Span Response	10.87	9.87	482.7	936.0	241.3
Final System Span Response	10.88	9.89	478.0	936.8	241.3
Initial System Zero Response	0.02	0.11	-3.7	12.6	0.8
Final System Zero Response	0.02	0.12	-3.2	16.7	1.7

Error Summary					
Initial Span Bias (% of Span)	-0.4%	-0.2%	-0.4%		-0.2%
Final Span Bias (% of Span)	-0.4%	0.0%	-0.9%		-0.2%
Initial Zero Bias (% of Span)	-0.1%	0.5%	-0.8%		-0.4%
Final Zero Bias (% of Span)	-0.1%	0.5%	-0.8%		-0.2%
Test Span Drift (% of Span)	0.0%	0.1%	-0.5%	0.0%	0.0%
Test Zero Drift (% of Span)	0.0%	0.1%	0.1%	0.1%	0.2%

Client: CRD - Hartland
Date 17-Jul-14

Sample ID	Volume (ml)	Aliquot (ml)	Titration (ml)	SO_2 (mg / sample)
Blank	-	10.00	0.05	
Run 1	405	10.00	2.15	25.41
Run 2	445	10.00	1.90	24.60
Run 3	430	10.00	2.10	26.34

$BaCl_2$ Std. Solution (N): 0.009328 *Standardized against 0.02000 N H_2SO_4
Traceable to NIST standards

Method of analysis: EPA CFR 40 Part 60 - Method 6 Determination of Sulfur Dioxide Emissions from Stationary Sources
Barium - Thorin titration method

Analyzed by:

Carter Lanfranco

Appendix II

Field Data Sheets

PLANT	CCO / Hartland Victoria B	PROBE TIP DIAMETER, IN.	0.297 ST-10
		PROBE LENGTH, FT / Cp	0.8373 ST-3A
RUN No	1	FILTER NUMBER	
LOCATION	Perfect Stack Port		
DATE	July 17/14	STATIC PRESSURE, IN. H_2O	-1.42
OPERATOR		STACK DIAMETER	15.0"
CONTROL UNIT / Y	1.0109 AL-1	STACK HEIGHT	
BAROMETRIC PRESSURE, IN. Hg	29.50	INITIAL LEAK TEST	0.003 @ 15"
ASSUMED MOISTURE, Bw	12%	FINAL LEAK TEST	0.003 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1 H_2O_2	100	187	87
Imp. # 2 H_2O_2	100	138	38
Imp. # 3	0	3	3
Imp. # 4	200		

Upstream Diameters

Downstream Diameters

CEMS

Point	Clock Time	Dry Gas Meter Ft^3	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Outlet °F	Temperature °F Stack	Box	Probe	Impinger Exit	Pump Vac. IN. Hg Gauge	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %
	09:25	917.728										
1		921.68	2.95	2.07	88	892				5		
2		925.69	3.15	2.23	88	882					11.5	7.5
3		929.72	3.05	2.15	86	880				5		
4		933.64	2.85	2.03	85	865						
5		937.50	2.90	2.00	83	865				4	11.5	7.7
6		941.23	2.65	1.87	82	871						
1		946.37	3.25	2.28	81	875				5		
2		949.52	3.30	2.31	80	876					11.5	7.7
3		953.48	3.00	2.10	79	873				5		
4		957.37	2.90	2.05	78	873						
5		961.16	2.75	1.93	77	866				4	11.4	7.7
6	10:28	964.82	2.60	1.82	77	866						

PLANT	CRD / Hartland Victoria B	PROBE TIP DIAMETER, IN. 0.2097	ST-10
		PROBE LENGTH, FT / Cp 0.8393	ST-34
RUN No	2	FILTER NUMBER	
LOCATION	Genset Stack Port		
DATE	July 17/14	STATIC PRESSURE, IN. H_2O -1.42	
OPERATOR		STACK DIAMETER 15"	
CONTROL UNIT / Y	0.9998 G105	STACK HEIGHT	
BAROMETRIC PRESSURE, IN. Hg	29.30	INITIAL LEAK TEST 0.003 @ 15"	
ASSUMED MOISTURE, Bw	12%	FINAL LEAK TEST 0.003 @ 15"	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1 H_2O_2	100	204	104
Imp. # 2 H_2O_2	100	122	22
Imp. # 3	0	6	6
Imp. # 4	200		

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Outlet °F	Temperature °F Stack	Box	Probe	Impinger Exit	Pump Vac. IN. Hg Gauge	CEMS Fyrites CO_2 Vol. %	CEMS Fyrites O_2 Vol. %
1	11:06	99.516										
1		103.62	3.15	2.20	73	872	240	238	56	2		
2		107.71	3.20	2.15	74	880						
3		111.62	2.90	1.96	74	870	238	240	56	2	11.70	7.6
4		115.50	2.85	1.93	75	871						
5		119.26	2.70	1.84	75	867	232	236	56	2	11.60	7.6
6		123.05	2.70	1.84	75	863						
1		127.02	3.00	2.03	75	873	235	238	55	2		
2		131.10	3.15	2.13	77	876						
3		135.08	3.00	2.05	77	877	233	240	55	2	11.5	7.7
4		138.93	2.80	1.91	78	872						
5		142.76	2.75	1.87	78	872	237	240	55	2	11.5	7.6
6	12:10	146.47	2.60	1.77	78	871						

PLANT	CRD / Hartland Victoria B.C	PROBE TIP DIAMETER, IN.	0.1097 ST-10
		PROBE LENGTH, FT / Cp	0.8393 ST-3A
RUN No	3	FILTER NUMBER	
LOCATION	Gypsum Stack Port		
DATE	July 17/14	STATIC PRESSURE, IN. H_2O	-1.42
OPERATOR		STACK DIAMETER	15"
CONTROL UNIT / Y	0.9998 G-105	STACK HEIGHT	
BAROMETRIC PRESSURE, IN. Hg	29.50	INITIAL LEAK TEST	0.003 @ 15"
ASSUMED MOISTURE, Bw	12 %	FINAL LEAK TEST	0.003 @ 15

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1 H_2O_2	200	215	
Imp. # 2 H_2O_2	200	214	
Imp. # 3	0	5	
Imp. # 4	200		

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Outlet °F	Temperature °F Stack	Box	Probe	Impinger Exit	Pump Vac. IN. Hg Gauge	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %
	12:30	146.843										
1		151.02	3.25	2.22	80	873	240	236	55	2	11.5	7.7
2		155.12	3.13	2.15	79	873						
3		159.10	3.00	2.05	79	873	243	240	55	2		
4		163.02	2.90	1.97	80	883						
5		166.88	2.80	1.91	80	877	241	241	55	2	11.5	7.6
6		170.72	2.75	1.88	80	872						
1		174.80	3.10	2.13	80	870	236	240	55	2	11.5	7.7
2		178.92	3.15	2.16	82	874						
3		182.90	2.95	2.03	84	877	234	243	56	2	11.5	7.6
4		186.84	2.85	1.96	85	879						
5		190.69	2.70	1.87	86	872	239	241	56	2		
6	13:34	194.45	2.60	1.80	86	868						

CEM FIELD DATA SHEET

Plant : Hartland
Source :
Date : July 17, 2014

Technician : Matt
Ambient Temp °C :
Bar. Pressure in Hg : 29.54

Cylinder Gas Pressure (psi)

1 Gas	2 Gas	3 Gas	4 Gas	5 Gas	N_2	O_2	~~H_2~~	Comb Air	Low meth	Mid meth	High meth
							CO_2				

Certified Gas Value (ppm)

CO		491	910				10.9	9.9			924	2508
SO2		222	444									
NOx		243	454									

Range

CEM Readings

Time	Source	O_2	CO_2	CO	THC	SO_2	NO_x	Response Time (sec)
								NO_x up
	Ambient	20.90						NO_x dn
								O_2 up
8:30	N_2	.04	.02	4.4		0.1	2.66	O_2 dn
Manifold	3			908		432	456	CO up
	2			487		220	242.5	CO dn
	O_2/CO_2	10.98	9.90					CO_2 up
								CO_2 dn
Stack	N_2	.07	.08	2.21	4.8	1.0	2.8	SO_2 up
	3			906		420	457	SO_2 dn
	2			485		220	243.6	THC up
	Hi THC				2494			THC dn
	Mid THC				929			
	O_2/CO_2	10.92	9.88					
	Run #1	9:30 -	10:40	mid				
	N_2	.03	.10	1.5	14.3	1.4	1.82	
	2			484		207	24	
	Hi THC				934		240.6	
	O_2/CO_2	10.90	9.85					
	Run #2	10:50 -	11:55					

CEM FIELD DATA SHEET

Plant : Hartland
Source :
Date : July 17, 2014

Technician : Matt
Ambient Temp °C :
Bar. Pressure in Hg : 29.54

Cylinder Gas Pressure (psi)

1 Gas	2 Gas	3 Gas	4 Gas	5 Gas	N_2	O_2	H_2	Comb Air	Low meth	Mid meth	High meth

Certified Gas Value (ppm)

CO												
SO2												
NOx												

Range

CEM Readings

Time	Source	O_2	CO_2	CO	THC	SO_2	NO_x	Response Time (sec)
								NO_x up
Run #2	10:50 - 11:55							NO_x dn
								O_2 up
	N2	.02	11	-3.7	12.6	1.2	.81	O_2 dn
	2			482.7		217	241.3	CO up
	Mid THC				936			CO dn
	O_2/CO_2	10.87	9.87					CO_2 up
								CO_2 dn
								SO_2 up
Run #3	12:05 - 13:10							SO_2 dn
								THC up
	N2	.02	.12	-3.2	16.7	1.6	1.65	THC dn
	2			478		215	241.3	
	Mid				936.8			
	O_2/CO_2	10.88	9.89					

Appendix III

Calibration Certificates

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22013

DocNumber: 000061034

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

A LANFRANCO & ASSOC INC
101 9488 189TH ST
SURREY BC V4N 4

Praxair Order Number: 19627615
Customer P. O. Number: MARK LAN FRAN
Customer Reference Number:

Fill Date: 11/21/2013
Part Number: NI CO900NS8E-AS
Lot Number: 109332512
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	12/3/2021	NIST Traceable Analytical Uncertainty:
Cylinder Number:	CC137529	
910 ppm	CARBON MONOXIDE	± 0.8 %
454 ppm	NITRIC OXIDE	± 0.6 %
444 ppm	SULFUR DIOXIDE	± 0.8 %
Balance	NITROGEN	

NOx = 454 ppm **NOx for Reference Only**

Certifcation Information: *Certification Date:* 12/3/2013 *Term:* 96 Months *Expiration Date:* 12/3/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON MONOXIDE

Requested Concentration: 900 ppm
Certified Concentration: 910 ppm
Instrument Used: HORIBA, VIA-510 576 876 015
Analytical Method: NDIR
Last Multipoint Calibration: 11/14/2013

First Analysis Data:						Date:	11/26/2013
Z:	0	R:	810	C:	910	Conc:	910
R:	810	Z:	0	C:	911	Conc:	911
Z:	0	C:	910	R:	810	Conc:	910
UOM:	ppm			Mean Test Assay:			910.33 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC313299
Ref. Std. Conc: 810.0 ppm
Ref. Std. Traceable to SRM # : 1681b
SRM Sample # : 1-28-I
SRM Cylinder # : CLM-009404

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			0 ppm

2. Component: NITRIC OXIDE

Requested Concentration: 450 ppm
Certified Concentration: 454 ppm
Instrument Used: Themo Electron 42i S/N 072602432C
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 11/22/2013

First Analysis Data:						Date:	11/26/2013
Z:	0	R:	1003	C:	456	Conc:	456
R:	1003	Z:	0	C:	455	Conc:	455
Z:	0	C:	454	R:	1003	Conc:	454
UOM:	ppm			Mean Test Assay:			455 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC148011
Ref. Std. Conc: 1003 ppm
Ref. Std. Traceable to SRM # : vs. 1687b
SRM Sample # : 41-K-34
SRM Cylinder # : FF31364

Second Analysis Data:						Date:	12/3/2013
Z:	0	R:	1003	C:	455	Conc:	455
R:	1003	Z:	0	C:	453	Conc:	453
Z:	0	C:	452	R:	1003	Conc:	452
UOM:	ppm			Mean Test Assay:			453.33 ppm

3. Component: SULFUR DIOXIDE

Requested Concentration: 450 ppm
Certified Concentration: 444 ppm
Instrument Used: HORIBA, VIA-510, 56946604
Analytical Method: NDIR11
Last Multipoint Calibration: 11/11/2013

First Analysis Data:						Date:	11/26/2013
Z:	0	R:	510	C:	442	Conc:	442
R:	510	Z:	0	C:	443	Conc:	443
Z:	0	C:	443	R:	510	Conc:	443
UOM:	ppm			Mean Test Assay:			442.67 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC76202
Ref. Std. Conc: 510 ppm
Ref. Std. Traceable to SRM # : vs. 1661a
SRM Sample # : 94-H-05
SRM Cylinder # : FF28146

Second Analysis Data:						Date:	12/3/2013
Z:	0	R:	510	C:	444	Conc:	444
R:	510	Z:	0	C:	445	Conc:	445
Z:	0	C:	445	R:	510	Conc:	445
UOM:	ppm			Mean Test Assay:			444.67 ppm

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information.

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22013

DocNumber: 000061407

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR DELTA
1470 DERWENT WAY
DELTA BC V3M 6

Praxair Order Number: 25667440
Customer P. O. Number:
Customer Reference Number:

Fill Date: 12/5/2013
Part Number: NI MER2E-AS
Lot Number: 109333909
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	12/9/2021		NIST Traceable
Cylinder Number:	CC92423		Analytical Uncertainty:
924	ppm	METHANE	± 1.5 %
Balance		NITROGEN	

Certifcation Information: *Certification Date:* 12/9/2013 *Term:* 96 Months *Expiration Date:* 12/9/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G2. Do Not Use this Standard if Pressure is less than 100 PSIG.

G2 was done using Environics Series 2000 @ 20%{c.f. = 0.198}.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: METHANE

Requested Concentration: 950 ppm
Certified Concentration: 924 ppm
Instrument Used: HORIBA, FIA-510, 851135122
Analytical Method: Flame Ionization Detector
Last Multipoint Calibration: 11/24/2013

First Analysis Data:						**Date:**	12/9/2013
Z:	0	R:	96.9	C:	179	Conc:	183.06
R:	97	Z:	0	C:	179.2	Conc:	183.26
Z:	0	C:	178.6	R:	97.1	Conc:	182.65
UOM:	ppm			Mean Test Assay:			182.99 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA 18808
Ref. Std. Conc: 99.2 ppm
Ref. Std. Traceable to SRM # : 2751
SRM Sample # : 212-09-AL
SRM Cylinder # : SX-20000

Second Analysis Data:						**Date:**	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			0 ppm

Analyzed by: Ying Yu

Certified by: Jacquelyne Elero

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PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22013

DocNumber: 000061044

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR DELTA
1470 DERWENT WAY
DELTA BC V3M 6

Praxair Order Number: 25667204
Customer P. O. Number:
Customer Reference Number:

Fill Date: 11/22/2013
Part Number: NI CD10O28E-AS
Lot Number: 109332606
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	11/26/2021	NIST Traceable
Cylinder Number:	CC115705	Analytical Uncertainty:
9.90 %	CARBON DIOXIDE	± 0.5 %
10.9 %	OXYGEN	± 1 %
Balance	NITROGEN	

Certifcation Information: *Certification Date:* 11/26/2013 *Term:* 96 Months *Expiration Date:* 11/26/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON DIOXIDE

Requested Concentration: 10 %
Certified Concentration: 9.90 %
Instrument Used: Horiba VIA-510 S/N 2807014
Analytical Method: NDIR
Last Multipoint Calibration: 11/24/2013

First Analysis Data:						Date:	11/26/2013
Z:	0	R:	20	C:	9.9	Conc:	9.895
R:	20.02	Z:	0	C:	9.9	Conc:	9.895
Z:	0	C:	9.91	R:	20.01	Conc:	9.905
UOM:	%			Mean Test Assay:			9.898 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC265290
Ref. Std. Conc: 20.00 %
Ref. Std. Traceable to SRM # : vs. 2745
SRM Sample # : 9-B-09
SRM Cylinder # : CAL010768

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%			Mean Test Assay:			0 %

2. Component: OXYGEN

Requested Concentration: 11 %
Certified Concentration: 10.9 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 11/24/2013

First Analysis Data:						Date:	11/26/2013
Z:	0	R:	15.08	C:	10.92	Conc:	10.927
R:	15.08	Z:	0	C:	10.92	Conc:	10.927
Z:	0	C:	10.92	R:	15.08	Conc:	10.927
UOM:	%			Mean Test Assay:			10.927 %

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC92651
Ref. Std. Conc: 15.09 %
Ref. Std. Traceable to SRM # : 2659a
SRM Sample # : 71-37-B
SRM Cylinder # : CLM-006734

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	%			Mean Test Assay:			0 %

Analyzed by: Jacquelyne Fiero

Certified by: Rolonda Haywood

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information.

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVP ID: F22012

DocNumber: 000045137

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

A LANFRANCO & ASSOC INC
101 9488 189TH ST
SURREY BC V4N 4

Praxair Order Number: 16737160
Customer P. O. Number: MARK
Customer Reference Number:

Fill Date: 10/16/2012
Part Number: NI CO495NS1E-AS
Lot Number: 109229009
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	11/6/2014	NIST Traceable
Cylinder Number:	CC169231	Analytical Uncertainty:
491 ppm	CARBON MONOXIDE	± 1 %
243 ppm	NITRIC OXIDE	± 1 %
222 ppm	SULFUR DIOXIDE	± 1 %
Balance	NITROGEN	

NOx = 243 ppm **NOx for Reference Only**

Certifcation Information: *Certification Date:* 11/6/2012 *Term:* 24 Months *Expiration Date:* 11/6/2014

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1
Do Not Use this Standard if Pressure is less than 150 PSIG

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON MONOXIDE

Requested Concentration: 495 ppm
Certified Concentration: 491 ppm
Instrument Used: HORIBA, VIA-510 576 876 015
Analytical Method: NDIR
Last Multipoint Calibration: 11/1/2012

First Analysis Data:						Date:	10/26/2012
Z: 0	R: 498	C: 493	Conc: 493				
R: 498	Z: 0	C: 493	Conc: 493				
Z: 0	C: 493	R: 498	Conc: 493				
UOM: ppm		Mean Test Assay:	493 ppm				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC76140
Ref. Std. Conc: 498ppm
Ref. Std. Traceable to SRM # : 1680b
SRM Sample # : 2-J-15
SRM Cylinder # : CAL018072

Second Analysis Data:						Date:	11/2/2012
Z: 0	R: 498	C: 489	Conc: 489				
R: 498	Z: 0	C: 489	Conc: 489				
Z: 0	C: 489	R: 498	Conc: 489				
UOM: ppm		Mean Test Assay:	489 ppm				

2. Component: NITRIC OXIDE

Requested Concentration: 240 ppm
Certified Concentration: 243 ppm
Instrument Used: Themo Electron 42i S/N 072602432C
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 11/1/2012

First Analysis Data:						Date:	10/26/2012
Z: 0	R: 254	C: 243	Conc: 243				
R: 254	Z: 0	C: 242	Conc: 242				
Z: 0	C: 242	R: 254	Conc: 242				
UOM: ppm		Mean Test Assay:	242 ppm				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC138294
Ref. Std. Conc: 254.2 ppm
Ref. Std. Traceable to SRM # : 1685b
SRM Sample # : 43-L-11
SRM Cylinder # : CAL017304

Second Analysis Data:						Date:	11/2/2012
Z: 0	R: 254	C: 244	Conc: 244				
R: 254	Z: 0	C: 244	Conc: 244				
Z: 0	C: 244	R: 254	Conc: 244				
UOM: ppm		Mean Test Assay:	244 ppm				

3. Component: SULFUR DIOXIDE

Requested Concentration: 225 ppm
Certified Concentration: 222 ppm
Instrument Used: Siemens Ultramat 5E S/N C1-009
Analytical Method: NDIR
Last Multipoint Calibration: 11/1/2012

First Analysis Data:						Date:	10/26/2012
Z: 0	R: 249	C: 223	Conc: 223				
R: 249	Z: 0	C: 223	Conc: 223				
Z: 0	C: 223	R: 249	Conc: 223				
UOM: ppm		Mean Test Assay:	223 ppm				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC155999
Ref. Std. Conc: 249 ppm
Ref. Std. Traceable to SRM # : vs. 1661a
SRM Sample # : 94-H-05
SRM Cylinder # : FF28146

Second Analysis Data:						Date:	11/2/2012
Z: 0	R: 249	C: 221	Conc: 221				
R: 249	Z: 0	C: 221	Conc: 221				
Z: 0	C: 2221	R: 249	Conc: 221				
UOM: ppm		Mean Test Assay:	221 ppm				

Analyzed by: Chas Manning
Chas Manning

Certified by: Nelson Ma
Nelson Ma

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information con tained herein exceed the fee established for providing such information.

PRAXAIR

Praxair Canada, Inc.
9501-34th Street
Edmonton, AB T6B 2X6
Tel: 780-449-0778
Fax: 780-449-5302

06/04/2014

PRAXAIR DELTA
1470 DERWENT WAY
DELTA, BC V3M 6H9
Attention: TICKET PRINTER 70 REPORT PRINTER 65

Work Order No. **20853925**
Customer Reference No. **02843786**
Product Lot/Batch No. **Z582415501**
Product Part No. **NI ME2500P-AS**

CERTIFICATE OF ANALYSIS

Primary Standard

Component	Requested Concentration	Certified Concentration	Analytical Principle	Analytical Accuracy
Methane	**2500 ppm**	**2508 ppm**	**U**	**± 1% rel**
Nitrogen	**Balance**	**Balance**		

Analytical Instruments: **Mettler-Toledo Analytical Balance~ID2sx/USA~~**
Cylinder Style: **AS**
Cylinder Pressure @70F: **13,790 kPa**
Cylinder Volume: **4.014 M3**
Valve Outlet Connection: **CGA-350**
Cylinder No(s). **CC366057**
Comments: **A Lan Franco**

Filling Method: **Gravimetric**
Date of Fill: **06/04/2014**
Expiration Date: **06/04/2017**

Analyst: **Alex Auty**

The gas calibration cylinder standard prepared by Praxair Canada, Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Praxair Canada, Inc. Reference Materials which are either prepared by weights traceable to the National Institute of Standards and Technology (NIST), Measurement Canada, or by using NIST Standard Reference Materials where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by volume (e.g., ppmv) unless otherwise noted.

Key to Analytical Techniques:

A Flame Ionization with Methanizer	B Gas Chromatography with Discharge Ionization Detector	C Gas Chromatography with Electrolytic Conductivity Detector	D Gas Chromatography with Flame Ionization Detector
E Gas Chromatography with Flame Photometric Detector	F Gas Chromatography with Helium Ionization Detector	G Gas Chromatography with Methanizer Carbonizer	H Gas Chromatography with Photoionization Detector
I Gas Chromatography with Reduction Gas Analyzer	J Gas Chromatography with Thermal Conductivity Detector	K Binary Gas Analyzer with Thermal Conductivity Detector	L Infrared - FTIR or NDIR
M Mass Spectrometry - MS or GC/MS	N By Difference of Typical Impurities	O Paramagnetic	P Specific Water Analyzer
Q Total Hydrocarbon Analyzer	R Wet Chemical	S Detector Tube	T Odor
U Gravimetric Methods	V Electrochemical	W Gas Chromatography with Chemiluminescence Detector	

IMPORTANT
The information contained herein has been prepared at your request by personnel within Praxair Canada, Inc.. While we believe the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall liability of Praxair Canada, Inc. arising out of the use of the information contained herein exceed the fee established for providing such information.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: **CAE**

Serial #: **AL1**

Date: 02-Jul-14

Barometric Pressure: 29.82 (in. Hg)

Theoretical Critical Vacuum: 14.07 (in. Hg)

!!!!!!!!!

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

!!!!!!!!!

---------- DRY GAS METER READINGS ----------

dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
3.62	17.00	714.200	732.156	17.956	78.0	78.0	81.0	81.0
1.92	16.00	701.200	713.474	12.274	76.0	76.0	78.0	78.0
1.15	17.00	690.500	700.635	10.135	75.0	75.0	76.0	76.0
0.67	15.00	683.050	689.848	6.798	73.0	73.0	76.0	76.0
0.35	20.00	676.300	682.512	6.212	77.0	77.0	74.0	74.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
73	0.8185	17.7	82.0	85.0	83.5
63	0.5956	20.5	81.0	84.0	82.5
55	0.4606	22.0	82.0	82.0	82.0
48	0.3560	24.0	80.0	85.0	82.5
40	0.2408	25.0	79.0	81.0	80.0

********** **RESULTS** **********

--- DRY GAS METER --- VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	--------- ORIFICE --------- VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	-- DRY GAS METER -- CALIBRATION FACTOR Y Value (number)	Variation (number)	--------- ORIFICE --------- CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
17.664	500.2	17.798	504.0	18.389	1.008	-0.003	1.812	46.02	-0.042	0.713
12.080	342.1	12.201	345.5	12.583	1.010	-0.001	1.820	46.23	-0.034	0.711
9.984	282.7	10.030	284.0	10.334	1.005	-0.006	1.826	46.39	-0.028	0.715
6.701	189.8	6.837	193.6	7.051	1.020	0.009	1.786	45.37	-0.068	0.712
6.107	173.0	6.180	175.0	6.344	1.012	0.001	2.026	51.46	0.172	0.674
					Average Y---------->	**1.0109**	**Average dH@----->**	**1.85**	**47.1**	**Average Ko----->** **0.705**

TEMPERATURE CALIBRATION

Calibration Standard -------> Omega Model CL23A S/N:T-218768

Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results Variation (degF)	Results Percent of Absolute
32	31	-1	-0.20%
100	99	-1	-0.18%
300	298	-2	-0.26%
500	498	-2	-0.21%
1000	998	-2	-0.14%

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

SIGNED: _____

Date: Jul 4 2 14

Pitot Tube Calibration

Date: 27-Jun-14
Pbar (in.Hg): 30.25

Temp (R): 530
Dn (in.): 0.25

Pitot ID: **3A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.610	0.840	51.4	0.8436	0.0042
0.480	0.670	45.6	0.8380	0.0015
0.300	0.420	36.1	0.8367	0.0028
0.210	0.290	30.2	0.8425	0.0030
0.100	0.140	20.8	0.8367	0.0028
		Average :	0.8395	0.0028

Pitot ID: **3A-ST**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.100	0.140	20.8	0.8367	0.0026
0.230	0.320	31.6	0.8393	0.0000
0.300	0.420	36.1	0.8367	0.0026
0.550	0.760	48.8	0.8422	0.0029
0.600	0.830	51.0	0.8417	0.0024
		Average :	0.8393	0.0021

Pitot ID: **3A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.050	0.070	14.7	0.8367	0.0010
0.140	0.195	24.6	0.8388	0.0011
0.230	0.325	31.6	0.8328	0.0049
0.415	0.580	42.4	0.8374	0.0003
0.685	0.945	54.5	0.8429	0.0051
		Average :	0.8377	0.0025

Pitot ID: **3B-ST**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.080	0.110	18.6	0.8443	0.0087
0.240	0.330	32.3	0.8443	0.0087
0.360	0.500	39.5	0.8400	0.0045
0.580	0.800	50.1	0.8430	0.0074
0.630	0.950	52.3	0.8062	0.0293
		Average :	0.8355	0.0117

Pitot ID: **3B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.070	0.100	17.4	0.8283	0.0009
0.180	0.260	27.9	0.8237	0.0054
0.250	0.350	32.9	0.8367	0.0075
0.480	0.680	45.6	0.8318	0.0026
0.695	1.000	54.9	0.8253	0.0038
		Average :	0.8292	0.0041

Pitot ID: **3C-ST**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.650	0.910	53.1	0.8367	0.0015
0.480	0.670	45.6	0.8380	0.0003
0.330	0.460	37.8	0.8385	0.0003
0.250	0.350	32.9	0.8367	0.0015
0.130	0.180	23.7	0.8413	0.0031
		Average :	0.8382	0.0013

Pitot ID: **3C**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.600	0.830	51.0	0.8417	0.0011
0.520	0.720	47.5	0.8413	0.0007
0.360	0.500	39.5	0.8400	0.0006
0.280	0.390	34.8	0.8388	0.0018
0.130	0.180	23.7	0.8413	0.0007
		Average :	0.8407	0.0010

Pitot ID:

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
		Average :		

* Average absolute deviation must not exceed 0.01.

Calibrated by A. Lanfranco and Associates Inc.

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

NOZZLE DIAMETER CALIBRATION FORM

Technician: S. Ferguson
Date: July 4, 2014

Signature:

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft^2)
ST01	0.1240	0.1250	0.1250	0.0010	0.1247	0.0000848
ST05	0.1670	0.1660	0.1670	0.0010	0.1667	0.0001515
SS-1	0.1730	0.1710	0.1720	0.0020	0.1720	0.0001614
SS-7	0.1720	0.1740	0.1750	0.0030	0.1737	0.0001645
SS-8	0.1970	0.1980	0.1970	0.0010	0.1973	0.0002124
ST11	0.2080	0.2080	0.2060	0.0020	0.2073	0.0002345
ST10	0.2100	0.2080	0.2110	0.0030	0.2097	0.0002398
SS-18	0.2310	0.2320	0.2320	0.0010	0.2317	0.0002927
ST15	0.2350	0.2370	0.2370	0.0020	0.2363	0.0003046
SS-2	0.2390	0.2420	0.2410	0.0030	0.2407	0.0003159
B	0.2430	0.2410	0.2440	0.0030	0.2427	0.0003212
SS-3	0.2450	0.2420	0.2430	0.0030	0.2433	0.0003229
ST30	0.2450	0.2430	0.2425	0.0025	0.2435	0.0003234
SS-14	0.2450	0.2460	0.2480	0.0030	0.2463	0.0003310
ST20	0.2490	0.2510	0.2520	0.0030	0.2507	0.0003427
A	0.2540	0.2510	0.2540	0.0030	0.2530	0.0003491
SS-9	0.2740	0.2710	0.2720	0.0030	0.2723	0.0004045
ST40	0.2840	0.2815	0.2845	0.0030	0.2833	0.0004378
SS-13	0.3010	0.2990	0.3000	0.0020	0.3000	0.0004909
SS-4	0.3030	0.3010	0.3040	0.0030	0.3027	0.0004996
ST50	0.3025	0.3040	0.3025	0.0015	0.3030	0.0005007
ST60	0.3050	0.3050	0.3030	0.0020	0.3043	0.0005052
SS-10	0.3200	0.3200	0.3200	0.0000	0.3200	0.0005585
ST65	0.3370	0.3360	0.3350	0.0020	0.3360	0.0006158
ST66	0.3370	0.3390	0.3380	0.0020	0.3380	0.0006231
ST80	0.3590	0.3590	0.3600	0.0010	0.3593	0.0007042
SS-5	0.3680	0.3650	0.3670	0.0030	0.3667	0.0007333
ST75	0.3710	0.3700	0.3690	0.0020	0.3700	0.0007467
ST76	0.3720	0.3720	0.3730	0.0010	0.3723	0.0007561
SS-16	0.3780	0.3750	0.3770	0.0030	0.3767	0.0007738
ST85	0.4000	0.4010	0.4015	0.0015	0.4008	0.0008763
SS-15	0.4050	0.4050	0.4050	0.0000	0.4050	0.0008946
DD	0.4070	0.4040	0.4070	0.0030	0.4060	0.0008990
SS-11	0.4210	0.4210	0.4220	0.0010	0.4213	0.0009682
ST70	0.4230	0.4260	0.4230	0.0030	0.4240	0.0009805
ST86	0.4450	0.4440	0.4480	0.0040	0.4457	0.0010833
ST90	0.4970	0.4950	0.4980	0.0030	0.4967	0.0013454
SS-6	0.4970	0.4960	0.4980	0.0020	0.4970	0.0013472
ST92	0.5070	0.5080	0.5060	0.0020	0.5070	0.0014020
ST96	0.5590	0.5600	0.5620	0.0030	0.5603	0.0017125
SS-12	0.7500	0.7510	0.7490	0.0020	0.7500	0.0030680

Where:

(a) D1, D2, D3 = three different nozzle diameters; each diameter must be measured to within (0.025mm) 0.001 in.

(b) Difference = maximum difference between any two diameters; must be less than or equal to (0.1mm) 0.004 in.

(c) Average = average of D1, D2 and D3

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: **CAE**
Serial #: **G10J**

Date:	02-Jul-14	
Barometric Pressure:	29.82	(in. Hg)
Theoretical Critical Vacuum:	14.07	(in. Hg)

!!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

---------- DRY GAS METER READINGS ----------

dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)
3.62	13.00	464.000	477.992	13.992	80.0	80.0	77.0	77.0
1.92	24.00	479.000	497.727	18.727	77.0	77.0	78.0	78.0
1.12	15.00	498.500	507.697	9.197	79.0	79.0	79.0	79.0
0.62	16.00	507.800	515.151	7.351	79.0	79.0	80.0	80.0
0.33	18.00	515.300	520.946	5.646	80.0	80.0	81.0	81.0

-CRITICAL ORIFICE READINGS-

Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	-- Ambient Temperature -- Initial (deg F)	Final (deg F)	Average (deg F)
73	0.8185	18.2	82.0	82.0	82.0
63	0.5956	20.8	79.0	75.0	77.0
55	0.4606	22.5	81.0	82.0	81.5
48	0.3560	24.0	81.0	80.0	80.5
40	0.2408	25.0	80.0	83.0	81.5

********** **RESULTS** **********

--- DRY GAS METER ---

VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)
13.790	390.5
18.414	521.5
9.000	254.9
7.178	203.3
5.499	155.7

--------- ORIFICE ---------

VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)
13.629	386.0	14.043
18.394	520.9	18.778
8.854	250.7	9.114
7.306	206.9	7.507
5.554	157.3	5.718

-- DRY GAS METER --

CALIBRATION FACTOR Y Value (number)	CALIBRATION FACTOR Y Variation (number)
0.988	-0.011
0.999	-0.001
0.984	-0.016
1.018	0.018
1.010	0.010

--------- ORIFICE ---------

CALIBRATION FACTOR dH@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
1.810	45.98	0.029	0.719
1.800	45.72	0.019	0.715
1.765	44.84	-0.016	0.734
1.631	41.44	-0.150	0.738
1.898	48.21	0.117	0.690

Average Y---------> 0.9998 **Average dH@-----> 1.78 45.2** **Average Ko----> 0.719**

TEMPERATURE CALIBRATION

Calibration Standard --------> Omega Model CL23A S/N:T-218768

Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results Variation (degF)	Results Percent of Absolute
32	34	2	0.41%
100	102	2	0.36%
300	302	2	0.26%
500	502	2	0.21%
1000	1001	1	0.07%

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
For Onfice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

SIGNED: _____

Date: July 2/14

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada (kPa)	Pbar Env Canada (inches of Hg)	Device (inches of Hg) Reading	Device (inches of Hg) Elevation Corrected	Difference (Env Can - Elv Corr)
LA	January 9, 2014	101.0	29.83	29.71	29.783	0.05
DS	January 9, 2014	101.0	29.83	29.74	29.813	0.02
CL	January 9, 2014	101.0	29.83	29.70	29.773	0.06
AL	January 9, 2014	101.0	29.83	29.71	29.783	0.05
ML	January 9, 2014	101.0	29.83	29.70	29.773	0.06
MH	January 9, 2014	101.0	29.83	29.74	29.813	0.02
SH	January 9, 2014	101.0	29.83	29.70	29.773	0.06
JZ	January 9, 2014	101.0	29.83	29.70	29.773	0.06
JB	January 9, 2014	101.0	29.83	29.73	29.803	0.03

Performance Specification is
Device Corrected for Elevation must be +/- 0.1 " Hg of ENV CANADA SEA-LEVEL Pbar
Enter Environment canada Pressure from their website for Vancouver (link below)
and the reading from your barometer on the ground floor of the office.

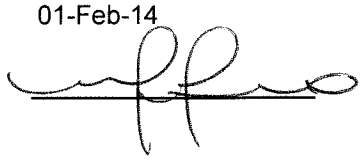
http://www.weatheroffice.gc.ca/city/pages/bc-74_metric_e.html

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Technician: C. Lanfranco
Date: 01-Feb-14

Signature: 

K-TYPE THERMOCOUPLE CALIBRATIONS

Probe/TC ID	Hg Thermometer Temp (F)	CL23A Readout (F)		Probe/TC ID		Hg Thermometer Temp (F)	CL23A Readout (F)
3B	212	211		TC 3-3		212	211
3C	212	211		TC 4-3		210	211
4A	212	212		TC 4-4		212	212
4B	212	212		TC 5-4		210	212
5A	211	211		TC 5-5		n/a	n/a
5B	212	211		TC 5-6		212	211
5C	211	211		TC 6-4		211	211
5D	211	211		TC 10-3		211	211
6A	212	212		TC 10-4		n/a	n/a
6B	211	211		5' Fording		211	211
6C	212	211		TCMarshal		212	211
7C	210	210					
8A	211	212					
8B	210	210					
10A	210	211					
10B	212	212					
11A	210	211					
12A	213	212.0					
12B	209	209					

* n/a denotes not in service

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 2014 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 (2012). All monitoring is completed with a LANDTEC Gas Analyzer and Extraction Monitor (GEM) 2000+. Prior to 2011, the GEM 500 model was used.

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 (steps1–8) 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 2014 Gas Probe Data

GAS PROBE 01A

Date Completed: December 1995

Location: East property boundary - 90 metres north of main gate

Co-ordinates: Northing = 5,377,771.57 Easting = 466,470.027

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to 10 metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.80 m.	Top of casing elevation	= 160.71 m.
Screen length	= 2.91 m.	Ground elevation	= 159.91 m.
Depth - top of screen	= 7.46 m.	Top of screen elevation	= 153.25 m.
Total depth	= 10.37 m.	Bottom elevation	= 150.34 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	12:35	0.0	3.46	-4	0.0	0.0	19.6	
17/06/2014	12:07	-12.5	4.10	-3.36	0.0	0.1	19.3	
01/08/2014	11:34	-34.0	-	-	0.0	0.2	19.7	No water level measurement
11/12/2014	13:19	-39.0	3.24	-4.22	0.0	0.0	19.5	

GAS PROBE 01B

Date Completed: December 1995

Location: East property boundary - 90 metres north of main gate

Co-ordinates: Northing = 5,377,771.57 Easting = 466,470.027

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to 10 metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.80 m.	Top of casing elevation	= 160.71 m.
Screen length	= 2.91 m.	Ground elevation	= 159.91 m.
Depth - top of screen	**= 2.91 m.**	Top of screen elevation	= 157.80 m.
Total depth	= 5.82 m.	Bottom elevation	= 154.89 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	12:40	0.16	3.80	0.89	0.0	1.7	17.5	
17/06/2014	12:10	-4.96	4.36	1.45	0.0	1.7	17.7	
01/08/2014	11:37	-28.41	-	-	0.0	1.6	18.5	No water level measurement
09/12/2014	13:27	-43.00	3.82	0.91	0.0	1.5	18.0	

GAS PROBE 02A

Date Completed: December 1995

Location: East property boundary - 190 metres north of main gate

Co-ordinates: Northing = 5,377,861.864 Easting = 466,470.204

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to 10 metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.82 m.	Top of casing elevation	= 169.70 m.
Screen length	= 2.91 m.	Ground elevation	= 168.88 m.
Depth - top of screen	**= 7.70 m.**	Top of screen elevation	= 162.00 m.
Total depth	= 10.61 m.	Bottom elevation	= 159.09 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	12:15	-0.02	3.99	-3.71	0.0	0.0	19.4	
17/06/2014	11:55	-21.99	6.40	-1.30	0.0	0.1	19.4	
01/08/2014	11:24	-11.30	-	-	0.0	0.0	20.0	No water level measurement
09/12/2014	13:05	-19.00	1.36	-6.34	0.0	0.0	19.4	

GAS PROBE 02B

Date Completed: December 1995

Location: East property boundary - 190 metres north of main gate

Co-ordinates: Northing = 5,377,861.864 Easting = 466,470.204

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to 10 metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.82 m.	Top of casing elevation	= 169.70 m.
Screen length	= 2.91 m.	Ground elevation	= 168.88 m.
Depth - top of screen	**= 3.45 m.**	Top of screen elevation	= 166.25 m.
Total depth	= 6.36 m.	Bottom elevation	= 163.34 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	12:20	-0.06	4.42	0.97	0.0	1.9	11.8	
17/06/2014	11:59	-7.20	5.73	2.28	0.0	3.3	9.7	
01/08/2014	11:11	-5.00	-	-	0.0	1.5	14.1	No water level measurement
09/12/2014	13:09	40.00	2.24	-1.21	0.0	3.2	12.9	

GAS PROBE 03A

Date Completed: December 1995

Location: East property boundary - 290 metres north of main gate

Co-ordinates: Northing = 5,377,925.947 Easting = 466,473.462

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to 10 metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.71 m.	Top of casing elevation	= 168.72 m.
Screen length	= 2.91 m.	Ground elevation	= 168.01 m.
Depth - top of screen	**= 7.72 m.**	Top of screen elevation	= 161.00 m.
Total depth	= 10.63 m.	Bottom elevation	= 158.09 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	11:55	-5.4	8.02	0.30	0.0	0.1	19.4	
17/06/2014	11:30	-14.0	-	-	0.0	2.3	10.0	dry
01/08/2014	11:15	-5.0	-	-	0.0	1.5	14.1	No water level measurement
09/12/2014	12:50	-10.0	7.74	0.02	0.0	1.3	14.3	

GAS PROBE 03B

Date Completed: December 1995

Location: East property boundary - 290 metres north of main gate

Co-ordinates: Northing = 5,377,925.947 Easting = 466,473.462

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to 10 metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.71 m.	Top of casing elevation	= 168.72 m.
Screen length	= 2.91 m.	Ground elevation	= 148.01 m.
Depth - top of screen	**= 1.92 m.**	Top of screen elevation	= 166.80 m.
Total depth	= 4.83 m.	Bottom elevation	= 163.89 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	12:00	0.0	4.52	2.60	0.0	4.2	12.6	
17/06/2014	11:34	-19.9	-	-	0.0	6.5	15.1	dry
01/08/2014	11:15	-7.0	-	-	0.0	2.1	18.2	No water level measurement
09/12/2014	12:56	-24.0	2.06	0.14	0.0	4.8	11.2	

GAS PROBE 04A

Date Completed: January 1996

Location: 2.4m from South - east corner of workshop in gravel driveway

Co-ordinates: Northing = 5,375,816.22 Easting = 466,124.03

Trench data: One 19 mm (3/4/ inch) diameter PVC screened conduit installed horizontally approximately 500 mm below grade. The conduit is located on top of a washed gravel collector trench and under a PVC barrier.

Collection area: Installed along the east side of the workshop for a horizontal distance of 12 metres.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	**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**	
21/03/2014	12:55	0.0	0.0	2.5	13.1	
17/06/2014	12:29	-16.0	0.0	0.0	1.7	
01/08/2014	-	-	-	-	-	Probe plugged with mud- no data
09/12/2014	-	-	-	-	-	Probe water logged - no data

GAS PROBE 05A

Date Completed: January 1996

Location: In administration office parking lot, behind mountain bike washrooms (in center of four yellow bollards)

Co-ordinates: Northing = 5,375,754.44 Easting = 466,126.67

Trench data: One 19 mm (3/4/ inch) diameter PVC screened conduit installed horizontally approximately 500 mm below grade. The conduit is located on top of a washed gravel collector trench and under a PVC barrier.

Collection area: Installed horizontally for 20 metres from the sampling point in a westerly direction.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	14:00	0.0	0.0	0.7	18.9	
17/06/2014	15:03	-2.4	0.0	0.9	18.6	
01/08/2014	12:20	-3.1	0.0	0.7	19.1	
09/12/2014	11:10	-11.7	0.0	0.6	19.0	

GAS PROBE 06A

Date Completed: January 1996

Location: North - east corner of CRD main office

Co-ordinates: Northing = 5,375,744.79 Easting = 466,108.94

Trench data: One 19 mm (3/4/ inch) diameter PVC screened conduit installed horizontally approximately 500 mm below grade. The conduit is located on top of a washed gravel collector trench and under a PVC barrier.

Collection area: Installed horizontally for 6 metres from the sampling point in a northerly direction along the west side of the portable lunch room trailer.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:50	0.0	0.0	0.3	19.5	
17/06/2014	14:53	-5.0	0.0	0.9	18.6	
01/08/2014	12:50	2.8	0.0	0.4	19.5	
09/12/2014	11:15	-9.4	0.0	0.3	19.4	

GAS PROBE 06B

Date Completed: January 1996

Location: North - east corner of CRD main office

Co-ordinates: Northing = 5,375,744.79 Easting = 466,108.94

Trench data: One 19 mm (3/4/ inch) diameter PVC screened conduit installed horizontally approximately 500 mm below grade. The conduit is located on top of a washed gravel collector trench and under a PVC barrier.

Collection area: Installed horizontally for 15 metres from the sampling point in a westerly direction along the north side of the CRD main office.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:55	0.0	0.0	0.1	19.6	
17/06/2014	14:57	-1.9	0.0	0.6	19.1	
01/08/2014	12:54	7.6	0.0	0.2	19.6	
09/12/2014	11:19	-22.0	0.0	0.3	19.2	

GAS PROBE 07A

Date Completed: January 1996

Location: North side of CRD main office, against wall in centre of covered porch area

Co-ordinates: Northing = 5,375,740.55 Easting = 466,099.29

Trench data: One 75mm (3") perforated HDPE pipe installed horizontally approximately 1m below base of building slab. The conduit is located on top of a washed gravel collector trench.

Collection area: Installed horizontally for 10 metres from the sampling point in a southerly direction along the toe of the initial excavation for the office extension.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:45	0.0	0.0	0.2	19.4	
17/06/2014	14:46	-11.0	0.0	0.2	19.2	
01/08/2014	12:46	5.3	0.0	0.1	19.4	
09/12/2014	11:29	-21.0	0.0	0.2	19.4	

GAS PROBE 7B

Date Completed: January 1996

Location: South of CRD main office, against wall outside multipurpose room

Co-ordinates: Northing = 5,375,727.98 Easting = 466,095.32

Trench data: One 75mm (3") perforated HDPE pipe installed horizontally directly under a 60mil HDPE membrane located under the building slab.

Collection area: Installed horizontally in an H pattern covering the underside of the building slab for the office extension using approximately 20m of piping.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:35	0.0	0.0	0.2	19.3	
17/06/2014	14:41	-12.8	0.0	0.1	19.3	
01/08/2014	12:39	6.0	0.0	0.0	19.6	
09/12/2014	11:24	-32.0	0.0	0.2	19.4	

GAS PROBE 08A

Date Completed: January 1996

Location: East end of CRD weigh scale building.

Co-ordinates: Northing = 5,375,710.65 Easting = 466,075.21

Trench data: One 19 mm (3/4/ inch) diameter PVC screened conduit installed horizontally approximately 500 mm below grade. The conduit is located on top of a washed gravel collector trench and under a PVC barrier.

Collection area: Installed horizontally for 1 metre below the sampling point to intersect service conduits to the weigh scale building.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:28	0.0	0.0	0.2	19.4	
17/06/2014	14:30	-5.7	0.0	0.3	19.0	
01/08/2014	12:27	-0.8	0.0	0.2	19.4	
09/12/2014	11:34	-14.0	0.0	0.1	19.4	

GAS PROBE 09A

Date Completed: January 1996

Location: West end of CRD weigh scale building.

Co-ordinates: Northing = 5,375,709.73 Easting = 466,067.67

Trench data: One 19 mm (3/4/ inch) diameter PVC screened conduit installed horizontally approximately 500 mm below grade. The conduit is located on top of a washed gravel collector trench and under a PVC barrier.

Collection area: Installed horizontally for 1 metre below the sampling point to intersect service conduits to the weigh scale building.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:33	0.0	0.0	0.2	19.3	
17/06/2014	14:35	-21.0	0.0	0.6	18.6	
01/08/2014	12:33	-14.1	0.0	0.2	19.4	
09/12/2014	11:40	-25.0	0.0	0.0	19.6	

GAS PROBE 11A

Date Completed: June 1996

Location: East property boundary - 20 metres north of main gate

Co-ordinates: Northing = 5,375,759.795 Easting = 466,187.961

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.95 m.	Top of casing elevation	= 149.91 m.
Screen length	= 2.91 m.	Ground elevation	= 148.96 m.
Depth - top of screen	= 7.81 m.	Top of screen elevation	= 142.10 m.
Total depth	= 10.72 m.	Bottom elevation	= 139.19 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	13:12	0.0	3.78	-4.03	0.0	0.1	19.4	
17/06/2014	14:05	-10.9	5.21	-2.60	0.0	0.1	18.6	
01/08/2014	11:06	-14.1	-	-	0.0	0.0	19.8	No water level measurement
09/12/2014	11:48	-14.0	2.56	-5.25	0.0	0.0	19.6	

GAS PROBE 11B

Date Completed: June 1996

Location: East property boundary - 20 metres north of main gate

Co-ordinates: Northing = 5,375,759.795 Easting = 466,187.961

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.95 m.	Top of casing elevation	= 149.91 m.
Screen length	= 2.91 m.	Ground elevation	= 148.96 m.
Depth - top of screen	= 2.32 m.	Top of screen elevation	= 147.59 m.
Total depth	= 5.23 m.	Bottom elevation	= 144.68 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	13:16	0.0	3.94	1.62	0.0	1.5	17.6	
17/06/2014	14:11	-16.8	5.41	3.09	0.0	2.4	17.0	
01/08/2014	12:11	5.4	-	-	0.0	1.6	18.4	No water level measurement
09/12/2014	11:52	-26.0	1.90	-0.42	0.0	0.2	19.5	

GAS PROBE 12A

Date Completed: June 1996

Location: East property boundary - 50m north of GP-03 along Perimeter Road (behind fence)

Co-ordinates: Northing = 5,376,088.470 Easting = 466,192.902

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to 9.0 metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.92 m.	Top of casing elevation	= 159.16 m.
Screen length	= 2.91 m.	Ground elevation	= 158.24 m.
Depth - top of screen	= 6.09 m.	Top of screen elevation	= 153.07 m.
Total depth	= 9.00 m.	Bottom elevation	= 150.16 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	11:30	0.1	5.21	-0.88	0.0	0.0	19.6	
17/06/2014	11:01	-3.2	9.67	3.58	0.0	2.3	11.9	
01/08/2014	10:56	-13.4	-	-	0.0	3.2	7.7	No water level measurement
09/12/2014	12:18	-25.0	4.31	-1.78	0.0	1.0	18.1	

GAS PROBE 12B

Date Completed: June 1996

Location: East property boundary - 50m north of GP-03 along Perimeter Road (behind fence)

Co-ordinates: Northing = 5,376,088.470 Easting = 466,192.902

Bore hole data: One 152.4 mm (6 inch) diameter bedrock hole drilled to metres below ground surface completed with two 19 mm (3/4 inch) diameter PVC piezometers.

Casing stick up	= 0.92 m.	Top of casing elevation	= 159.16 m.
Screen length	= 2.91 m.	Ground elevation	= 158.24 m.
Depth - top of screen	= 2.81 m.	Top of screen elevation	= 156.35 m.
Total depth	= 5.72 m.	Bottom elevation	= 153.44 m.

Sample pump run time = 200 seconds

GAS PROBE READINGS								
Date	**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**	
21/03/2014	11:35	0.0	4.36	1.55	0.0	2.4	13.7	
17/06/2014	11:06	-10.2	-	-	0.0	5.5	10.4	dry
01/08/2014	11:00	-11.4	-	-	0.0	7.3	12.9	No water level measurement
09/12/2014	12:23	-34.0	2.72	-0.09	0.0	0.4	19.0	

GAS PROBE 13A

Date Completed:

Location: In front of workshop door, at grey plactic stand pipe

Co-ordinates: Northing = 5,375,817.68 Easting = 466,110.93

Trench data: Unknown

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:00	0.0	0.0	1.6	18.2	
17/06/2014	12:34	-14.6	0.0	4.6	15.2	
01/08/2014	11:49	-8.3	0.0	0.0	20.0	
09/12/2014	13:38	-9.0	0.0	2.0	17.7	

GAS PROBE 14A

Date Completed:

Location: West side of workshop, between workshop and lock block retaining wall

Co-ordinates: Northing = 5,375,823.90 Easting = 466,110.06

Trench data: Unknown

Collection area: Installed along the east side of the workshop for a horizontal distance of 12 metres.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	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	
21/03/2014	13:05	0.0	0.0	0.5	19.4	
17/06/2014	12:40	-10.5	0.0	7.1	11.4	
01/08/2014	11:56	-11.2	0.0	3.4	17.7	
09/12/2014	13:42	-10.0	0.0	0.3	18.8	

GAS PROBE 17A HLC

Date Completed:

Location: North-west corner of Hartland Learning Centre (white 4" PVC cap)

Co-ordinates: Northing = 5,375,801.14 Easting = 466,112.12

Trench data: One 75 mm (3 inch) perforated HDPE pipe installed horizontally approximately 300 mm below base of building slab. The conduit is located on top of a washed gravel collector trench.

Collection area: Installed horizontally around the perimeter (~45 m) of the Hartland Learning Centre.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	**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**	
21/03/2014	12:48	0.0	0.0	0.0	19.9	
17/06/2014	12:20	-6.3	0.0	0.1	19.4	
01/08/2014	11:44	-28.0	0.0	0.1	19.8	
09/12/2014	13:32	-44.0	0.0	0.0	19.4	

GAS PROBE 18A

Date Completed:

Location: North-west corner of new contractors shed (white 4" PVC cap)

Co-ordinates: Northing = 5,376,450.55 Easting = 465,638.64

Trench data: One 75 mm (3 inch) perforated HDPE pipe installed horizontally approximately 300 mm below base of building slab. The conduit is located on top of a washed gravel collector trench.

Collection area: Installed horizontally around the perimeter (~70 m) of the Hartland Contractor's Shed.

Sample pump run time = 200 seconds

GAS PROBE READINGS						
Date	**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**	
21/03/2014	11:10	0.3	0.0	0.3	18.3	
17/06/2014	10:53	0.1	0.0	0.5	18.1	
01/08/2014	10:44	-3.0	0.0	0.5	18.5	
09/12/2014	12:09	-31.0	0.0	0.1	19.5	

APPENDIX E

Grid and Hot Spot Monitoring

E1 Grid and Hot Spot Monitoring Methodology

E2 2014 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) as well as a zero gas to generate a proper calibration slope. After successful calibration, as pan check is done whereby the span gases are applied to the FID and the concentration is 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, doesn't 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 2014 Grid and Z Point Monitoring Data

Table 1. Hartland Landfill Ambient Air Monitoring Program – Calibration Sheet

FID Calibration					Calibration Check						
Date	Time	Warmup 30 minutes	Calibrate	Span Check	Zero Gas		Low Span Gas		High Span Gas		Comments
					Concentration	Reading	Concentration	Reading	Concentration	Reading	
18-Mar-14	8:55	☒	☒		0		500		15,000		
18-Mar-14	9:05			☒	0	-0.1	500	504	15,000	1.50%	
18-Mar-14	15:40			☒	0	-2.56	500	482	15,000	1.45%	
20-Mar-14	9:05	☒	☒		0		500		15,000		
20-Mar-14	9:10			☒	0	-0.63	500	503	15,000	1.49%	
20-Mar-14	12:20			☒	0	-1.47	500	571	15,000	1.61%	
20-Mar-14	12:25		☒		0	-0.65	500	508	15,000	1.47%	
29-Jul-14	9:45	☒	☒		0		500		15,000		
	9:55			☒	0	-1	500	506	15,000	1.55%	
30-Jul-14	10:00	☒	☒		0		500		15,000		
	10:15			☒	0	-0.8	500	498	15,000	1.55%	
	15:15			☒	0	-1.30	500	582	15,000	1.92%	
31-Jul-14	10:15	☒	☒		0		500		15,000		
	10:25			☒	0	0.32	500	498	15,000	1.52%	

Table 2. Hartland Landfill VOC & TRS Grid Data

APPROX. LOCATION	March		July	
	VOC READING	TRS	VOC READING	TRS
B1	0.77	0.002	0.60	0.003
B2	0.66	0.002	0.55	0.000
B3	0.64	0.005	0.55	0.003
B4	0.61	0.003	0.88	0.002
B5	0.63	0.003	2.30	0.002
B6	0.97	0.002	2.20	0.004
B7	0.75	0.001	1.52	0.003
B8	0.77	0.003	5.60	0.006
B9	8.06	0.003	2.90	0.004
B10	0.30	0.003	2.79	0.006
C11	0.27	0.003	4.77	0.002
C10	2.46	0.003	3.57	0.003
C9	0.37	0.003	2.51	0.002
C8	0.56	0.002	4.67	0.005
C7	0.42	0.003	2.21	0.004
C6	0.57	0.003	2.65	0.003
C5	0.67	0.003	4.32	0.004
C4	0.46	0.003	1.52	0.003
C3	0.50	0.003	1.42	0.003
C2	0.30	0.003	1.39	0.003
C1	0.20	0.003	0.78	0.002
D1	0.20	0.003	1.21	0.002
D2	0.30	0.003	1.83	0.003
D3	0.43	0.003	1.96	0.004
D4	0.64	0.002	1.97	0.004
D5	0.30	0.003	3.59	0.004
D6	0.48	0.000	4.56	0.004
D7	0.19	0.003	4.27	0.002
D8	0.96	0.002	6.33	0.004
D9	0.44	0.002	5.06	0.004
D10	8.12	0.002	5.35	0.004
D11	5.25	0.002	4.17	0.004
E11	115.00	0.004	23.31	0.005
E10	36.00	0.005	3.61	0.004
E9	15.00	0.004	3.94	0.004
E8	8.60	0.006	4.18	0.004
E7	10.14	0.005	9.02	0.004
E6	25.00	0.005	5.23	0.004
E5	15.11	0.004	4.84	0.004
E4	3.84	0.003	2.11	0.005
E3	2.95	0.003	1.88	0.004
E2	2.62	0.004	1.52	0.004
E1	2.98	0.003	1.07	0.004
F1	2.71	0.004	0.84	0.004
F2	1.65	0.005	1.03	0.005
F3	2.30	0.005	1.10	0.005
F4	3.87	0.005	1.26	0.005
F5	25.49	0.006	3.38	0.004

Table 2, continued

APPROX. LOCATION	March		July	
	VOC READING	TRS	VOC READING	TRS
F6	3.07	0.005	8.45	0.003
F7	14.39	0.007	2.60	0.004
F8	MISSED	MISSED	3.78	0.006
F9	MISSED	MISSED	2.83	0.006
F10	13.88	0.006	2.50	0.006
F11	7.91	0.006	5.19	0.005
G13	101.00	0.005	5.80	0.005
G12	10.15	0.004	20.92	0.005
G11	23.04	0.004	3.78	0.006
G10	MISSED	MISSED	17.76	0.005
G9	MISSED	MISSED	136.00	0.006
G8	MISSED	MISSED	25.80	0.006
G7	24.20	0.007	MISSED	MISSED
G6	6.73	0.006	16.02	0.005
G5	14.52	0.004	10.64	0.005
G4	5.65	0.005	1.99	0.004
G3	3.55	0.004	2.01	0.005
G2	2.87	0.005	1.87	0.005
G1	2.85	0.006	1.80	0.004
H1	0.11	0.000	0.81	0.002
H2	0.37	0.001	0.69	0.001
H3	0.89	0.002	0.79	0.002
H4	0.97	0.001	1.33	0.003
H5	47.22	0.000	2.69	0.001
H6	8.64	0.003	37.20	0.002
H7	7.81	0.001	MISSED	MISSED
H8	MISSED	MISSED	7.10	0.004
H9	MISSED	MISSED	34.40	0.002
H10	MISSED	MISSED	80.10	0.003
H11	8.12	0.030	48.20	0.003
I12	48.00	0.003	60.40	0.002
I11	8.47	0.003	48.20	0.003
I10	88.00	0.002	6.06	0.002
I9	102.00	0.002	62.60	0.002
I8	81.22	0.001	46.10	0.002
I7	9.90	0.001	19.30	0.002
I6	57.01	0.001	19.90	0.002
I5	11.22	0.001	13.10	0.003
I4	1.95	0.002	1.60	0.002
I3	1.60	0.000	1.41	0.004
I2	1.77	0.002	MISSED	MISSED
I1	1.35	0.002	1.48	0.003
J1	1.59	0.002	1.71	0.003
J2	1.04	0.002	1.87	0.003
J3	1.11	0.002	1.69	0.002
J4	1.19	0.002	1.72	0.004
J5	1.07	0.003	1.96	0.003
J6	1.09	0.002	1.30	0.003
J7	1.32	0.002	1.73	0.004
J8	1.09	0.002	2.05	0.004

Table 2, continued

APPROX. LOCATION	March		July	
	VOC READING	TRS	VOC READING	TRS
J9	117.00	0.002	15.89	0.002
K12	136.00	0.003	54.29	0.004
K11	23.59	0.001	165.00	0.004
K10	31.00	0.002	212.00	0.004
K9	336.00	0.003	33.96	0.004
K8	2.30	0.003	27.32	0.007
K7	1.32	0.001	2.05	0.004
K6	1.60	0.001	1.65	0.004
K5	1.90	0.002	2.10	0.004
K4	2.04	0.003	2.23	0.003
K3	2.01	0.002	1.53	0.004
K2	1.86	0.001	MISSED	MISSED
K1	1.21	0.001	1.64	0.004
L1	2.24	0.004	1.24	5.000
L2	1.72	0.002	1.86	0.003
L3	2.05	0.003	1.43	0.004
L4	1.94	0.003	1.55	0.004
L5	1.95	0.003	1.45	0.004
L6	4.43	0.004	2.23	0.006
L7	6.18	0.004	2.05	0.005
L8	4.55	0.002	2.29	0.005
L9	7.54	0.003	11.30	0.005
L10	27.85	0.004	6.65	0.004
L11	61.00	0.004	18.00	0.004
L12	120.00	0.004	31.70	0.006
L13	104.00	0.004	41.90	0.006
L14	64.22	0.003	36.40	0.006
M14	74.82	0.004	10.70	0.004
M13	230.00	0.003	54.80	0.005
M12	26.68	0.003	19.50	0.004
M11	32.26	0.003	5.10	0.006
M10	19.25	0.002	2.66	0.004
M9	19.91	0.003	2.75	0.004
M8	4.73	0.003	1.94	0.005
M7	5.34	0.003	1.63	0.004
M6	3.90	0.001	2.27	0.004
M5	3.14	0.003	1.62	0.004
M4	2.98	0.003	1.69	0.004
M3	2.76	0.002	1.98	0.004
M2	1.30	0.002	1.99	0.004
M1	1.14	0.002	1.72	0.004
N1	1.68	0.001	1.51	0.002
N2	2.04	0.002	1.84	0.002
N3	5.75	0.003	1.84	0.002
N4	2.81	0.003	1.56	0.002
N5	2.52	0.003	1.51	0.002
N6	3.67	0.003	1.56	0.001
N7	5.56	0.003	1.91	0.002
N8	3.84	0.003	1.50	0.002
N9	9.71	0.003	1.76	0.003

Table 2, continued

APPROX. LOCATION	March		July	
	VOC READING	TRS	VOC READING	TRS
N10	MISSED	MISSED	1.35	0.002
N11	14.60	0.002	2.20	0.004
N12	26000.00	0.003	22.90	0.004
P1	10.07	0.003	1.10	0.004
P2	7.23	0.003	1.36	0.004
P3	9.33	0.003	2.02	0.002
P4	12.18	0.003	2.00	0.003

Table 3. Hartland Landfill VOC & TRS Background Monitoring

WayPoint	Mar-14		Jul-14	
	VOC (ppm)	TRS (ppm)	VOC (ppm)	TRS (ppm)
Back 1	1.4	0.006	0.67	0.002
Back 7	1.5	0.006	0.68	0.003
Back 6	1.6	0.006	0.71	0.004
Back 21	1.5	0.006	0.42	0.002
Back 20	3.0	0.008	0.39	0.004
Back 10	1.5	0.006	1.14	0.004
Back 11	1.4	0.007	0.10	0.002
Back 13	1.6	0.007	0.16	0.001

Table 4. Hartland Landfill VOC from Walkabout

Point	March			May		
	VOC (ppm)	TRS (ppm)	Comments	VOC (ppm)	TRS (ppm)	Comments
Z42	1442	0.010	Bird pole	---	---	discontinued
Z64	10	0.006	Edge of Phase 2, Cell 1 closure - leaking from under geomembrane	-	-	active face
Z80	1.34%	0.007	Edge of N. Face interim closure tarp	8.74	0.00	
Z84	886	0.005	Edge of N. Face interim closure tarp	---	---	
Z86	4.11	0.006	Top of tarp - N. Face closure	3.18	0.00	
Z87	7200	0.009	N. Face closure at Tuttle Valley (tear in membrane)	28.18	0.00	
Z88	8720	0.010	Infrastructure box near top of N. Face closure tarp	54.12	0.00	
Z92	463	0.007	Bird pole	15.18	0.001	
Z93	MISSED	MISSED	Bird pole	0.0235	0.00	
Z94	3.62%	0.010	Ripped tarp - north closure	116	0.00	
Z95	2886	0.007	End of leachate/gas collector	23.49	0.00	
Z96	261	0.005	Black discolouration & H2O on Bench Road	41.18	0.00	
Z97	5.05	0.008	Garbage	10.17	0.00	
Z98	1.13	0.007	Pipe sticking out of ground at corner between LFG 20 & 21	940	0.00	
Z100	19.88	0.009	Gas well	196	0.00	
Z101	1053	0.010	Side of Bench Road between L11 to M11	0.0486	0.00	
Z102	360	0.004	Litter fence in garbage at active face	9,890	0.00	
Z103	2.74	0.006	Top edge of new tarped area	---	---	
Z104	7.39%	0.047	West face closure - Bench Road by K8	0.0322	0.00	
Z105	360	0.004	Old contractor's workshop	0.038	0.00	
Z106	11.29%	0.005	LFG infrastructure on N. Face interim closure	>15,000	0.13	
Z107	25	0.005	Edge of N. Face interim closure tarp	-	-	active face
Z108	2.53%	0.007	Black standpipe from leachate collection pipe at the base of old controlled waste are (was active face at the time)	---	---	
Z109	88	0.006	Tarp seam along top Bench Road at NW Face closure	-	-	active face
Z110	210	0.009		>15,000	0.01	
Z111	1.09%	0.010	Gas infrastructure	3,791	0.00	
Z112	2.13%	0.010	Edge of tarp, north edge of Bench Road	>15,000	0.01	
Z113	---	---	---	8,466	0.004	hole in tarp
Z114	---	---	---	48,400	0.004	hole in tarp
Z115	---	---	---	61,800	0.004	hole in tarp

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Appendix E3 Hartland Landfill Historical Z-Point Data

Location UTM		Point	Created	Methane Concentration (ppm/%)																												Source
Northing	Easting			Nov-2002	Jun-2003	Nov-2003	Dec-2004	Mar-2005	Sep-2005	Feb-2006	Feb-2007	Mar-2007	Nov-2007	Mar-2008	Sep-2008	Feb-2009	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	
5376376.24	465770.27	Z1	Apr-2001	49.5	667	290	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376382.91	465752.09	Z2	Apr-2001	18	113	553	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376390.19	465731.55	Z3	Apr-2001	103	16.4	172	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376404.12	465695.20	Z4	Apr-2001	121	47.4	246	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376409.56	465682.96	Z5	Apr-2001	247	196	1775	>20000	3166	178	1991	57	38	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376307.82	465646.30	Z6	Apr-2001	170	723	1720	413	2036	10.2	5.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376379.40	465641.99	Z7	Apr-2001	-1.7	2023	2382	420	123	66.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376358.61	465629.59	Z8	Apr-2001	-1.1	91.9	251	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376294.56	465571.38	Z9	Apr-2001	-1.7	11.5	53.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376288.59	465571.74	Z10	Apr-2001	-2	1697	>20000	6.1	4.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376301.61	465588.85	Z11	Apr-2001	-1.3	92	353	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376153.49	465921.77	Z12	Apr-2001	543	14.3	19.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376069.56	465700.69	Z13	Jun-2003	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
		Z14	n/a	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
		Z15	n/a	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
		Z16	n/a	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
		Z17	n/a	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
		Z18	n/a	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
		Z19	n/a	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376240.81	465682.72	Z20	Dec-2001	186	47	16.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376249.22	465672.08	Z21	Nov-2002	279	275	151	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376140.63	465682.91	Z22	Dec-2001	74.7	92.6	71.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376199.46	465617.53	Z23	Dec-2001	161	59.4	1722	9.1	17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376344.34	465719.78	Z24	Dec-2001	146	72.1	62.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376341.83	465741.15	Z25	Dec-2001	20000	1921	7.7	16.9	>20000	210	6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376332.13	465767.23	Z26	Dec-2001	20000	75.4	60.7	48.7	69.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376157.75	465907.15	Z27	Jun-2003		29	9.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376127.51	465683.22	Z28	Jun-2003		106	>20000	54.4	16.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376305.09	465604.31	Z29	Nov-2003			2283	18.7	27.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376154.49	465756.65	Z30	Nov-2003			1056	29.9	3.6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5375849.50	465901.32	Z31	Dec-2004				1397	1336	780	11.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376179.56	465851.44	Z32	Dec-2004				1338	87	817	245	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376200.63	465818.31	Z33	Dec-2004				>20000	29	6310	279	2433	577	EQT FAIL	-0.4	414	507	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	Bird pole
5376157.59	465835.86	Z34	Dec-2004				10407	12800	320	477	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376147.38	465848.08	Z35	Dec-2004				18400	13550	4840	214	710	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376099.41	465792.74	Z36	Dec-2004				>20000	1283	14847	1623	1608	196	678	932	12.96	37.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376298.24	465750.39	Z37	Dec-2004				1559	2151	1413	156	14898	1955	EQT FAIL	1350	3.90%	4140	1.13%	6.00%	>12,500	11.6	19.68	56.1	---	---	---	---	---	---	---	---	---	Bird pole
5376283.62	465801.38	Z38	Dec-2004				1248	1112	239	5.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376322.83	465824.59	Z39	Dec-2004				16000	2806	39.3	19.4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5375817.05	465744.70	Z40	Mar-2005					1276	33.1	263	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376147.36	465850.85	Z41	Sep-2005						4199	1905	968	756	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376155.19	465838.23	Z42	Sep-2005						400	103	MISSED	MISSED	MISSED	MISSED	2.00%	205	1.30%	1.14%	4.28%	5.13%	1.44%	181	ACTIVE FACE	1285	1116	1442	667	MISSED	565	Bird pole, top edge of WF closure
5376256.03	465630.94	Z43	Mar-2005					8400	4.2	7.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376364.18	465792.37	Z44	Mar-2005					9741	83.3	1445	180	1116	EQT FAIL	17.6	2.8	1981	9.1	12.1	MISSED	4.5	---	---	---	---	---	---	---	---	---	---	---	---	Edge of Phase 2, Cell 1 closure - leaking from edge
5376338.64	465774.39	Z45	Feb-2006							28.7	10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376322.08	465752.91	Z46	Feb-2006							16.5	150	MISSED	MISSED	MISSED	76.71	179	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376175.39	465850.23	Z47	Feb-2006							169	19999	8.7	EQT FAIL	12412	12.68%	1.46%	7.47%	1.25%	401	3.82	1.67%	38.22	8.74	2.04	---	---	---	---	---	---	---	Edge of Phase 2, Cell 1 closure - leaking from edge
5376101.47	465847.01	Z48	Feb-2006							201	380	MISSED	MISSED	MISSED	3005	725	8%	4.36%	8.07	182	121	---	---	---	---	---	---	---	---	---	---	Top edge of geomembrane
5375901.10	465848.17	Z49	Feb-2006							348	93.9	MISSED	MISSED	479	2.98%	3597	13.93%	1.44%	175	4.19	13.25	---	---	---	---	---	---	---	---	---	---	Bird pole
5375953.93	465888.09	Z50	Feb-2006							1924	1033	216	EQT FAIL	CW AREA	CW AREA	CW AREA	CW AREA	CW AREA	CW AREA	CW AREA	43.01	1.41	---	---	---	---	---	---	---	---	---	Abandoned buried gas well - >90 degree turn in buried lateral pipe
5376100.18	465962.24	Z51	Feb-2006							6690	409	25	---	---	---	---	6.60%	CW AREA	3.69	CW AREA	2.7	CW AREA	3.18	---	---	---	---	---	---	---	---	Abandoned gas manifold sampling station GMSS0002
5375975.37	465696.95	Z52	Feb-2006							13036	8403	>20000	19999	1718	27.56	2.11%	10%	7.54%	5.28%	>12500	17.5	1.81	28.18	---	---	---	---	---	---	---	---	Cleanout
5376194.67	465817.08	Z53	Feb-2006							2286	363	559	---	---	---	---	270	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
5376112.28	465834.80	Z54	Feb-2007								1300	1701	EQT FAIL	509	9.46%	2.52%	13.93%	1900	8000	>1500	56.1	17.1	54.12	---	---	---	---	---	---	---	---	Top of geomembrane - along rock berm

Appendix E3, continued

Location UTM		Point	Created	Methane Concentration (ppm/%)																									Source
Northing	Easting			Nov-2002	Jun-2003	Nov-2003	Dec-2004	Mar-2005	Sep-2005	Feb-2006	Feb-2007	Mar-2007	Nov-2007	Mar-2008	Sep-2008	Feb-2009	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	
5376360.04	465590.39	Z55	Feb-2007								2695	12.7	EQT FAIL	MISSED	349	8.02	---	---	---	---	---	---	---	---	---	---	---	---	
5376230.52	465707.61	Z56	Feb-2007								2414	1062	9.8	7.2	37.63	ACTIVE FACE	---	---	---	---	---	---	---	---	---	---	---	---	
5376146.42	465711.45	Z57	Feb-2007								11597	51.5	4776	21.2	13.30%	ACTIVE FACE	6.40%	130	1.03%	2.09%	1.35%	19.1	15.18	161	---	---	---	---	Bird pole
5376156.98	465740.43	Z58	Feb-2007								1308	13.6	11	126	ACTIVE FACE	3.10%	50.11	ACTIVE FACE	ACTIVE FACE	11.02	14.1	---	---	---	---	---	---	---	unknown
5376179.09	465731.85	Z59	Feb-2007								2071	1690	14.2	14.5	---	---	53.62	---	---	---	---	---	---	---	---	---	---	---	
		Z60	n/a								---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	-
5375826.01	465743.17	Z61	Mar-2007									1287	29.6	8.3	2.06	90	---	---	---	---	---	---	---	---	---	---	---	---	
		Z62	n/a								---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	-
5376202.48	465808.02	Z63	Mar-2007									20000	EQT FAIL	5674	4669	21.07%	1.74%	9.82%	140	-1.76	432	---	---	---	---	---	---	---	Edge of Phase 2, Cell 1 closure - leaking from under geomembrane
5376222.89	465785.18	Z64	Mar-2007									1996	EQT FAIL	-1.1	12.42	2760	4.62	2.18%	500	416	6.13%	1020	15.18	968	467	10	52	53	---	Edge of Phase 2, Cell 1 closure - leaking from under geomembrane
5376022.24	465735.25	Z65	Mar-2007									1226	12.9	226	25.97	14.96	---	---	---	---	---	---	---	---	---	---	---	---	
5376254.13	465648.75	Z66	Mar-2007									>20000	EQT FAIL	ACTIVE FACE	2.25%	10.83%	13.93%	17.79	208	122	---	---	---	---	---	---	---	---	Bird pole
5376200.88	465678.92	Z67	Mar-2007									19551	19110	1323	1605	ACTIVE FACE	1.91%	25.23	ACTIVE FACE	ACTIVE FACE	1.01%	43.6	116	14.43	---	---	---	---	Bird pole
5376231.00	465640.00	Z68	Nov-2007										1666	ACTIVE FACE	1228	1146	1.03%	9768	2.51	1268	16.68	624	23.49	---	---	---	---	---	GW 84 culverts
5376259.00	465772.00	Z69	Mar-2008											7810	10%	9.67%	13.93%	>1.25%	9.02	-2.13	1.79	---	---	---	---	---	---	---	Abandoned GW well
5376112.00	465801.00	Z70	Nov-2007										2311	1810	2436	1066	21.55	22.53	MISSED	35	---	---	---	---	---	---	---	---	Terminal end of a horizontal gas collector (139 m lift) and edge of geomembrane
5376097.00	465704.00	Z71	Sep-2008												2.63%	1.50%	13.93%	9226	2.12%	3500	573	20.82	41.18	---	---	---	---	---	Bird pole
5376153.49	465921.77	Z72	Sep-2008												1.70%	8.62	2.09	2.95	---	---	---	---	---	---	---	---	---	---	Gas escaping from area with frost heave
5376307.59	465739.45	Z73	Sep-2008												9565	6.18	5.84	1.43%	7.33	7321	2.95	270	10.17	---	---	---	---	---	Edge of geomembrane
5376230.77	465743.00	Z74	Sep-2008												1.27%	24.76	ACTIVE FACE	15.31	207	---	---	---	---	---	---	---	---	---	Former corner for traffic to active face (see Z78)
5375953.74	465849.99	Z75	Sep-2008												4.48%	1.56%	13.93%	4.50%	57	13%	25.86	2.02	940	---	---	---	---	---	Bird pole
5376050.48	465710.00	Z76	Feb-2009													1.05%	1.22%	5.72%	14%	>12500	33.1	13.99	196	---	---	---	---	---	Bird pole
5376051.20	465820.81	Z77	Feb-2009													1.05%	663	4%	6.49	150	13.45	---	---	---	---	---	---	---	Decommissioned bird pole (inside blackberry bush)
5376222.29	465772.39	Z78	Feb-2009													8.31%	4.11%	235	MISSED	409	97.2	---	---	---	---	---	---	---	Active corner for traffic to active face (see Z74)
5376120.72	465805.84	Z79	Feb-2009													4.79%	24.39	6.68	MISSED	450	88.42	---	---	---	---	---	---	---	Bottom of berm
5376199.66	465562.00	Z80	Oct-2009														1.50%	>50000	3%	11%	2.68%	1.31%	4.86%	2.11%	18.30%	1.34%	14	66.1	5048	
5376249.92	465708.55	Z81	Oct-2009														2700	2.50%	29.7	288	106	---	---	---	---	---	---	---	---	Bird pole
5376240.56	465727.11	Z82	Oct-2009														13.93%	700	212	112	---	---	---	---	---	---	---	---	---	Unknown
5376354.32	465720.64	Z83	Oct-2009														13.47%	6.53%	11.41	10.48	4.69	---	---	---	---	---	---	---	---	Edge of Phase 2, Cell 1 closure - leaking from under geomembrane
5375847.24	465856.80	Z84	Jan-2010															1.50%	178	4%	55.83	33.25	9890	3706	1.20%	886	12	174	---	Edge of N. face interim closure tarp
5375908.06	465797.51	Z85	Jan-2010															1.30%	INACCESSIBLE	285	24.1	21.33	---	---	---	---	---	---	---	At edge of road E8-E9 - abandoned buried gas well?
5376299.34	465738.10	Z86	Jan-2010															6.74%	1.50%	1.20%	2.10%	1.17%	3.22%	2.88%	2798	4	38	1.86%	3076	Top of tarp - N. Face closure
5376293.64	465535.40	Z87	Jan-2010															6.94%	3.89%	3%	6%	5.17%	3.80%	1.17%	1.57%	7200	29	1.08%	2.08%	N. Face closure at Tuttle Valley
5376317.71	465627.16	Z88	Jan-2010															>50000	12.10%	2395	>15000	2.20%	>15000	1.03%	13	8720	36	4.17%	8919	Infrastructure box near top of N. Face closure tarp
5375917.12	465772.41	Z89	Jun-2010																3000	3743	170	5.27	ACTIVE FACE	10.74	---	---	---	---	---	On slope behind contractor's workshop
5376288.21	465567.54	Z90	Jun-2010																1499	4291	3028	INACCESSIBLE	---	---	---	---	---	---	---	Top NW corner of N. Face closure where tarps overlap
5376140.25	465838.33	Z91	Jan-2011																	6.30%	364	19.15	ACTIVE FACE	15.12	---	---	---	---	---	Top of WF closure
5376150.59	465640.49	Z92	Jan-2011																	9%	1049	47.61	>15000	1.92%	51.76	463	22	---	---	Bird pole
5376022.63	465721.01	Z93	Jan-2011																	1257	22.66	140	3791	36.77	133	MISSED	56	70.9	---	Bird pole
5376339.03	465598.07	Z94	Jan-2011																	>12500	>20000	>15000	>15000	7.97%	16.34%	3.62%	MISSED	2.38%	1.32%	Ripped tarp - north closure
5375971.36	465753.09	Z95	Dec-2011																		1490	3.44%	ACTIVE FACE	924	3	29	12	---	---	End of leachate/gas collector
5376105.80	465654.91	Z96	Dec-2011																		1000	4.17	144	3668	423	261	28	---	---	Black discolouration & H2O on Bench Road
5376016.90	465863.60	Z97	Dec-2011																		1750	189	ACTIVE FACE	2280	2	5	37	---	---	Garbage
5376166.37	466106.42	Z98	Dec-2011																		5364	1.9	3.65	1032	7	1	1	---	---	Pipe sticking out of ground at corner between LFG 20 & 21
5376262.55	465730.69	Z99	Dec-2011																		3800	54.21	24.99	6.48	---	---	---	---	---	LFG infrastructure
5376298.15	465682.45	Z100	Dec-2011																		2300	>15000	>15000	1.08%	9.97%	19.88	1088	1.89%	314	Gas well
5376283.35	465708.83	Z101	Dec-2011																		1.17%	23.05	1.78%	3.09%	5.00%	1053	127	1.45%	1.76%	Side of Bench Road between L11 to M11

Appendix E3, continued

Location UTM		Point	Created	Methane Concentration (ppm/%)																								Source
Northing	Easting			Nov-2002	Jun-2003	Nov-2003	Dec-2004	Mar-2005	Sep-2005	Feb-2006	Feb-2007	Mar-2007	Nov-2007	Mar-2008	Sep-2008	Feb-2009	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	
5375971.71	465831.90	Z102	Mar-2012																			9657	1.47%	356	MISSED	360	13	3	---	Litter fence in garbage at active face
5376218.62	465630.27	Z103	Mar-2012																			1.37%	>15000	6.40%	2531	3	26	5.4	---	Top edge of new tarped area
5376171.21	465831.76	Z104	Mar-2012																			3.25%	1.80%	1.94%	5323	7.39%	2510	3.65%	1.23%	West face closure - Bench Road by K8
5375895.89	465693.72	Z105	May-2012																				6766	3865	1531	360	88	36	---	Old contractor's workshop
5376327.32	465654.99	Z106	May-2012																				6.13%	3.57%	4.20%	11.29%	6566	2693	9300	LFG infrastructure on N. face interim closure
5376291.17	465680.05	Z107	May-2012																				1600	3376	6471	25	113	2.50%	1.22%	Edge of N. Face interim closure tarp
5375951.04	466005.54	Z108	Dec-2012																						1015	2.53%	7	0.31	1.55	Black standpipe near SW diversion pipe in P1 at old soot disposal area
5376181.69	465671.86	Z109	Dec-2012																						1800	88	52	7559	12.53	Tarp seam along W Face closure
5376224.73	465547.03	Z110	Dec-2012																						6.34%	210	21	53.2	---	Edge of tarp at W Face closure
5376292.76	465689.88	Z111	Dec-2012																						13.89%	1.09%	4200	7.68%	2.69%	LFG infrastructure (small culvert with a 2" gas line running through it - W Face closure near gas well
5376253.90	465689.97	Z112	Mar-2013																							2.13%	12	5900	31.6	Edge of tarp on north side of Bench Road, just west of L11
5376254.68	465641.39	Z113	Oct-2013																								8466	MISSED	3.00%	Hole in tarp
5376257.42	465644.69	Z114	Oct-2013																								4.84%	MISSED	3.44%	Hole in tarp
5376257.97	465597.96	Z115	Oct-2013																								6.18%	MISSED	6560	Hole in tarp
5376251.73	465651.90	Z116	Mar-2013																									2.65%	MISSED	Hole in tarp - Could not locate in last 2 monitoring events - May be covered now
5376222.21	465602.70	Z117	Mar-2013																									1.26%	5915	Hole in tarp
5376314.21	465611.88	Z118	Jul-2014																										3600	Hole in tarp
5376296.43	465718.43	Z119	Jul-2014																										1.59%	4 holes along LFG pipe
5376250.71	465549.48	Z120	Mar-2015																											3 large holes in tarp, 10 ft west of L14

APPENDIX F

Volatile Organic Compounds (VOC) Data

F1 Hartland Landfill Historical VOC Data

F2 Hartland Landfill Ambient VOC Data

Appendix F1 Hartland Landfill Historical VOC Data

Parameter	Date	17-Dec-98	11-Mar-99	25-May-99	30-Nov-99	29-Mar-00	27-Jul-00	20-Dec-00	12-Dec-01	20-Dec-05	11-Aug-06	17-Mar-09	13-Dec-11	23-Jul-13	Maximum	WCB Limit (8 hr) (ppm)	STEL	Danger
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		ug	ppm			
	CAS																	
Acetone	67-64-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.59	ND		6.59	250 ppm	500 ppm	
Benzene	71-43-2	0.22	0.5	0.28	0.41	0.16	0.15	0.11	0.13	0.82	0.59	0.68	0.68	1.27	0.82	0.5 ppm	2.5 ppm	skin; A1, 1
Bromodichloromethane	75-27-4																	
Bromoform	75-25-2															0.5		
Bromomethane (Methyl bromide)	74-83-9															1		skin
n-butane	106-97-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16.72	4.7	<1	16.72	600	750	
2-Butanone	78-93-3											5.33	1.33		5.33	50	100	
Carbon Tetrachloride	56-23-5															2		skin; A2, 2B
Chlorobenzene	108-90-7	0.1	0.2	0.1	0.18		0.06				0.26	0.13	0.11	0.05	0.26	10		
Chloroethane (Ethyl chloride)	75-00-3	0.4	0.3		0.31	0.22	0.14	0.15					0.36		0.4	100		skin
Chloroform	67-66-3													ND		2		2B; R
Chloromethane (methyl chloride)	74-87-3															50	100	skin; R
Dibromochloromethane	124-48-1																	
1,2-Dibromoethane	106-93-4															0.5		skin; 2A
Dibromomethane	74-95-3							0.09							0.09			
Dichlorodifluoromethane	75-71-8	9.7	3.5	26.4	2.06	1.8	0.96	8.62			53.25		4.04		53.25	1000		
1,2-dichlorobenzene	95-50-1		0.03											0.01	0.03	25	50	
1,3-Dichlorobenzene	541-73-1																	
1,4-dichlorobenzene	106-46-7	0.03	0.4	0.1							0.13		0.12	0.06	0.4	10		2B
1-1,dichloroethane	75-34-3	0.2	0.2	0.1	0.16	0.06	0.07	0.05		0.36	0.2		0.11	0.00	0.36	100		
1-2,dichloroethane	107-06-2											0.03	0.07	0.20	0.03	1	2	2B
1,1-Dichloroethene	75-34-4																	
1,2-dichloroethylene	156-59-2	1	1.4	1	1.3	0.61	0.52	0.34	0.4	1.35	0.89		0.61	1.02	1.4	200		
trans-1,2-Dichloroethene	156-60-5				0.03								0.04		0.03	200		
1,2-Dichloropropane	78-87-5												0.03			75	110	S
1,3-Dichloropropene	542-75-6															1		skin; 2B
Ethylbenzene	100-41-4	2.5	5	2.8	5.2	2.21	1.77	3.1	1.05	5.70	5.06	4.11	1.99	3.06	5.7	20		2B
n-heptane	142-82-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.22	ND		0.22	400	500	
n-hexane	110-54-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.02	2		2.02	20		skin
2-Hexanone	591-78-6															5	10	skin; R
Isopropanol	67-63-0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.44	ND		3.44	200	400	
Isopropylbenzene	98-82-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23	ND		0.23	25	75	
4-Methyl-2-pentanone	123-42-2												0.08		0.08	50		
Methyl acetate	79-20-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.32	ND		0.32	200	250	
Methylene Chloride (syn: Dichloromethane)	75-09-2											0.16	0.04		0.16	25		2B

Appendix F1, continued

Parameter	Date	17-Dec-98	11-Mar-99	25-May-99	30-Nov-99	29-Mar-00	27-Jul-00	20-Dec-00	12-Dec-01	20-Dec-05	11-Aug-06	17-Mar-09	13-Dec-11	23-Jul-13	Maximum	WCB Limit (8 hr) (ppm)	STEL	Danger
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		ug	ppm			
	CAS																	
n-nonane	111-84-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.84	ND		1.84	200		
n-octane	111-65-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.37	ND		0.37	300		
n-pentane	109-66-0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.17	11.3		11.3	600		
phenol	108-95-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.03	ND		3.03	5		skin
Styrene	100-42-5	0.1	0.6	0.1			0.05	0.09	0.04			0.17	0.25	ND	0.6	50	75	2B
1,1,2,2-Tetrachloroethane	79-34-5															1		skin
Tetrachloroethene	127-18-4	0.1	0.2	0.1	0.11	0.05	0.05	0.04		1.20		0.2	0.07	0.09	1.2	25	100	2A
Toluene	108-88-3	4.5	6.5	5.6	7.85	3.07	2.56	3.13	1.08	9.90	5.84	12.67	2.83	4.25	12.67	20		R
1,1,1-Trichloroethane	71-55-6	0.04	0.1	0.04	0.04							0.03	0.04	0.02	0.1	350	450	
1,1,2-Trichloroethane	79-00-5															10		skin
Trichloroethene	79-01-6	0.1	0.1	0.1	0.08	0.04	0.03	0.02		0.18	0.07	0.07	0.05	0.07	0.18	10	25	A2, 2A
Trichlorofluoromethane	75-69-4	0.1	0.1	0.1	0.05			0.05		0.18	0.16		0.13		0.18		C 1000	
1,2,4-trimethylbenzene	95-63-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.52	ND		1.52			
Vinyl Chloride	75-01-4	2.2	1.4	2.8	4.75	1.57	0.69	1.3		5.98	1.45	ND	1.86	4.40	5.98	1		A1, 1
Xylenes	1330-20-7	4.7	9.9	6.3	20.5	4.38	3.31	6.27	1.26	11.05	10.98	7.87	1	6.47	20.5	100	150	
Methane	74-82-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	46.3 (%)	47(%)	46(%)	47(%)	1000 ppm		
Carbon dioxide	124-38-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35 (%)	32.3 (%)	27.5(%)	35 (%)	5000 ppm	15000 ppm	
Hydrogen sulfide	7783-06-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	40.33	16.70	41.00	40.33		10 ppm	ceiling
Aliphatic hydrocarbon gases																		
Ethane	78-84-0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND							
Butane	106-97-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16.72	4.70		16.72	600 ppm	750 ppm	
Butene	9003-28-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND							
Pentene	646-04-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND							
Propane	74-98-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	28.0	11.0	35.5	28.0	1000 ppm		
Ethene	74-85-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8		<1	2.8	200 ppm		
Propene	115-07-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.5	4.3	---	4.3	500 ppm		
Pentane	109-66-0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.6		3.85	2.6	600 ppm		
Hexene	592-41-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.4		<1	3.4	50 ppm		R

Notes: Blank cells =below detection limit; ND = not done
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.

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	1.10	1,849.00	13,984.00	10.00	19,999.00	2,184.00	15,354.00	6,560.00	11736.00	6,028.00	17,793.00	ND	>20,000	>20,000	>20,000	>20,000
Benezene	0.00	0.00	0.0046*	0.00	0.00	0.00	<	0.01	0.00	0.00	0.00	0.00	<	<	<	<
Chlorobenzene	<	<	0.00	<	0.00	<	<	0.00	<	0.00	<	0.00	<	<	<	<
Ethylbenzene	<	<	0.002*	0.00	0.0023*	0.00	<	0.04	0.00	0.02	0.00	0.00	<	<	<	<
Tetrachloroethene	<	0.00	0.00	<	<	<	<	0.00	<	0.00	0.00	0.01	<	<	<	<
Toluene	0.00	0.0087*	0.0076*	0.00	0.009*	0.0058*	<	<	0.00	0.00	0.00	0.02	<	<	<	<
Xylenes	0.00	0.00	0.004*	0.00	0.0041*	0.00	<	0.12	0.00	0.03	0.00	0.01	<	<	<	<

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