Chestnut Landfill
Republic Services

Facility Permit C-146-1-3

Annual Compliance Emissions Test Report #14237
6 MMBTUH Landfill Gas Flare

Located at:

12825 S. Chestnut Avenue
Fresno, CA 93725

Performed and Reported by:

Blue Sky Environmental, Inc.
624 San Gabriel Avenue
Albany, CA 94706

Prepared For:

Erin Fanning
Forward Landfill
9999 S. Austin Road
Manteca, CA 95336

For Submittal To:
John Copp
San Joaquin Valley APCD
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244

Resubmittal
Found incorrect CH4 DE calculation
Original report mis-stated the emission limits, too.
The original report is behind these 11 pages.
J Copp

Testing Performed On:
November 12th, 2014

Final Report Submitted On:
January 5th, 2015
Revised January 30th, 2015

REVIEW AND CERTIFICATION

Team Leader:

The work performed herein was conducted under my supervision, and I certify that: a) the details and results contained within this report are to the best of my knowledge an authentic and accurate representation of the test program; b) that the sampling and analytical procedures and data presented in the report are authentic and accurate: c) that all testing details and conclusions are accurate and valid, and: d) that the production rate and/or heat input rate during the source test are reported accurately.

If this report is submitted for Compliance purposes it should only be reproduced in its entirety. If there are any questions concerning this report, please contact me at (510) 525 1261.

Guy Worthington
Principal Project Manager

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SECTION 1. INTRODUCTION

1.1. Summary

Blue Sky Environmental, Inc. was contracted to perform the annual emissions testing on the 6 MMBTU John Zink Landfill Gas Flare at Chestnut Landfill, 12825 S. Chestnut, Fresno, CA 93725. Table 1 summarizes the source test information. Table 2 summarizes the results compared to the emission limits. The flare met all compliance emission criteria.

Table 1. Source Test Information

Test Location:	Chestnut Landfill, 12825 S. Chestnut Avenue, Fresno, CA 93725
Source Contact:	Don Litchfield (209) 684-4733 Erin Fanning 9999 S. Austin Road, Manteca, CA 95336 (209) 982-4298 Office, (209) 982-1009 Fax (209) 227-9531 Cell, efanning@republicservices.com
Source Tested:	John Zink Enclosed Landfill Gas Flare
Source Test Date:	November 12th, 2014
Test Objective:	Determine Compliance with Permit C-146-1-3
Test Performed By:	Blue Sky Environmental, Inc. 624 San Gabriel Ave., Albany, CA 94706 Guy Worthington (510) 508 3469
Test Parameters:	**Landfill Gas** O_2, N_2, CO_2, BTU, THC, CH_4, NMOC, HHV, F-Factor, Sulfur Species, Volumetric Flow Rate **Flare Emissions** THC, CH_4, NMOC, NOx, CO, O_2, SO_2, Volumetric Flow Rate, Temperature.

Table 2. Compliance Summary

(6 MMBtu/hr Flare)	Average Test Result	Permit Limit	Compliance Status
NOx, lbs/MMBTU	0.02 ✓	0.08 ✓	In Compliance
CO, lbs/MMBTU	0.001 ✓	0.20 ✓	In Compliance
SO_2, lbs/day	0.28 ✓	2.6 ✓	In Compliance
NMOC, (ppmvd @ 3% O_2 as Methane) ✓	13.5 ✓	20 ✓	In Compliance
NMOC, Destruction Efficiency %	>97.4 ✓	or 98	
NMOC, lbs/MMBtu	0.007 ✓	0.014 ✓	In Compliance
CH_4, Destruction Efficiency %	>99.998 ✓	99	In Compliance

SECTION 2. SOURCE TEST PROGRAM

2.1. Overview

This annual performance test was conducted to demonstrate that the landfill gas flare is operating in accordance with the current SJVUAPCD Permit.

2.2. Pollutants Tested

The following CARB and EPA and ASTM sampling and analytical methods were used:

Test Parameters	Inlet- Test Method	Outlet-Test Method	Measurement Principle
O_2, CO_2	ASTM 1945 x 3	CARB 100 x 3	GC-TCD/Paramagnetic/Infrared
CO		CARB 100 x 3	Non-Dispersive Infrared
NO_x		CARB 100 x 3	Chemiluminescence
SO_2	ASTM 5504 x 3	Calculated x 3	Gas Chromatography/SCD
VOC (NMOC)	EPA M25C x 3	EPA 18 x 3	Gas Chromatography/FID
Flow	CARB M2	EPA M19 x 3	Pitot Differential Pressure
Moisture	CARB M4 WBDB	N/A	

2.3. Test Date(s)

Testing was conducted on November 12th, 2014.

2.4. Sampling and Observing Personnel

Guy Worthington representing Blue Sky Environmental, Inc., performed testing.

Chris Carver of SCS was present to oversee the Flare operation and assist in coordinating testing and the collection of process data during testing.

The SJVAPCD was notified of the test in a Source Test Plan (STP) submitted on October 7th, 2014, and approved the STP on October 20th, 2014. John Copp of SJVAPCD was present to witness the testing. A copy of the STP can be found in Appendix I.

2.5. Source/Process Description

The enclosed landfill gas flares consist of a 6 million British Thermal Units per hour (MMBtu/hr) unit. The Flare shell is approximately 35 feet high and has a 48-inch inside diameter. There is a platform around one quarter of the stack, with a ladder for access, which does provide access (with a stretch) to both 4-inch ports.

2.6. Source Operating Conditions

The flare operating temperature records are contained in Appendix-F. There is no condensate injection.

The 6 MMBtu/hr flare was operated at a lower thermocouple control temperature of 1600°F. The monitored landfill gas flow rate averaged 162 Standard Cubic Feet per Minute (SCFM). The landfill gas methane content ranged between 29.9 to 31.2%. Measured fuel flow averaged 164 DSCFM.

SECTION 3. SAMPLING AND ANALYSIS PROCEDURES

3.1. Port location

The Flare sampling was conducted in the 48-inch diameter ID stack, via ports approximately 30' above grade, accessed by a fixed ladder and platform. Two 4-inch flange ports were available ~4 stack diameters downstream from the burners and ~1 stack diameters upstream from the exit.

3.2. Point description/Labeling – ports/stack

Blue Sky Environmental conducted two perpendicular 8 pt traverses and found O_2 stratification greater than 10%, therefore subsequent CEM sampling was conducted at 16 pts per test run.

3.3. Sample train description

Sampling system diagrams are included in the appendix H. Additional descriptive information is included in the following section.

3.4. Sampling procedure description

On the Flare, three, 30-32 minute test runs were performed, completely traversing the stack on two diameters during Run #1, 2 & 3. Sixteen points were sampled during the Stratification Check, eight points per port, for two minutes per point.

CARB 100 is the protocol for continuous monitoring techniques using instrumental analyzers. Sampling is performed by extracting exhaust flue gas from the stack via a heated sample line, conditioning the sample to remove moisture and particulates and analyzing it by continuous monitoring gas analyzers in a Continuous Emission Monitoring (CEM) test van. The sampling system consists of a stainless steel sample probe, heated teflon sample line maintained @248°F ±25, a glass-fiber particulate filter, glass moisture-knockout condensers in ice, teflon sample transfer tubing, diaphragm pump and a stainless steel/teflon manifold and flow control/delivery system. A constant sample and calibration gas supply pressure of ~5 PSI is provided to each analyzer to avoid pressure variable response differences. The entire sampling system is leak checked prior to and at the end of the sampling program.

The calibration gases are selected to fall approximately within the following instrument ranges; 40-60% and 80-100% of range and zero. Linearity and system bias checks are performed prior to Run 1. All calibrations during testing are performed externally to incorporate any system bias that may exist. Zero and calibration drift and bias values are determined for each run.

All calibration gases are EPA Protocol #1. The analyzer data recording system consists of Omega 0595 3-pen channel strip chart recorders, which can be supported by a Data Acquisition System (DAS). A separate data disk is included containing this electronic record.

System Performance Criteria

Instrument Linearity	≤2% Full Scale
Instrument Bias	≤5% Full Scale
System Response Time	≤± 2 minutes
NOx Converter Efficiency (EPA 20)	≥ 90%
Instrument Zero/Span Drift	≤± 3% Full Scale

EPA Method 18. Concurrent with the exhaust sampling, Blue Sky collected a total of three integrated 5-liter Tedlar Bag samples of the LFG for analysis. The samples were collected using Teflon tubing connections, and the tubing and the Tedlar bag were filled and purged prior to sampling. The gas sample was controlled with a rotameter to collect a 32-minute integrated sample. All the samples were analyzed for NMOC, HHV, F-Factor, Fixed Gases, Sulfur Species (incl. H_2S and TRS) and NMOC.

Sampling & Traverse Points Selection by CARB/EPA Method 1. This method is used to determine the duct or stack area and appropriate traverse points that represent equal areas of the duct for sampling and velocity measurements.

Stack Gas Velocity & Flow Rate by CARB/EPA Method 2. This method is used to determine stack gas velocity using a standard or S-type pitot tube and inclined manometer or Shortridge electronic manometer. Temperature is monitored using a K-type thermocouple and calibrated Omega temperature meter. QA/QC procedures include leak checks before and after each traverse to validate the results. Thermometer calibrations are performed using an Omega Model CL-300 calibrator. Geometric calibrations of S-type pitots are performed every 6 months or following modification according to the guidelines in California Air Resources Board (CARB) QA/QC Volume VI, Table 3.

Stack Gas Molecular Weight by CARB/EPA Method 3. This method is used to determine the molecular weight of the stack gas. Measurements of gas constituents; $\%O_2$ and $\%CO_2$ were collected in an integrated bag sample from the inlet and were analyzed by GC/TCD. The O_2 and CO_2 in the exhaust were measured by CARB 100.

EPA Method 19 (gas) was used to determine stack gas volumetric flow rates using oxygen based F-factors. F-factors are ratios of combustion gas volumes generated from heat input. The heating value of the fuel in Btu per cubic foot is determined from analysis of the fuel gas samples using ASTM D1946/3588 gas chromatography analytical procedures. Total fuel consumption was measured by CARB Methods 1, 2, 3 and 4 wetbulb-drybulb, but the facility flow meter was used to calculate mass emissions. The total cubic feet per hour of fuel multiplied times the Btu/cf provides million Btu per hour (MMBtu) heat input. The heat input in MMBtu/hr is multiplied by the F-factor (DSCF/MMBtu) and adjusted for the measured oxygen content of the source to determine volumetric flow rate. The facility flow rates were used to determine emission rates.

3.5. Instrumentation and Analytical procedures

The following continuous emissions analyzers were used:

Instrumentation	Parameter	Principle
TECO 42i	NO_x	Chemiluminescence
TECO 48C	CO	GFC/IR
Rosemount 755R	O_2	Paramagnetic
Rosemount 800	CO_2	IR

3.6. Comments: Limitations and Data Qualifications

SJVAPCD Appendix G Draft QA/QC calculation spreadsheet is included in the Calculation Section of the report.

Landfill gas flow is recorded by facility meters. An independent measure of the landfill gas flow was performed using a standard pitot and measuring differential pressure in units of inches of water. The only means to obtain a reasonable determination of the flow was using an ADM 880C and mini pitot and measuring the pressure differential. Wet bulb temperature was determined by flowing the positive pressure landfill gas over the psychrometer sensor.

Blue Sky Environmental has reviewed this report for accuracy, and concluded that the test procedures were followed and accurately described and documented. The review included the following items:

Review of the general text
Review of calculations
Review of CEMS data
Review of supporting documentation

The services described in this report were performed in a manner consistent with the generally accepted professional testing principles and practices. No other warranty, expressed or implied, is made. These services were performed in a manner consistent with our agreement with our client. The report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions contained in this report pertain to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and operating parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations, subsequent to this, and do not warranty the accuracy of information supplied by others.

Measured fuel flow has an average slightly higher than recorded fuel rate by the facility Yokogawa.

SECTION 4. APPENDICES

A.	Tabulated Results
B.	Calculations
C.	Laboratory Reports
D.	Field Data Sheets & DAS Summary
E.	Strip Charts
F.	Process Information
G.	Calibration Certifications and Quality Assurance Records
H.	Sample Train Configuration and Stack Diagrams
I.	Related Correspondence (Source Test Plan)
J.	Permit

A
Tabulated Results

TABLE #1

Republic-Chestnut Landfill
6 MMBtu/hr Flare

	Run 1	Run 2	Run 3	AVERAGE	LIMITS
Test Date	11/12/14	11/12/14	11/12/14		
Test Time	0950-1023	1103-1136	1206-1239		
Standard Temp., °F	60	60	60	60	
Flare Temperature, °F	1,603	1,604	1,604	1,604	>1400
Fuel Flow Rate, DSCFM (Method 2)	159	164	169	164	
Fuel Heat Input, MMBTU/Hr	2.9	3.1	3.2	3.1	
Exhaust Flow Rate, DSCFM (Method 19)	1,073	1,112	1,214	1,133 ✓	
Oxygen, O_2, %	11.3	11.2	11.6	11.4 ✓	
Carbon Dioxide, CO_2, %	8.1	8.0	8.0	8.0 ✓	
NOx, ppm	7.4	7.3	7.4	7.4	
NOx, ppm @ 15% O_2	4.5	4.4	4.7	4.6	
NOx, lbs/hr	0.06	0.06	0.07	0.06	
NOx, lbs/MMBTU	**0.02**	**0.02**	**0.02**	**0.02** ✓	**0.08** ✓
CO, ppm	0.7	1.1	0.6	0.8	
CO, ppm @ 15% O_2	0.4	0.7	0.4	0.5	
CO, lbs/hr	0.003	0.006	0.003	0.004	
CO, lbs/MMBTU	**0.001**	**0.002**	**0.001**	**0.001** ✓	**0.20** ✓
Total Reduced Sulfur as H_2S in fuel, ppm	6.8	7.2	7.3	7.1	
SO_2, ppm calculated emission	1.0	1.1	1.0	1.0	
SO_2, lbs/hr	0.01	0.01	0.01	0.01	
SO_2, lbs/day	**0.27**	**0.29**	**0.30**	**0.28** ✓	**2.6** ✓
THC, ppm (M18)	6.5	8.2	9.2	8.0	
THC, lbs/hr as CH_4	0.02	0.02	0.03	0.02	
CH_4, ppm (M18)	1.0	0.6	0.7	0.8	
CH_4, lbs/hr	0.003	0.002	0.002	0.002	
NMHC, ppm as CH_4	5.5	7.6	8.5	7.2	
NMHC, lbs/hr as CH_4	0.015	0.021	0.026	0.021	
NMHC (VOC), lbs/MMBtu	**0.005**	**0.007**	**0.008**	**0.007** ✓	**0.014** ✓
NMHC, ppm @ 3% O_2 as CH_4	**10.3**	**14.0**	**16.4**	**13.5** ✓	**20** ✓
TNMHC, ppm as Hexane (C_6H_{14}) @ 3% O_2	1.72	2.33	2.73	2.26	
INLET NMHC ppm as CH_4	1,824	1,948	1,997	1,923	OR
INLET NMHC lbs/hr as CH_4	0.7	0.8	0.9	0.8	
NMHC Removal Efficiency	**>98.0%**	**>97.3%**	**>96.9%**	**>97.4%** ✓	**98** ✓
INLET CH_4, ppm	299,000	308,000	312,000	306,333	
INLET CH_4 lbs/hr	121	128	133	127	
CH_4 Removal Efficiency (AB32)	**>99.998%**	**>99.999%**	**>99.998%**	**>99.998%** ✓	**99** ✓
INLET THC (TOC) ppm as CH_4	300,824	309,948	313,997	308,256	
INLET THC (TOC) lbs/hr as CH_4	121	128	134	128	
THC (TOC) Removal Efficiency	**99.985%**	**99.982%**	**99.979%**	**99.982%**	

WHERE,

ppm = Parts Per Million Concentration
Lbs/hr = Pound Per Hour Emission Rate
Tstd. = Standard Temp. (°R = °F+460)
MW = Molecular Weight
DSCFM = Dry Standard Cubic Feet Per Minute
NOx = Oxides of Nitrogen as NO_2 (MW = 46)
CO = Carbon Monoxide (MW = 28)
TOC = THC = Total Organic Carbon as Methane including CH_4 (MW = 16)
THC = Total Hydrocarbons as Methane (MW = 16)
NMHC = Total Non-Methane Hydrocarbons as Methane (MW = 16)
SO_2 = Sulfur Dioxide as SO_2 (MW = 64.1)

CALCULATIONS,

PPM @ 15% O_2 = ppm * 5.9 / (20.9 - %O_2)
PPM @ 3% O_2 = ppm * 17.9 / (20.9 - %O_2)
Lbs/hr = ppm x 8.223 E-05 x DSCFM x MW / Tstd. °R
Lbs/MMBtu = (Lbs/hr)/(MMBtu/hr)
Lbs/day = Lbs/hr * 24
Removal Efficiency = (inlet lbs/hr- outlet lbs/hr) / inlet lbs/hr
SO_2 emission ppm = TRS in fuel * Fuel Flow/Stack Gas Flow

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Original submittal - has errors
1) Miscalculated CH4 DE
2) NMOC emission limit is 30 ppm as methane not as hexane
J Copp

REVIEW AND CERTIFICATION

Team Leader:

The work performed herein was conducted under my supervision, and I certify that: a) the details and results contained within this report are to the best of my knowledge an authentic and accurate representation of the test program; b) that the sampling and analytical procedures and data presented in the report are authentic and accurate: c) that all testing details and conclusions are accurate and valid, and: d) that the production rate and/or heat input rate during the source test are reported accurately.

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Guy Worthington
Principal Project Manager

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SECTION 1. INTRODUCTION

1.1. Summary

Blue Sky Environmental, Inc. was contracted to perform the annual emissions testing on the 6 MMBTU John Zink Landfill Gas Flare at Chestnut Landfill, 12825 S. Chestnut, Fresno, CA 93725. Table 1 summarizes the source test information. Table 2 summarizes the results compared to the emission limits. The flare met all compliance emission criteria.

Table 1. Source Test Information

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Table 2. Compliance Summary

(6 MMBtu/hr Flare)	Average Test Result	Permit Limit	Compliance Status
NOx, lbs/MMBTU	**0.02**	**0.08**	**In Compliance**
CO, lbs/MMBTU	**0.001**	**0.2**	**In Compliance**
SO_2, lbs/day	**0.28**	**2.6**	**In Compliance**
NMOC, (ppmvd @ 3% O_2 as Hexane)	~~2.26~~ 12.5	**20** or **98**	**In Compliance**
NMOC, Destruction Efficiency %	**>97.4**		
NMOC, lbs/MMBtu	**0.007**	**0.014**	**In Compliance**
CH_4, Destruction Efficiency %	~~>99.849~~ 99.998%	**99**	**In Compliance**

SECTION 2. SOURCE TEST PROGRAM

2.1. Overview

This annual performance test was conducted to demonstrate that the landfill gas flare is operating in accordance with the current SJVUAPCD Permit.

2.2. Pollutants Tested

The following CARB and EPA and ASTM sampling and analytical methods were used:

Test Parameters	Inlet- Test Method	Outlet-Test Method	Measurement Principle
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NO_x		CARB 100 x 3	Chemiluminescence
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VOC (NMOC)	EPA M25C x 3	EPA 18 x 3	Gas Chromatography/FID
Flow	CARB M2	EPA M19 x 3	Pitot Differential Pressure
Moisture	CARB M4 WBDB	N/A	

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The Flare sampling was conducted in the 48-inch diameter ID stack, via ports approximately 30' above grade, accessed by a fixed ladder and platform. Two 4-inch flange ports were available ~4 stack diameters downstream from the burners and ~1 stack diameters upstream from the exit.

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3.5. Instrumentation and Analytical procedures

The following continuous emissions analyzers were used:

Instrumentation	Parameter	Principle
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TECO 48C	CO	GFC/IR
Rosemount 755R	O_2	Paramagnetic
Rosemount 800	CO_2	IR

3.6. Comments: Limitations and Data Qualifications

SJVAPCD Appendix G Draft QA/QC calculation spreadsheet is included in the Calculation Section of the report.

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Review of supporting documentation

The services described in this report were performed in a manner consistent with the generally accepted professional testing principles and practices. No other warranty, expressed or implied, is made. These services were performed in a manner consistent with our agreement with our client. The report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions contained in this report pertain to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and operating parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations, subsequent to this, and do not warranty the accuracy of information supplied by others.

Measured fuel flow has an average slightly higher than recorded fuel rate by the facility Yokogawa.

SECTION 4. APPENDICES

A.	Tabulated Results
B.	Calculations
C.	Laboratory Reports
D.	Field Data Sheets & DAS Summary
E.	Strip Charts
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A
Tabulated Results

TABLE #1

Republic-Chestnut Landfill
6 MMBtu/hr Flare

	Run 1	Run 2	Run 3	AVERAGE	LIMITS
Test Date	11/12/14	11/12/14	11/12/14		
Test Time	0950-1023	1103-1136	1206-1239		
Standard Temp., °F	60	60	60	60	
Flare Temperature, °F	1,603	1,604	1,604	1,604	>1400
Fuel Flow Rate, DSCFM (Method 2)	159	164	169	164	
Fuel Heat Input, MMBTU/Hr	2.9	3.1	3.2	3.1	
Exhaust Flow Rate, DSCFM (Method 19)	1,073	1,112	1,214	1,133	
Oxygen, O_2, %	11.3	11.2	11.6	11.4 ✓	
Carbon Dioxide, CO_2, %	8.1	8.0	8.0	8.0 ✓	
NOx, ppm	7.4	7.3	7.4	7.4	
NOx, ppm @ 15% O_2	4.5	4.4	4.7	4.6	
NOx, lbs/hr	0.06	0.06	0.07	0.06	
NOx, lbs/MMBTU	**0.02**	**0.02**	**0.02**	**0.02** ✓	0.08
CO, ppm	0.7	1.1	0.6	0.8	
CO, ppm @ 15% O_2	0.4	0.7	0.4	0.5	
CO, lbs/hr	0.003	0.006	0.003	0.004	
CO, lbs/MMBTU	**0.001**	**0.002**	**0.001**	**0.001** ✓	0.20
Total Reduced Sulfur as H_2S in fuel, ppm	6.8	7.2	7.3	7.1	
SO_2, ppm calculated emission	1.0	1.1	1.0	1.0	
SO_2, lbs/hr	0.01	0.01	0.01	0.01	
SO_2, lbs/day	**0.27** ✓	**0.29** ✓	**0.30** ✓	**0.28** ✓	2.6
THC, ppm (M18)	6.5	8.2	9.2	8.0	
THC, lbs/hr as CH_4	0.02 ✓	0.02 ✓	0.03 ✓	0.02	
CH_4, ppm (M18)	1.0	0.6	0.7	0.8	
CH_4, lbs/hr	0.003 ✓	0.002 ✓	0.002 ✓	0.002	
NMHC, ppm as CH_4	5.5 ✓	7.6 ✓	8.5 ✓	7.2	
NMHC, lbs/hr as CH_4	0.015 ✓	0.021 ✓	0.026 ✓	0.021	
NMHC (VOC), lbs/MMBtu	**0.005** ✓	**0.007** ✓	**0.008** ✓	**0.007** ✓	0.014
NMHC, ppm @ 3% O_2 as CH_4	10.3	14.0	16.4	13.5	20
TNMHC, ppm as Hexane (C_6H_{14}) @ 3% O_2	**1.72** ✓	**2.33** ✓	**2.73** ✓	**2.26** ✓	20
INLET NMHC ppm as CH_4	1,824 ✓	1,948 ✓	1,997 ✓	1,923	OR
INLET NMHC lbs/hr as CH_4	0.7 ✓	0.8 ✓	0.9 ✓	0.8	
NMHC Removal Efficiency	**>98.0%** ✓	**>97.3%** ✓	**>96.9%** ✓	**>97.4%** ✓	98
INLET CH_4, ppm	299,000 ✓	308,000 ✓	312,000 ✓	306,333	
INLET CH_4 lbs/hr	121 ✓	128 ✓	133 ✓	127	
CH_4 Removal Efficiency (AB32)	**>99.998%** ✓	**>99.774%**	**>99.774%**	**>99.849%**	99
INLET THC (TOC) ppm as CH_4	300,824	309,948	313,997	308,256	
INLET THC (TOC) lbs/hr as CH_4	121	128	134	128	
THC (TOC) Removal Efficiency	**99.985%**	**99.982%**	**99.979%**	**99.982%**	

limit is X20ppm as methane

99.998

WHERE,

ppm = Parts Per Million Concentration
Lbs/hr = Pound Per Hour Emission Rate
Tstd. = Standard Temp. (°R = °F+460)
MW = Molecular Weight
DSCFM = Dry Standard Cubic Feet Per Minute
NOx = Oxides of Nitrogen as NO_2 (MW = 46)
CO = Carbon Monoxide (MW = 28)
TOC = THC = Total Organic Carbon as Methane including CH_4 (MW = 16)
THC = Total Hydrocarbons as Methane (MW = 16)
NMHC = Total Non-Methane Hydrocarbons as Methane (MW = 16)
SO_2 = Sulfur Dioxide as SO_2 (MW = 64.1)

CALCULATIONS,

PPM @ 15% O_2 = ppm * 5.9 / (20.9 - %O_2)
PPM @ 3% O_2 = ppm * 17.9 / (20.9 - %O_2)
Lbs/hr = ppm x 8.223 E-05 x DSCFM x MW / Tstd. °R
Lbs/MMBtu = (Lbs/hr)/(MMBtu/hr)
Lbs/day = Lbs/hr * 24
Removal Efficiency = (inlet lbs/hr- outlet lbs/hr) / inlet lbs/hr
SO_2 emission ppm = TRS in fuel * Fuel Flow/Stack Gas Flow

B
Calculations

BLUE SKY ENVIRONMENTAL

PRELIMINARY CEM SYSTEM QA/QC SUMMARY SHEET

Facility: Republic-Chestnut Landfill **Date:** 11/12/14

Location: 6 MMBtu/hr Flare **Personnel:** GW

Parameter	O2	CO2	NOx	CO			Comments
Analyzer	755R	880	42C	48C			
Range	25	15	15	15			
Cal Value (low)	0	0	0	0			EPA 20 & 25A only
Cyl. #							
Cal Value (mid)	14.5	8.06	8.602	8.592			
Cyl. #							
Cal Value (Hi)	20.51	12.02	12.6	12.6			
Cyl. #							

LINEARITY

low cal (int)	-0.1	0.3	-0.1	-0.1			zero gas
Abs. Difference	-0.1	0.3	-0.1	-0.1			
% Linearity	**-0.4**	**1.9**	**-0.6**	**-0.7**			**<2%**
mid cal (int)	14.6	8.3	8.6	8.4			set at mid
Abs. Difference	0.1	0.2	0.0	-0.2			
% Linearity	**0.4**	**1.6**	**-0.2**	**-1.3**			**<2%**
high cal (int)	20.5	12.1	12.6	12.5			
Abs. Difference	0.0	0.1	0.0	-0.1			
% Linearity	**0.0**	**0.6**	**-0.2**	**-0.9**			**<2%**

Initial SYSTEM BIAS Check

Zero (int)	-0.1	0.3	-0.1	-0.1			
Zero (ext)	0.0	0.1	0.3	-0.1			
Abs. Difference	0.1	-0.2	0.4	0.0			
bias, % range	**0.3**	**-1.3**	**2.3**	**-0.3**			EPA 20/6C/7E (±5%)
Cal (int)	14.6	8.3	8.6	8.4			
Cal (ext)	14.3	8.0	8.6	8.4			
Abs. Difference	-0.3	-0.3	0.0	0.0			
bias, % range	**-1.1**	**-1.9**	**-0.1**	**-0.1**			EPA 20/6C/7E (±5%)

SYSTEM RESPONSE TIME (secs) - time from ext. zero to ext. cal, or ext. cal to ext. zero (95% response) -

zero to cal.	60	60	60	60		
cal. to zero	60	60	60	60		

If NO_2 % > 5% of NOx then run converter test.

Stack Gas NOx =

Stack Gas NO =

Stack Gas NO_2 =

NO_2 %=

NO_2 CONVERTER TEST

Cal value NO2

Analyzer NOx Response =

Analyzer NO_2 Response =

Analyzer NO Response =

% Efficiency = $\frac{\text{NOx-NO response}}{NO_2 \text{ cal gas value}}$ x 100

System Cal. Bias (Limit ± 5%) = $\frac{100 * \text{External cal - Internal cal}}{\text{Span Range}}$

% Linearity (Limit ± 2%) = $\frac{100 * \text{Cal Gas Value - Internal cal}}{\text{Span Range}}$

BLUE SKY ENVIRONMENTAL

CEM BIAS CORRECTION SUMMARY

Facility:	Republic-Chestnut Landfill	Barometric:	30.00
Unit:	6 MMBtu/hr Flare	Leak Check:	OK
Condition:		Strat. Check:	OK
Date:	11/12/14	Personnel:	GW

	O_2	CO_2	NOx	CO						
Analyzer	755R	880	42C	48C						
Range	25	15	15	15						r
EPA Span	20.51	12.02	12.60	12.60						
Units, ppm or %	%	%	ppm	ppm						
Span Gas Value	**14.50**	**8.06**	**8.60**	**8.59**						**Ccal Primary**
Span Gas Value	20.51	12.02	12.60	12.60						Ccal Secondary
Initial (int. zero)	-0.10	0.29	-0.09	-0.10						Analyzer Response, Ca
Initial (int. cal) hi	20.50	12.11	12.57	12.46						Analyzer Response, Ca
Initial (int. cal) mid	14.61	8.30	8.57	8.40						Analyzer Response, Ca
Initial (int. cal) run	14.61	8.30	8.57	8.40						Analyzer Response, Ca

Run 1	xzero	-0.02	0.09	0.26	-0.14						zero (initial), Cib
Test Time:	xcal	14.33	8.01	8.56	8.38						cal (initial), Cib
0950-1023	AVG	11.14 ✓	8.02 ✓	7.29 ✓	0.42 ✓						TEST AVG, Cavg
	xzero	-0.23	0.06	0.14	-0.34						zero (final), Cfb
	xcal	14.25	7.95	8.38	8.17						cal (final), Cfb
CARB	3	*-1%*	*0%*	*-1%*	*-1%*						zero drift, % of range
CARB	3	*0%*	*0%*	*-1%*	*-1%*						cal drift % of range
CARB	5	*-1%*	*-2%*	*2%*	*-2%*						% zero bias
CARB	5	*-1%*	*-2%*	*-1%*	*-2%*						% cal bias
		11.33 ✓	**8.10** ✓	**7.4** ✓	**0.7** ✓						**Cgas**

Run 2	xzero	-0.23	0.06	0.14	-0.34						zero (initial), Cib
Test Time:	xcal	14.25	7.95	8.38	8.17						cal (initial), Cib
1103-1136	AVG	10.79 ✓	7.91✓	7.07 ✓	0.78✓						TEST AVG, Cavg
	xzero	-0.40	0.05	0.10	-0.36						zero (final), Cfb
	xcal	14.01	8.00	8.25	8.12						cal (final), Cfb
CARB	3	*-2%*	*0%*	*-1%*	*-1%*						zero drift, % of range
CARB	3	*-1%*	*0%*	*-2%*	*-2%*						cal drift % of range
CARB	5	*-1%*	*-2%*	*1%*	*-2%*						% zero bias
CARB	5	*-2%*	*-2%*	*-2%*	*-2%*						% cal bias
		11.15 ✓	**7.99** ✓	**7.3** ✓	**1.1** ✓						**Cgas**

Run 3	xzero	-0.40	0.05	0.10	-0.36						zero (initial), Cib
Test Time:	xcal	14.01	8.00	8.25	8.12						cal (initial), Cib
1206-1239	AVG	11.20 ✓	7.97 ✓	7.12 ✓	0.20 ✓						TEST AVG, Cavg
	xzero	-0.28	0.05	0.10	-0.35						zero (final), Cfb
	xcal	14.18	8.01	8.21	8.11						cal (final), Cfb
CARB	3	*-1%*	*0%*	*-1%*	*-1%*						% zero drift
CARB	3	*-1%*	*0%*	*-2%*	*-2%*						% cal drift
CARB	5	*-1%*	*-2%*	*1%*	*-2%*						% zero bias
CARB	5	*-2%*	*-2%*	*-2%*	*-2%*						% cal bias
		11.60 ✓	**8.02** ✓	**7.4** ✓	**0.6** ✓						**Cgas**

Pollutant Concentration (Cgas) = (Cavg - Co) x Ccal / (Cbcal - Co)

Zero and Calibration Drift = 100 x (Cfb - Cib) / r

Bias = 100 x (Cfb - Ca) / r

Co = (Cib + Cfb) / 2 for zero gas

Cbcal = (Cib + Cfb) / 2 for cal gas

Cib (CARB=Pre-first run) (EPA=Pre-run)

BLUE SKY ENVIRONMENTAL

STACK GAS FLOW RATE DETERMINATION -- Method 19

Facility: Republic-Chestnut Landfill
Unit: 6 MMBtu/hr Flare
Condition:
Date: 11/12/14

		Time:	0950-1023	1103-1136	1206-1239	
		Run:	1	2	3	
# cubic feet/rev	M2		159	164	169	ft^3
# of seconds/rev			60	60	60	seconds
Gas Line Pressure (PSIG)			0.0	0.0	0.0	PSI Gauge
Gas Line Pressure (PSIA)			14.7	14.7	14.7	PSI Absolute
Gross Calorific Value @ 60°F	avg		303.5 ✓	312.6 ✓	316.7 ✓	Btu / ft^3
Stack Oxygen			11.3	11.2	11.6	%
Gas Fd-Factor @ 60°F	avg		10,154.8 ✓	10,139.0 ✓	10,119.9 ✓	DSCF/MMBtu
Gas Temperature (°F)			60	60	60	°F
Standard Temperature (°F) Tstd			60	60	60	°F
Realtime Fuel Rate (CFM)			159.3	163.6	168.6	CFM
Corrected Fuel Rate (SCFM) @ Tstd			159.3	163.6	168.6	SCFM
Fuel Flowrate (SCFH)			9,561	9,819	10,118	SCFH
Million Btu per minute			0.048	0.051	0.053	MMBtu/min
Heat Input (MMBtu/hour)			2.9 ✓	3.1 ✓	3.2 ✓	MMBtu/Hr
			229.5	235.7	242.8	MSCFD
Stack Gas Flow Rate @ Tstd			**1,073** ✓	**1,112** ✓	**1,214** ✓	**DSCFM**

WHERE:

Gas Fd-Factor = Fuel conversion factor (ratio of combustion gas volumes to heat inputs)
MMBtu = Million Btu

CALCULATIONS:

SCFM = CFM * (460+Tstd) * (PSIA) / 14.7 / (460+Gas°F))
SCFH = SCFM * 60
MMBtu/min = SCFM * (Btu/ft^3) * (520/(460+Tstd)) / 1,000,000
MMBtu/hr Heat Input = MMBtu/min * 60
DSCFM = Gas Fd-Factor * ((460+Tstd)/520) * MMBtu/min * 20.9/ (20.9 - O_2%)

GAS FLOW RATE DETERMINATION -- PITOT TRAVERSE

Method 2

Facility: Republic-Chestnut Landfill
Unit: 6 MMBtu/hr Flare
Condition:
Date: 11/12/14

			Time:	1050-	1155-	1256-	
			Run:	**1 - Inlet**	**2 - Inlet**	**3 - Inlet**	
1. Temperature of Stack (Ts)				120.0	120.0	120.0	°F
2. Std Temperature (Tstd)				60	60	60	°F
3. Square Root of ΔP ($\sqrt{\Delta P}$)				0.533	0.547	0.564	"H_2O
4. Barometric Pressure (Pb)				30.00	30.00	30.00	"Hg
5. Static Pressure (Pstatic)				49.30	49.00	48.64	"H_2O
6. Stack Pressure (Ps)				33.63	33.60	33.58	"H_2O
7. Stack Gas:							
	Moisture (H_2O)	M.W.= 18		2.8	2.8	2.8	%
	Oxygen (O_2)	M.W.= 32		4.3	3.9	3.8	%
	Carbon Dioxide (CO_2)	M.W.= 44		23.7	24.1	24.5	%
	Carbon Monoxide (CO)	M.W.= 28		0.00	0.00	0.00	%
	Other: methane	M.W.= 16		29.90	30.80	31.20	%
	Nitrogen (N_2)	M.W.= 28		42.10	41.20	40.50	%
8. Mol. Weight of Stack Gas (MWs)				28.09	28.03	28.04	g/g-mol
9. Stack Dimension	Diameter or Width			3.750	3.750	3.750	in
	Length			#N/A	#N/A	#N/A	in
10. Area of Stack (As)				0.08	0.08	0.08	ft^2
11. Pitot Tube Factor (Cp)				0.99	0.99	0.99	
Stack Gas Velocity				**35.35**	**36.33**	**37.47**	ft/s
Actual Flow Rate				**163**	**167**	**172**	ACFM
Standard Flow Rate				**159**	**164**	**169**	DSCFM
			meter:	165	162	160	scfm

WHERE:

Bws = % Moisture / 100
MWs = Molecular Weight of Stack Gas (wet-basis)
MWd = Molecular Weight of Stack Gas (dry-basis)
ΔP = Pitot Differential Pressure

CALCULATIONS:

MWs = MWd * (1-Bws) + 18 (Bws)

MWd = .44(%CO_2) + .32(%O_2) + .28(%CO+%N_2) + (%Other*M.W./100)

Ps = (Pstatic / 13.6) + Pb

As = (Diameter / 24)^2 * P - for Round Stacks; Length * Width / 144 - for Rectangular Stacks

Vs = 85.49 * Cp * $\sqrt{\Delta P}$ * $\sqrt{((Ts + 460) / (Ps \times MWs))}$

ACFM = 60 * Vs * As

DSCFM = 60 (1-Bwo) * Vs * As * (Tstd + 460)/(Ts + 460) * (Ps/29.92)

BLUE SKY ENVIRONMENTAL

STACK MOISTURE DETERMINATION

using wet bulb / dry bulb

Facility: Republic-Chestnut Landfill
Unit: 6 MMBtu/hr Flare
Condition:
Date: 11/12/14

	WB/DB - Inlet			
	Run 1	**Run 2**	**Run 3**	
Time:	**1050-**	**1155-**	**1256-**	
1. Dry Bulb Stack Temperature, (t)	120.0	120.0	120.0	°F
2. Wet Bulb Temperature, (tw)	88.0	88.0	88.0	°F
3. Barometric Pressure (Pb)	30.00	30.00	30.00	" Hg
4. Static Pressure (Pstatic)	49.30	49.00	48.64	" H_2O
5. Stack Absolute Pressure (Ps)	33.63	33.60	33.58	" Hg
6. Saturated Vapor Pressure, (SVP @tw)	1.340	1.340	1.340	" Hg
7. Saturated Vapor Pressure, (SVP @t)	3.536	3.536	3.536	" Hg
Percent of H_2O in Stack Gas @ Saturation (% H_2Osat)	**10.51**	**10.52**	**10.53**	%
Percent of H_2O in Stack Gas (% H_2O)	**2.79**	**2.79**	**2.79**	%
Relative Humidity	**26.5**	**26.5**	**26.5**	%
Dewpoint	**88.0**	**88.0**	**88.0**	°F

WHERE

H_2O = Inches of water
Hg = Inches of Mercury
°F = Fahrenheit

CALCULATIONS

$Ps = Pb + (Pstatic/13.6)$

$SVP\ @tw = EXP(-0.0000573tw^2 + 0.042232tw - 2.97986)$

$\%\ H_2Osat = 100 * \{SVP\ @t - (3.667E\text{-}04 * Ps * (t\text{-}tw) * (1 + (0.000639(t\text{-}tw)))\}/Ps$

$\%\ H_2O = 100 * \{SVP\ @tw - (3.667E\text{-}04 * Ps * (t\text{-}tw) * (1 + (0.000639(t\text{-}tw)))\}/Ps$

Fd-FACTOR CALCULATION

Landfill Gas - Run 1

Sample ID: LFG-1

Date: 11/12/2014

	Molecular Weight	Ideal Gas Specific Gravity, G_i	Ideal Gas Total Calorific Value, H_i	Compressibility Summation Factor, $\sqrt{\beta_i}$	Specific Volume, ft^3/lb	PPM %	Composition Mole Fraction, x_i	Specific Gravity Fraction, x_iG_i	Calorific Value Fraction, x_iH_i	Compressibility Fraction, $x_i\sqrt{\beta_i}$	x_iMW	Weight Fraction, $x_iMW / \Sigma x_iMW$	CARBON Weight Fraction	HYDROGEN Weight Fraction	OXYGEN Weight Fraction	NITROGEN Weight Fraction	SULFUR Weight Fraction	CHONS SUM	Specific Volume, ft^3/lb
Helium‡	4.00	0.1382	0.0	-0.0170		**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000							
Hydrogen (H_2) ‡	2.02	0.0696	324.9		187.723	**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000							0.0000	
Nitrogen	28.01	0.9672	0.0	0.0164	13.443	**42.1**	**0.4210**	0.4072	0.0	0.0069	11.7922	0.4151				0.4151		0.4151	5.5800
Oxygen	32.00	1.1053	0.0		11.819	**4.3**	**0.0430**	0.0475	0.0	0.0000	1.3760	0.0484			0.0484			0.0484	0.5725
Carbon Monoxide	28.01	0.9671	321.3	0.0217	13.506	**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000
Carbon Dioxide‡	44.01	1.5194	0.0	0.0640	8.548	**23.7**	**0.2370**	0.3601	0.0	0.0152	10.4304	0.3671	0.1002	0.0000	0.2670			0.3671	3.1384
Methane	16.04	0.5539	1012.0	0.0436	23.565	**29.9**	**0.2990**	0.1656	302.6	0.0130	4.7960	0.1688	0.1264	0.0424				0.1688	3.9782
Ethane(C2)	30.01	1.0382	1772.9	0.0917	12.455	0.0	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Propane(C3)	44.09	1.5224	2523.0	0.1342	8.365	9	**0.0000**	0.0000	0.0	0.0000	0.0004	0.0000	0.0000	0.0000				0.0000	0.0001
Isobutane(C4)	58.12	2.0067	3260.1	0.1744	6.321	4	**0.0000**	0.0000	0.0	0.0000	0.0002	0.0000	0.0000	0.0000				0.0000	0.0001
n-Butane	58.12	2.0067	3269.6	0.1825	6.321		**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Isopentane(C5)	72.14	2.4910	4009.4	0.2276	5.252	10	**0.0000**	0.0000	0.0	0.0000	0.0007	0.0000	0.0000	0.0000				0.0000	0.0001
n-Pentane	72.14	2.4910	4018.5	0.2377	5.252		**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Hexanes(C6)	86.17	2.9753	4758.0	0.2830	4.398	10.8	**0.0000**	0.0000	0.1	0.0000	0.0009	0.0000	0.0000	0.0000				0.0000	0.0001
C6+	86.17	2.9753	4758.0	0.2830	4.398	142.0	**0.0001**	0.0004	0.7	0.0000	0.0122	0.0004	0.0004	0.0001				0.0005	0.0019
Total							1.0002	**0.981**	**303.4**	0.0200	28.4091	1.0000	0.2270	0.0426	0.3154	0.4151	0.0000	1.0001	**13.27**
								SG	**Btu/ft³**	$\Sigma x_i\sqrt{\beta_i}$	$\Sigma xiMW$		**22.70%**	**4.26%**	**31.54%**	**41.51%**	**0.00%**		**ft³/lb**

‡ Omitted from Compressibility Factor Calculation

Calculated Specific Gravity (SG) *(Air = 1.000 @ 760mm Hg, 60°F)* **0.981**

Compressibility Factor (Z) **0.9996**

$Z = 1 - [(\Sigma x_i \sqrt{b_i})^2 + (2x_H \cdot x_H^2)\ (0.0005)]$

Specific Gravity (corrected) **0.981**

Specific Volume, (SV) ft^3/lb **13.27** ft^3/lb

Gross Calorific Value (GCV) @ 60°F **303.5** ✓ **Btu/ft^3 Gross**

Gross Calorific Value (GCV) @ 68°F **298.9** **Btu/ft^3 Gross**

Ideal Gross Calorific Value (GCV) **4,028** **Btu/lb**

$Btu/lb = Btu/ft^3 * ft^3/lb$

Gas Fd-Factor @ 68°F **10,311** **DSCF/MMBtu**

$DSCF/MMBtu = 10^6 * ((3.64*\%H_2)+(1.53*\%C)+(0.57*\%S)+(0.14*\%N_2)-(0.46*\%O_2)) / Btu/lb$

Gas Fd-Factor @ 60°F **10,155** ✓ **DSCF/MMBtu**

BLUE SKY ENVIRONMENTAL

Fd-FACTOR CALCULATION

Landfill Gas - Run 2

Sample ID: LFG-2
Date: 11/12/2014

	Molecular Weight	Ideal Gas Specific Gravity, G_i	Ideal Gas Total Calorific Value, H_i	Compressibility Summation Factor, $\sqrt{\beta_i}$	Specific Volume, ft^3/lb	PPM %	Composition Mole Fraction, x_i	Specific Gravity Fraction, x_iG_i	Calorific Value Fraction, x_iH_i	Compressibility Fraction, $x_i\sqrt{\beta_i}$	x_iMW	Weight Fraction, x_iMW / $\Sigma xiMW$	CARBON Weight Fraction	HYDROGEN Weight Fraction	OXYGEN Weight Fraction	NITROGEN Weight Fraction	SULFUR Weight Fraction	CHONS SUM	Specific Volume, ft^3/lb
Helium‡	4.00	0.1382	0.0	-0.0170		**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000							
Hydrogen (H_2) ‡	2.02	0.0696	324.9		187.723	**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000							0.0000	
Nitrogen	28.01	0.9672	0.0	0.0164	13.443	**41.2**	**0.4120**	0.3985	0.0	0.0068	11.5401	0.4071				0.4071		0.4071	5.4723
Oxygen	32.00	1.1053	0.0		11.819	**3.9**	**0.0390**	0.0431	0.0	0.0000	1.2480	0.0440			0.0440			0.0440	0.5203
Carbon Monoxide	28.01	0.9671	321.3	0.0217	13.506	**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000
Carbon Dioxide‡	44.01	1.5194	0.0	0.0640	8.548	**24.1**	**0.2410**	0.3662	0.0	0.0154	10.6064	0.3741	0.1021	0.0000	0.2720			0.3741	3.1981
Methane	16.04	0.5539	1012.0	0.0436	23.565	**30.8**	**0.3080**	0.1706	311.7	0.0134	4.9403	0.1743	0.1305	0.0438				0.1743	4.1066
Ethane(C2)	30.01	1.0382	1772.9	0.0917	12.455	0.0	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Propane(C3)	44.09	1.5224	2523.0	0.1342	8.365	9.3	**0.0000**	0.0000	0.0	0.0000	0.0004	0.0000	0.0000	0.0000				0.0000	0.0001
Isobutane(C4)	58.12	2.0067	3260.1	0.1744	6.321	4.2	**0.0000**	0.0000	0.0	0.0000	0.0002	0.0000	0.0000	0.0000				0.0000	0.0001
n-Butane	58.12	2.0067	3269.6	0.1825	6.321		**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Isopentane(C5)	72.14	2.4910	4009.4	0.2276	5.252	10.6	**0.0000**	0.0000	0.0	0.0000	0.0008	0.0000	0.0000	0.0000				0.0000	0.0001
n-Pentane	72.14	2.4910	4018.5	0.2377	5.252		**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Hexanes(C6)	86.17	2.9753	4758.0	0.2830	4.398	11.5	**0.0000**	0.0000	0.1	0.0000	0.0010	0.0000	0.0000	0.0000				0.0000	0.0002
C6+	86.17	2.9753	4758.0	0.2830	4.398	138.0	**0.0001**	0.0004	0.7	0.0000	0.0119	0.0004	0.0004	0.0001				0.0005	0.0018
Total							1.0002	**0.979**	**312.5**	0.0202	28.3492	1.0000	0.2330	0.0439	0.3161	0.4071	0.0000	1.0001	**13.30**
								SG	**Btu/ft^3**	$\Sigma x_i\sqrt{\beta_i}$	$\Sigma xiMW$		**23.30%**	**4.39%**	**31.60%**	**40.70%**	**0.00%**		**ft^3/lb**

‡ Omitted from Compressibility Factor Calculation

Calculated Specific Gravity (SG) *(Air = 1.000 @ 760mm Hg, 60°F)* **0.979**

Compressibility Factor (Z) **0.9996**

$Z = 1 - [(\Sigma x_i \sqrt{b_i})^2 + (2x_H \cdot x_H^2)\ (0.0005)]$

Specific Gravity (corrected) **0.979**

Specific Volume, (SV) ft^3/lb **13.30** **ft^3/lb**

Gross Calorific Value (GCV) @ 60°F **312.6** ✓ **Btu/ft^3 Gross**

Gross Calorific Value (GCV) @ 68°F **307.9** **Btu/ft^3 Gross**

Ideal Gross Calorific Value (GCV) **4,158** **Btu/lb**

*Btu/lb = Btu/ft^3 * ft^3/lb*

Gas Fd-Factor @ 68°F **10,295** **DSCF/MMBtu**

$DSCF/MMBtu = 10^6 * ((3.64*\%aH_2)+(1.53*\%C)+(0.57*\%S)+(0.14*\%aN_2)-(0.46*\%aO_2)) / Btu/lb$

Gas Fd-Factor @ 60°F **10,139** ✓ **DSCF/MMBtu**

BLUE SKY ENVIRONMENTAL

Fd-FACTOR CALCULATION

Landfill Gas - Run 3

Sample ID: LFG-3
Date: 11/12/2014

	Molecular Weight	Ideal Gas Specific Gravity, G_i	Ideal Gas Total Calorific Value, H_i	Compressibility Summation Factor, $\sqrt{\beta_i}$	Specific Volume, ft^3/lb	PPM	%	Composition Mole Fraction, x_i	Specific Gravity Fraction, x_iG_i	Calorific Value Fraction, x_iH_i	Compressibility Fraction, $x_i\sqrt{\beta_i}$	x_iMW	Weight Fraction, $x_iMW / \Sigma xiMW$	CARBON Weight Fraction	HYDROGEN Weight Fraction	OXYGEN Weight Fraction	NITROGEN Weight Fraction	SULFUR Weight Fraction	CHONS SUM	Specific Volume, ft^3/lb
Helium‡	4.00	0.1382	0.0	-0.0170			**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000								
Hydrogen (H_2) ‡	2.02	0.0696	324.9		187.723		**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000								0.0000	
Nitrogen	28.01	0.9672	0.0	0.0164	13.443		**40.5**	**0.4050**	0.3917	0.0	0.0066	11.3441	0.4000				0.4000			0.4000	5.3769
Oxygen	32.00	1.1053	0.0		11.819		**3.8**	**0.0380**	0.0420	0.0	0.0000	1.2160	0.0429			0.0429				0.0429	0.5067
Carbon Monoxide	28.01	0.9671	321.3	0.0217	13.506		**0.0**	**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
Carbon Dioxide‡	44.01	1.5194	0.0	0.0640	8.548		**24.5**	**0.2450**	0.3723	0.0	0.0157	10.7825	0.3802	0.1037	0.0000	0.2764				0.3802	3.2497
Methane	16.04	0.5539	1012.0 ✓	0.0436	23.565		**31.2**	**0.3120**	0.1728	315.7	0.0136	5.0045	0.1765	0.1321	0.0444					0.1765	4.1581
Ethane(C2)	30.01	1.0382	1772.9	0.0917	12.455	0.0		**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000					0.0000	0.0000
Propane(C3)	44.09	1.5224	2523.0	0.1342	8.365	9.3		**0.0000**	0.0000	0.0	0.0000	0.0004	0.0000	0.0000	0.0000					0.0000	0.0001
Isobutane(C4)	58.12	2.0067	3260.1	0.1744	6.321	4.3		**0.0000**	0.0000	0.0	0.0000	0.0002	0.0000	0.0000	0.0000					0.0000	0.0001
n-Butane	58.12	2.0067	3269.6	0.1825	6.321			**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000					0.0000	0.0000
Isopentane(C5)	72.14	2.4910	4009.4	0.2276	5.252	10.6		**0.0000**	0.0000	0.0	0.0000	0.0008	0.0000	0.0000	0.0000					0.0000	0.0001
n-Pentane	72.14	2.4910	4018.5	0.2377	5.252			**0.0000**	0.0000	0.0	0.0000	0.0000	0.0000	0.0000	0.0000					0.0000	0.0000
Hexanes(C6)	86.17	2.9753	4758.0	0.2830	4.398	11.8		**0.0000**	0.0000	0.1	0.0000	0.0010	0.0000	0.0000	0.0000					0.0000	0.0002
C6+	86.17	2.9753	4758.0	0.2830	4.398	143.0		**0.0001**	0.0004	0.7	0.0000	0.0123	0.0004	0.0004	0.0001					0.0005	0.0019
Total								1.0002	**0.979**	**316.6**	0.0203	28.3617	1.0000	0.2363	0.0445	0.3193	0.4000	0.0000	1.0001	**13.29**	
									SG	**Btu/ft³**	$\Sigma x_i\sqrt{\beta_i}$	$\Sigma xiMW$		**23.63%**	**4.45%**	**31.93%**	**39.99%**	**0.00%**		**ft³/lb**	

‡ Omitted from Compressibility Factor Calculation

Calculated Specific Gravity (SG) *(Air = 1.000 @ 760mm Hg, 60°F)* **0.979**

Compressibility Factor (Z) **0.9996**

$Z = 1 - [(\Sigma x_i \sqrt{b_i})^2 + (2x_H - x_H^2)(0.0005)]$

Specific Gravity (corrected) **0.980**

Specific Volume, (SV) ft^3/lb **13.29** ft^3/lb

Gross Calorific Value (GCV) @ 60°F **316.7** ✓ **Btu/ft^3 Gross**

Gross Calorific Value (GCV) @ 68°F **311.9** **Btu/ft^3 Gross**

Ideal Gross Calorific Value (GCV) **4,210** **Btu/lb**

*Btu/lb = Btu/ft^3 * ft^3 / lb*

Gas Fd-Factor @ 68°F **10,276** **DSCF/MMBtu**

*DSCF/MMBtu = 10^6 * [(3.64**%H_2)+(1.53**%C)+(0.57**%S)+(0.14**%N_2)-(0.46**%O_2)] / Btu/lb*

Gas Fd-Factor @ 60°F **10,120** ✓ **DSCF/MMBtu**

SJVAPCD - Appendix G

Three Run Review Sheet

DRAFT COPY - San Joaquin Valley Air Pollution Control District - Testing Contractor's CARB Method 100 Quality Assurance Worksheet

**** All supporting data for this worksheet must also be clearly indicated and labeled on the emission trace chart ****

**** A copy of a this completed worksheet is required for every unit tested and must be included in the Summary Section of the Source Test Report ****

Company Name:	Chestnut	Permit Number:	C-146-1-3			Test Date:	11/12/2014
Unit Name:	Flare 6 MMBTUH	Average Fuel Rate MSCFD:	236			Was multipoint sampling required by the District policy?	Yes
Select Test Type:	Non RATA	Fuel BTU/CF, dry, gross(% wt):	280			Highest point for all pollutants above the Run 1 Cavg.%:	1638.1%
Permitted MMBtu/hr:	6	Fuel Ffactor @ 68:	10822			Lowest point for all pollutants below the Run 1 Cavg %:	176.2%
Testing Company:	BLUE SKY	Estimated Qsd DSCFM:	1092			From above does subsequent runs require multipoint?, >10%, M100 4.5:	Yes
Name of Tester:	Guy Worthington	Estimated MMBtu/hr, firing percent :	2.75	46%	OK	Is a PM or EPA Method 6 test included in this test report?	No

2.2 Gas Analyzers	O2			NOx			CO			SO2		
Limit equivalent (LE)as uncorrected ppm:												
Range, Limit equivalent %:	25			15	0%		15	0%			—	
Non RATA; R1 Cavg (0-95%) of r:		45%	OK		49%	OK		3%	OK		—	—
RATA; Run 1 Cavg (10%-95%) of r, M100 1.5.1:		N/A	N/A		N/A	N/A		N/A	N/A		—	—

3 Calibration Gases														
Was EPA Method 205 gas dilution used?, Then identify gas with division symbol M100 3.2:					No									
If 'Yes' above, select the mid-level cal. gas ppm or %, +/-2%, EPA 205:				÷				÷				÷		÷
High-range: (80-100%) of r, Chcal, M100 3.1.1; select if divider used:	20.510	82.0%	OK		12.600	84.0%	OK		12.600	84.0%	OK		—	—		
High-range cylinder #, M100 3.1.1:	CC163810		OK		CC363264		OK		CC363264		OK			—		
High-range expiration date:	10/09/20		OK		08/26/16		OK		08/26/16		OK			—		
Mid-range: (40-60%) of r, Cmcal, M100 3.1.2; indicate if divider used:	14.500	58.0%	OK		8.600	57.3%	OK		8.590	57.3%	OK		—	—		
Mid-range cylinder #, M100 3.1.2:	CC78071		OK		CC179894		OK		CC179894		OK			—		
Mid-range expiration date:	04/10/21		OK		06/19/15		OK		06/19/15		OK			—		
Zero cylinder #, M100 3.1.3:			X											

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2				NOx				CO				SO2			
4.2 Calibration of Continuous Analyzers																
NO2 converter efficiency, Eff%, >90%, M100 2.2.5:							—			D3, < 1 ppm:	-0.50					
High-range response (+/-2%) of r, Cauh, M100 4.2:	20.50	-0.04%	OK		12.57	-0.20%	OK		12.46	-0.93%	OK			—	—	
Mid-range response (+/-2%) of r, Caum, M100 4.2:	14.61	0.44%	OK		8.57	-0.20%	OK		8.40	-1.27%	OK			—	—	
Zero gas response (+/- 2%) of r, Caz, M100 4.2:	-0.10	-0.40%	OK		-0.09	-0.60%	OK		-0.10	-0.67%	OK			—	—	
4.3 Pre-Test Leak Check																
Time of leak check, M100 4.3:	9:25		OK													
4.4 Pre-Test System Bias Check (Suggest using both mid and high gases if unsure of emission concentration)																
Initial high-gas (+/-5%) Cibu,M100 6.2,Eq100-2:		—	N/A			—	N/A			—	N/A			—	—	
Initial mid-gas (+/-5%) Cibu, M100 6.2,Eq100-2:	14.33	1.12%	OK		8.56	0.07%	OK		8.38	0.13%	OK			—	—	
Initial zero gas (+/-5%) Cibz, M100 6.2,Eq100-2:	-0.02	-0.32%	OK		0.26	-2.33%	OK		-0.14	0.27%	OK			—	—	
Run 1																
Run 1 start time:	9:50		OK													
Van's voltage, VAC RMS, per policy:	110.00		OK													
5 Sample Collection																
Raw avg, ppm or %, Cavg:	11.14	11.14			7.29	7.29			0.42	0.42				—		
Raw highest, ppm or %, Cmax:	12.05	8.17%			8.45	15.91%			7.30	1638.10%				—		
Raw lowest, ppm or %, Cmin:	10.22	8.26%			6.46	11.39%			-0.32	176.19%				—		
Run1 Cavg as a % of r, M100 4.4:		44.56%				48.60%				2.80%				—		
Select Chcal or Cmcal to become Ccal M100 4.4:	14.510	14.50	X		8.602	8.60	X		8.592	8.59	X			—	—	
Cau, M100 6.2:		14.61				8.57				8.40				—		
6.1 Zero and Calibration Drift																
Final upscale (+/-3%),Cfbu,Eq 100-1:	14.25	0.32%	OK		8.38	1.20%	OK		8.17	1.40%	OK			—	—	
Final zero (+/-3%),Cfbu,Eq 100-1:	-0.23	0.84%	OK		0.14	0.80%	OK		-0.34	1.33%	OK			—	—	
6.2 Post-Test System Bias Check																
Final upscale (+/-5%),Cfbu,Eq 100-2:		1.44%	OK			1.27%	OK			1.53%	OK			—	—	
Final zero (+/-5%),Cfbz,Eq 100-2:		0.52%	OK			-1.53%	OK			1.60%	OK			—	—	
7.1 Pollutant Concentration																
Range(0%-95%):		44.56%	OK			48.60%	OK			2.80%	OK			—	—	
Avg. of Cibu and Cfbu, Cbcal:		14.29				8.47				8.28				—		
Avg. of Cibz and Cfbz, Co:		-0.13				0.20				-0.24				—		
Cgas, ppm or %:		**11.34**				**7.37**				**0.67**				—		
Eq 100-5 Cgas@3%:						13.80				1.25				—		
Cgas@15%:						4.55				0.41				—		

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2			NOx			CO			SO2		
Run 2												
Run 2 start time:	11:03		OK									
Van's voltage, VAC RMS, per policy:	107.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	10.79	10.79		7.07	7.07		0.78	0.78			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	14.01	1.28%	OK	8.25	2.07%	OK	8.12	1.73%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	-0.40	1.52%	OK	0.10	1.07%	OK	-0.36	1.47%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		2.40%	OK		2.13%	OK		1.87%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		1.20%	OK		-1.27%	OK		1.73%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		43.16%	OK		47.13%	OK		5.20%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		14.13			8.32			8.15			—	
Avg. of Cibz and Cfbz, Co:		-0.32			0.12			-0.35			—	
Cgas, ppm or %:		**11.15**			**7.30**			**1.14**			—	
Eq 100-5 Cgas@3%:					13.40			2.09			—	
Cgas@15%:					4.42			0.69			—	

Run 3												
Run 3 start time:	12:06		OK									
Van's voltage, VAC RMS, per policy:	112.00		OK									
5 Sample Collection												
Raw avg, ppm or %, Cavg:	11.20	11.20		7.12	7.12		0.20	0.20			—	
6.1 Zero and Calibration Drift												
Final upscale (+/-3%),Cfbu,Eq 100-1:	14.18	0.60%	OK	8.21	2.33%	OK	8.11	1.80%	OK		—	—
Final zero (+/-3%),Cfbu,Eq 100-1:	-0.28	1.04%	OK	0.10	1.07%	OK	-0.35	1.40%	OK		—	—
6.2 Post-Test System Bias Check												
Final upscale (+/-5%),Cfbu,Eq 100-2:		1.72%	OK		2.40%	OK		1.93%	OK		—	—
Final zero (+/-5%),Cfbz,Eq 100-2:		0.72%	OK		-1.27%	OK		1.67%	OK		—	—
7.1 Pollutant Concentration												
Range(0%-95%):		44.80%	OK		47.47%	OK		1.33%	OK		—	—
Avg. of Cibu and Cfbu, Cbcal:		14.10			8.23			8.12			—	
Avg. of Cibz and Cfbz, Co:		-0.34			0.10			-0.36			—	
Cgas, ppm or %:		**11.60**			**7.43**			**0.56**			—	
Eq 100-5 Cgas@3%:					14.30			1.08			—	
Cgas@15%:					4.71			0.36			—	

O2% Avg.

- ◉ No Range Changes Occurred. Average From Three Run Review.
- ○ Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ○ Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

NOx Avg.

- ◉ No Range Changes Occurred. Average From Three Run Review.
- ○ Range Change Occurred After First Run. Average From Run 1 of Three Run Review and
- ○ Range Change Occurred After Second Run. Average From Runs 1 & 2 From The Three Run Review and One Run Review.

CO Avg.

- ◉ No Range Change Occurred. Average From Three Run Review.
- ○ Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ○ Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SO2 Avg.

- ◉ No Range Change Occurred. Average From Three Run Review.
- ○ Range Change Occurred After First Run. Average From Run 1 of Three Run Review and Two Run Review.
- ○ Range Change Occurred After Second Run. Average From Runs 1 and 2 From The Three Run Review and One Run Review.

SJVAPCD - Appendix G

Three Run Review Sheet

Pollutant	O2	NOx	CO	SO2
Est. avg. from 3 runs (not to be used for compliance determination)				
Cgas, ppm or %:	11.4	7.4	0.8	—
Eq 100-5 Cgas@3%:		13.8	1.5	—
Cgas@15%:		4.6	0.5	—
Eq 100-4 lbs/hr:		0.06	0.00	—
EPA Eq 19-1 lbs/MMBtu:		0.017	0.001	—
g/Bhp-hr:		0.065	0.004	—

If permit conditions require source to maintain daily, monthly, quarterly or annual fuel, production or sulfur records then enter the data below. Include copies or a printout of these records in the Operating Data section of the test report.

Fuel or production rate nearest to the day of the test.		Units	Fuel sulfur concentration rate nearest to the day of the test.		Units
Fuel or production rate nearest to 3-months prior to the day of test.			Fuel sulfur concentration rate nearest to 3-months prior to the day of the test.		
Fuel or production rate nearest lo 6-months prior to the day of test.			Fuel sulfur concentration rate nearest to 6-months prior to the day of the test.		
Fuel or production rate nearest to 9-months prior to the day of test.			Fuel sulfur concentration rate nearest to 9-months prior to the day of the test.		

Tester's comment area, explain each "X" mark and what actions will be taken to prevent reoccurrence.
Linearity, Bias and drift limits are in Compliance. <2%, <3% and <5%

District Review Code:	1	/

C
Laboratory Reports

Atmospheric Analysis & Consulting, Inc.

7CLIENT : Blue Sky Environmental, Inc.
PROJECT NAME : CHESTNUT
AAC PROJECT NO. : 141785
REPORT DATE : 11/17/2014

On November 13, 2013, Atmospheric Analysis & Consulting, Inc. received three (3) Tedlar bags for TNMOC analysis by EPA 25C, TRS analysis by ASTM D-5504, and ASTM D-1945 analysis. Also received were three (3) Tedlar bags for TNMOC analysis by EPA 18 Modified. Upon receipt, each sample was assigned a unique Laboratory ID number as follows:

Client ID	Lab No.
LFG-1	141785-75676
LFG-2	141785-75677
LFG-3	141785-75678
NMOC-1	141785-75679
NMOC-2	141785-75680
NMOC-3	141785-75681

EPA 25C Analysis - Up to a 1 mL aliquot of sample is injected into the GC/FID/TCA for analysis following EPA 25C as specified in the SOW.

ASTM D-5504 Analysis - Up to a 1 mL aliquot of sample is injected into the GC/SCD for analysis following ASTM D-5504 as specified in the SOW.

ASTM D-1945 Analysis - Up to a 1 mL aliquot of sample is injected into the GC/FID/TCD for analysis following ASTM D-1945 as specified in the SOW.

EPA 18 Modified Analysis - Up to a 1 mL aliquot of sample is injected into the GC/FID for analysis following EPA 18 Modified as specified in the SOW.

No problems were encountered during receiving, preparation, and/or analysis of these samples. The test results included in this report meet all requirements of the NELAC Standards and/or AAC SOP# AACI- EPA 25C, ASTM D-5504, ASTM D-1945, and EPA 18 Modified.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. The Laboratory Director or his designee, as verified by the following signature, has authorized release of the data contained in this hardcopy data package.

If you have any questions or require further explanation of data results, please contact the undersigned.

Marcus Hueppe
Laboratory Director

This report consists of 9 pages.

ACCREDITED IN ACCORDANCE WITH nelac Certificate #E87837

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Atmospheric Analysis & Consulting, Inc.

Laboratory Analysis Report

CLIENT : **Blue Sky Environmental, Inc.**
PROJECT NO. : **141785**
MATRIX : **Air**

SAMPLING DATE : **11/12/2014**
RECEIVING DATE : **11/13/2014**
ANALYSIS DATE : **11/13-14/2014**
REPORT DATE : **11/17/2014**

ASTM D-1945 & EPA 25C

Inlet

Client ID	LFG-1	LFG-2	LFG-3
AAC ID	141785-75676	141785-75677	141785-75678
Analyte	Result	Result	Result
H_2	< 1.2 %	< 0.4 %	< 1.0 %
O_2	4.3 %	3.9 %	3.8 %
N_2	42.1 %	41.2 %	40.5 %
CO	< 0.1 %	< 0.1 %	< 0.1 %
CO_2	23.7 %	24.1 %	24.5 %
CH_4	29.9 % ✓	30.8 % ✓	31.2 % ✓
C_2	< 2.5 ppmV	< 2.5 ppmV	< 2.5 ppmV
C_3	9.0 ppmV	9.3 ppmV	9.3 ppmV
C_4	4.0 ppmV	4.2 ppmV	4.3 ppmV
C_5	10.0 ppmV	10.6 ppmV	10.6 ppmV
C_6	10.8 ppmV	11.5 ppmV	11.8 ppmV
C_6+	142 ppmV	138 ppmV	143 ppmV
TNMOC (as CH_4)	1,824 ppmV ✓	1,948 ppmV ✓	1,997 ppmV ✓

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac (if applicable)

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

LABORATORY ANALYSIS REPORT

CLIENT : **Blue Sky Environmental, Inc.**
PROJECT NO. : **141785**
MATRIX : **Air**
UNITS : **ppmV**

SAMPLING DATE : **11/12/2014**
RECEIVING DATE : **11/13/2014**
ANALYSIS DATE : **11/13/2014**
REPORT DATE : **11/17/2014**

Total Reduced Sulfur Compounds Analysis by ASTM D-5504

Outlet

Client ID	LFG-1	LFG-2	LFG-3
AAC ID	141785-75676	141785-75677	141785-75678
Analyte	Result	Result	Result
Hydrogen Sulfide	**4.78 ppmv**	**5.08 ppmv**	**5.16 ppmv**
Carbonyl Sulfide	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Sulfur Dioxide	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Methyl Mercaptan	**0.273 ppmv**	**0.282 ppmv**	**0.315 ppmv**
Ethyl Mercaptan	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Dimethyl Sulfide	**1.71 ppmv**	**1.76 ppmv**	**1.78 ppmv**
Carbon Disulfide	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Isopropyl Mercaptan	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
tert-Butyl Mercaptan	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
n-Propyl Mercaptan	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Methylethylsulfide	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
sec-Butyl Mercaptan	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Thiophene	< 0.050 ppmv	**0.051 ppmv**	< 0.050 ppmv
iso-Butyl Mercaptan	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Diethyl Sulfide	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
n-Butyl Mercaptan	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Dimethyl Disulfide	**0.072 ppmv**	**0.061 ppmv**	**0.058 ppmv**
2-Methylthiophene	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
3-Methylthiophene	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Tetrahydrothiophene	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Bromothiophene	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Thiophenol	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Diethyl disulfide	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Total Unidentified Sulfur	< 0.050 ppmv	< 0.050 ppmv	< 0.050 ppmv
Total Reduced Sulfurs as H_2S	**6.84 ppmv**	**7.23 ppmv**	**7.32 ppmv**

All compound's concentrations expressed in terms of H_2S (TRS does not include COS and SO_2)
Sample Reporting Limit (SRL) is equal to Reporting Limit x Canister Dil. Fac. x Analysis Dil. Fac.

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

LABORATORY ANALYSIS REPORT

CLIENT	: Blue Sky Environmental, Inc.	**SAMPLING DATE**	: 11/12/2014
PROJECT NO.	: 141785	**RECEIVING DATE**	: 11/13/2014
MATRIX	: Air	**ANALYSIS DATE**	: 11/13-14/2014
UNITS	: ppmV	**REPORT DATE**	: 11/17/2014

TNMOC by EPA 18 Modified

Client ID	NMOC-1		SRL	NMOC-2		SRL	NMOC-3		SRL	Reporting Limit
AAC ID	141785-75679		(RL x DF's)	141785-75680		(RL x DF's)	141785-75681		(RL x DF's)	(RL)
Analyte	Result	Analysis Dil. Fac.		Result	Analysis Dil. Fac.		Result	Analysis Dil. Fac.		
C_1 (as Methane)	1.0	1	0.5	0.6	1	0.5	0.7	1	0.5	0.5
C_2 (as Ethane)	<SRL	1	0.5	<SRL	1	0.5	<SRL	1	0.5	0.5
C_3 (as Propane)	<SRL	1	0.5	<SRL	1	0.5	<SRL	1	0.5	0.5
C_4 (as Butane)	<SRL	1	0.5	<SRL	1	0.5	<SRL	1	0.5	0.5
C_5 (as Pentane)	<SRL	1	0.5	<SRL	1	0.5	<SRL	1	0.5	0.5
C_6 (as Hexane)	<SRL	1	0.5	<SRL	1	0.5	<SRL	1	0.5	0.5
C_6+ (as Hexane)	0.9	1	0.5	1.4	1	0.5	1.5	1	0.5	0.5
TNMOC (as Methane)	5.5	1	0.5	7.6	1	0.5	8.5	1	0.5	0.5

Sample Reporting Limit (SRL) is equal to Reporting Limit (RL) x Canister Dilution Factor x Analysis Dilution Factor (if applicable)

THC 5.5 + 1.0 = 6.5

8.2

Marcus Hueppe
Laboratory Director

9.2

Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : 11/13/2014
Analyst : DJ
Units : %

Instrument ID : TCD#1
Calb Date : 08/05/2014
Reporting Limit : 0.1%

I - Opening Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CO_2	CH_4	CO
CCV	Spike Conc	9.5	10.1	20.2	10.2	10.1	10.2
	Result	9.7	10.1	20.1	9.9	9.3	9.3
	% Rec *	101.6	100.2	99.2	96.6	92.3	91.3

II - Method Blank - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CO_2	CH_4	CO
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CO_2	CH_4	CO
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	9.5	10.1	20.2	10.2	10.1	10.2
	LCS Result	9.1	9.6	19.4	9.6	9.0	9.0
	LCSD Result	9.8	10.9	22.4	10.5	10.0	10.1
	LCS % Rec *	96.0	95.7	95.9	94.0	88.8	88.5
	LCSD % Rec *	103.4	108.0	110.8	102.3	99.1	98.7
	% RPD ***	7.4	12.1	14.4	8.4	10.9	10.9

IV - Sample & Sample Duplicate - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CO_2	CH_4	CO
141785-75676	Sample	0.0	4.3	42.8	24.2	30.5	0.0
	Sample Dup	0.0	4.3	42.8	24.0	30.5	0.0
	Mean	0.0	4.3	42.8	24.1	30.5	0.0
	% RPD ***	0.0	0.6	0.0	0.6	0.1	0.0

V - Matrix Spike & Duplicate - EPA 3C

AAC ID	Analyte	H_2	N_2	CO_2	CH_4	CO
141785-75676	Sample Conc	0.0	21.4	12.1	15.2	0.0
	Spike Conc	9.5	9.2	10.2	10.1	10.2
	MS Result	9.5	31.2	21.5	25.1	10.3
	MSD Result	9.5	31.4	21.4	25.0	10.3
	MS % Rec **	100.3	106.5	92.1	97.6	100.6
	MSD % Rec **	100.5	108.0	91.2	96.8	100.5
	% RPD ***	0.1	1.4	1.0	0.9	0.2

VI - Closing Continuing Calibration Verification - EPA 3C

AAC ID	Analyte	H_2	O_2	N_2	CO_2	CH_4	CO
CCV	Spike Conc	9.5	10.1	20.2	10.2	10.1	10.2
	Result	9.9	10.3	20.7	10.8	10.5	10.4
	% Rec *	104.1	102.4	102.3	105.5	103.5	102.0

** Must be 85-115%*
*** Must be 75-125%*
**** Must be < 25%*
ND = Not Detected
<RL = less than Reporting Limit

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Date Analyzed : 11/13/2014
Analyst : DJ
Units : ppmv

Instrument ID : FID #3
Calb Date : 09/05/14
Reporting Limit : 0.5 ppmv

I - Opening Continuing Calibration Verification - EPA 18 Mod

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	97.7	99.1	99.7	99.0	99.1	99.4
	Result	94.7	96.7	98.3	99.1	99.6	98.2
	% Rec *	96.9	97.6	98.5	100.1	100.4	98.7

II - Method Blank - EPA 18

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
MB	Concentration	ND	ND	ND	ND	ND	ND

III - Laboratory Control Spike & Duplicate - EPA 18

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
Lab Control Standards	Sample Conc	0.0	0.0	0.0	0.0	0.0	0.0
	Spike Conc	97.7	99.1	99.7	99.0	99.1	99.4
	LCS Result	98.6	100.8	102.0	102.8	103.3	101.7
	LCSD Result	97.7	99.9	100.9	102.1	102.4	100.9
	LCS % Rec *	100.9	101.8	102.3	103.8	104.2	102.3
	LCSD % Rec *	100.0	100.8	101.2	103.1	103.3	101.5
	% RPD ***	0.9	0.9	1.1	0.7	0.8	0.8

IV -Sample & Sample Duplicate - EPA 18

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
141783-75635	Sample	NA	0.0	0.0	0.0	0.0	0.0
	Sample Dup	NA	0.0	0.0	0.0	0.0	0.0
	Mean	NA	0.0	0.0	0.0	0.0	0.0
	% RPD ***	NA	0.0	0.0	0.0	0.0	0.0

V - Matrix Spike & Duplicate- EPA 18

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
141783-75635	Sample Conc	NA	0.0	0.0	0.0	0.0	0.0
	Spike Conc	NA	49.5	49.9	49.5	49.6	49.7
	MS Result	NA	51.1	52.4	52.9	53.0	52.2
	MSD Result	NA	52.9	52.9	53.4	54.1	53.1
	MS % Rec **	NA	103.1	105.1	106.8	107.0	105.0
	MSD % Rec **	NA	106.8	106.1	107.9	109.1	106.9
	% RPD ***	NA	3.6	1.0	1.0	2.0	1.7

VI - Closing Continuing Calibration Verification - EPA 18

AAC ID	Analyte	Methane	Ethane	Propane	Butane	Pentane	Hexane
CCV	Spike Conc	97.7	99.1	99.7	99.0	99.1	99.4
	Result	103.0	105.0	106.5	107.5	107.7	105.9
	% Rec *	105.4	106.0	106.8	108.6	108.7	106.5

** Must be 85-115%*
*** Must be 75-125%*
**** Must be < 25%*
ND = Not Detected
<RL = less than Reporting Limit

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report
ASTM D-5504

Date Analyzed: 11/13/2014
Analyst: ZB

Instrument ID: SCD#10
Calb. Date: 10/20/2014

Opening Calibration Verification Standard

	Resp. (area)	Result (ppbV)	% Rec *	% RPD ****
Initial	14850	488	97.6	NA
Duplicate	14919	490	98.1	0.5
Triplicate	14808	487	97.3	0.3

Method Blank

Analyte	Result
H2S	ND

Duplicate Analysis Sample ID 141785-75676 x5

Analyte	Sample Result	Duplicate Result	Mean	% RPD ***
H2S	4797.8	4770.8	4784.3	0.6

Matrix Spike & Duplicate Sample ID 141785-75676 x10

Analyte	Sample Conc.	Spike Added	MS Result	MSD Result	MS % Rec **	MSD % Rec **	% RPD ***
H2S	478.4	250.0	717.9	713.7	98.5	98.0	0.6

Closing Calibration Verification Standard

Analyte	Std. Conc.	Result (ppbV)	% Rec **
H2S	500.0	496.7	99.3

** Must be 95-105%*
*** Must be 90-110%*
**** Must be < 10%*
***** Must be < 5% RPD from Initial result.*

Marcus Hueppe
Laboratory Director

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Atmospheric Analysis & Consulting, Inc.

Quality Control/Quality Assurance Report

Analysis Date : 11/13/2014
Analyst : DJ
Units : ppmv

Instrument ID: FID#4
Calibration Date: 9/3/2014

I - Opening Calibration Verification Standard - Method 25C

Analyte	xRF	DRF	%RPD*
Propane	38823	41398	6.4

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	38823	41398	41316	41203	41306	6.2

III - Method Blank - Method 25C

AAC ID	Analyte	Sample Result
MB	TNMOC	ND

IV - Laboratory Control Spike & Duplicate - Method 25C

AAC ID	Analyte	Spike Added	LCS Result	LCSD Result	LCS % Rec **	LCSD % Rec **	% RPD***
LCS/LCSD	Propane	54.0	54.3	54.1	100.6	100.3	0.3

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	38823	40779	4.9

xCF - Average Calibration Factor from Initial Calibration Curve
dCF - Daily Calibration Factor
* Must be <15%
** Must be 90-110 %
*** Must be <20%

Marcus Hueppe
Laboratory Director

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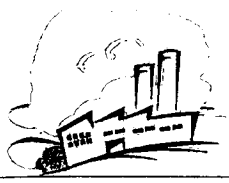

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Contact:

CHAIN OF CUSTODY RECORD

Project Name: CHESTNUT

Project #: 141785

SAMPLE Date	SAMPLE Time	Sample ID (Method-Run-Fraction)	Type/Size of container	Analysis Requested: 25C	ASTM 1945	ASTM 5504	Modified EPA 18 NMOC C1-C6+ or TO-12			
12-Nov		LFG-1 75676	Tedlar 5 L	X	X	X				
12-Nov		LFG-2 75677	Tedlar 5 L	X	X	X				
12-Nov		LFG-3 75678	Tedlar 5 L	X	X	X				
12-Nov		NMOC-1 75679	Tedlar 5 L				X			
12-Nov		NMOC-2 75680	Tedlar 5 L				X			
12-Nov		NMOC-3 75681	Tedlar 5 L				X			

All samples submitted to laboratories are accepted on a custodial basis only. Ownership of sample remains with the client submitting the sample. Samples should be held for 90+ days. The laboratory reserves the right to return unused sample portions.

COMMENTS:

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
[signature]	11-12-14	6 PM	GSO	11/12	6 PM
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
			[signature]	11/13	0900
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

GSO

D
Field Data Sheets & DAS Summary

CHESTNUT

		O_2	CO_2	NOx	CO	
DATE	TIME	%	%	PPM	PPM	
11/12/2014	9:04:43 AM	-0.1	0.29	-0.09	-0.1	INTERNAL LINEARITY
11/12/2014	9:10:38 AM	20.5	12.11	12.57	12.46	
11/12/2014	9:13:36 AM	14.61	8.30	8.57	8.40	
11/12/2014	9:33:21 AM	14.33	8.01	0.26	-0.14	EXTERNAL BIAS
11/12/2014	9:38:17 AM	-0.02	0.09			
11/12/2014	9:39:16 AM			8.56	8.38	

RUN 1		O_2	CO_2	NOx	CO
DATE	TIME	%	%	PPM	PPM
11/12/2014	9:50:08 AM	10.93	8.12	7.82	1.51
11/12/2014	9:51:08 AM	11.20	8.00	7.45	0.03
11/12/2014	9:52:07 AM	11.06	8.10	7.20	-0.06
11/12/2014	9:53:06 AM	10.95	8.15	7.30	-0.10
11/12/2014	9:54:05 AM	11.00	8.10	7.42	-0.12
11/12/2014	9:55:05 AM	11.06	8.08	7.35	-0.12
11/12/2014	9:56:04 AM	11.28	7.92	7.28	-0.11
11/12/2014	9:57:03 AM	11.37	7.88	7.05	-0.12
11/12/2014	9:58:02 AM	11.41	7.86	6.95	-0.15
11/12/2014	9:59:01 AM	11.68	7.77	6.90	-0.15
11/12/2014	10:00:01 AM	11.78	7.69	6.77	-0.15
11/12/2014	10:01:00 AM	12.05	7.57	6.61	-0.16
11/12/2014	10:01:59 AM	11.72	7.77	6.46	-0.17
11/12/2014	10:02:59 AM	11.87	7.68	6.69	-0.19
11/12/2014	10:03:58 AM	11.72	7.79	6.66	-0.19
11/12/2014	10:04:57 AM	11.57	7.86	6.67	-0.20
PORT CHANGE					
11/12/2014	10:08:54 AM	10.68	8.32	7.49	7.30
11/12/2014	10:09:53 AM	10.26	8.50	8.02	5.12
11/12/2014	10:10:53 AM	10.36	8.40	8.45	1.96
11/12/2014	10:11:52 AM	10.67	8.23	8.16	1.16
11/12/2014	10:12:51 AM	10.22	8.47	7.77	0.35
11/12/2014	10:13:50 AM	10.49	8.28	8.09	-0.01
11/12/2014	10:14:50 AM	11.01	8.06	7.79	-0.04
11/12/2014	10:15:49 AM	10.75	8.21	7.29	-0.09
11/12/2014	10:16:48 AM	10.72	8.22	7.48	-0.14
11/12/2014	10:17:47 AM	10.84	8.13	7.65	-0.16
11/12/2014	10:18:47 AM	11.35	7.90	7.40	-0.16
11/12/2014	10:19:46 AM	11.10	8.07	6.99	-0.20
11/12/2014	10:20:45 AM	11.17	7.99	7.23	-0.25
11/12/2014	10:21:44 AM	11.47	7.85	7.14	-0.26
11/12/2014	10:22:44 AM	11.38	7.92	6.81	-0.30
11/12/2014	10:23:43 AM	11.41	7.88	6.87	-0.32
AVERAGE		11.14 ✓	8.02	7.29 ✓	0.42 ✓
11/12/2014	10:31:37 AM	14.25	7.95	0.14	-0.34
11/12/2014	10:36:33 AM	-0.23	0.06	8.38	8.17

RUN 2	O_2	CO_2	NOx	CO
TIME	%	%	PPM	PPM
11:03:13 AM	10.39	8.18	7.82	10.52
11:04:12 AM	10.06	8.34	7.61	4.11
11:05:11 AM	10.08	8.30	7.82	1.73
11:06:11 AM	10.36	8.13	7.73	1.55
11:07:10 AM	10.12	8.29	7.44	1.36
11:08:09 AM	10.24	8.18	7.72	1.19
11:09:08 AM	10.92	7.88	7.64	0.93
11:10:08 AM	10.78	7.97	7.00	0.62
11:11:07 AM	10.88	7.90	6.96	0.35
11:12:06 AM	11.17	7.75	7.01	-0.10
11:13:05 AM	11.11	7.80	6.75	-0.36
11:14:05 AM	11.42	7.60	6.79	-0.36
11:15:04 AM	11.68	7.48	6.62	-0.36
11:16:03 AM	12.37	7.08	6.21	-0.36
11:17:02 AM	12.12	7.36	5.81	-0.36
11:18:02 AM	11.78	7.47	6.06	-0.36
PORT CHANGE				
11:21:58 AM	10.77	7.86	6.49	2.08
11:22:58 AM	10.33	8.05	7.04	1.04
11:23:57 AM	10.46	7.94	7.30	0.88
11:24:56 AM	10.67	7.85	7.10	0.86
11:25:56 AM	10.75	7.87	6.84	0.59
11:26:55 AM	10.73	7.91	6.80	0.40
11:27:54 AM	10.53	8.04	6.92	0.35
11:28:53 AM	10.38	8.11	7.12	0.34
11:29:53 AM	10.53	8.01	7.34	0.22
11:30:52 AM	10.66	7.99	7.16	-0.02
11:31:51 AM	10.52	8.07	7.11	-0.24
11:32:50 AM	10.58	7.98	7.25	-0.31
11:33:49 AM	10.50	8.06	7.17	-0.29
11:34:49 AM	10.34	8.12	7.25	-0.34
11:35:48 AM	10.95	7.78	7.35	-0.35
11:36:47 AM	11.25	7.75	6.92	-0.35
AVERAGE	10.79 ✓	7.91	7.07 ✓	0.78 ✓
11:46:40 AM	14.01	8.00	0.10	-0.36
11:53:34 AM	-0.40	0.05	8.25	8.12

RUN 3	O_2	CO_2	NOx	CO
TIME	%	%	PPM	PPM
12:06:25 PM	10.89	8.10	6.88	2.26
12:07:24 PM	11.22	7.88	7.15	1.26
12:08:23 PM	11.68	7.69	6.79	1.10
12:09:23 PM	11.11	8.04	6.42	0.84
12:10:22 PM	10.69	8.20	7.05	0.79
12:11:21 PM	11.02	8.03	7.30	0.99
12:12:20 PM	10.74	8.21	7.09	0.90
12:13:20 PM	10.81	8.15	7.43	0.53
12:14:19 PM	10.98	8.10	7.36	0.26
12:15:18 PM	10.79	8.22	7.25	0.12
12:16:17 PM	10.99	8.10	7.48	-0.13
12:17:17 PM	11.10	8.08	7.36	-0.35
12:18:16 PM	11.03	8.09	7.41	-0.35
12:19:15 PM	11.65	7.74	7.42	-0.35
12:20:14 PM	11.72	7.75	6.91	-0.35
12:21:14 PM	11.36	7.89	6.78	-0.35
PORT CHANGE				
12:24:11 PM	10.58	8.29	6.00	-0.35
12:25:10 PM	10.92	8.11	7.79	-0.22
12:26:10 PM	10.91	8.14	7.54	0.17
12:27:09 PM	11.07	8.06	7.59	0.32
12:28:08 PM	11.33	7.94	7.32	0.28
12:29:08 PM	10.64	8.30	7.23	0.18
12:30:07 PM	10.91	8.12	7.73	0.15
12:31:06 PM	10.77	8.22	7.52	0.14
12:32:05 PM	11.19	7.97	7.54	0.07
12:33:04 PM	10.97	8.14	7.22	-0.02
12:34:04 PM	10.77	8.14	7.43	-0.10
12:35:03 PM	11.66	7.73	7.34	-0.12
12:36:02 PM	12.06	7.47	6.70	-0.23
12:37:01 PM	11.87	7.62	6.47	-0.35
12:38:01 PM	12.86	6.96	6.39	-0.35
12:39:00 PM	12.21	7.50	5.87	-0.35
AVERAGE	11.20 ✓	7.97	7.12 ✓	0.20 ✓
12:46:54 PM	14.18	8.01	0.10	-0.35
12:51:50 PM	-0.28	0.05	8.21	8.11

BLUE SKY ENVIRONMENTAL, INC

Method 2 - Stack Gas Volumetric Flow Rate Determination

Facility: CHESTNUT		Location: INLET	
Date: 11/12/14	Personnel: GW	Barometric (P_{bar}), "Hg: 30.0	
Pitot Factor (C_p): 0.99	Pitot #: Mini Std 12"	Stack Dia. (D_s), ": 3.75	De = 2(LW)/(L+W) =
Thermocouple #:	Mag / Incline #: 880C ADM	Stack Area ft^2 (A_s):	
Assumed $\%O_2$:	Actual $\%O_2$:	Port Diameter ": 3/16"	
Assumed $\%CO_2$:	Actual $\%CO_2$:	Port Depth ": 1/2"	
Assumed %CO:	Actual %CO:	Downstream to port: >8	
Assumed $\%H_2O$:	Actual $\%H_2O$:	Upstream to port: >2	
Pitot Leak Check (15sec @ >3"H_2O) : ✓		Cyclonic Flow Check:	

			RUN # 1	TIME 1030	STATIC 49.3	RUN # 2	TIME 1155	STATIC 49.0	RUN # 3	TIME 1256	STATIC 48.64
Port ID & Point #	Point Location Inches		Stack Temp °F, (ts)	ΔP "H_2O"	√ΔP "H_2O"	Stack Temp °F, (ts)	ΔP "H_2O"	√ΔP "H_2O"	Stack Temp °F, (ts)	ΔP "H_2O"	√ΔP "H_2O"
✓ 1	0.5		120	0.2085	0.457		0.2281	0.478		0.499	0.2489
2	0.9			0.2597	0.510		0.3019	0.549		0.585	0.2425
3	2.8			0.3337	0.578		0.3401	0.583		0.579	0.3331
4	3.25			0.3465	0.589		0.3335	0.579		0.595	0.3535
AVERAGES					0.533			0.547			0.564
			ft/sec			ft/sec			ft/sec		
			ACFM			ACFM			ACFM		
			DSCFM			DSCFM			DSCFM		

Ps = Pb + (Pstatic/13.6)

Vs = 85.49 * Cp * √ΔP * √[(Ts + 460) / (Ps x MWs)]

ACFM = 60 * Vs * As

DSCFM = 60 (1-Bwo) * Vs * As * (Tstd + 460)/(Ts + 460) * (Ps/29.92)

Comments: (e.g.: cycling, pulsing, diagram or process info.)

wet-bulb - 88°F

E
Strip Charts

CO
0-15

O_2 0-25 (R)

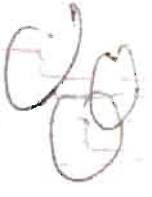
RUN-1

NO_x
0-15

EXIT O_2 @ 0933

EXIT

09:47



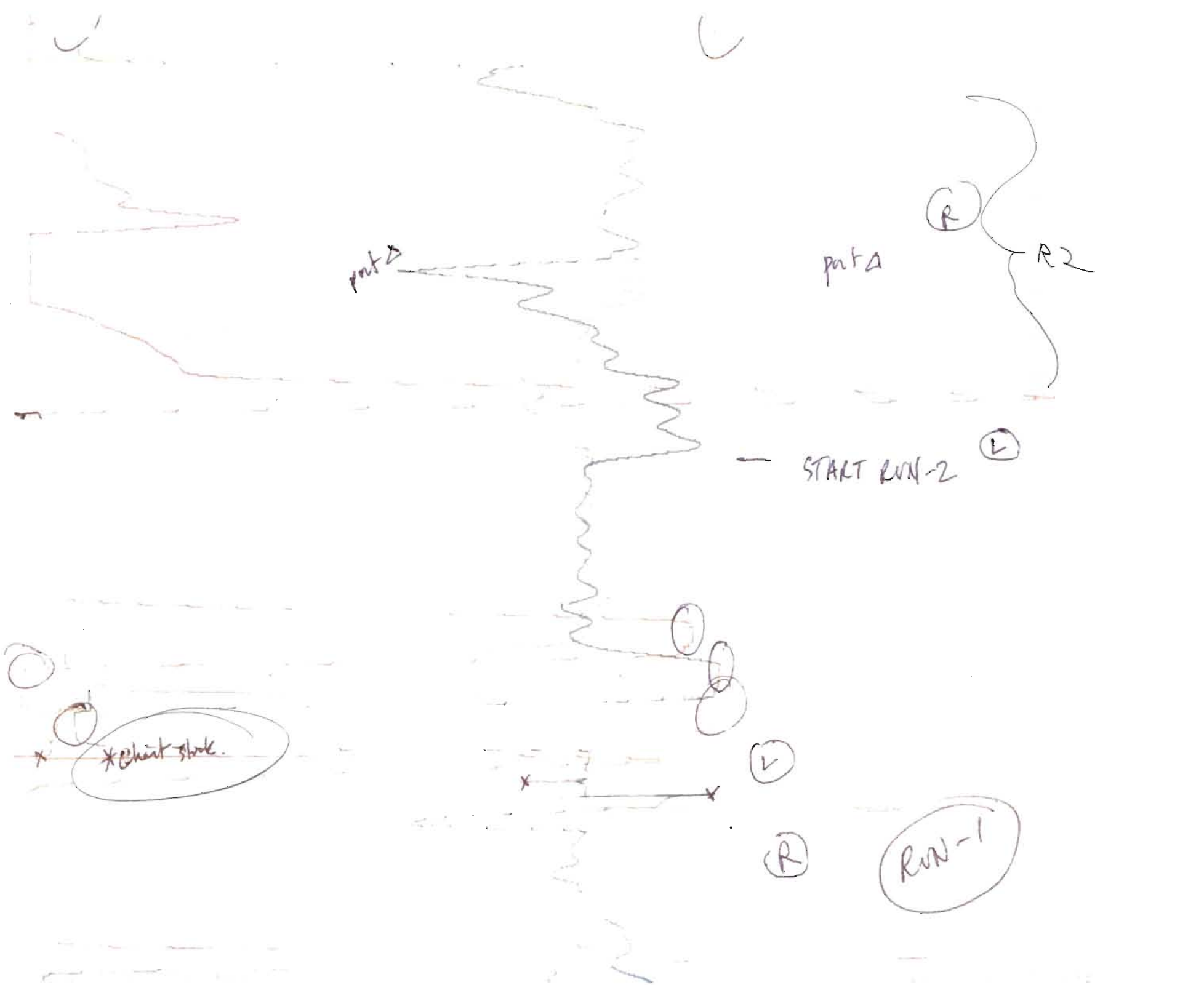
CHESTNUT

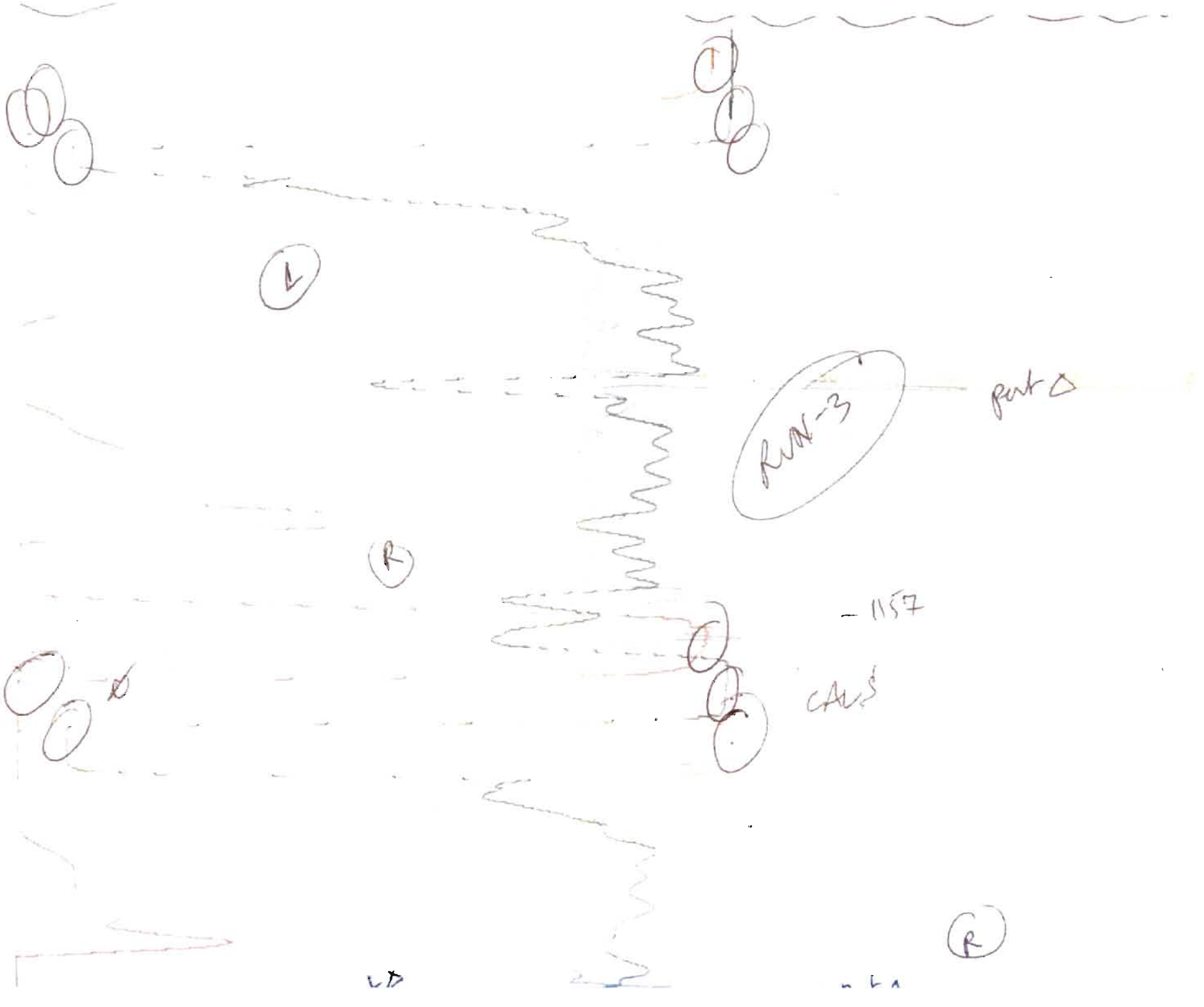
11-12-14

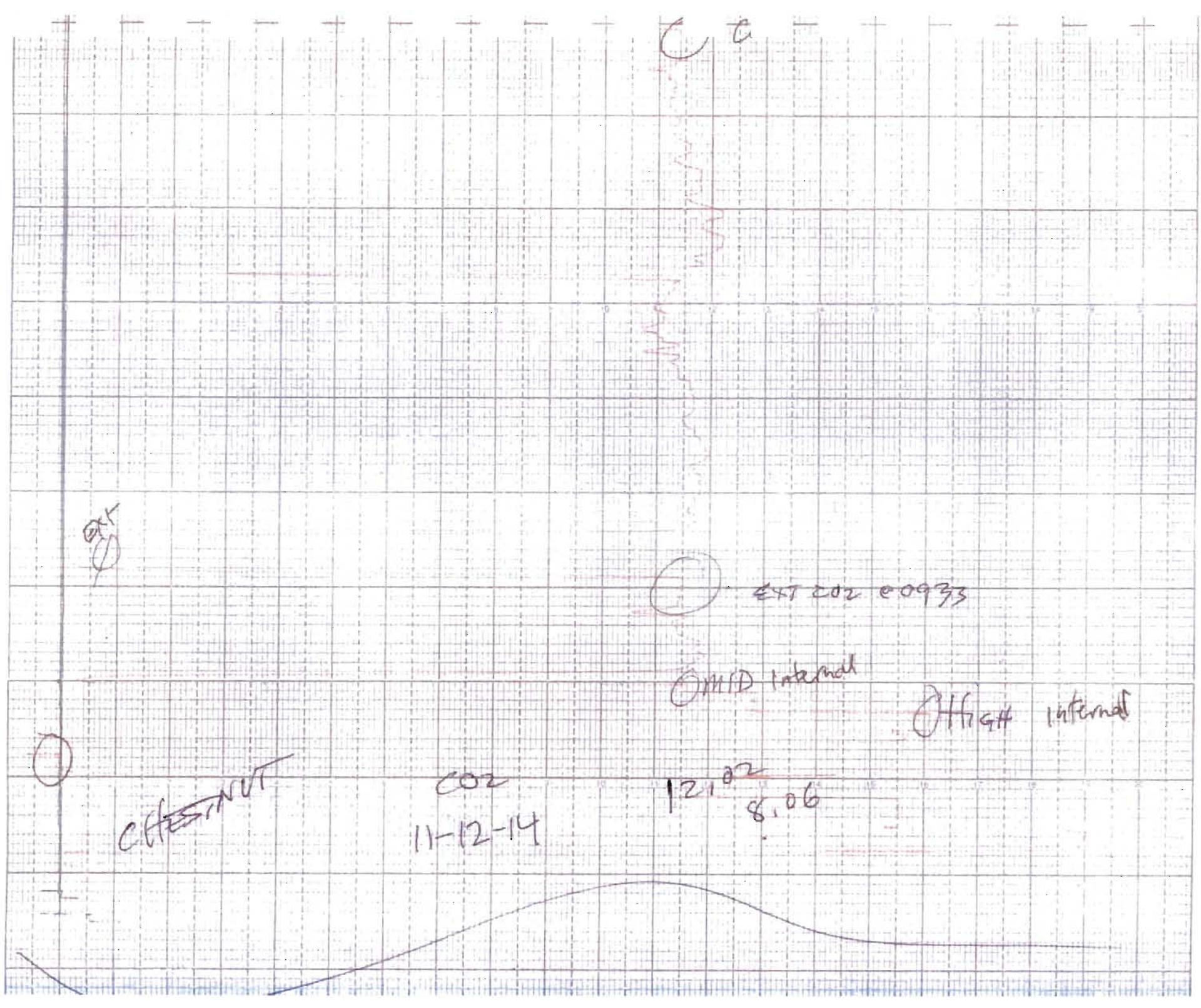
NOx
8.602
12.6
GREEN PEN
0-15 PPM

CO
8592
12.6
RED PEN
0-15 PPM

O_2
20.51
14.5
BLACK PEN
0-25%


R
R2
part A
part A
START RUN-2
L
*Chair stand.
L
R
RUN-1


RUN-3
port
R
- 1157
CALS
R


EXT CO2 e0933
MID interval
High interval
CO2
11-12-14
12.02
8.06

(R)

part A

RUN-2

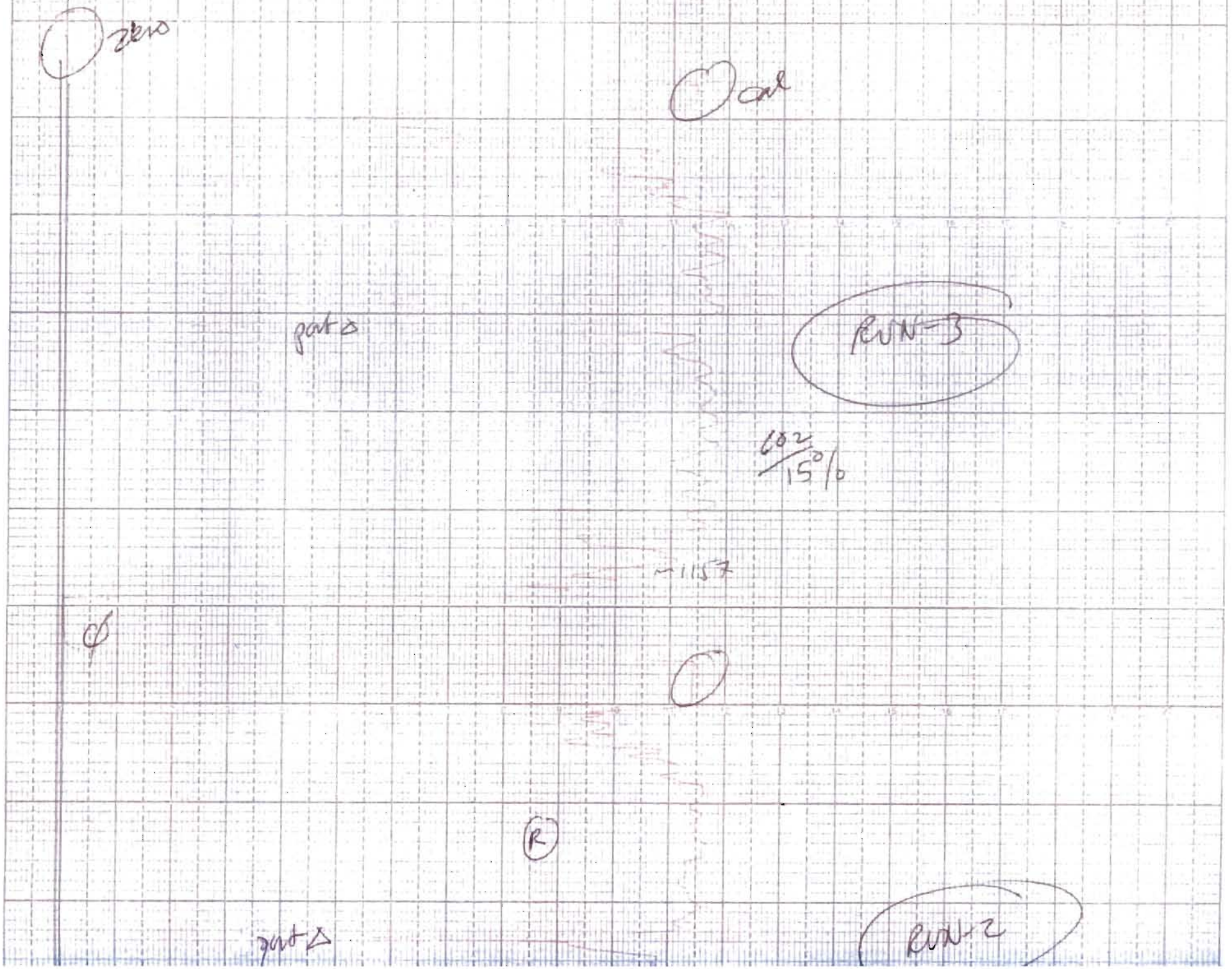
(L)

CO_2 / 15%

— start RUN-2

cf

(L) cal


zero
cal
gas
RUN-3
CO2
15%
~115°
RUN-2

F
Process Information

Date	Time	CH01 GAS FLOW SCFM MIN	CH01 GAS FLOW SCFM MAX	CH02 FLARE TEMP DEG F MIN	CH02 FLARE TEMP DEG F MAX
START RUN 1					
2014/11/12	09:50:00	163	167	1604	1605
2014/11/12	09:51:00	164	169	1604	1606
2014/11/12	09:52:00	164	168	1605	1606
2014/11/12	09:53:00	163	170	1603	1605
2014/11/12	09:54:00	166	170	1602	1603
2014/11/12	09:55:00	163	169	1602	1603
2014/11/12	09:56:00	163	169	1602	1603
2014/11/12	09:57:00	164	170	1602	1603
2014/11/12	09:58:00	163	168	1603	1605
2014/11/12	09:59:00	164	169	1604	1605
2014/11/12	10:00:00	163	169	1604	1605
2014/11/12	10:01:00	163	168	1604	1604
2014/11/12	10:02:00	162	168	1603	1605
2014/11/12	10:03:00	162	169	1604	1606
2014/11/12	10:04:00	163	168	1604	1606
2014/11/12	10:05:00	163	167	1602	1604
2014/11/12	10:06:00	162	169	1602	1604
2014/11/12	10:07:00	162	168	1604	1605
2014/11/12	10:08:00	162	167	1604	1605
2014/11/12	10:09:00	162	167	1602	1604
2014/11/12	10:10:00	162	166	1601	1602
2014/11/12	10:11:00	162	167	1602	1604
2014/11/12	10:12:00	162	167	1600	1604
2014/11/12	10:13:00	161	167	1598	1600
2014/11/12	10:14:00	161	167	1599	1605
2014/11/12	10:15:00	160	167	1605	1606
2014/11/12	10:16:00	161	164	1602	1606
2014/11/12	10:17:00	161	166	1602	1606
2014/11/12	10:18:00	160	165	1605	1607
2014/11/12	10:19:00	162	165	1598	1605
2014/11/12	10:20:00	160	165	1597	1599
2014/11/12	10:21:00	160	165	1599	1604
2014/11/12	10:22:00	161	165	1604	1606
2014/11/12	10:23:00	160	164	1601	1604
Average Run 1		**165**		**1603**	

Blue Sky pitot : 159 scfm

Date	Time	CH01 GAS FLOW SCFM MIN	CH01 GAS FLOW SCFM MAX	CH02 FLARE TEMP DEG F MIN	CH02 FLARE TEMP DEG F MAX
START RUN 2					
2014/11/12	11:03:00	160	165	1602	1603
2014/11/12	11:04:00	160	165	1602	1603
2014/11/12	11:05:00	161	165	1603	1605
2014/11/12	11:06:00	159	164	1605	1607
2014/11/12	11:07:00	158	165	1600	1606
2014/11/12	11:08:00	160	164	1600	1601
2014/11/12	11:09:00	159	166	1601	1604
2014/11/12	11:10:00	159	165	1603	1605
2014/11/12	11:11:00	159	166	1601	1603
2014/11/12	11:12:00	159	165	1602	1610
2014/11/12	11:13:00	160	165	1605	1610
2014/11/12	11:14:00	160	165	1600	1605
2014/11/12	11:15:00	160	165	1601	1604
2014/11/12	11:16:00	161	165	1602	1604
2014/11/12	11:17:00	159	165	1601	1603
2014/11/12	11:18:00	159	165	1603	1605
2014/11/12	11:19:00	161	165	1603	1605
2014/11/12	11:20:00	161	165	1602	1603
2014/11/12	11:21:00	161	166	1602	1606
2014/11/12	11:22:00	160	166	1603	1606
2014/11/12	11:23:00	162	168	1602	1603
2014/11/12	11:24:00	163	166	1602	1607
2014/11/12	11:25:00	160	166	1606	1610
2014/11/12	11:26:00	160	165	1600	1606
2014/11/12	11:27:00	160	165	1600	1604
2014/11/12	11:28:00	159	163	1604	1606
2014/11/12	11:29:00	158	162	1603	1606
2014/11/12	11:30:00	157	162	1603	1604
2014/11/12	11:31:00	156	164	1604	1605
2014/11/12	11:32:00	157	163	1603	1605
2014/11/12	11:33:00	158	163	1603	1607
2014/11/12	11:34:00	156	163	1606	1607
2014/11/12	11:35:00	158	162	1603	1606
2014/11/12	11:36:00	157	161	1603	1604
Average Run 2		**162**		**1604**	

Blue Sky pilot: 164 scfm

Date	Time	CH01 GAS FLOW SCFM MIN	CH01 GAS FLOW SCFM MAX	CH02 FLARE TEMP DEG F MIN	CH02 FLARE TEMP DEG F MAX
START RUN 3					
2014/11/12	12:06:00	162	168	1605	1609
2014/11/12	12:07:00	161	168	1604	1609
2014/11/12	12:08:00	163	168	1603	1606
2014/11/12	12:09:00	162	168	1603	1607
2014/11/12	12:10:00	161	168	1601	1603
2014/11/12	12:11:00	163	170	1603	1607
2014/11/12	12:12:00	163	169	1600	1607
2014/11/12	12:13:00	162	167	1597	1600
2014/11/12	12:14:00	162	168	1598	1604
2014/11/12	12:15:00	163	169	1604	1605
2014/11/12	12:16:00	164	168	1602	1604
2014/11/12	12:17:00	164	167	1603	1606
2014/11/12	12:18:00	163	167	1603	1606
2014/11/12	12:19:00	161	168	1603	1605
2014/11/12	12:20:00	162	167	1605	1605
2014/11/12	12:21:00	160	167	1604	1605
2014/11/12	12:22:00	160	165	1604	1605
2014/11/12	12:23:00	159	165	1604	1606
2014/11/12	12:24:00	157	161	1606	1607
2014/11/12	12:25:00	156	164	1604	1607
2014/11/12	12:26:00	156	160	1604	1606
2014/11/12	12:27:00	155	160	1606	1607
2014/11/12	12:28:00	153	160	1606	1609
2014/11/12	12:29:00	152	158	1604	1609
2014/11/12	12:30:00	152	158	1604	1606
2014/11/12	12:31:00	151	158	1605	1607
2014/11/12	12:32:00	152	156	1599	1605
2014/11/12	12:33:00	149	154	1599	1602
2014/11/12	12:34:00	150	153	1601	1603
2014/11/12	12:35:00	150	155	1601	1605
2014/11/12	12:36:00	149	155	1602	1605
2014/11/12	12:37:00	151	157	1599	1602
2014/11/12	12:38:00	153	158	1600	1604
2014/11/12	12:39:00	154	158	1603	1604
Average Run 3		**160**		**1604**	

Blue sky pitot 169 scfm

G
Calibration Certifications & QC Records

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

DocNumber: 000043833

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE HAYWARD CA
23133 KIDDER ST
HAYWARD CA 945450000

Praxair Order Number: 21383182
Customer PO Number: 04056650
Customer Reference Number:

Fill Date: 9/7/2012
Part Number: NI CD12.5O1E-AS
Lot Number: 109225105
Cylinder Style and Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date: 10/09/2020			NIST Traceable Analytical Uncertainty:
Cylinder Number: CC163810			
12.02	%	CARBON DIOXIDE	± 1 %
20.51	%	OXYGEN	± 1 %
	Balance	NITROGEN	

Certification Information:

Certification Date : 10/9/2012 *Term :* 96 Months *Expiration Date :* 10/09/2020

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 DIOXIDE

Requested Concentration: 12.5 %
Certified Concentration: 12.02 %
Instrument Used: Horiba VIA-510 S/N 2807014
Analytical Method: NDIR
Last Multipoint Calibration: 09/11/2012

First Analysis Data:						Date:	10/04/2012
Z:	0	R:	10.07	C:	12.02	Conc:	12.02
R:	10.07	Z:	0	C:	12.02	Conc:	12.02
Z:	0	C:	12.02	R:	10.07	Conc:	12.02
UOM:	%				Mean Test Assay:		12.02 %

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC7663
Ref. Std. Conc: 10.07%
Ref. Std. traceable to SRM #: 1675b
SRM Sample #: 6-F-51
SRM Cylinder #: CAL014538

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: 20.5 %
Certified Concentration: 20.51 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 09/11/2012

First Analysis Data:						Date:	10/04/2012
Z:	0	R:	20.04	C:	20.52	Conc:	20.51
R:	20.04	Z:	0	C:	20.52	Conc:	20.51
Z:	0	C:	20.52	R:	20.04	Conc:	20.51
UOM:	%				Mean Test Assay:		20.51 %

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC14572
Ref. Std. Conc: 20.03%
Ref. Std. traceable to SRM #: vs. 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: Nelson Ma

Nelson Ma

Certified by: Shameela Jiffrey

Shameela Jiffrey

PRAXAIR

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

DocNumber: 000052280

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE HAYWARD CA
23133 KIDDER ST
HAYWARD CA 945450

Praxair Order Number: 23299684
Customer P. O. Number: 04344450
Customer Reference Number:

Fill Date: 4/4/2013
Part Number: NI CD8.25O2E-AS
Lot Number: 108309408
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu ft.

Certified Concentration:

Expiration Date:	4/10/2021	NIST Traceable
Cylinder Number:	CC78071	Analytical Uncertainty:
8.16 %	CARBON DIOXIDE	± 1 %
14.47 %	OXYGEN	± 1 %
Balance	NITROGEN	

Certification Information: *Certification Date:* 4/10/2013 *Term:* 96 Months *Expiration Date:* 4/10/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.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 DIOXIDE

Requested Concentration: 8.25 %
Certified Concentration: 8.16 %
Instrument Used: Horiba VIA-510 S/N 2807014
Analytical Method: NDIR
Last Multipoint Calibration: 3/20/2013

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC7663
Ref. Std. Conc: 10.07%
Ref. Std. Traceable to SRM #: 1675b
SRM Sample #: 6-F-51
SRM Cylinder #: CAL014538

First Analysis Data:					Date: 4/10/2013
Z: 0	R: 10.07	C: 8.16	Conc:	8.16	
R: 10.07	Z: 0	C: 8.16	Conc:	8.16	
Z: 0	C: 8.15	R: 10.07	Conc:	8.15	
UOM: %		Mean Test Assay:		8.16 %	

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: 14.5 %
Certified Concentration: 14.47 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 3/20/2013

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-008734

First Analysis Data:					Date: 4/10/2013
Z: 0	R: 15.08	C: 14.46	Conc:	14.47	
R: 15.08	Z: 0	C: 14.46	Conc:	14.47	
Z: 0	C: 14.46	R: 15.08	Conc:	14.47	
UOM: %		Mean Test Assay:		14.47 %	

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: Shameela Jiffrey

Certified by: Ying Yu

Airgas

Airgas Specialty Gases
11711 S. Alameda Street
Los Angeles , CA 90059
(323) 588-2206 Fax: (323) 587-3686
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI99E15A1702	Reference Number:	48-124321173-13
Cylinder Number:	CC406005	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32012	Valve Outlet:	660
Gas Code:	CO,NO	Analysis Date:	Jun 19, 2012

Expiration Date: Jun 19, 2015

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
NOx	8.500 PPM	8.602 PPM	G1	+/- 1% NIST Traceable
CARBON MONOXIDE	8.500 PPM	8.592 PPM	G1	+/- 1% NIST Traceable
NITRIC OXIDE	8.500 PPM	8.563 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	051201	CC179894	10.17PPM CARBON MONOXIDE/NITROGEN	Feb 02, 2013
NTRM	120611	CC281035	9.76PPM NITRIC OXIDE/NITROGEN	Jan 30, 2015
NTRM	120611NOx	CC281035-NOx	9.79PPM NOx/NITROGEN	Jan 30, 2015

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801551 CO	FTIR	Jun 14, 2012
Thermo 42-iLS 1115848421 NO	Chemiluminescence	Jun 11, 2012
Thermo 42-iLS 1115848421 NOx	Chemiluminescence	Jun 11, 2012

Triad Data Available Upon Request

Notes:

Approved for Release

PRAXAIR

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

DocNumber: 000057720

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE HAYWARD CA
23133 KIDDER ST
HAYWARD CA 945450

Praxair Order Number	24624640
Customer P. O. Number	04534438
Customer Reference Number	

[illegible]	0[illegible]/2013	
[illegible]	EV NICONOI 12/AS	
[illegible]	10332750/	
[illegible]	AS	CGA 660
[illegible]	2000 psig	140 cu ft

Certified Concentration:

Expiration Date:	8/28/2016		NIST Traceable
Cylinder Number:	CC363264		Analytical Uncertainty:
12.6 ppm	CARBON MONOXIDE		± 0.9 %
12.6 ppm	NITRIC OXIDE		± 1 %
Balance	NITROGEN		

NOx = 12.6 ppm — NOx for Reference Only

Certification Information: *Certification Date:* 8/28/2013 *Term:* 36 Months *Expiration Date:* 8/28/2016

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	12.5 ppm	Reference Standard Type	GMIS
Certified Concentration	12.6 ppm	Ref Std Cylinder #	CC147268
Instrument Used	Horiba VIA-510 S/N 57287015	Ref Std Conc	24.7 ppm
Analytical Method	NDIR	Ref Std Traceable to SRM #	2635a
Last Multipoint Calibration	7/24/2013	SRM Sample #	58-C-32
		SRM Cylinder #	CAL011857

First Analysis Data: Date: 8/21/2013

Z:	0	R:	24.7	C:	12.5	Conc:	12.5
R:	24.7	Z:	0	C:	12.6	Conc:	12.6
Z:	0	C:	12.6	R:	24.7	Conc:	12.6

UOM: ppm — Mean Test Assay: 12.567 ppm

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	12.6 ppm	Reference Standard Type	GMIS
Certified Concentration	12.5 ppm	Ref Std Cylinder #	CC330331
Instrument Used	Thermo Electron 42C S/N 519112467	Ref Std Conc	10.01 ppm
Analytical Method	Chemiluminescence	Ref Std Traceable to SRM #	2628a
Last Multipoint Calibration	8/24/2013	SRM Sample #	60-G-109
		SRM Cylinder #	FF31631

First Analysis Data: Date: 8/21/2013

Z:	0	R:	10.01	C:	12.5	Conc:	12.5
R:	10.01	Z:	0	C:	12.54	Conc:	12.54
Z:	0	C:	12.56	R:	10.01	Conc:	12.56

UOM: ppm — Mean Test Assay: 12.533 ppm

Second Analysis Data: Date: 8/28/2013

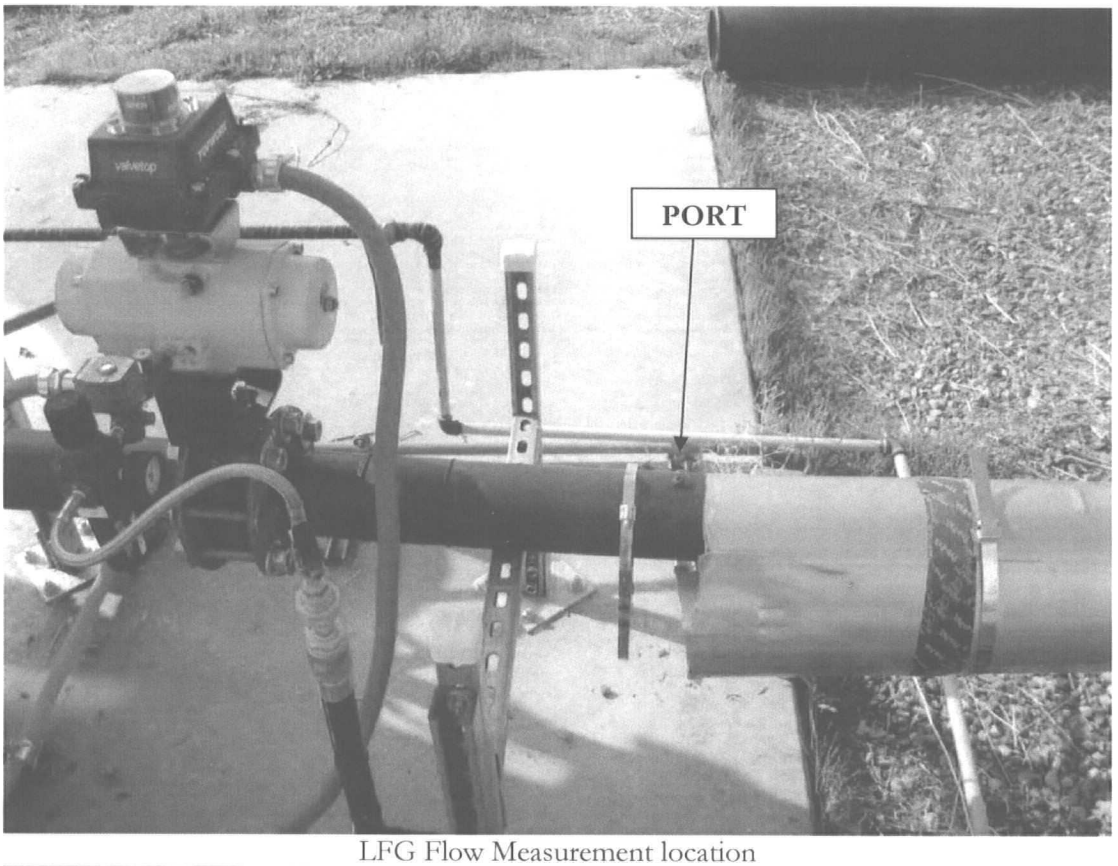
Z:	0	R:	10.01	C:	12.49	Conc:	12.49
R:	10.01	Z:	0	C:	12.5	Conc:	12.5
Z:	0	C:	12.52	R:	10.01	Conc:	12.52

UOM: ppm — Mean Test Assay: 12.503 ppm

Analyzed by: Jack E[illegible]

Certified by: Diego Mustanza

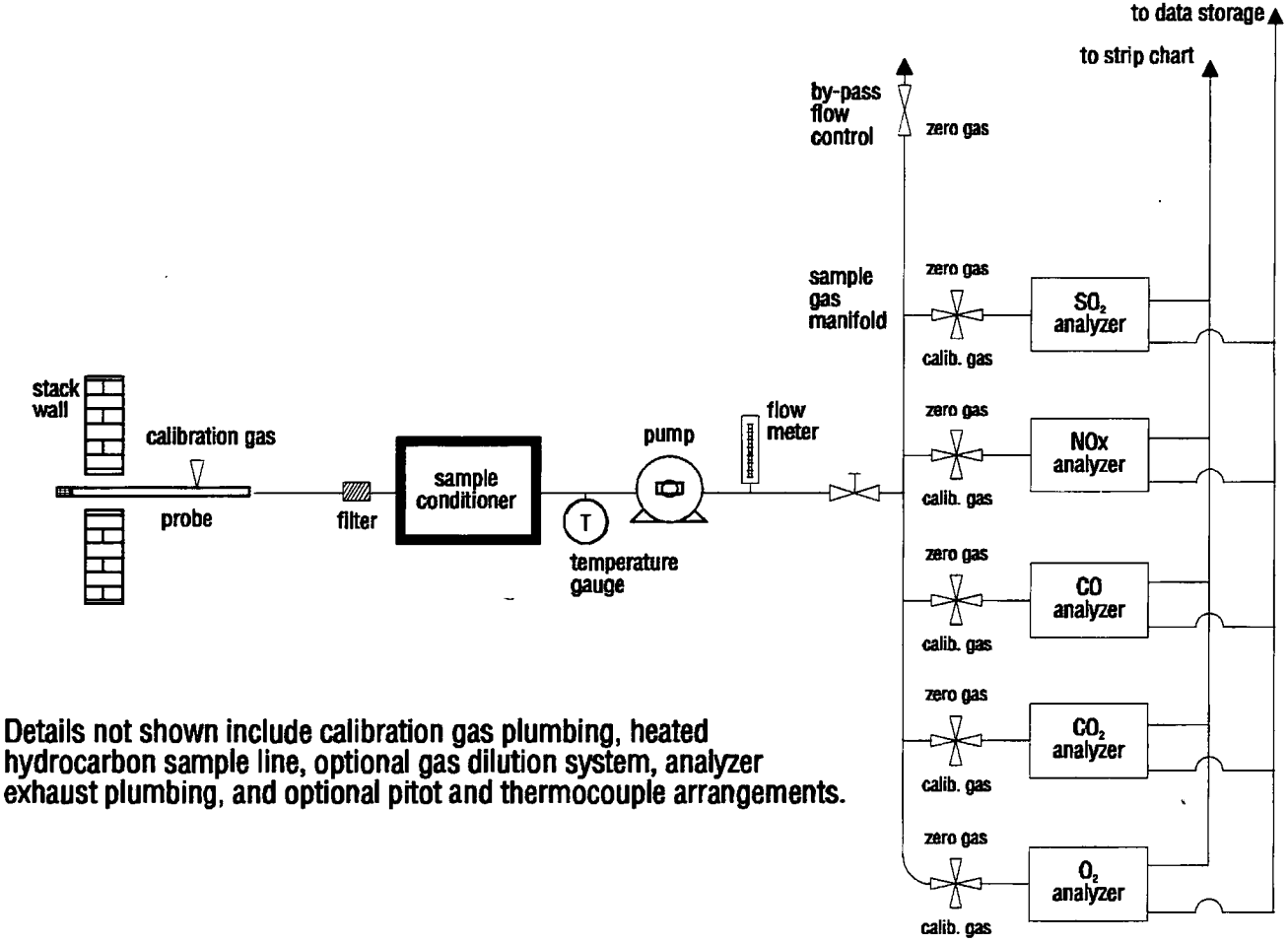
H
Sample Train Configuration and Stack Diagrams



LFG Flow Measurement location

Chestnut Landfill - Gas sampling port

FIGURE 100.1
Method 100 Sample Train Assembly



* Details not shown include calibration gas plumbing, heated hydrocarbon sample line, optional gas dilution system, analyzer exhaust plumbing, and optional pitot and thermocouple arrangements.

I
Related Correspondence (Source Test Plan)

Blue Sky Environmental, Inc
624 San Gabriel Avenue
Albany, California 94706
Cell (510) 508-3469
Office (510) 525-1261
blueskyenvironmental@yahoo.com

October 7, 2014

Attn.: John Copp
San Joaquin Valley APCD
1990 E. Gettysburg Ave
Fresno, CA 93726

Re: Source Test Plan (STP) to perform testing as required on the 45 MMBTUH enclosed flare at Chestnut Landfill (Facility C-146-1-1), located at 12825 S. Chestnut, Fresno, CA 93725.

Dear, Mr Copp

Blue Sky Environmental is pleased to present this Source Test Plan for the above referenced sampling project. Testing will include the following:

1) Three 30 minute test runs will be performed at the Flare exhaust for NOx, CO, CO_2 and O_2 using CARB Method 100. NMOC will be measured per run from Tedlar Bag or SUMMA Canisters using Modified EPA Method 18 (TO-12).

2) Integrated Tedlar bag samples of the Landfill Gas (LFG) will be collected during each test run, and will be analyzed for HHV, CO_2, N_2, O_2, NMOC and CH_4, using ASTM 1945/3588 (EPA 25C). Also, the LFG samples will be analyzed for TRS and sulfur species by ASTM D 1072, D 3031, D 4084, D 3246 or D 5504 or SCAQMD 307-91. The samples will be analyzed within 24-72 hours.

3) Fuel flowrate and moisture will be measured by CARB Methods 1 & 2. Moisture will be measured by CARB Method 4 (wet bulb–dry bulb). The exhaust flowrate will be determined by EPA 19 based on fuel analysis and stack oxygen.

Test Parameters	**Inlet**	**Outlet**	**Limits**
O_2, CO_2	ASTM 1945 x 3	CARB 100 x 3	
CO		CARB 100 x 3	CO 0.2 lbs/MMBtu
NO_x		CARB 100 x 3	NOx 0.08 lbs/MMBtu
SO_2	ASTM 5504 x 3	Calculated	SO_2 2.6 lbs/Day
VOC	M25C x3	MM18 x 3	VOC D.E. 98% or 20 ppm as Hexane @ 3% O_2 or 0.014 lbs/MMBtu
High Heating Value	ASTM 1945/3588	N/A	
Flow	M2 x 3	M19 x 3	
Moisture	M4 WBDB x 3	N/A	

4) A report will be submitted to the client within four weeks of test program completion (meeting all APCD/AQMD requirements). The report will include a test description and tables presenting emission concentrations, emission factors and/or rates (lbs/hr) for all compliance parameters. All supporting documentation will be included (strip charts, field data sheets, calibrations, calculations, etc.).

This test program is currently scheduled for November 12th, 2014. The facility contact is Erin Fanning (209) 227 9531 or Don Litchfield who may be reached at 209 684 4733. If you have any questions, please contact Guy Worthington at 510.525.1261 or 510.508.3469.

Sincerely,

Guy Worthington

CC: SJVAPCD Email: sourcetestC@valleyair.org

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

October 20, 2014

Blue Sky Environmental
Attn: Mr. Guy Worthington
624 San Gabriel Ave
Albany, CA 94706

RE: Approval of Test Protocol
Browning Ferris – Chestnut Landfill
November 12, 2014
Permit to Operate: C-146-1-3

District staff has completed the review of the test protocol submitted for the compliance testing of a 45 MMBtu/hr landfill gas collection and treatment system with a 6 MMBtu/hr John Zink enclosed flare. Staff finds the protocol will meet the District's requirements. Should the test date or test methods change from the approved protocol, then a modified protocol shall be submitted for review no later than seven (7) days prior to the scheduled test date. Submittal of the modified protocol after this date may result in test cancellation by District staff.

Standard conditions include the following:

1) All data must be recorded by a data logger and shall be submitted to the District in hard copy and in electronic form on disk.
2) A colored copy of the original 110% strip chart must be submitted with the report.
3) If at any time during a test run the measured concentration exceeds the span, the test run shall be considered invalid for determining compliance (in some cases, two recorders or a dual-range recorder may be necessary). The emission standard shall not be less than 30% of the monitoring range.
4) Source test is being performed in accordance with the most recent PTO/ATC.
5) All testing must be done during normal District business hours unless otherwise approved.

If the equipment to be tested is being operated under a District issued Authority to Construct, it is the operator's responsibility to contact the District and schedule a start-up inspection prior to the scheduled source test date. Failure to do so may result in cancellation of the scheduled source test. If you have any questions, please contact Mr. Joe Avila at (559) 230-5951.

Sincerely,

Lupe Jauregui
Supervising Air Quality Inspector

Joe Avila
Air Quality Inspector II

J
Permit

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: C-146-1-3 **EXPIRATION DATE:** 04/30/2014

EQUIPMENT DESCRIPTION:
6 MMBTU/HR LANDFILL GAS COLLECTION AND TREATMENT SYSTEM WITH JOHN ZINK MODEL ZTOF ENCLOSED FLARE WITH COMBUSTION AIR CONTROLS, PROPANE-FIRED PILOT FLAME, FLAME RESTOR, BLOWERS, CONCRETE CONDENSATE SUMPS, EXHAUST TACK, KNOCKOUT VESSEL AND WELLS

PERMIT UNIT REQUIREMENTS

1. Flare shall be equipped with a failure alarm to automatically shut off the blower and landfill gas supply. [District Rule 2201]
2. All condensate traps shall remain covered unless treatment of condensate is taking place. [District Rule 2201]
3. A non-resettable, totalizing mass or volumetric landfill gas fuel flow meter to measure the amount of gas combusted in the enclosed flare shall be installed, utilized and maintained. [District Rule 2201]
4. Gas collection system shall be sealed at all times during operation. [District Rule 2201]
5. Flame temperature indicator and recorder shall be operated whenever gas is flared. [District Rule 2201]
6. Flare temperature shall be maintained to at least 1,400 degree F. [District Rule 2201]
7. Emissions from the flare shall not exceed any of the following limits: 0.08 lb-NOx/MMBtu, 2.6 lb-SOx/day, 0.0010 lb-PM10/hr/scfm, 0.20 lb-CO/MMBtu, or 0.014 lb-VOC(NMHC)/MMBtu. [District Rule 2201]
8. The flowrate of collected landfill gas into the flare shall not exceed 144 MMBtu/day. [District Rule 2201]
9. Sampling ports adequate for sulfur testing shall be provided in the landfill gas manifold line to the flare. [District Rule 1081]
10. SOx emissions shall be determined by measuring the sulfur concentration in the landfill gas and calculating the correlated SOx emission rate based on the correlation between landfill gas sulfur concentration and associated SOx emission rate demonstrated during startup. [District Rule 1081]
11. Testing to demonstrate compliance with the daily SOx emission limit shall be conducted quarterly. Once eight (8) consecutive quarterly tests show compliance, the frequency of monitoring sulfur content, and associated SOx emissions, may be reduced to semi-annually. If a semi-annual test shows violation of the SOx emission limit, then quarterly testing shall resume and continue until four (4) consecutive tests show compliance. Once compliance is shown on four (4) consecutive quarterly tests, then testing may return to semi-annually. [District Rule 2201]
12. Sulfur content of the landfill gas being combusted in the flare shall be determined using ASTM D 1072, D 3031, D 4084, D 3246, double GC or colorimetric methods using Draeger tubes for H2S and mercaptans, or an equivalent method approved by the District. [District Rule 1081]
13. Methane destruction efficiency shall be at least 99% by weight. [17 CCR 95464]
14. Flare NMOC emissions shall be conducted using USEPA Test Method 18, 25A, or 25C. [District Rule 1081]
15. Source testing for flare NOx emissions shall be conducted using CARB Method 7, Method 20, or Method 100. [District Rule 1081]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

16. Source testing for flare CO emissions shall be conducted using EPA Method 10 or 10B, CARB Methods 1 through 5 with 10, or CARB Method 100. [District Rule 1081]
17. At least once every 12 months, the operator shall determine landfill gas fuel higher heating value (HHV) by ASTM D 1826 or D 1945 in conjunction with ASTM D 3588 for gaseous fuels. [District Rule 2201]
18. The results of each landfill gas sulfur content test shall be submitted to the District within 60 days thereafter. [District Rule 1081]
19. The gas collection system shall be operated such that the concentration of total organic compounds (as CH4) shall not exceed 1000 ppmv at any point along the gas transfer path of the gas collection system. [District Rule 4642]
20. Sampling ports shall be installed on each well head. [District Rule 4642]
21. Gas collection system shall be operated in a manner which maximizes the amount of landfill gas extracted while preventing overdraw that can cause fires or damage the gas collection system. [District Rule 4642]
22. Landfill gas collection system shall be equipped with a control device having VOC destruction efficiency of at least 98% by weight, or reduce the VOC concentration (measured as methane) to 20 ppmv @ 3% O2. [District Rules 2201 and 4642]
23. Excavated solid waste shall be covered using fresh soil, plastic sheeting, or vapor retarding foam as necessary to prevent odorous emissions and to minimize the release of landfill gas. [District Rule 4642]
24. Maintenance is defined as any work performed on the gas collection system and/or control device in order to ensure continued compliance with District rules, regulations, and/or Permits to Operate, and to prevent its failure or malfunction. [District Rule 4642]
25. The permittee shall notify the APCO by telephone at least 24 hours before performing any maintenance work that requires the system to be shutdown. The notification shall include a description of work, the date work will be performed and the amount of time needed to complete the maintenance work. [District Rule 4642]
26. During maintenance of the gas collection system or incineration device, emissions of landfill gas shall be minimized during shutdown. [District Rule 4642]
27. The landfill gas vapor collection system and/or control device shall not be shut down for more than 144 cumulative hours in any calendar year. [District Rule 4642]
28. Prior to testing of surface emissions, the operator shall submit a written Surface Emissions Testing Protocol for approval by the APCO. [District Rule 4642]
29. The volumetric flow rate shall be measured using CARB Method 2. [District Rule 4642]
30. The heating value of the process gas shall be determined by using the latest revision of test method ASTM D1826 or ASTM D3588. [District Rule 4642]
31. The destruction efficiency of the flare shall be evaluated per Rule 4642 subsection 6.1.4. [District Rule 4642]
32. Permittee shall maintain records of surface emissions test including: date and time, weather conditions, including precipitation records, areas sampled, calibration records, and test results. [District Rule 4642]
33. Permittee shall record emission control device source test reports showing VOC destruction/treatment efficiency. [District Rule 4642]
34. Permittee shall maintain daily records of landfill gas flow rate to any control device(s). [District Rule 4642]
35. Permittee shall maintain records of maintenance related or other collection system and control device downtime, including individual well shutdown. [District Rule 4642]
36. The District must be notified 30 days prior to any compliance source test, and a source test plan must be submitted for approval 15 days prior to testing. The results of each source test shall be submitted to the District within 60 days after testing. [District Rules 1081 and 4642]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

37. Surface emission testing shall be performed once every six month period per calendar year. Upon completion of two consecutive semi-annual tests without an exceedance of the 1000 ppmv standard, other than non-repeatable, momentary readings, testing may be reduced to once every calendar year. [District Rule 4642]
38. The operator shall record emission control device source tests (emissions of CO, NOx, and VOC) in pounds per MMBtu heat input. Operator shall also record VOC destruction/treatment efficiency. [District Rule 1081]
39. The operator shall maintain a continuous record of the flare combustion temperature. [District Rule 2201]
40. The operator shall maintain a daily record of (1) landfill gas flow rate, (2) heat input (based on the daily landfill gas flow and most recent HHV test), and (3) calculated SOx emissions. [District Rule 2201]
41. The operator shall maintain an annual record the higher heating value (HHV) of the landfill gas being combusted. [District Rule 2201]
42. Records shall be kept for at least five years and made available within 24 hours upon request from the District. [District Rule 1070]
43. Permittee shall terminate surface emission testing when the measured average wind speed is over 10 mph or the instantaneous wind speed is over 20 mph. [17 CCR 95468, 17 CCR 95471]
44. Landfill gas collection system wellheads must be operated under vacuum. Monthly monitoring of wellheads is required. Landfill gas collection system wellheads may be operated under neutral or positive pressure when there is a fire or during other times as allowed in sections 95464(c), 95464(d), and 95464(e) [17 CCR 95464]
45. Landfill gas collection system components downstream of blower have a leak limit of 500 ppmv as methane. Components must be checked quarterly. If compliance with the methane limit has been demonstrated for 4 consecutive quarters, then the component checking frequency shall be annually. If an annual test fails to show compliance, quarterly testing shall resume. [17 CCR 95464]
46. The flare must be source tested annually. If the flare is in compliance after three consecutive source tests, the facility may move to source testing the flare every three years. If subsequent tests show the flare out of compliance, the test frequency shall revert to annual testing. [17 CCR 95464]
47. The flare must have automatic dampers, an automatic shutdown device, a flame arrester, and continuous recording temperature sensors. [17 CCR 95464]
48. The flare must operate within the parameter ranges established during the initial or most recent source test. [17 CCR 95464]
49. Landfill collection and control system shall be operated such that landfill surface methane emissions shall not exceed instantaneous surface emission limit of 500 ppmv as methane or integrated surface emission limit of 25 ppmv as methane. [District Rule 4642, 17 CCR 95464]
50. Instantaneous and integrated landfill surface emissions measurements shall be done quarterly. If there are no exceedances after 4 consecutive quarterly measurements, the facility may measure annually. Any exceedances that can not be remediated within 10 days or any exceedances during compliance inspection will result in a return to quarterly monitoring. [District Rule 4642 and 17 CCR 95469]
51. Permittee shall keep records of all gas collection system downtime exceeding five days, including individual well shutdown and disconnection times and the reason for downtime. [17 CCR 95470]
52. Permittee shall keep records of all gas control system downtime in excess of one hour, the reason for the downtime and the length of time the gas control system was shutdown. [17 CCR 95470]
53. Permittee shall keep records of the expected gas generation flow rate calculated pursuant to section 95471(e). [17 CCR 95470]

PERMIT UNIT REQUIREMENTS CONTINUE ON NEXT PAGE

54. Permittee shall keep records of all instantaneous surface readings of 200 ppmv or greater; all exceedances of the limits in sections 95464(b)(1)(B) or 95465, including the location of the leak (or affected grid), leak concentration in ppmv, date and time of measurement, the action taken to repair the leak, date of repair, any required re-monitoring and the re-monitored concentration in ppmv, and wind speed during surface sampling; and the installation date and location of each well installed as part of a gas collection system expansion. [17 CCR 95470]

55. Permittee shall keep records of any positive wellhead gauge pressure measurements, the date of the measurements, the well identification number, and the corrective action taken. [17 CCR 95470]

56. Permittee shall keep records of the nature, location, amount , and date of deposition of non-degradable waste for any landfill areas excluded from the collection system. [17 CCR 95470]

57. Permittee shall conduct surface emission monitoring using either the procedures specified in section 95471 or the Los Angeles County Sanitation District monitoring procedure. Permittee shall keep records of which procedure was used. [17 CCR 95468]

58. Permittee shall conduct monitoring of the landfill surface within 3 inches of the surface. The facility may monitor surface emissions with the probe tip at the height of the vegetation if there is vegetation and it is impractical to monitor at 3 inches from the landfill surface. [17 CCR 95468]

59. Permittee shall identify areas which are dangerous and unable to be inspected. Areas shall be clearly identified on a map of the facility. A copy of the map shall be kept onsite as well as submitted with the annual report. [17 CCR 95468]

60. Permittee shall only conduct surface emission testing when precipitation has met the following requirements. It has been 24 hours since measured precipitation of 0.01 to 0.15 inches. It has been 48 hours since measured precipitation of 0.16 to 0.24 inches. It has been 72 hours since measured precipitation of 0.25 or more inches. [17 CCR 95468]

61. Permittee shall keep records of any source tests conducted pursuant to section 95464(b)(4). [17 CCR 95470]

62. Permittee shall keep records describing the mitigation measures taken to prevent the release of methane or other emissions into the atmosphere during the following activities: 1. When solid waste was brought to the surface during the installation or preparation of wells, piping, or other equipment; 2. During repairs or the temporary shutdown of gas collection system components; or, 3. When solid waste was excavated and moved. [17 CCR 95470]

63. Permittee shall keep records of any construction activities pursuant to section 95466. The records must contain the following information: 1. A description of the actions being taken, the areas of the MSW landfill that will be affected by these actions, the reason the actions are required, and any landfill gas collection system components that will be affected by these actions. 2. Construction start and finish dates, projected equipment installation dates, and projected shut down times for individual gas collection system components. 3. A description of the mitigation measures taken to minimize methane emissions and other potential air quality impacts. [17 CCR 95470]

64. Permittee shall keep records of the equipment operating parameters specified to be monitored under section 95469(b)(1) as well as records for periods of operation during which the parameter boundaries established during the most recent source test are exceeded. The records must include the following information: 1. For enclosed flares, all 3-hour periods of operation during which the average temperature difference was more than 28 degrees Celsius (or 50 degrees Fahrenheit) below the average combustion temperature during the most recent source test at which compliance with sections 95464(b)(2) was determined and a gas flow rate device which must record the flow to the control device at least every 15 minutes. [17 CCR 95470]

65. Permittee shall submit the following reports as required in section 95470(b): Equipment removal report and Annual report. All reports must be accompanied by a certification of truth, accuracy, and completeness signed by a responsible official. [17 CCR 95470]

66. Permittee may comply with the CARB regulation for landfill methane control measures by using approved alternative compliance options. The permittee shall obtain written District approval for the use of any alternative compliance options not specifically approved by this permit. Changes to the approved alternate compliance options must be made and approved in writing. Documentation of approved alternative compliance options shall be available for inspection upon request. [17 CCR 95468]

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

October 20, 2014

Blue Sky Environmental
Attn: Mr. Guy Worthington
624 San Gabriel Ave
Albany, CA 94706

RE: Approval of Test Protocol
Browning Ferris – Chestnut Landfill
November 12, 2014
Permit to Operate: C-146-1-3

District staff has completed the review of the test protocol submitted for the compliance testing of a 45 MMBtu/hr landfill gas collection and treatment system with a 6 MMBtu/hr John Zink enclosed flare. Staff finds the protocol will meet the District's requirements. Should the test date or test methods change from the approved protocol, then a modified protocol shall be submitted for review no later than seven (7) days prior to the scheduled test date. Submittal of the modified protocol after this date may result in test cancellation by District staff.

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4) Source test is being performed in accordance with the most recent PTO/ATC.
5) All testing must be done during normal District business hours unless otherwise approved.

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Sincerely,

Lupe Jauregui
Supervising Air Quality Inspector

Joe Avila
Air Quality Inspector II

rec'd 10/09/14

Blue Sky Environmental, Inc
624 San Gabriel Avenue
Albany, California 94706
Cell (510) 508-3469
Office (510) 525-1261
blueskyenvironmental@yahoo.com

October 7, 2014

Attn.: John Copp
San Joaquin Valley APCD
1990 E. Gettysburg Ave
Fresno, CA 93726

Re: Source Test Plan (STP) to perform testing as required on the 45 MMBTUH enclosed flare at Chestnut Landfill (Facility C-146-1-1), located at 12825 S. Chestnut, Fresno, CA 93725.

Dear, Mr Copp

Blue Sky Environmental is pleased to present this Source Test Plan for the above referenced sampling project. Testing will include the following:

1) Three 30 minute test runs will be performed at the Flare exhaust for NOx, CO, CO_2 and O_2 using CARB Method 100. NMOC will be measured per run from Tedlar Bag or SUMMA Canisters using Modified EPA Method 18 (TO-12).
2) Integrated Tedlar bag samples of the Landfill Gas (LFG) will be collected during each test run, and will be analyzed for HHV, CO_2, N_2, O_2, NMOC and CH_4, using ASTM 1945/3588 (EPA 25C). Also, the LFG samples will be analyzed for TRS and sulfur species by ASTM D 1072, D 3031, D 4084, D 3246 or D 5504 or SCAQMD 307-91. The samples will be analyzed within 24-72 hours.
3) Fuel flowrate and moisture will be measured by CARB Methods 1 & 2. Moisture will be measured by CARB Method 4 (wet bulb–dry bulb). The exhaust flowrate will be determined by EPA 19 based on fuel analysis and stack oxygen.

Test Parameters	Inlet	Outlet	Limits
O_2, CO_2	ASTM 1945 x 3	CARB 100 x 3	
CO		CARB 100 x 3	CO 0.2 lbs/MMBtu
NO_x		CARB 100 x 3	NOx 0.08 lbs/MMBtu
SO_2	ASTM 5504 x 3	Calculated	SO_2 2.6 lbs/Day
VOC	M25C x3	MM18 x 3	VOC D.E. 98% or 20 ppm as Hexane @ 3% O_2 or 0.014 lbs/MMBtu
High Heating Value	ASTM 1945/3588	N/A	
Flow	M2 x 3	M19 x 3	
Moisture	M4 WBDB x 3	N/A	

4) A report will be submitted to the client within four weeks of test program completion (meeting all APCD/AQMD requirements). The report will include a test description and tables presenting emission concentrations, emission factors and/or rates (lbs/hr) for all compliance parameters. All supporting documentation will be included (strip charts, field data sheets, calibrations, calculations, etc.).

This test program is currently scheduled for November 12th, 2014. The facility contact is Erin Fanning (209) 227 9531 or Don Litchfield who may be reached at 209 684 4733. If you have any questions, please contact Guy Worthington at 510.525.1261 or 510.508.3469.

Sincerely,

Guy Worthington

CC: SJVAPCD Email: sourcetestC@valleyair.org

CONDITIONS FOR PERMIT C-146-1-3

INSPECTION WORKSHEET

EXPIRATION DATE: 04/30/2019

LEGAL OWNER OR OPERATOR: BROWNING FERRIS INDUSTRIES
MAILING ADDRESS: 9999 S AUSTIN RD
MANTECA, CA 95336

LOCATION: 12825 S CHESTNUT
FRESNO, CA 93725

INSPECT PROGRAM PARTICIPANT: NO

EQUIPMENT DESCRIPTION:
6 MMBTU/HR LANDFILL GAS COLLECTION AND TREATMENT SYSTEM WITH JOHN ZINK MODEL ZTOF ENCLOSED FLARE WITH COMBUSTION AIR CONTROLS, PROPANE-FIRED PILOT FLAME, FLAME RESTOR, BLOWERS, CONCRETE CONDENSATE SUMPS, EXHAUST TACK, KNOCKOUT VESSEL AND WELLS

CONDITIONS

1. Flare shall be equipped with a failure alarm to automatically shut off the blower and landfill gas supply. [District Rule 2201]
2. All condensate traps shall remain covered unless treatment of condensate is taking place. [District Rule 2201]
3. A non-resettable, totalizing mass or volumetric landfill gas fuel flow meter to measure the amount of gas combusted in the enclosed flare shall be installed, utilized and maintained. [District Rule 2201]
4. Gas collection system shall be sealed at all times during operation. [District Rule 2201]
5. Flame temperature indicator and recorder shall be operated whenever gas is flared. [District Rule 2201]
6. Flare temperature shall be maintained to at least 1,400 degree F. [District Rule 2201]
7. Emissions from the flare shall not exceed any of the following limits: 0.08 lb-NOx/MMBtu, 2.6 lb-SOx/day, 0.0010 lb-PM10/hr/scfm, 0.20 lb-CO/MMBtu, or 0.014 lb-VOC(NMHC)/MMBtu. [District Rule 2201]
8. The flowrate of collected landfill gas into the flare shall not exceed 144 MMBtu/day. [District Rule 2201]
9. Sampling ports adequate for sulfur testing shall be provided in the landfill gas manifold line to the flare. [District Rule 1081]
10. SOx emissions shall be determined by measuring the sulfur concentration in the landfill gas and calculating the correlated SOx emission rate based on the correlation between landfill gas sulfur concentration and associated SOx emission rate demonstrated during startup. [District Rule 1081]
11. Testing to demonstrate compliance with the daily SOx emission limit shall be conducted quarterly. Once eight (8) consecutive quarterly tests show compliance, the frequency of monitoring sulfur content, and associated SOx emissions, may be reduced to semi-annually. If a semi-annual test shows violation of the SOx emission limit, then quarterly testing shall resume and continue until four (4) consecutive tests show compliance. Once compliance is shown on four (4) consecutive quarterly tests, then testing may return to semi-annually. [District Rule 2201]
12. Sulfur content of the landfill gas being combusted in the flare shall be determined using ASTM D 1072, D 3031, D 4084, D 3246, double GC or colorimetric methods using Draeger tubes for H2S and mercaptans, or an equivalent method approved by the District. [District Rule 1081]
13. Methane destruction efficiency shall be at least 99% by weight. [17 CCR 95464]
14. Flare NMOC emissions shall be conducted using USEPA Test Method 18, 25A, or 25C. [District Rule 1081]
15. Source testing for flare NOx emissions shall be conducted using CARB Method 7, Method 20, or Method 100. [District Rule 1081]
16. Source testing for flare CO emissions shall be conducted using EPA Method 10 or 10B, CARB Methods 1 through 5 with 10, or CARB Method 100. [District Rule 1081]
17. At least once every 12 months, the operator shall determine landfill gas fuel higher heating value (HHV) by ASTM D 1826 or D 1945 in conjunction with ASTM D 3588 for gaseous fuels. [District Rule 2201]

18. The results of each landfill gas sulfur content test shall be submitted to the District within 60 days thereafter. [District Rule 1081]
19. The gas collection system shall be operated such that the concentration of total organic compounds (as CH4) shall not exceed 1000 ppmv at any point along the gas transfer path of the gas collection system. [District Rule 4642]
20. Sampling ports shall be installed on each well head. [District Rule 4642]
21. Gas collection system shall be operated in a manner which maximizes the amount of landfill gas extracted while preventing overdraw that can cause fires or damage the gas collection system. [District Rule 4642]
22. Landfill gas collection system shall be equipped with a control device having VOC destruction efficiency of at least 98% by weight, or reduce the VOC concentration (measured as methane) to 20 ppmv @ 3% O2. [District Rules 2201 and 4642]
23. Excavated solid waste shall be covered using fresh soil, plastic sheeting, or vapor retarding foam as necessary to prevent odorous emissions and to minimize the release of landfill gas. [District Rule 4642]
24. Maintenance is defined as any work performed on the gas collection system and/or control device in order to ensure continued compliance with District rules, regulations, and/or Permits to Operate, and to prevent its failure or malfunction. [District Rule 4642]
25. The permittee shall notify the APCO by telephone at least 24 hours before performing any maintenance work that requires the system to be shutdown. The notification shall include a description of work, the date work will be performed and the amount of time needed to complete the maintenance work. [District Rule 4642]
26. During maintenance of the gas collection system or incineration device, emissions of landfill gas shall be minimized during shutdown. [District Rule 4642]
27. The landfill gas vapor collection system and/or control device shall not be shut down for more than 144 cumulative hours in any calendar year. [District Rule 4642]
28. Prior to testing of surface emissions, the operator shall submit a written Surface Emissions Testing Protocol for approval by the APCO. [District Rule 4642]
29. The volumetric flow rate shall be measured using CARB Method 2. [District Rule 4642]
30. The heating value of the process gas shall be determined by using the latest revision of test method ASTM D1826 or ASTM D3588. [District Rule 4642]
31. The destruction efficiency of the flare shall be evaluated per Rule 4642 subsection 6.1.4. [District Rule 4642]
32. Permittee shall maintain records of surface emissions test including: date and time, weather conditions, including precipitation records, areas sampled, calibration records, and test results. [District Rule 4642]
33. Permittee shall record emission control device source test reports showing VOC destruction/treatment efficiency. [District Rule 4642]
34. Permittee shall maintain daily records of landfill gas flow rate to any control device(s). [District Rule 4642]
35. Permittee shall maintain records of maintenance related or other collection system and control device downtime, including individual well shutdown. [District Rule 4642]
36. The District must be notified 30 days prior to any compliance source test, and a source test plan must be submitted for approval 15 days prior to testing. The results of each source test shall be submitted to the District within 60 days after testing. [District Rules 1081 and 4642]
37. Surface emission testing shall be performed once every six month period per calendar year. Upon completion of two consecutive semi-annual tests without an exceedance of the 1000 ppmv standard, other than non-repeatable, momentary readings, testing may be reduced to once every calendar year. [District Rule 4642]
38. The operator shall record emission control device source tests (emissions of CO, NOx, and VOC) in pounds per MMBtu heat input. Operator shall also record VOC destruction/treatment efficiency. [District Rule 1081]
39. The operator shall maintain a continuous record of the flare combustion temperature. [District Rule 2201]

40. The operator shall maintain a daily record of (1) landfill gas flow rate, (2) heat input (based on the daily landfill gas flow and most recent HHV test), and (3) calculated SOx emissions. [District Rule 2201]
41. The operator shall maintain an annual record the higher heating value (HHV) of the landfill gas being combusted. [District Rule 2201]
42. Records shall be kept for at least five years and made available within 24 hours upon request from the District. [District Rule 1070]
43. Permittee shall terminate surface emission testing when the measured average wind speed is over 10 mph or the instantaneous wind speed is over 20 mph. [17 CCR 95468, 17 CCR 95471]
44. Landfill gas collection system wellheads must be operated under vacuum. Monthly monitoring of wellheads is required. Landfill gas collection system wellheads may be operated under neutral or positive pressure when there is a fire or during other times as allowed in sections 95464(c), 95464(d), and 95464(e) [17 CCR 95464]
45. Landfill gas collection system components downstream of blower have a leak limit of 500 ppmv as methane. Components must be checked quarterly. If compliance with the methane limit has been demonstrated for 4 consecutive quarters, then the component checking frequency shall be annually. If an annual test fails to show compliance, quarterly testing shall resume. [17 CCR 95464]
46. The flare must be source tested annually. If the flare is in compliance after three consecutive source tests, the facility may move to source testing the flare every three years. If subsequent tests show the flare out of compliance, the test frequency shall revert to annual testing. [17 CCR 95464]
47. The flare must have automatic dampers, an automatic shutdown device, a flame arrester, and continuous recording temperature sensors. [17 CCR 95464]
48. The flare must operate within the parameter ranges established during the initial or most recent source test. [17 CCR 95464]
49. Landfill collection and control system shall be operated such that landfill surface methane emissions shall not exceed instantaneous surface emission limit of 500 ppmv as methane or integrated surface emission limit of 25 ppmv as methane. [District Rule 4642, 17 CCR 95464]
50. Instantaneous and integrated landfill surface emissions measurements shall be done quarterly. If there are no exceedances after 4 consecutive quarterly measurements, the facility may measure annually. Any exceedances that can not be remediated within 10 days or any exceedances during compliance inspection will result in a return to quarterly monitoring. [District Rule 4642 and 17 CCR 95469]
51. Permittee shall keep records of all gas collection system downtime exceeding five days, including individual well shutdown and disconnection times and the reason for downtime. [17 CCR 95470]
52. Permittee shall keep records of all gas control system downtime in excess of one hour, the reason for the downtime and the length of time the gas control system was shutdown. [17 CCR 95470]
53. Permittee shall keep records of the expected gas generation flow rate calculated pursuant to section 95471(e). [17 CCR 95470]
54. Permittee shall keep records of all instantaneous surface readings of 200 ppmv or greater; all exceedances of the limits in sections 95464(b)(1)(B) or 95465, including the location of the leak (or affected grid), leak concentration in ppmv, date and time of measurement, the action taken to repair the leak, date of repair, any required re-monitoring and the re-monitored concentration in ppmv, and wind speed during surface sampling; and the installation date and location of each well installed as part of a gas collection system expansion. [17 CCR 95470]
55. Permittee shall keep records of any positive wellhead gauge pressure measurements, the date of the measurements, the well identification number, and the corrective action taken. [17 CCR 95470]
56. Permittee shall keep records of the nature, location, amount , and date of deposition of non-degradable waste for any landfill areas excluded from the collection system. [17 CCR 95470]
57. Permittee shall conduct surface emission monitoring using either the procedures specified in section 95471 or the Los Angeles County Sanitation District monitoring procedure. Permittee shall keep records of which procedure was used. [17 CCR 95468]

58. Permittee shall conduct monitoring of the landfill surface within 3 inches of the surface. The facility may monitor surface emissions with the probe tip at the height of the vegetation if there is vegetation and it is impractical to monitor at 3 inches from the landfill surface. [17 CCR 95468]

59. Permittee shall identify areas which are dangerous and unable to be inspected. Areas shall be clearly identified on a map of the facility. A copy of the map shall be kept onsite as well as submitted with the annual report. [17 CCR 95468]

60. Permittee shall only conduct surface emission testing when precipitation has met the following requirements. It has been 24 hours since measured precipitation of 0.01 to 0.15 inches. It has been 48 hours since measured precipitation of 0.16 to 0.24 inches. It has been 72 hours since measured precipitation of 0.25 or more inches. [17 CCR 95468]

61. Permittee shall keep records of any source tests conducted pursuant to section 95464(b)(4). [17 CCR 95470]

62. Permittee shall keep records describing the mitigation measures taken to prevent the release of methane or other emissions into the atmosphere during the following activities: 1. When solid waste was brought to the surface during the installation or preparation of wells, piping, or other equipment; 2. During repairs or the temporary shutdown of gas collection system components; or, 3. When solid waste was excavated and moved. [17 CCR 95470]

63. Permittee shall keep records of any construction activities pursuant to section 95466. The records must contain the following information: 1. A description of the actions being taken, the areas of the MSW landfill that will be affected by these actions, the reason the actions are required, and any landfill gas collection system components that will be affected by these actions. 2. Construction start and finish dates, projected equipment installation dates, and projected shut down times for individual gas collection system components. 3. A description of the mitigation measures taken to minimize methane emissions and other potential air quality impacts. [17 CCR 95470]

64. Permittee shall keep records of the equipment operating parameters specified to be monitored under section 95469(b)(1) as well as records for periods of operation during which the parameter boundaries established during the most recent source test are exceeded. The records must include the following information: 1. For enclosed flares, all 3-hour periods of operation during which the average temperature difference was more than 28 degrees Celsius (or 50 degrees Fahrenheit) below the average combustion temperature during the most recent source test at which compliance with sections 95464(b)(2) was determined and a gas flow rate device which must record the flow to the control device at least every 15 minutes. [17 CCR 95470]

65. Permittee shall submit the following reports as required in section 95470(b): Equipment removal report and Annual report. All reports must be accompanied by a certification of truth, accuracy, and completeness signed by a responsible official. [17 CCR 95470]

66. Permittee may comply with the CARB regulation for landfill methane control measures by using approved alternative compliance options. The permittee shall obtain written District approval for the use of any alternative compliance options not specifically approved by this permit. Changes to the approved alternate compliance options must be made and approved in writing. Documentation of approved alternative compliance options shall be available for inspection upon request. [17 CCR 95468]

SAN JOAQUIN VALLEY UNIFIED
AIR POLLUTION CONTROL DISTRICT

MEMORANDUM

DATE: March 11, 2015
TO: Source Test File
FROM: John Copp

SUBJECT: Review of Source Test for Browning Ferris Industries - Chestnut Avenue Landfill
November 12, 2014
PTO #C-146-1-3

Blue Sky Environmental, LLC (Blue Sky) was retained by Browning Ferris Industries to conduct a compliance emission test of a 6 MMBtu/hr John Zink enclosed gas flare serving the Chestnut Avenue landfill gas collection and control system. The flare unit was fired on landfill gas under a normal operating load of 3.1 MMBtu/hr. The source test measured outlet NOx, CO, and O2 and both inlet and outlet TNMHC and CH_4. Fuel samples were taken for CHONS and fuel gas sulfur analyses and determination of fuel HHV and F-factors.

District compliance staff found notification, reporting, and source test protocols employed during this test to be satisfactory.

The data and calculations included in the report submittal were evaluated to ensure accuracy. After calculation and emission limit errors were identified, a revised report was received on February 2, 2015.

A review of the report submitted by Blue Sky on behalf of Browning Ferris Industries indicated that the flare unit was successful in meeting the emission limits specified in the permit.

PTO C-146-1-3 6 MMBtu/hr John Zink enclosed landfill gas flare

Outlet NOx	7.4 ppmv	0.061 lb/hr	**0.020** lb/MMBtu (limit 0.08)
Outlet CO	0.8 ppmv	0.004 lb/hr	**0.001** lb/MMBtu (limit 0.20)
Outlet Methane	0.8 ppmv	0.002 lb/hr	
Outlet TNMHC[1]	**13.5** ppmv @ 3% O2 (limit 20)	0.021 lb/hr	**0.007** lb/MMBtu (limit 0.014)
SO2[2]	1.0 ppmv	**0.28** lb/day (limit 2.6)	0.004 lb/MMBtu
Outlet O_2	11.4%		
Outlet CO_2	8.04%		
Outlet Flow	1133 dscfm		
Flare Temperature	**1604** F (minimum of 1400 F)		
Inlet Methane	306,300	127 lb/hr	
Inlet TNMHC[3]	1923 ppmv	0.80 lb/hr	
Inlet Flow	164 dscfm		

TNMHC %DE[4] by weight **97.4%** (limit 98.0 or TNMHC <20 ppm @ 3% O2, as methane)
Methane % DE[5] by weight **100.0%** (limit 99)

[1] As methane, CH_4.
[2] Calculated from sulfur in fuel samples
[3] As methane, CH_4
[4] DE % = ((Inlet lb/hr – Outlet lb/hr)/Inlet lb/hr)*100

Fuel Analysis

Run 1 Sample - Fuel Inlet

- HHV – 303.5 Btu/cf @ 60 F (4028 Btu/lb)
- F-Factor – 10,155 dscf/MMBtuhr @ 60 F

Run 2 Sample - Fuel Inlet

- HHV – 312.6 Btu/cf @ 60 F (4158 BTU/lb)
- F-Factor – 10,139 dscf/MMBtu @ 60 F

Run 3 Sample - Fuel Inlet

- HHV – 316.7 Btu/cf @ 60 F (4210 Btu/lb)
- F-Factor – 10,120 dscf/MMBtu @ 60 F

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

March 11, 2015

Republic Services, Inc.
Attn: Don Litchfield
3260 Blume Dr., Ste. 200
San Pablo, CA 94806

Re: **DETERMINATION OF COMPLIANCE EMISSION TESTING**

Dear Mr. Litchfield,

District staff has received the test report for the permitted equipment listed below, submitted for compliance determination with permitted emission limits. Review of the test result(s) reveal the equipment to be operating in compliance with permitted NOx, CO, VOC, and SO2 emission limits and with VOC and CH4 destruction efficiency specifications.

If the permitted equipment has annual source testing requirements, then the next annual test must be conducted within thirty days (+/- 30) of the next test date as shown below. If an ATC has been issued for modifications to the permitted equipment, then the testing requirements must follow the ATC.

Permit Number	Unit	Test Date	Next Test Date
C-146-1-3	Enclosed Landfill Gas Flare – Chestnut Avenue	11/12/14	11/02/17

If you have any questions please call this office at (559) 230-6000.

Sincerely,

Lupe Jauregui
Supervising Air Quality Inspector

John Copp
Air Quality Inspector II