Summary of Test Results
Municipality of Anchorage, Solid Waste Services
Anchorage Landfill Gas Collection and Control System
NMOC Destruction Efficiency Testing

(Inlet/Outlet NMOCs, TO-14 VOCs, O_2, CO_2, CH_4,N_2, and Inlet Total Reduced Sulfur Compounds)

January 19, 2007

Prepared for:

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On Behalf of:

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Prepared by:

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March 8, 2007

[illegible]

Report Certification

As Principal Project Engineer and project manager, I certify that the testing was performed in accordance with approved methods and the data, calculations and results described in this report are true and accurate.

William M. Hudson

SAiW2 for Wm Hudson
Signature

March 8, 2007
Date

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1. Introduction

The Municipality of Anchorage – Solid Waste Services (MOA-SWS) owns and operates the Anchorage Regional Landfill. The landfill is located at 15500 East Eagle River Loop Road, Eagle River, Alaska.

In accordance with operating permit 624TVP01, Revision 1, the MOA-SWS recently installed a flare as a collection and control system to capture the gas generated within the landfill as required by Condition 5.2. BC Excavating, Inc., the MOA-SWS contractor for the project, engaged Alaska Source Testing, LLC (AST) to conduct a source test on the flare. The scope of this testing, measured in accordance with Title 40 of the Code of Federal Regulations Part 60, (§ 60.1 to End), Revised as of July 1, 2006 (*40 CFR 60)* Appendix A, included:

- Inlet and outlet flow and moisture measurements, Methods 2, 2D & 4
- inlet and outlet non-methane hydrocarbons (NMOC), Method 25C
- inlet and outlet testing for toxics, EPA Method TO-14
- inlet and outlet testing for oxygen (O_2), methane (CH_4), carbon dioxide (CO_2), and nitrogen (N_2)
- inlet testing for total reduced sulfur compounds, SCAQMD Method 307.91 (this method is compliant with EPA Method 15/16)
- inlet BTU testing

Testing took place on January 19, 2007. Bill Hudson was the AST on site project manager. Mr. Hudson collected the source testing data. MOA operators provided the operational data. Robert Morgan from the Alaska Department of Environmental Conservation (ADEC) witnessed the test.

The overall regulatory objective of the testing was to determine the NMOC destruction efficiency of the unit. Three sample runs were performed; for each run, samples were simultaneously collected at the flare inlet and outlet. Other non-regulatory tests were conducted at the same time for informational purposes.

This report summarizes the results of the test data, based on dry volumetric concentrations. Volumetric emission calculations for NMOCs were performed in accordance with 40 CFR 60, Subpart WWW.

Detailed test information and documentation is provided in the appendices of this report.

2. SUMMARY OF RESULTS

A summary of the test results is presented in Tables 2-1 to 2-3. Permit Condition 5.3b requires that the control system must "either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen."

Table 2-1 Summary of NMOC Emissions

	Run 1	Run 2	Run 3	Average
TGNMO*, ppmv, inlet	3177.4	3084.1	3074.4	3112.0
TGNMO*, ppmv, outlet	2.18	2.82	4.60	3.2
TGNMO*, lb/hr, inlet	5.56	5.40	5.37	5.44
TGNMO*, lb/hr, outlet	0.07	0.08	0.13	0.09
TGNMO*, lb/MMBtu, inlet	0.27	0.26	0.27	0.27

*total gaseous non-methane organics and ethane measured; reported as methane

The control efficiency (Equation 4) based on the three run average is 98.35% [(5.44 – 0.09) / (5.44)].

Table 2-2 Summary of $NMOC_{outlet}$ Emissions
Expressed as Hexane

	Run 1	Run 2	Run 3	Average
NMOC, dppmv[1]	2.18	2.82	4.60	3.2
NMOC[2], dppmv[2] 3% O_2	4.70	6.08	9.92	6.9
NMOC[3]	0.78	1.01	1.65	1.15

[1]dry parts per million volumetric, expressed as methane
[2]expressed as methane, corrected to 3% O_2
[3]expressed as hexane, @ 3% O_2

The average outlet NMOC concentration corrected to 3 percent oxygen and expressed as hexane is 1.15 dppmv.

Table 2-3 Summary of Permanent Gases and Total Gaseous Non-Methane Organics (TGNMO)

	Run 1	Run 2	Run 3	Average
$\%O_2$, inlet	0.90	1.69	1.86	1.48
$\%O_2$, outlet	12.6	12.6	12.6	12.6
$\%CO_2$, inlet	39.6	37.9	37.9	38.5
$\%CO_2$, outlet	6.94	6.96	7.17	7.02
$\%N_2$, inlet	9.48	12.5	12.9	11.6
$\%N_2$, outlet	76.7	76.9	77.3	77.0
N_2, dvppm, inlet	94,800	12,500	12,900	11,600
N_2, dvppm, outlet	767,000	769,000	773,000	770,000
$\%CH_4$, inlet	48.8	47.6	47.0	47.8
$\%$ CH_4, outlet	0.00	0.00	0.00	0.00
CH_4, dvppm, inlet	488,000	476,000	470,000	478,000
CH_4, dvppm, outlet	<1	1.07	1.35	<1.14
Inlet reduced sulfur, ppmv	14.8	15.4	15.0	15.1
Btu content, ft^3, inlet	495	483	477	485

The detailed USEPA Method TO-14 analysis for toxics is found in Appendix C. The test results for sulfur compounds and toxics are non-regulatory and completed for informational purposes only.

The ADEC requested SUMMA blank resulted in 76.9% N_2, 20.4% O_2, 1.77 ppmv methane, <1 ppmv ethane/TGNMO, and 562 ppmv carbon dioxide.

3. DESCRIPTION OF THE SOURCE

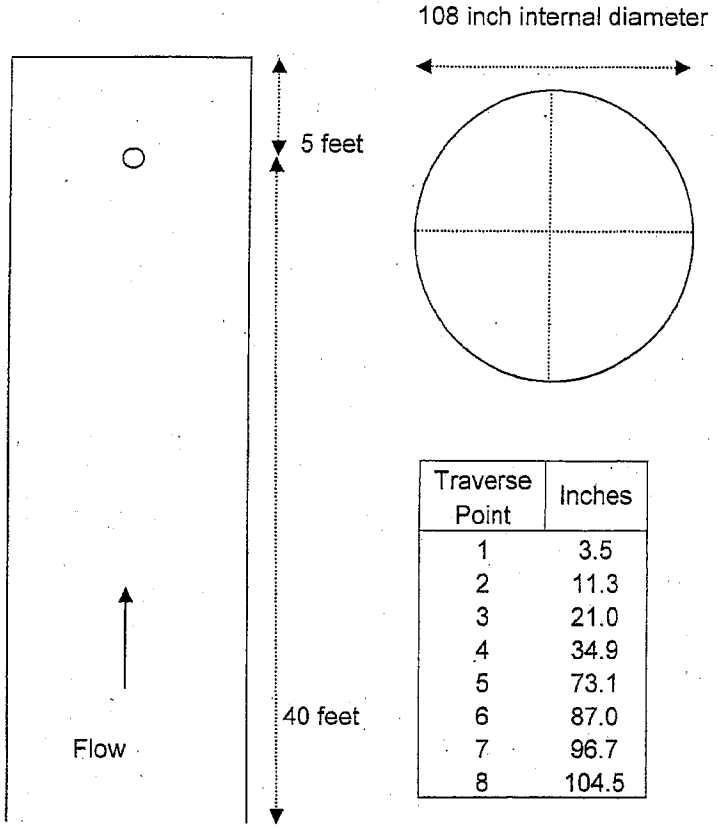
The landfill gas flare system with blower skid is manufactured by Parnel Biogas Inc. The flare system will process landfill gases at a rate of 200 – 2000 scfm. The optimal operating temperature is 1625°F; the low/high temperature alarm/shutdown is currently set at 1400/ 2000°F.

4. DESCRIPTION OF THE SAMPLE LOCATIONS

The stack assembly is 9 feet in diameter and 45 feet high. The stack is equipped with four, four-inch sample ports. The ports are located five feet upstream of the stack exit and more than two stack diameters downstream of the flare.

The sample ports meet USEPA Method 1 siting criteria. A schematic of the port locations and traverse points follows.

Figure 4-1 Stack Schematic and Traverse Points



Traverse Point	Inches
1	3.5
2	11.3
3	21.0
4	34.9
5	73.1
6	87.0
7	96.7
8	104.5

Not to Scale

5. DESCRIPTION OF SOURCE OPERATIONS AND TEST CONDITIONS

Table 5 – 1 Summary of Process Data

Run	Waste Gas Flow SCFM		Flare Temperature °F	
	SCFM	SCF	Min	Max
1, 69 min	704	48570	1398	1399
2, 73 min	705	51467	1398	1400
3, 61 min	703	42870	1397	1399

Based on the testing, the average temperature during the test was 1399 °F. With these test results, the source test temperature establishes a new minimum temperature for flare operation under 40 CFR 60, Subpart WWW. As defined by the

regulations, the new minimum temperature based on a 3-hour block average is 1349 °F, 50°F below the average source test temperature during the most recent successful compliance test for NMOC destruction efficiency.

Detailed operational is provided in Appendix D.

6. DESCRIPTION OF TEST PROCEDURES

6.1 Test Methods

The emission-testing program was performed in accordance with USEPA Reference Methods as prescribed in 40 *CFR* 60, Appendix A. The specific methods are listed below.

- Method 1 — Sample and Velocity Traverses for Stationary Sources
- Method 2 — Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot tube)
- Method 2D — Measurement of Gas Volume Flow Rates in Small Pipes and Ducts
- Method 3A — Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- Method 4 — Determination of Moisture Content in Stack Gases
- Method 25C — Determination of Non-Methane Organic Compounds (NMOC) in Landfill Gases

6.2 Description of Test Procedures

Prior to the source test, SUMMA canisters (6 liter capacity) and flow control units for sample collection were obtained from AtmAA, Inc. laboratory. The SUMMA canisters were evacuated and leak checked by the laboratory. The canisters arrived at 26 inches mercury vacuum. AtmAA also supplied Tedlar bags for sulfur compound testing from the inlet gas site.

Mr. Hudson performed a cyclonic flow check in the exhaust stack; no cyclonic flow was detected. The data sheet is found in Appendix B, Field Data.

Internal stack sampling points were determined in accordance with Method 1. An 8-point O_2 traverse was performed. No stratification was detected and the probe was positioned in the center of the stack.

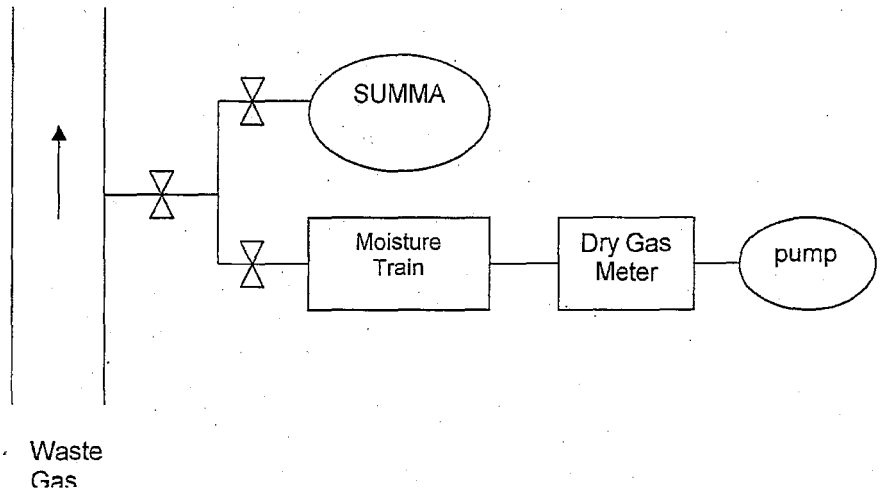
The inlet flow rate of the waste gas was measured continuously throughout the test using the installed facility flow meter. The SUMMA canisters came equipped with a critical orifice to regulate sample flow. The canisters were filled until approximately 8" of Hg vacuum. This took a little over an hour for each canister. Outlet velocity in the stack was measured during the time period the canisters were filling. Due to a possible concern that there was not enough inlet gas pressure to perform the inlet

moisture, analysis at the same time as the canister was filled, the Run 1 inlet moisture was performed immediately after the canister was filled. During Run 1, it was determined that there was adequate gas pressure to perform the sample collection of moisture analysis simultaneously. For Runs 2 and 3, the moisture analysis was performed simultaneously.

Inlet Sampling

The inlet gas sample was obtained from a sample tap immediately downstream of the compressor. The sample pressure was +1.5" of water. A tee was installed to split the sample between the SUMMA canister and the moisture train. Prior to hooking up the SUMMA canister, the short sample line was vented for one minute. A small vacuum pump was used to get adequate volume for the moisture runs.

Figure 6-2a Inlet Sample Train



Outlet Sampling

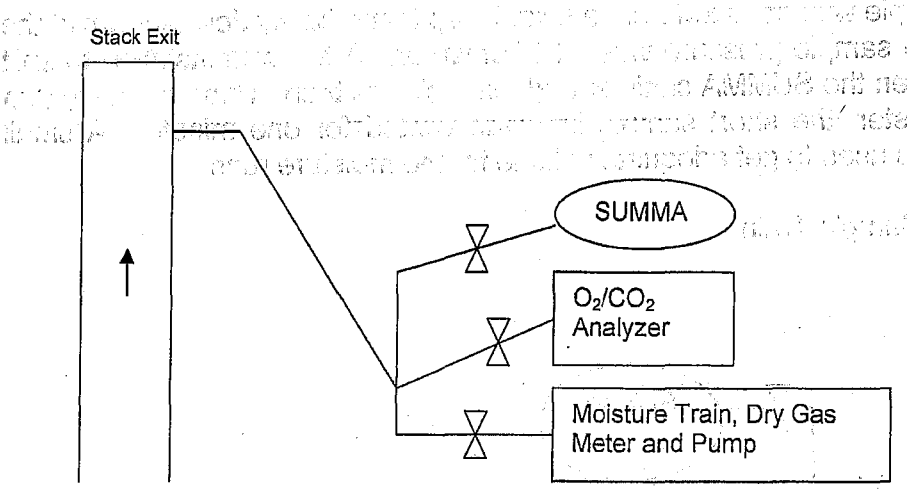
Sample was extracted through a stainless steel probe connected to a heated sample line. The heated sample line was Teflon and the temperature was maintained at 250°F. A sample pump withdrew sample gas at a total rate of 10 standard cubic feet per hour (scfh) providing continuous flow for the SUMMA canister to sample from. Additionally, a sample for moisture determination was also drawn through the line providing an additional 30 – 50 scfh or volume through the sample line. The entire system was leak checked periodically.

O_2 and CO_2 were measured continuously to calculate the molecular weight of the outlet gas. Velocity in the stack was measured during the sample run using an "S"-

type Pitot tube connected to a calibrated magnahelix gauge. Temperatures were measured using a type "k" thermocouple and handheld omega reader.

The SUMMA canisters were prepared for shipment to AtmAA.

Figure 6-2b Outlet Sample Train



Six SUMMA samples were taken, three from the inlet and three from the outlet. At the request of ADEC, one field blank was collected in a SUMMA canister to evaluate potential residual contamination and sample bias from the heated sample lines. Three Tedlar bags were filled at the inlet location for sulfur compound analysis.

AtmAA, Inc. performed all analysis of the SUMMA and Tedlar bags. SUMMA canisters were pressurized to approximately 1060 mm Hg (567 in. H_2O) absolute pressure with helium; the final pressure was recorded. The AtmAA detailed laboratory report is found in Appendix C.

6.3 List of Field Testing Equipment

Method 2 – 4 equipment and associated hardware are listed below.

- Test Console with sample flow control, dry gas test meter, temperature controllers for probe and sample box heater, thermocouple readouts and dual incline manometers for delta H and delta P.
- Leak free vacuum pump
- Ice bath impinger tray with sample-out thermocouple sensor
- Umbilical with Pitot lines, thermocouple wire, and control wiring
- Method 4 Glassware Set
- Analytical balance capable of determinations to 0.1 mg

All of the Method 4 equipment specified above was provided and/or manufactured by the Environmental Supply Company of Durham, North Carolina.

Method 3A equipment is described below. O_2/CO_2 analysis for the combustion gas sample will be performed using a California Analytical Model 200 Analyzer. The instrument specifications are listed below.

Oxygen Analyzer Components	Carbon Dioxide Components
Principle of Operation: Paramagnetic	Principle of Operation: NDIR
Span: 0-5%, 0-10%, 0-25%	Span: 0-10%, 0-20%
Linearity: Better than ± 1 % full scale	Linearity: Better than ± 1 % full scale
Zero/Span Drift: Less than ± 1 % full scale in 24 hours	Zero/Span Drift: Less than ± 1 % full scale in 24 hours

The sample conditioning system that will be used is an Alfa Laval MAK 6-2.

AtmAA, Inc. provided SUMMA canisters with flow control units and Tedlar bags for sample collection.

7. CALCULATIONS

- All calculations were checked by a second party. Hand calculations have been performed to verify the spreadsheet calculations. Please refer to Appendix A for a printout of the spreadsheet and for the hand calculations.

8. QUALITY ASSURANCE

To ensure the collection of high quality and accurate data AST strictly adhered to all the U.S. EPA Reference Methods and the *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III* used during this testing program. In all other aspects of the testing, AST followed its own corporate Quality Program Manual QPM-1, 10/31/97.

Documentation for all quality control/quality assurance activities for the sample collection is presented in Appendix F. Quality assurance data for the gravimetric analyses of the field and laboratory blanks are presented with the laboratory data in Appendix D.

Appendix A

Emission Results With Example Calculation

			outlet		
Run Number			1	2	3
DGM Volume	V_m	cubic feet	25.620	47.572	49.674
DGM Y Factor	Y	-	0.985	0.985	0.985
DGM Average Temperature	T_m	Degrees R	516	524	530
Barometric Pressure	P_{bar}	Inches Hg	29.50	29.50	29.50
Delta H	ΔH	Inches Water	2	2	2
Sample Volume at Standard Conditions	V_{mstd}	Standard	25.577	46.767	48.280
Total Volume of Water collected	V_{lc}	Milliliters	41.5	72.5	73.0
Standard Volume of Water	V_{wstd}	Standard Cubic	1.953	3.412	3.435
Stack Gas Moisture Content	B_{ws}	-	0.0709	0.0680	0.0664
Pitot Tube Coefficient	C_p	-	0.84	0.84	0.84
Average Pitot differential pressure	ΔP	Inches Water	0.013	0.012	0.012
Square Root of Differential Pressure		-	0.114	0.110	0.110
Average Stack Gas Temperature	$T_{s(ave)}$	Degrees R	1848	1849	1849
Measured Stack Pressure	P_g	Inches Water	-0.1	-0.1	-0.11
Absolute Stack Pressure	P_s	Inches Hg	29.5	29.5	29.5
Stack $\%O_2$		%	12.6	12.6	12.6
Stack $\%CO_2$		%	6.94	6.96	7.17
Stack $\%N_2$ + %CO		%	80.5	80.4	80.2
Stack Gas Dry Molecular Weight	M_d		29.6	29.6	29.7
Stack Gas Wet Molecular Weight	M_s	lb/lb mole	28.79	28.83	28.88
Actual Average Velocity	V_s	ft/sec	12.08	11.60	11.59
Stack Diameter		ft	9.00	9.00	9.00
Stack Area	A	sq ft	63.62	63.62	63.62
Standard Stack Gas Volumetric Flow	Q_{sd}	Standard Dry Cubic Feet/min	12109.6	11660.8	11670.2
TGNMO		ppmv	2.2	2.8	4.6
NMOC - outlet, as methane @ 3% O2		dppmv	4.7014	6.0817	9.9205
NMOC - outlet, as hexane @ 3% O2		dppmv	0.7836	1.0136	1.6534

NMOC Example Calculations (run 1):

TGNMO to NMOC as methane @ 3% O2 (2.2 ppm)*(17.9/(20.9-12.6) = 4.74

NMOC, as hexane @ 3% O2 4.74/6 = 0.79

			outlet		
Run Number			1	2	3
DGM Volume	V_m	cubic feet	25.620	47.572	49.674
DGM Y Factor	Y	-	0.985	0.985	0.985
DGM Average Temperature	T_m	Degrees R	516	524	530
Barometric Pressure	P_{bar}	Inches Hg	29.50	29.50	29.50
Delta H	ΔH	Inches Water	2	2	2
Sample Volume at Standard Conditions	V_{mstd}	Standard	25.577	46.767	48.280
Total Volume of Water collected	V_{lc}	Milliliters	41.5	72.5	73.0
Standard Volume of Water	V_{wstd}	Standard Cubic	1.953	3.412	3.435
Stack Gas Moisture Content	B_{ws}	-	0.0709	0.0680	0.0664
Pitot Tube Coefficient	C_p	-	0.84	0.84	0.84
Average Pitot differential pressure	ΔP	Inches Water	0.013	0.012	0.012
Square Root of Differential Pressure		-	0.114	0.110	0.110
Average Stack Gas Temperature	$T_{s(ave)}$	Degrees R	1848	1849	1849
Measured Stack Pressure	P_g	Inches Water	-0.1	-0.1	-0.11
Absolute Stack Pressure	P_s	Inches Hg	29.5	29.5	29.5
Stack $\%O_2$		%	12.6	12.6	12.6
Stack $\%CO_2$		%	6.94	6.96	7.17
Stack $\%N_2$ + %CO		%	80.5	80.4	80.2
Stack Gas Dry Molecular Weight	M_d		29.6	29.6	29.7
Stack Gas Wet Molecular Weight	M_s	lb/lb mole	28.79	28.83	28.88
Actual Average Velocity	V_s	ft/sec	12.08	11.60	11.59
Stack Diameter		ft	9.00	9.00	9.00
Stack Area	A	sq ft	63.62	63.62	63.62
Standard Stack Gas Volumetric Flow	Q_{sd}	Standard Dry Cubic Feet/min	12109.6	11660.8	11670.2
TGNMO		ppmv	2.2	2.8	4.6
NMOC - outlet, as methane		lb/hr	0.066	0.082	0.133

			inlet		
Waste Gas Flow Rate		Standard Dry Cubic Feet/min	704	705	703
TGNMO and Ethane		ppmv	3177.4	3084.1	3074.4
NMOC - outlet, as methane		lb/hr	5.559	5.403	5.371
Inlet Btu Content		BTU/scf	495	483	477
Inlet Firing Rate		MMBtu/hr	20.91	20.43	20.12
NMOC - outlet, as methane		lb/MMBtu	0.266	0.264	0.267

MOA Regional Landfill
Method 1 – 4 Example Calculations
Outlet Run 1

Dry Gas Meter (DGM) Volume V_m :	25.620 cubic feet
DGM Y Factor:	0.985
DGM Average Temperature T_m :	516° R
Barometric Pressure P_{bar} :	29.50" Hg
Average Delta H dH:	2" H_2O

Sample Volume at Standard Conditions V_{mstd} (USEPA Method 5 Eq. 5-1)

$V_{mstd} = K_1 V_m Y ((P_{bar} + dH/13.6)/T_m)$

$K_1 = 17.64$ °R/ in. Hg

$V_{mstd} = 17.64$ °R/ in. Hg *25.620 ft^3 *0.985((29.5 in Hg + 2" H_2O/13.6)/ 516° R)

$V_{mstd} = 25.5768$ Standard Cubic Feet

Moisture Content (USEPA Method 5)

Total Water Collected in Sample Train: 41.5 ml

$V_{wstd} = K_2 V_{lc}$ (Eq. 5-2)

Where: V_{wstd} = Volume of water vapor in the gas sample in standard cubic feet
K_2 = 0.04707 ft^3/ml
V_{lc} = total volume of liquid collect in ml at standard conditions

$V_{wstd} = 0.04707$ (41.5 ml) = 1.953 sft^3

$B_{ws} = V_{wstd}/(V_{mstd} + V_{wstd})$ (Eq. 5-3)

Where: B_{ws} = Moisture content of the sample gas expressed as a fraction
$B_{ws} = 1.953/(25.5768 + 1.953) = 0.0709$

Average MW (Molecular weight of stack gas (dry basis) M_d

$\%N_2 + \%CO = 80.46\%$ (Method 3, 12.2 (100-$\%O_2$ - $\%CO_2$))

Average MW (M_d) = $0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2 + \%CO)$ (Method 3, Eq. 3-1)

Average MW (M_d) = *0.44(6.94) + 0.32(12.6) + 0.28(80.46)* = 29.614 lb/lb mole

Average MW (wet basis) M_s

$M_s = M_d(1 - B_{ws}) + 18(B_{ws})$ (Method 2, Eq. 2-6)

$M_s = 29.614(1 - 0.0709) + 18(0.0709) = 28.79$ lb/lb mole

Velocity Calculation (40 CFR 60 App. A Method 2)

Average Pitot differential pressure (Δp): 0.013" H_2O
Average stack temperature (T_s): 1848°R
Measured Stack Static Pressure: -0.1" H_2O

$V_s = K_p * C_p * \sqrt{(\Delta p)_{av}} * \sqrt{(T_{s(av)}/P_s M_s)}$ (Eq. 2.9)

Where:

V_s = Velocity in Standard Feet per Sec (fps)
K_p = 85.49 ft/s[(lb/lb mole)(in. Hg)/(°R)(in. H_2O)]$^{1/2}$
C_p = Pitot tube coefficient = 0.84 (dimensionless)
Δp = Measured velocity head in inches of H_2O
T_s = Average Stack temperature in °R
P_s = Absolute Stack Pressure in inches of Hg
M_s = Molecular weight of the Stack gas (wet)

P_s = Ambient Pressure + Stack Pressure

1 inch H_2O = 0.0736 inches Hg

P_s = 29.50" Hg + (-0.1"H_2O)(.0736)in.Hg/in. H_2O = 29.49" Hg

$V_s = 85.49(.84)(\sqrt{0.013}) * \sqrt{(1848/(29.49*28.79))}$ = 12.0798 fps

Volumetric Calculation (Method 2)

Stack Diameter: 9.0 feet
Stack Area: 63.62 ft^2

$Q_{sd} = 60\ (1-B_{ws})V_s A(T_{STD}/T_{s\ av})(P_s/P_{STD})$ (Eq. 2-10)

Where:

Q_{sd} = Dry volumetric stack gas flow rate corrected to standard conditions (dscf/min)
B_{ws} = Volume of water vapor in stack gas (%/100)
V_s = Average velocity (ft/sec)
A = Stack cross sectional area (ft^2)
T_{STD} = 530° R
P_{STD} = 29.92 in Hg

Q_{sd} = 60(1- 0.0709)(12.0798)(63.62)(530/1848)(29.49/29.92) = **12110.3 dscf/min**

Please Note: Small differences result from rounding.

Run 1, Inlet ppmv to lb/hr

NMOC = (60 min/hr)(Q_{sd})(1 lb-mole/386 SCF)C_d(1/1,000,000 ppm)(MW)

Where:

NMOC	= emission rate in lb/hr correct to 3% oxygen expressed as methane
Q_{sd}	= Dry volumetric stack gas flow rate corrected to standard conditions (dscf/min) = Waste gas flow rate
C_d	= Measured concentration in dppmv
MW	= Molecular weight = 16 lb/lb-mole for methane

(60 min/hr) (704scfm)(lb-mole/386.3 scf)(3177.4 ppmv)(1/10^6 ppmv)(16 lb methane/lb-mole)

= 5.5589 lb/hr

Run 1, Inlet lb/hr to lb/MMBtu

(704 scfm)(495 Btu/scf)(60 min/hr)(1/10^6) = 20.91 MMBtu/hr

(5.5589 lb/hr)/(20.91 MMBtu/hr) = 0.2658 lb/MMBtu

Appendix B

Field Data Sheets

CYCLONIC FLOW CHECK

Client: MRO

Test Date: 1/19/17

Performed By: [illegible]

Alaska Source Testing, LLC

Port 1	
Point	Null Angle
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	
10	
11	
12	

Port 2	
Point	Null Angle
1	0
2	0
3	
4	0
5	0
6	0
7	0
8	0
9	
10	
11	
12	

7.5 / 7.? 13.01.17

Outlet

1	11:50 – 12:55			65°F
	25" Start	7" End		
2	26" → 7"		29.50" Hg	68°F
	15:07	16:19		
3	16:30 → 17:30		29.50 Hg	65°F
	26"	10"		

Inlet

1	26"	5"	29.44" Hg	62°F
	11:54	13.07		
2	26"	9" 17:06	29.50" H_2O	52°F
	15:50			
3	17:2			
	26			

PRELIMINARY VELOCITY TRAVERSE

Plant MOA LANDFILL

Date 1/19/17

Location Anch.

Stack I.D. Flare

Barometric Pressure, in. Hg 29.50

Stack Gauge Pressure, in. H2O -.1"

Operators Hilo

Alaska Source Testing, LLC

R1

Traverse Point Number	Velocity Head (Δps), in. H2O	Stack Temperature (Ts), °F
1	0.01	1376
2	0.015	1389
3	0.015	1391
4	0.017	1390
5	0.015	1390
6	0.012	1390
7	0.010	1376
8	0.010	1371
9		
10		
11		
12		
1	0.010	1380
2	0.011	1393
3	0.012	1396
4	0.014	~
5	0.016	~
6	0.016	1391
7	0.012	1390
8	0.010	1387
9		
10		
11		
12		
Average	0.013	1388

R2

Traverse Point Number	Velocity Head (Δps), in. H2O	Stack Temperature (Ts), °F
1	0.011	1387
2	0.010	1392
3	0.013	1393
4	0.014	~
5	0.015	~
6	0.016	1390
7	0.013	1395
8	0.011	1376
9		
10		
11		
12		
1	0.011	1379
2	0.012	1389
3	0.013	1394
4	0.014	~
5	0.014	~
6	0.012	~
7	0.010	1391
8	0.010	1382
9		
10		
11		
12		
Average	0.012	1389

PRELIMINARY VELOCITY TRAVERSE

Plant _____

Date 1/19/17

Location NIOA

Stack I.D. _____

Barometric Pressure, in. Hg 29.50

Stack Gauge Pressure, in. H20 -.11"

Operators _____

Alaska Source Testing, LLC

R3

Traverse Point Number	Velocity Head (Δps), in. H2O	Stack Temperature (Ts), °F
1	0.010	1379
2	0.011	1385
3	0.012	1396
4	0.012	1397
5	0.015	"
6	0.015	"
7	0.011	1385
8	0.010	1392
9		
10		
11		
12		
1	0.011	1387
2	0.010	1388
3	0.013	1393
4	0.015	1391
5	0.015	"
6	0.012	"
7	0.013	1382
8	0.012	1376
9		
10		
11		
12		
Average	0.012	1389

Traverse Point Number	Velocity Head (Δps), in. H2O	Stack Temperature (Ts), °F
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
Average		

MOISTURE DATA SHEET

Alaska Source Testing, LLC

— OUTLET —

Client		MOA							
Date		1/21/07							
Source		Main Flare							
Run Number		1		2		3			
Time		14:00		15:00		16:38			
Barometric Pressure	in. Hg	29.50		29.50		29.50			
Impinger 1	Initial/final grams	736	763.0	747	802.5	709.0	762		
Impinger 2	Initial/final grams	754	759.0	759.0	769	769.0	774.5		
Impinger 3	Initial/final grams	643	646.5	646.5	649	649	651.5		
Impinger 4	Initial/final grams	894.5	900.5	900.5	905	905	912		
Hose Catch	grams	0							
Total Water	**grams**	41.5		72.5		73.00			
DGM Vol., Start	cubic ft	844.080		869.738		917.326			
DGM Vol., Finish	cubic ft	869.700		917.310		967.000			
DGM Volume	**cubic ft**	25.620		47.572		49.674			
DGM Inlet Temp.	Initial/final °F	53	59	57	76	66	77		
DGM Outlet Temp	Initial/final °F	53	59	57	66	66	69		
Ave. DGM Temp	**°R**		516		524		530		
Delta H	in. H20	2		2		2			
Vacuum	in. Hg	21		21		21			
Pre-leak test	cfm	0/5		0/5		0/5			
Post-leak test	cfm	0/5		0/5		0/5			

Impinger out 62/51 61/56 60/57

MOISTURE DATA SHEET

Alaska Source Testing, LLC

Inlet RC

Client		MJA									
Date		1/19/17									
Source		Final									
Run Number		1				2				3			
Time		14:00				15:40							
Barometric Pressure	in. Hg	29.50				29.50				29.50			
Impinger 1	Initial/final grams	768.5	769.5			769.5	770.0			770.0	773.5		
Impinger 2	Initial/final grams	696.5	697.5			697.5	698.0			698.0	698.5		
Impinger 3	Initial/final grams	655.5	666.5			656.5	657.0			657.0	658.0		
Impinger 4	Initial/final grams	819.5	822.5			822.5	826.0			826.0	828.5		
Hose Catch	grams	—											
Total Water	**grams**	6.0				5.0				7.5			
DGM Vol., Start	cubic ft	79.815				101.6				124.7			
DGM Vol., Finish	cubic ft	101.400				123.7				141.82			
DGM Volume	**cubic ft**	21.585				22.1				17.12			
DGM Inlet Temp.	Initial/final °F	62	63			52	51			51	52		
DGM Outlet Temp	Initial/final °F	62	63			52	51			51	52		
Ave. DGM Temp	**°R**		523				512				512		
Delta H	in. H20	2				2				2			
Vacuum	in. Hg	<1				<1				<1			
Pre-leak test	cfm	0/1				0/1				0/1			
Post-leak test	cfm	0/1				0/1				0/1			

Impact 58/48 57/49 57/50

1 773.5

2 698.5

3 658.0

4 825.5

Moisture Data
Run 3
final impinger wts transferred to Moisture data Sheet - Sr

Appendix C

Laboratory Data

AtmAA Inc.
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February 9, 2007 LTR/021n/07

Bill Hudson
Alaska Source Testing
5630 Silverado Way
Ste. 3A
Anchorage, AK 99518

re: Anchorage Regional Landfill

Dear Bill:

Please find enclosed the laboratory analysis reports, quality assurance summaries, and the original chain of custody form for seven SUMMA cansiter samples and three Tedlar bag samples received January 24, 2007.

The Tedlar bag samples were analyzed for reduced sulfur components. The canister samples were analyzed for TO14 components, permanent gases, and TGNMO as requested on the chain of custody form. BTU was calculated from methane and TGNMO concentrations and reported.

A data package will follow within two weeks.

Sincerely,

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/bwf

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LABORATORY ANALYSIS REPORT

Permanent Gases and Total Gaseous Non- Methane Organics (TGNMO)
Analysis in Inlet SUMMA Canister Samples

Report Date: February 5, 2007
Client: Alaska Source Testing
Project Location: Anchorage Regional LF
Client Project No.: MOA 2007-1
Date Received: January 24, 2007
Date Analyzed: January 25 & 31, 2007

ANALYSIS DESCRIPTION

Permanent gases were measured by thermal conductivity detection/gas chromatography (TCD/GC). Total gaseous non-methane organics (TGNMO) was measured by flame ionization detection/total combustion analysis (FID/TCA), EPA Method 25.

AtmAA Lab No.:	00247-5	00247-7	00247-9
Sample I.D.:	Inlet Run 1	Inlet Run 2	Inlet Run 3
Components	*(Concentration in %,v)*		
Nitrogen	9.48	12.5	12.9
Oxygen	0.90	1.69	1.86
Methane	48.8	47.6	47.0
Carbon dioxide	39.6	37.9	37.9
	(Concentration in ppmv)		
Ethane	7.35	9.09	9.41
TGNMO	3170	3075	3065
BTU/cu.ft.	495	483	477

The reported oxygen concentration includes any argon present in the sample. Calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.
TGNMO is total gaseous non-methane organics measured and reported as ppm methane.
Ethane is reported as ppmv methane.
The accuracy of permanent gas analysis by TCD/GC is +/- 2%, actual results are reported.
BTU/cu.ft is calculated from methane @ 1010 and TGNMO @ 804 BTU/cu.ft.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Anchorage Regional LF
Date Received: January 24, 2007
Date Analyzed: January 25, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in %,v)			
Nitrogen	Inlet Run 1	9.47	9.50	9.48	0.16
Oxygen	Inlet Run 1	0.88	0.92	0.90	2.2
Methane	Inlet Run 1	48.8	48.9	48.8	0.10
Carbon dioxide	Inlet Run 1	39.6	39.6	39.6	0.0
		(Concentration in ppmv)			
Ethane	Inlet Run 1	6.08	8.62	7.35	17
	Inlet Run 2	9.10	9.08	9.09	0.11
	Inlet Run 3	8.42	10.4	9.41	11
TGNMO	Inlet Run 1	3120	3220	3170	1.6
	Inlet Run 2	3050	3100	3075	0.81
	Inlet Run 3	3050	3080	3065	0.49

Three SUMMA canister samples, laboratory numbers 00247-(5,7,&9), were analyzed for permanent gases and TGNMO. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % Difference from Mean for 10 repeat measurements from three SUMMA canister samples is 3.3%.

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LABORATORY ANALYSIS REPORT

Permanent Gases and Total Gaseous Non- Methane Organics (TGNMO)
Analysis in SUMMA Canister Samples

Report Date: February 5, 2007
Client: Alaska Source Testing
Project Location: Anchorage Regional Landfill
Client Project No.: MOA 2007-1
Date Received: January 24, 2007
Date Analyzed: January 25 & 31, 2007

ANALYSIS DESCRIPTION

Permanent gases were measured by thermal conductivity detection/gas chromatography (TCD/GC). Total gaseous non-methane organics (TGNMO) was measured by flame ionization detection/total combustion analysis (FID/TCA), EPA Method 25.

AtmAA Lab No.:	00247-6	00247-8	00247-10
Sample I.D.:	Outlet Run 1	Outlet Run 2	Outlet Run 3
Components	*(Concentration in %,v)*		
Nitrogen	76.7	76.9	77.3
Oxygen	12.6	12.6	12.6
Carbon dioxide	6.94	6.96	7.17
	(Concentration in ppmv)		
Methane	<1	1.07	1.35
Ethane	<1	<1	<1
TGNMO	2.18	2.82	4.60

TGNMO is total gaseous non-methane organics measured and reported as ppm methane.
Ethane is reported as ppmv methane.
The accuracy of permanent gas analysis by TCD/GC is +/- 2%, actual results are reported.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Anchorage Regional Landfill
Date Received: January 24, 2007
Date Analyzed: January 25, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in %,v)			
Nitrogen	Outlet Run 1	76.4	76.9	76.7	0.33
Oxygen	Outlet Run 1	12.5	12.7	12.6	0.80
Carbon dioxide	Outlet Run 1	6.97	6.91	6.94	0.43
		(Concentration in ppmv)			
Methane	Outlet Run 1	<1	<1	---	---
	Outlet Run 2	1.06	1.08	1.07	0.93
	Outlet Run 2	1.15	1.55	1.35	15
Ethane	Outlet Run 1	<1	<1	---	---
	Outlet Run 2	<1	<1	---	---
	Outlet Run 2	<1	<1	---	---
TGNMO	Outlet Run 1	2.05	2.31	2.18	6.0
	Outlet Run 2	2.71	2.93	2.82	3.9
	Outlet Run 2	4.68	4.52	4.60	1.7

Three SUMMA canister samples, laboratory numbers 00247-(5,7,&9), were analyzed for permanent gases and TGNMO. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % Difference from Mean for 8 repeat measurements from three SUMMA canister samples is 3.6%.

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LABORATORY ANALYSIS REPORT

Permanent Gases and TGNMO Analysis in SUMMA Canister Samples

Report Date: February 8, 2007
Client: Alaska Source Testing
Site: Anchorage Regional Landfill
Client Project No.: MOA 2007-1

Date Received: January 24, 2007
Date Analyzed: January 25, & 31, 2007

ANALYSIS DESCRIPTION

Permanent gases are measured by thermal conductivity detection/gas chromatography (TCD/GC), TGNMO is measured by Method 25 analysis, FID/TCA, total combustion analysis.

AtmAA Lab No.:	00247-11
Sample ID:	Blank Out (amb. Air)
	(Concentration in %v)
Nitrogen	76.9
Oxygen	20.4
	(Concentration in ppmv)
Methane	1.77
Ethane	<1
Carbon Dioxide	562
TGNMO	<1

TGNMO is total gaseous non-methane organics (excluding ethane), reported as ppmv methane.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Site: Anchorage Regional Landfill
Date Received: January 24, 2007
Date Analyzed: January 25, & 31, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in %v)			
Nitrogen	Blank Out	no repeat			
Oxygen	Blank Out	no repeat			
		(Concentration in ppmv)			
Methane	Blank Out	1.51	2.03	1.77	15
Ethane	Blank Out	<1	<1	---	---
Carbon Dioxide	Blank Out	559	564	562	0.45
TGNMO	Blank Out	<1	<1	---	---

One SUMMA canister sample, laboratory number 00247-11, was analyzed for permanent gases. and TGNMO. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % Difference from Mean for 2 repeat measurements from one SUMMA canister sample is 7.6%.

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LABORATORY ANALYSIS REPORT

TO-14 Component Analysis in Inlet SUMMA Canister Samples, by GC/MS

Report Date: February 5, 2007
Client: Alaska Source Testing
Project Location: Anchorage Regional LF
Client Project No.: MOA 2007-1
Date Received: January 24, 2007
Date Analyzed: January 25, 2007

AtmAA Lab No.:	00247-5	00247-7	00247-9
Sample ID:	Inlet Run 1	Inlet Run 2	Inlet Run 3
Components	(Concentations in ppbv)		
Freon-12	4620	4310	4300
Methyl chloride	225	206	198
Freon-114	138	129	123
Vinyl chloride	2820	2590	2550
Methyl bromide	<80	<80	<80
Ethyl chloride	1480	1340	1390
Freon-11	2560	2330	2330
1,1-dichloroethylene	<80	<80	<80
Dichloromethane	7180	6780	6740
Freon-113	103	96.3	80.6
1,1-dichloroethane	2160	2010	1980
c-1,2-dichloroethene	714	662	635
Chloroform	<40	<40	<40
1,2-dichloroethane	50.0	46.4	45.6
1,1,1-trichloroethane	244	232	235
Benzene	1760	1640	1640
Carbon tetrachloride	<60	<60	<60
1,2-dichloropropane	<60	<60	<60
Trichloroethene	756	707	707
t-1,3-dichloropropene	<60	<60	<60
c-1,3-dichloropropene	<60	<60	<60
1,1,2-trichloroethane	<60	<60	<60
Toluene	26800	25300	26200
1,2-dibromoethane	<60	<60	<60
Perchloroethylene	1260	1240	1270
Chlorobenzene	<80	<80	<80
Ethylbenzene	2880	2810	2960
m+p-xylenes	6750	6520	6860
Styrene	388	380	415
1,1,2,2-tetrachloroethane	<60	<60	<60
o-xylene	1910	1910	2060
4-ethyl-toluene	644	639	720
1,3,5-trimethylbenzene	252	239	285
1,2,4-trimethylbenzene	564	571	662
m-dichlorobenzene	<40	<40	<40
p-dichlorobenzene	56.8	57.7	69.6
Benzylchloride	<80	<80	<80
o-dichlorobenzene	<40	<40	<40
1,2,4-trichlorobenzene	<100	<100	<100
Hexachlorobutadiene	<80	<80	<80

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Anchorage Regional LF
Date Received: January 24, 2007
Date Analyzed: January 25, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Freon-12	Inlet Run 1	4650	4590	4620	0.65
Methyl chloride	Inlet Run 1	222	228	225	1.3
Freon-114	Inlet Run 1	140	136	138	1.4
Vinyl chloride	Inlet Run 1	2840	2790	2820	0.89
Methyl bromide	Inlet Run 1	<80	<80	---	---
Ethyl chloride	Inlet Run 1	1480	1470	1480	0.34
Freon-11	Inlet Run 1	2560	2560	2560	0.0
1,1-dichloroethylene	Inlet Run 1	<80	<80	---	---
Dichloromethane	Inlet Run 1	7250	7110	7180	0.97
Freon-113	Inlet Run 1	114	92.6	103	10
1,1-dichloroethane	Inlet Run 1	2160	2170	2160	0.23
c-1,2-dichloroethene	Inlet Run 1	714	714	714	0.0
Chloroform	Inlet Run 1	<40	<40	---	---
1,2-dichloroethane	Inlet Run 1	49.0	51.1	50.0	2.1
1,1,1-trichloroethane	Inlet Run 1	242	246	244	0.82
Benzene	Inlet Run 1	1770	1740	1760	0.85
Carbon tetrachloride	Inlet Run 1	<60	<60	---	---
1,2-dichloropropane	Inlet Run 1	<60	<60	---	---
Trichloroethene	Inlet Run 1	768	744	756	1.6
t-1,3-dichloropropene	Inlet Run 1	<60	<60	---	---
c-1,3-dichloropropene	Inlet Run 1	<60	<60	---	---

QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
1,1,2-trichloroethane	Inlet Run 1	<60	<60	---	---
Toluene	Inlet Run 1	27300	26400	26800	1.7
1,2-dibromoethane	Inlet Run 1	<60	<60	---	---
Perchloroethylene	Inlet Run 1	1300	1230	1260	2.8
Chlorobenzene	Inlet Run 1	<80	<80	---	---
Ethylbenzene	Inlet Run 1	2910	2860	2880	0.87
m+p-xylenes	Inlet Run 1	6870	6630	6750	1.8
Styrene	Inlet Run 1	399	376	388	3.0
1,1,2,2-tetrachloroethane	Inlet Run 1	<60	<60	---	---
o-xylene	Inlet Run 1	1980	1840	1910	3.7
4-ethyl-toluene	Inlet Run 1	665	624	644	3.2
1,3,5-trimethylbenzene	Inlet Run 1	261	243	252	3.6
1,2,4-trimethylbenzene	Inlet Run 1	586	542	564	3.9
m-dichlorobenzene	Inlet Run 1	<40	<40	---	---
p-dichlorobenzene	Inlet Run 1	62.4	51.3	56.8	9.8
Benzylchloride	Inlet Run 1	<80	<80	---	---
o-dichlorobenzene	Inlet Run 1	<40	<40	---	---
1,2,4-trichlorobenzene	Inlet Run 1	<100	<100	---	---
Hexachlorobutadiene	Inlet Run 1	<80	<80	---	---

Three SUMMA canister samples, laboratory number 00247-(5,7,&9), were analyzed for TO-14 components by GC/MS. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 24 repeat measurements from three SUMMA canister samples is 2.3%.

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LABORATORY ANALYSIS REPORT

TO-14 Component Analysis in Outlet SUMMA Canister Samples, by GC/MS

Report Date: February 5, 2007
Client: Alaska Source Testing
Project Location: Anchorage Regional Landfill
Client Project No.: MOA 2007-1
Date Received: January 24, 2007
Date Analyzed: January 29, 2007

AtmAA Lab No.:	00247-6	00247-8	00247-10	00247-11
Sample ID:	Outlet Run 1	Outlet Run 2	Outlet Run 3	Blank Outlet
Components	*(Concentations in ppbv)*			
Freon-12	<0.4	<0.4	<0.4	<0.4
Methyl chloride	<0.6	<0.6	<0.6	<0.6
Freon-114	<0.4	<0.4	<0.4	<0.4
Vinyl chloride	<0.4	<0.4	<0.4	<0.4
Methyl bromide	<0.6	<0.6	<0.6	<0.6
Ethyl chloride	<0.4	<0.4	<0.4	<0.4
Freon-11	<0.4	<0.4	<0.4	<0.4
1,1-dichloroethylene	<0.6	<0.6	<0.6	<0.6
Dichloromethane	<0.6	<0.6	<0.6	<0.6
Freon-113	<0.4	<0.4	<0.4	<0.4
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.5
c-1,2-dichloroethene	<0.5	<0.5	<0.5	<0.5
Chloroform	<0.4	<0.4	<0.4	<0.4
1,2-dichloroethane	<0.5	<0.5	<0.5	<0.5
1,1,1-trichloroethane	<0.4	<0.4	<0.4	<0.4
Benzene	0.68	0.72	1.11	1.35
Carbon tetrachloride	<0.4	<0.4	<0.4	<0.4
1,2-dichloropropane	<0.5	<0.5	<0.5	<0.5
Trichloroethene	<0.4	<0.4	<0.4	<0.4
t-1,3-dichloropropene	<0.5	<0.5	<0.5	<0.5
c-1,3-dichloropropene	<0.5	<0.5	<0.5	<0.5
1,1,2-trichloroethane	<0.5	<0.5	<0.5	<0.5
Toluene	1.26	0.61	0.94	1.47
1,2-dibromoethane	<0.4	<0.4	<0.4	<0.4
Perchloroethylene	<0.4	<0.4	<0.4	<0.4
Chlorobenzene	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	<0.5	<0.5
m+p-xylenes	0.76	0.71	0.61	0.71
Styrene	<0.5	<0.5	<0.5	<0.5
1,1,2,2-tetrachloroethane	<0.5	<0.5	<0.5	<0.5
o-xylene	<0.5	<0.5	<0.5	<0.5
4-ethyl-toluene	0.89	0.94	0.72	0.87
1,3,5-trimethylbenzene	0.74	0.78	0.72	0.75
1,2,4-trimethylbenzene	1.10	1.56	1.26	1.25
m-dichlorobenzene	<0.4	<0.4	<0.4	<0.4
p-dichlorobenzene	<0.4	<0.4	<0.4	<0.4
Benzylchloride	<0.6	<0.6	<0.6	<0.6
o-dichlorobenzene	<0.4	<0.4	<0.4	<0.4
1,2,4-trichlorobenzene	<0.6	<0.6	<0.6	<0.6
Hexachlorobutadiene	<0.6	<0.6	<0.6	<0.6

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

Project Location: Anchorage Regional LF
Date Received: January 24, 2007
Date Analyzed: January 25, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Freon-12	Outlet Run 1	<0.4	<0.4	---	---
Methyl chloride	Outlet Run 1	<0.6	<0.6	---	---
Freon-114	Outlet Run 1	<0.4	<0.4	---	---
Vinyl chloride	Outlet Run 1	<0.4	<0.4	---	---
Methyl bromide	Outlet Run 1	<0.6	<0.6	---	---
Ethyl chloride	Outlet Run 1	<0.4	<0.4	---	---
Freon-11	Outlet Run 1	<0.4	<0.4	---	---
1,1-dichloroethylene	Outlet Run 1	<0.6	<0.6	---	---
Dichloromethane	Outlet Run 1	<0.6	<0.6	---	---
Freon-113	Outlet Run 1	<0.4	<0.4	---	---
1,1-dichloroethane	Outlet Run 1	<0.5	<0.5	---	---
c-1,2-dichloroethene	Outlet Run 1	<0.5	<0.5	---	---
Chloroform	Outlet Run 1	<0.4	<0.4	---	---
1,2-dichloroethane	Outlet Run 1	<0.5	<0.5	---	---
1,1,1-trichloroethane	Outlet Run 1	<0.4	<0.4	---	---
Benzene	Outlet Run 1	0.68	0.68	0.68	0.0
Carbon tetrachloride	Outlet Run 1	<0.4	<0.4	---	---
1,2-dichloropropane	Outlet Run 1	<0.5	<0.5	---	---
Trichloroethene	Outlet Run 1	<0.4	<0.4	---	---
t-1,3-dichloropropene	Outlet Run 1	<0.5	<0.5	---	---
c-1,3-dichloropropene	Outlet Run 1	<0.5	<0.5	---	---

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)
(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
1,1,2-trichloroethane	Outlet Run 1	<0.5	<0.5	---	---
Toluene	Outlet Run 1	1.16	1.35	1.26	7.6
1,2-dibromoethane	Outlet Run 1	<0.4	<0.4	---	---
Perchloroethylene	Outlet Run 1	<0.4	<0.4	---	---
Chlorobenzene	Outlet Run 1	<0.5	<0.5	---	---
Ethylbenzene	Outlet Run 1	<0.5	<0.5	---	---
m+p-xylenes	Outlet Run 1	0.67	0.84	0.76	11
Styrene	Outlet Run 1	<0.5	<0.5	---	---
1,1,2,2-tetrachloroethane	Outlet Run 1	<0.5	<0.5	---	---
o-xylene	Outlet Run 1	<0.5	<0.5	---	---
4-ethyl-toluene	Outlet Run 1	0.89	0.89	0.89	0.0
1,3,5-trimethylbenzene	Outlet Run 1	0.74	0.74	0.74	0.0
1,2,4-trimethylbenzene	Outlet Run 1	1.18	1.03	1.11	6.8
m-dichlorobenzene	Outlet Run 1	<0.4	<0.4	---	---
p-dichlorobenzene	Outlet Run 1	<0.4	<0.4	---	---
Benzylchloride	Outlet Run 1	<0.6	<0.6	---	---
o-dichlorobenzene	Outlet Run 1	<0.4	<0.4	---	---
1,2,4-trichlorobenzene	Outlet Run 1	<0.6	<0.6	---	---
Hexachlorobutadiene	Outlet Run 1	<0.6	<0.6	---	---

Four SUMMA canister samples, laboratory number 00247-(5,7,9 & 11), were analyzed for TO-14 components by GC/MS. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % Difference from Mean for 6 repeat measurements from four SUMMA canister samples is 4.2%.

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environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Hydrogen Sulfide and Reduced Sulfur Compounds
Analysis in Inlet Tedlar Bag Samples

Report Date: February 5, 2007
Client: Alaska Source Testing
Project Location: Anchorage Regional LF
Client Project No.: MOA 2007-1
Date Received: January 24, 2007
Date Analyzed: January 24, 2007

ANALYSIS DESCRIPTION

Hydrogen sulfide was analyzed by gas chromatography with a Hall electrolytic conductivity detector operated in the oxidative sulfur mode. All other components were measured by GC/ Mass Spec.

AtmAA Lab No.:	00247-12	00247-13	00247-14
Sample I.D.:	Inlet Run 1	Inlet Run 2	Inlet Run 3
Components	*(Concentration in ppmv)*		
Hydrogen sulfide	10.0	10.9	10.4
Carbonyl sulfide	<0.2	<0.2	<0.2
Methyl mercaptan	0.60	0.57	0.59
Ethyl mercaptan	<0.2	<0.2	<0.2
Dimethyl sulfide	4.02	3.93	3.96
Carbon disulfide	0.10	<0.1	<0.1
isopropyl mercaptan	<0.1	<0.1	<0.1
n-propyl mercaptan	<0.1	<0.1	<0.1
Dimethyl disulfide	<0.1	<0.1	<0.1
TRS	14.8	15.4	15.0

TRS - total reduced sulfur

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Anchorage Regional LF
Date Received: January 24, 2007
Date Analyzed: January 24, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Hydrogen sulfide	Inlet Run 1	9.90	10.2	10.0	1.5
	Inlet Run 2	10.9	10.9	10.9	0.0
	Inlet Run 3	10.3	10.6	10.4	1.4
Carbonyl sulfide	Inlet Run 1	<0.2	<0.2	---	---
Methyl mercaptan	Inlet Run 1	0.62	0.58	0.60	3.3
Ethyl mercaptan	Inlet Run 1	<0.2	<0.2	---	---
Dimethyl sulfide	Inlet Run 1	3.98	4.06	4.02	1.0
Carbon disulfide	Inlet Run 1	0.10	0.10	0.10	0.0
iso-propyl mercaptan	Inlet Run 1	<0.1	<0.1	---	---
n-propyl mercaptan	Inlet Run 1	<0.1	<0.1	---	---
Dimethyl disulfide	Inlet Run 1	<0.1	<0.1	---	---

Three Tedlar bag samples, laboratory numbers 00247-(12-14), were analyzed for hydrogen sulfide and reduced sulfur compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 6 repeat measurements from the three Tedlar bag samples is 1.2%.

CHAIN OF CUSTODY RECORD

Client/Project Name	Project Location
MOA Landfill	Anchorage Regional Landfill
Project No. MOA 2007-1	**Field Logbook No.**
Sampler: (Signature) W.M. Hall	**Chain of Custody Tape No.**

Sample No./ Identification	Type of Sample	AtmAA Lab Number	Sampling Date	Sampling Time	CH4& TGNMO	O2,N2, CH4, CO2	TO-14	Reduced Sulfur	BTU		Special Remarks
Run 1 Inlet	SUMMA	SERIAL # 00377	1-19-07	1154	✓	✓	✓		✓		00247-5
Run 1 Outlet		00321		1150	✓	✓	✓				-6
Run 2 Inlet		00369		1550	✓	✓	✓		✓		-7
Run 2 Outlet		00287		1567	✓	✓	✓				-8
Run 3 Inlet		00286		1722	✓	✓	✓		✓		-9
Run 3 Outlet		00108		1630	✓	✓	✓				-10
Blank Outlet		00360		1745	✓	✓	✓				-11
RUN 1 Inlet RUN 2, RUN 3	3 each Tedlar Bags	NA		1315 1625/1740				✓ ✓			00247-12 - Run 1 -13 - " 2 -14 - " 3

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	1-22-07	900		1-22-07	900
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	1-22-07		Fed Ex	1-22-07	
Relinquished by: (Signature) W.M. Hall	Date	Time	Received for Laboratory by: (Signature)	Date	Time
				1/24/07	11:35 am

Sample Collector Info

Company: ALASKA SOURCE TESTING
Street Address: 520 W 58th Ave, Ste A
City/State/Zip: ANCHORAGE AK 99518
Telephone No.: 907-562-2880
Fax No.: 907-569-4225

Analytical Laboratory

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Appendix D

Operational Data

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

DAQSTANDARD	R2.07	
Data Viewer	R2.07	
MOA solid waste services	SWSAdmin	110-73939-****
Device Type	DX100	
Serial No.	S5F309160	
File Message	Anchorage Landfill	

		Ch.	CH01		CH02		CH03		CH04		CH05		CH31	
		Tag	LFG Flow		Main Temp		Valve Status		Blower Status		Flame Proved		Total Flow	
		Unit	SCFM		°F								SCF	
Date	Time	sec	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
2007/01/19	11:55:00	0.000	692	712	1399	1402	1	1	1	1	1	1	2006122	2006825
2007/01/19	11:56:00	0.000	693	709	1397	1402	1	1	1	1	1	1	2006825	2007528
2007/01/19	11:57:00	0.000	694	709	1396	1397	1	1	1	1	1	1	2007528	2008231
2007/01/19	11:58:00	0.000	695	709	1397	1399	1	1	1	1	1	1	2008231	2008934
2007/01/19	11:59:00	0.000	693	708	1399	1400	1	1	1	1	1	1	2008934	2009636
Start Run 1														
2007/01/19	12:00:00	0.000	690	715	1398	1400	1	1	1	1	1	1	2009636	2010338
2007/01/19	12:01:00	0.000	694	713	1396	1398	1	1	1	1	1	1	2010338	2011043
2007/01/19	12:02:00	0.000	700	722	1396	1397	1	1	1	1	1	1	2011043	2011750
2007/01/19	12:03:00	0.000	696	713	1396	1397	1	1	1	1	1	1	2011750	2012455
2007/01/19	12:04:00	0.000	687	708	1396	1398	1	1	1	1	1	1	2012455	2013155
2007/01/19	12:05:00	0.000	695	716	1398	1401	1	1	1	1	1	1	2013155	2013860
2007/01/19	12:06:00	0.000	693	719	1398	1401	1	1	1	1	1	1	2013860	2014564
2007/01/19	12:07:00	0.000	689	711	1396	1398	1	1	1	1	1	1	2014564	2015264
2007/01/19	12:08:00	0.000	695	711	1396	1397	1	1	1	1	1	1	2015264	2015968
2007/01/19	12:09:00	0.000	693	715	1396	1397	1	1	1	1	1	1	2015968	2016672
2007/01/19	12:10:00	0.000	693	714	1397	1400	1	1	1	1	1	1	2016672	2017376
2007/01/19	12:11:00	0.000	691	714	1400	1402	1	1	1	1	1	1	2017376	2018079
2007/01/19	12:12:00	0.000	670	734	1399	1400	1	1	1	1	1	1	2018079	2018781
2007/01/19	12:13:00	0.000	664	735	1398	1399	1	1	1	1	1	1	2018781	2019483
2007/01/19	12:14:00	0.000	664	746	1398	1398	1	1	1	1	1	1	2019483	2020186
2007/01/19	12:15:00	0.000	665	742	1397	1398	1	1	1	1	1	1	2020186	2020891
2007/01/19	12:16:00	0.000	687	731	1396	1397	1	1	1	1	1	1	2020891	2021595
2007/01/19	12:17:00	0.000	684	740	1396	1399	1	1	1	1	1	1	2021595	2022304

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

		Ch.	CH01		CH02		CH03		CH04		CH05		CH31	
		Tag	LFG Flow		Main Temp		Valve Status		Blower Status		Flame Proved		Total Flow	
		Unit	SCFM		°F								SCF	
Date	Time	sec	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
2007/01/19	12:18:00	0.000	690	726	1399	1401	1	1	1	1	1	1	2022304	2023007
2007/01/19	12:19:00	0.000	683	736	1400	1401	1	1	1	1	1	1	2023007	2023714
2007/01/19	12:20:00	0.000	685	744	1400	1401	1	1	1	1	1	1	2023714	2024428
2007/01/19	12:21:00	0.000	668	740	1397	1400	1	1	1	1	1	1	2024428	2025135
2007/01/19	12:22:00	0.000	676	733	1396	1397	1	1	1	1	1	1	2025135	2025837
2007/01/19	12:23:00	0.000	680	739	1396	1398	1	1	1	1	1	1	2025837	2026542
2007/01/19	12:24:00	0.000	683	727	1398	1399	1	1	1	1	1	1	2026542	2027248
2007/01/19	12:25:00	0.000	676	742	1398	1399	1	1	1	1	1	1	2027248	2027955
2007/01/19	12:26:00	0.000	669	743	1398	1399	1	1	1	1	1	1	2027955	2028657
2007/01/19	12:27:00	0.000	678	723	1397	1398	1	1	1	1	1	1	2028657	2029355
2007/01/19	12:28:00	0.000	676	723	1397	1399	1	1	1	1	1	1	2029355	2030057
2007/01/19	12:29:00	0.000	697	718	1399	1401	1	1	1	1	1	1	2030057	2030764
2007/01/19	12:30:00	0.000	679	726	1401	1402	1	1	1	1	1	1	2030764	2031467
2007/01/19	12:31:00	0.000	690	717	1397	1401	1	1	1	1	1	1	2031467	2032171
2007/01/19	12:32:00	0.000	693	716	1396	1397	1	1	1	1	1	1	2032171	2032876
2007/01/19	12:33:00	0.000	698	717	1396	1397	1	1	1	1	1	1	2032876	2033582
2007/01/19	12:34:00	0.000	691	714	1396	1400	1	1	1	1	1	1	2033582	2034286
2007/01/19	12:35:00	0.000	691	714	1400	1402	1	1	1	1	1	1	2034286	2034990
2007/01/19	12:36:00	0.000	689	714	1399	1401	1	1	1	1	1	1	2034990	2035696
2007/01/19	12:37:00	0.000	693	717	1398	1399	1	1	1	1	1	1	2035696	2036400
2007/01/19	12:38:00	0.000	693	718	1396	1398	1	1	1	1	1	1	2036400	2037104
2007/01/19	12:39:00	0.000	693	712	1396	1398	1	1	1	1	1	1	2037104	2037807
2007/01/19	12:40:00	0.000	695	715	1398	1399	1	1	1	1	1	1	2037807	2038511
2007/01/19	12:41:00	0.000	696	715	1397	1398	1	1	1	1	1	1	2038511	2039216
2007/01/19	12:42:00	0.000	694	715	1398	1400	1	1	1	1	1	1	2039216	2039920
2007/01/19	12:43:00	0.000	695	712	1399	1400	1	1	1	1	1	1	2039920	2040623
2007/01/19	12:44:00	0.000	694	714	1400	1402	1	1	1	1	1	1	2040623	2041327
2007/01/19	12:45:00	0.000	694	713	1398	1401	1	1	1	1	1	1	2041327	2042030
2007/01/19	12:46:00	0.000	693	710	1397	1398	1	1	1	1	1	1	2042030	2042733
2007/01/19	12:47:00	0.000	692	722	1397	1397	1	1	1	1	1	1	2042733	2043437
2007/01/19	12:48:00	0.000	693	717	1397	1399	1	1	1	1	1	1	2043437	2044141
2007/01/19	12:49:00	0.000	696	716	1399	1400	1	1	1	1	1	1	2044141	2044846
2007/01/19	12:50:00	0.000	695	711	1399	1400	1	1	1	1	1	1	2044846	2045551

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

		Ch. Tag Unit	CH01 LFG Flow SCFM		CH02 Main Temp °F		CH03 Valve Status		CH04 Blower Status		CH05 Flame Proved		CH31 Total Flow SCF	
Date	**Time**	**sec**	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**	**MIN**	**MAX**
2007/01/19	12:51:00	0.000	691	714	1397	1399	1	1	1	1	1	1	2045551	2046255
2007/01/19	12:52:00	0.000	687	711	1397	1397	1	1	1	1	1	1	2046255	2046956
2007/01/19	12:53:00	0.000	693	714	1397	1399	1	1	1	1	1	1	2046956	2047659
2007/01/19	12:54:00	0.000	692	713	1398	1399	1	1	1	1	1	1	2047659	2048361
2007/01/19	12:55:00	0.000	694	718	1398	1400	1	1	1	1	1	1	2048361	2049067
2007/01/19	12:56:00	0.000	695	715	1399	1400	1	1	1	1	1	1	2049067	2049772
2007/01/19	12:57:00	0.000	689	711	1398	1399	1	1	1	1	1	1	2049772	2050474
2007/01/19	12:58:00	0.000	695	714	1399	1399	1	1	1	1	1	1	2050474	2051179
2007/01/19	12:59:00	0.000	695	715	1399	1399	1	1	1	1	1	1	2051179	2051883
2007/01/19	13:00:00	0.000	693	713	1398	1399	1	1	1	1	1	1	2051883	2052586
2007/01/19	13:01:00	0.000	692	708	1395	1398	1	1	1	1	1	1	2052586	2053288
2007/01/19	13:02:00	0.000	691	712	1395	1397	1	1	1	1	1	1	2053288	2053989
2007/01/19	13:03:00	0.000	683	719	1397	1400	1	1	1	1	1	1	2053989	2054690
2007/01/19	13:04:00	0.000	678	725	1400	1400	1	1	1	1	1	1	2054690	2055393
2007/01/19	13:05:00	0.000	675	733	1398	1400	1	1	1	1	1	1	2055393	2056100
2007/01/19	13:06:00	0.000	675	730	1396	1398	1	1	1	1	1	1	2056100	2056802
2007/01/19	13:07:00	0.000	670	743	1396	1397	1	1	1	1	1	1	2056802	2057502
2007/01/19	13:08:00	0.000	685	736	1397	1399	1	1	1	1	1	1	2057502	2058206
End Run 1 Averages			**687**	**721**	**1398**	**1399**	**1**	**1**	**1**	**1**	**1**	**1**		
Fuel Flow	**69 minutes**													
2007/01/19	13:09:00	0.000	685	720	1398	1399	1	1	1	1	1	1	2058206	2058908
2007/01/19	13:10:00	0.000	681	724	1398	1399	1	1	1	1	1	1	2058908	2059608
2007/01/19	13:11:00	0.000	686	719	1399	1400	1	1	1	1	1	1	2059608	2060309
2007/01/19	13:12:00	0.000	687	726	1398	1399	1	1	1	1	1	1	2060309	2061015
2007/01/19	13:13:00	0.000	688	732	1398	1399	1	1	1	1	1	1	2061015	2061719
2007/01/19	13:14:00	0.000	696	707	1398	1399	1	1	1	1	1	1	2061719	2062420
2007/01/19	13:15:00	0.000	697	707	1398	1399	1	1	1	1	1	1	2062420	2063123
2007/01/19	13:16:00	0.000	692	706	1397	1400	1	1	1	1	1	1	2063123	2063824
2007/01/19	13:17:00	0.000	695	708	1400	1402	1	1	1	1	1	1	2063824	2064526
2007/01/19	13:18:00	0.000	695	708	1398	1403	1	1	1	1	1	1	2064526	2065228
2007/01/19	15:12:00	0.000	698	712	1396	1399	1	1	1	1	1	1	39642	40348

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

Date	Time	Ch. Tag Unit sec	CH01 LFG Flow SCFM MIN	CH01 LFG Flow SCFM MAX	CH02 Main Temp °F MIN	CH02 Main Temp °F MAX	CH03 Valve Status MIN	CH03 Valve Status MAX	CH04 Blower Status MIN	CH04 Blower Status MAX	CH05 Flame Proved MIN	CH05 Flame Proved MAX	CH31 Total Flow SCF MIN	CH31 Total Flow SCF MAX
2007/01/19	15:13:00	0.000	702	710	1396	1400	1	1	1	1	1	1	40348	41055
2007/01/19	15:14:00	0.000	700	710	1400	1402	1	1	1	1	1	1	41055	41761
2007/01/19	15:15:00	0.000	702	711	1396	1402	1	1	1	1	1	1	41761	42466
2007/01/19	15:16:00	0.000	702	711	1395	1398	1	1	1	1	1	1	42466	43172
Start Run 2														
2007/01/19	15:17:00	0.000	703	709	1398	1401	1	1	1	1	1	1	43172	43877
2007/01/19	15:18:00	0.000	700	712	1396	1401	1	1	1	1	1	1	43877	44584
2007/01/19	15:19:00	0.000	698	714	1396	1398	1	1	1	1	1	1	44584	45288
2007/01/19	15:20:00	0.000	698	712	1398	1401	1	1	1	1	1	1	45288	45995
2007/01/19	15:21:00	0.000	698	712	1399	1401	1	1	1	1	1	1	45995	46700
2007/01/19	15:22:00	0.000	701	709	1396	1399	1	1	1	1	1	1	46700	47406
2007/01/19	15:23:00	0.000	701	710	1396	1400	1	1	1	1	1	1	47406	48112
2007/01/19	15:24:00	0.000	699	709	1399	1401	1	1	1	1	1	1	48112	48816
2007/01/19	15:25:00	0.000	700	709	1396	1399	1	1	1	1	1	1	48816	49520
2007/01/19	15:26:00	0.000	699	711	1396	1397	1	1	1	1	1	1	49520	50226
2007/01/19	15:27:00	0.000	701	713	1397	1400	1	1	1	1	1	1	50226	50932
2007/01/19	15:28:00	0.000	702	710	1400	1402	1	1	1	1	1	1	50932	51638
2007/01/19	15:29:00	0.000	702	709	1398	1401	1	1	1	1	1	1	51638	52344
2007/01/19	15:30:00	0.000	700	709	1396	1398	1	1	1	1	1	1	52344	53048
2007/01/19	15:31:00	0.000	702	709	1396	1398	1	1	1	1	1	1	53048	53753
2007/01/19	15:32:00	0.000	700	708	1398	1399	1	1	1	1	1	1	53753	54457
2007/01/19	15:33:00	0.000	699	709	1399	1399	1	1	1	1	1	1	54457	55162
2007/01/19	15:34:00	0.000	699	709	1398	1399	1	1	1	1	1	1	55162	55866
2007/01/19	15:35:00	0.000	697	711	1398	1399	1	1	1	1	1	1	55866	56571
2007/01/19	15:36:00	0.000	698	711	1396	1398	1	1	1	1	1	1	56571	57277
2007/01/19	15:37:00	0.000	701	710	1398	1402	1	1	1	1	1	1	57277	57982
2007/01/19	15:38:00	0.000	692	711	1399	1402	1	1	1	1	1	1	57982	58686
2007/01/19	15:39:00	0.000	697	714	1396	1399	1	1	1	1	1	1	58686	59390
2007/01/19	15:40:00	0.000	695	713	1397	1398	1	1	1	1	1	1	59390	60093
2007/01/19	15:41:00	0.000	695	715	1397	1398	1	1	1	1	1	1	60093	60798
2007/01/19	15:42:00	0.000	697	711	1397	1399	1	1	1	1	1	1	60798	61504
2007/01/19	15:43:00	0.000	696	721	1399	1402	1	1	1	1	1	1	61504	62208
2007/01/19	15:44:00	0.000	696	714	1399	1401	1	1	1	1	1	1	62208	62915

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

		Ch.	CH01		CH02		CH03		CH04		CH05		CH31	
		Tag	LFG Flow		Main Temp		Valve Status		Blower Status		Flame Proved		Total Flow	
		Unit	SCFM		°F								SCF	
Date	Time	sec	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
2007/01/19	15:45:00	0.000	689	712	1398	1399	1	1	1	1	1	1	62915	63617
2007/01/19	15:46:00	0.000	698	714	1398	1398	1	1	1	1	1	1	63617	64323
2007/01/19	15:47:00	0.000	696	716	1397	1398	1	1	1	1	1	1	64323	65029
2007/01/19	15:48:00	0.000	693	709	1398	1400	1	1	1	1	1	1	65029	65731
2007/01/19	15:49:00	0.000	693	713	1400	1401	1	1	1	1	1	1	65731	66434
2007/01/19	15:50:00	0.000	695	714	1400	1401	1	1	1	1	1	1	66434	67140
2007/01/19	15:51:00	0.000	696	715	1400	1401	1	1	1	1	1	1	67140	67846
2007/01/19	15:52:00	0.000	699	711	1398	1400	1	1	1	1	1	1	67846	68551
2007/01/19	15:53:00	0.000	700	712	1396	1398	1	1	1	1	1	1	68551	69257
2007/01/19	15:54:00	0.000	702	711	1396	1397	1	1	1	1	1	1	69257	69964
2007/01/19	15:55:00	0.000	698	710	1397	1398	1	1	1	1	1	1	69964	70670
2007/01/19	15:56:00	0.000	696	715	1398	1398	1	1	1	1	1	1	70670	71375
2007/01/19	15:57:00	0.000	699	711	1397	1398	1	1	1	1	1	1	71375	72080
2007/01/19	15:58:00	0.000	699	710	1398	1403	1	1	1	1	1	1	72080	72786
2007/01/19	15:59:00	0.000	700	712	1399	1403	1	1	1	1	1	1	72786	73493
2007/01/19	16:00:00	0.000	699	711	1397	1399	1	1	1	1	1	1	73493	74199
2007/01/19	16:01:00	0.000	697	711	1397	1398	1	1	1	1	1	1	74199	74902
2007/01/19	16:02:00	0.000	698	709	1397	1398	1	1	1	1	1	1	74902	75607
2007/01/19	16:03:00	0.000	696	709	1397	1399	1	1	1	1	1	1	75607	76310
2007/01/19	16:04:00	0.000	699	709	1399	1402	1	1	1	1	1	1	76310	77015
2007/01/19	16:05:00	0.000	702	709	1399	1402	1	1	1	1	1	1	77015	77721
2007/01/19	16:06:00	0.000	701	713	1397	1399	1	1	1	1	1	1	77721	78426
2007/01/19	16:07:00	0.000	699	709	1396	1397	1	1	1	1	1	1	78426	79129
2007/01/19	16:08:00	0.000	699	709	1397	1400	1	1	1	1	1	1	79129	79835
2007/01/19	16:09:00	0.000	701	707	1400	1401	1	1	1	1	1	1	79835	80538
2007/01/19	16:10:00	0.000	694	712	1400	1402	1	1	1	1	1	1	80538	81244
2007/01/19	16:11:00	0.000	696	708	1396	1400	1	1	1	1	1	1	81244	81948
2007/01/19	16:12:00	0.000	699	709	1396	1398	1	1	1	1	1	1	81948	82651
2007/01/19	16:13:00	0.000	698	711	1398	1401	1	1	1	1	1	1	82651	83358
2007/01/19	16:14:00	0.000	698	711	1400	1401	1	1	1	1	1	1	83358	84062
2007/01/19	16:15:00	0.000	694	724	1399	1400	1	1	1	1	1	1	84062	84767
2007/01/19	16:16:00	0.000	696	724	1398	1399	1	1	1	1	1	1	84767	85472
2007/01/19	16:17:00	0.000	685	735	1395	1398	1	1	1	1	1	1	85472	86177

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

Date	Time	Ch. Tag Unit sec		CH01 LFG Flow SCFM MIN	MAX	CH02 Main Temp °F MIN	MAX	CH03 Valve Status MIN	MAX	CH04 Blower Status MIN	MAX	CH05 Flame Proved MIN	MAX	CH31 Total Flow SCF MIN	MAX
2007/01/19	16:18:00		0.000	669	735	1395	1400	1	1	1	1	1	1	86177	86884
2007/01/19	16:19:00		0.000	678	740	1399	1401	1	1	1	1	1	1	86884	87589
2007/01/19	16:20:00		0.000	682	742	1396	1399	1	1	1	1	1	1	87589	88298
2007/01/19	16:21:00		0.000	680	729	1395	1397	1	1	1	1	1	1	88298	89005
2007/01/19	16:22:00		0.000	677	743	1397	1402	1	1	1	1	1	1	89005	89710
2007/01/19	16:23:00		0.000	688	741	1397	1401	1	1	1	1	1	1	89710	90417
2007/01/19	16:24:00		0.000	675	712	1397	1398	1	1	1	1	1	1	90417	91115
2007/01/19	16:25:00		0.000	695	720	1397	1398	1	1	1	1	1	1	91115	91823
2007/01/19	16:26:00		0.000	678	718	1398	1399	1	1	1	1	1	1	91823	92525
2007/01/19	16:27:00		0.000	686	716	1397	1398	1	1	1	1	1	1	92525	93228
2007/01/19	16:28:00		0.000	678	720	1397	1398	1	1	1	1	1	1	93228	93930
2007/01/19	16:29:00		0.000	696	723	1398	1401	1	1	1	1	1	1	93930	94639
End Run 2 Averages				**695**	**715**	**1398**	**1400**	**1**	**1**	**1**	**1**	**1**	**1**		
Fuel Flow	**73 minutes**														
2007/01/19	16:30:00		0.000	682	723	1400	1401	1	1	1	1	1	1	94639	95344
2007/01/19	16:31:00		0.000	696	717	1400	1402	1	1	1	1	1	1	95344	96047
2007/01/19	16:32:00		0.000	699	714	1396	1401	1	1	1	1	1	1	96047	96751
2007/01/19	16:33:00		0.000	699	711	1395	1397	1	1	1	1	1	1	96751	97456
2007/01/19	16:34:00		0.000	693	711	1396	1398	1	1	1	1	1	1	97456	98160
2007/01/19	16:35:00		0.000	699	719	1396	1398	1	1	1	1	1	1	98160	98865
2007/01/19	16:36:00		0.000	701	719	1398	1400	1	1	1	1	1	1	98865	99570
2007/01/19	16:37:00		0.000	697	714	1400	1400	1	1	1	1	1	1	99570	100275
2007/01/19	16:38:00		0.000	694	711	1399	1400	1	1	1	1	1	1	100275	100977
2007/01/19	16:39:00		0.000	689	722	1398	1399	1	1	1	1	1	1	100977	101681
Start Run 3															
2007/01/19	16:40:00		0.000	680	712	1395	1398	1	1	1	1	1	1	101681	102379
2007/01/19	16:41:00		0.000	667	730	1396	1396	1	1	1	1	1	1	102379	103082
2007/01/19	16:42:00		0.000	684	739	1396	1400	1	1	1	1	1	1	103082	103793
2007/01/19	16:43:00		0.000	663	735	1400	1401	1	1	1	1	1	1	103793	104493
2007/01/19	16:44:00		0.000	671	711	1400	1401	1	1	1	1	1	1	104493	105189
2007/01/19	16:45:00		0.000	674	728	1399	1400	1	1	1	1	1	1	105189	105893
2007/01/19	16:46:00		0.000	687	719	1397	1399	1	1	1	1	1	1	105893	106594

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

		Ch.	CH01		CH02		CH03		CH04		CH05		CH31	
		Tag	LFG Flow		Main Temp		Valve Status		Blower Status		Flame Proved		Total Flow	
		Unit	SCFM		°F								SCF	
Date	Time	sec	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
2007/01/19	16:47:00	0.000	698	709	1397	1398	1	1	1	1	1	1	106594	107296
2007/01/19	16:48:00	0.000	698	705	1396	1398	1	1	1	1	1	1	107296	107997
2007/01/19	16:49:00	0.000	698	706	1396	1397	1	1	1	1	1	1	107997	108699
2007/01/19	16:50:00	0.000	696	709	1397	1398	1	1	1	1	1	1	108699	109402
2007/01/19	16:51:00	0.000	698	704	1398	1399	1	1	1	1	1	1	109402	110102
2007/01/19	16:52:00	0.000	697	707	1397	1398	1	1	1	1	1	1	110102	110803
2007/01/19	16:53:00	0.000	699	708	1398	1400	1	1	1	1	1	1	110803	111506
2007/01/19	16:54:00	0.000	695	704	1400	1401	1	1	1	1	1	1	111506	112206
2007/01/19	16:55:00	0.000	698	705	1399	1400	1	1	1	1	1	1	112206	112908
2007/01/19	16:56:00	0.000	698	711	1397	1400	1	1	1	1	1	1	112908	113610
2007/01/19	16:57:00	0.000	697	707	1396	1397	1	1	1	1	1	1	113610	114312
2007/01/19	16:58:00	0.000	688	708	1396	1399	1	1	1	1	1	1	114312	115013
2007/01/19	16:59:00	0.000	697	708	1399	1400	1	1	1	1	1	1	115013	115716
2007/01/19	17:00:00	0.000	689	717	1399	1400	1	1	1	1	1	1	115716	116420
2007/01/19	17:01:00	0.000	697	705	1400	1401	1	1	1	1	1	1	116420	117121
2007/01/19	17:02:00	0.000	694	706	1398	1401	1	1	1	1	1	1	117121	117823
2007/01/19	17:03:00	0.000	689	708	1398	1399	1	1	1	1	1	1	117823	118525
2007/01/19	17:04:00	0.000	698	707	1397	1398	1	1	1	1	1	1	118525	119227
2007/01/19	17:05:00	0.000	697	709	1397	1399	1	1	1	1	1	1	119227	119930
2007/01/19	17:06:00	0.000	699	709	1399	1402	1	1	1	1	1	1	119930	120634
2007/01/19	17:07:00	0.000	699	710	1400	1402	1	1	1	1	1	1	120634	121337
2007/01/19	17:08:00	0.000	697	708	1399	1400	1	1	1	1	1	1	121337	122040
2007/01/19	17:09:00	0.000	696	706	1398	1399	1	1	1	1	1	1	122040	122741
2007/01/19	17:10:00	0.000	697	711	1398	1399	1	1	1	1	1	1	122741	123444
2007/01/19	17:11:00	0.000	699	711	1397	1399	1	1	1	1	1	1	123444	124147
2007/01/19	17:12:00	0.000	697	711	1397	1398	1	1	1	1	1	1	124147	124852
2007/01/19	17:13:00	0.000	701	712	1398	1399	1	1	1	1	1	1	124852	125558
2007/01/19	17:14:00	0.000	693	706	1398	1399	1	1	1	1	1	1	125558	126261
2007/01/19	17:15:00	0.000	699	706	1399	1403	1	1	1	1	1	1	126261	126964
2007/01/19	17:16:00	0.000	696	708	1399	1402	1	1	1	1	1	1	126964	127666
2007/01/19	17:17:00	0.000	695	710	1396	1399	1	1	1	1	1	1	127666	128370
2007/01/19	17:18:00	0.000	700	713	1395	1396	1	1	1	1	1	1	128370	129075
2007/01/19	17:19:00	0.000	701	715	1396	1398	1	1	1	1	1	1	129075	129780

Anchorage Regional Landfill
Gas Collection and Control System Operational Data

Date	Time	Ch. Tag Unit sec	CH01 LFG Flow SCFM		CH02 Main Temp °F		CH03 Valve Status		CH04 Blower Status		CH05 Flame Proved		CH31 Total Flow SCF	
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
2007/01/19	17:20:00	0.000	699	707	1398	1401	1	1	1	1	1	1	129780	130485
2007/01/19	17:21:00	0.000	700	708	1400	1401	1	1	1	1	1	1	130485	131189
2007/01/19	17:22:00	0.000	698	709	1400	1401	1	1	1	1	1	1	131189	131893
2007/01/19	17:23:00	0.000	695	711	1397	1400	1	1	1	1	1	1	131893	132596
2007/01/19	17:24:00	0.000	699	708	1395	1397	1	1	1	1	1	1	132596	133299
2007/01/19	17:25:00	0.000	702	708	1395	1397	1	1	1	1	1	1	133299	134004
2007/01/19	17:26:00	0.000	696	706	1397	1400	1	1	1	1	1	1	134004	134707
2007/01/19	17:27:00	0.000	698	708	1398	1400	1	1	1	1	1	1	134707	135409
2007/01/19	17:28:00	0.000	698	711	1396	1398	1	1	1	1	1	1	135409	136114
2007/01/19	17:29:00	0.000	696	707	1395	1397	1	1	1	1	1	1	136114	136817
2007/01/19	17:30:00	0.000	697	708	1397	1400	1	1	1	1	1	1	136817	137520
2007/01/19	17:31:00	0.000	697	706	1398	1400	1	1	1	1	1	1	137520	138224
2007/01/19	17:32:00	0.000	699	709	1396	1398	1	1	1	1	1	1	138224	138926
2007/01/19	17:33:00	0.000	697	705	1396	1397	1	1	1	1	1	1	138926	139628
2007/01/19	17:34:00	0.000	700	706	1396	1399	1	1	1	1	1	1	139628	140331
2007/01/19	17:35:00	0.000	700	709	1399	1401	1	1	1	1	1	1	140331	141035
2007/01/19	17:36:00	0.000	700	709	1399	1401	1	1	1	1	1	1	141035	141739
2007/01/19	17:37:00	0.000	696	707	1398	1399	1	1	1	1	1	1	141739	142441
2007/01/19	17:38:00	0.000	699	708	1396	1398	1	1	1	1	1	1	142441	143145
2007/01/19	17:39:00	0.000	699	711	1396	1396	1	1	1	1	1	1	143145	143849
2007/01/19	17:40:00	0.000	699	709	1395	1396	1	1	1	1	1	1	143849	144551
End Run 3 Averages			**695**	**710**	**1397**	**1399**	**1**	**1**	**1**	**1**	**1**	**1**		
Fuel Flow	**61 minutes**													
2007/01/19	17:41:00	0.000	699	708	1396	1396	1	1	1	1	1	1	144551	145254
2007/01/19	17:42:00	0.000	699	709	1396	1401	1	1	1	1	1	1	145254	145959
2007/01/19	17:43:00	0.000	697	708	1400	1401	1	1	1	1	1	1	145959	146662
2007/01/19	17:44:00	0.000	698	707	1399	1400	1	1	1	1	1	1	146662	147366

Process Specifications

Landfill Gas Flow rate (max) This will vary according to methane concentration	2000 scfm
Landfill Gas Flow rate (min)	200 scfm
Landfill Gas Composition:	
Methane	50%
CO2, N2, O2, VOC's, H2O, H2S	50%
Heat Release (max)	87.34 MMBtu/hr
Inlet Pressure to Flare	10"-15" WC (approx)
Blower specifications HSI Model 5204	1000 scfm @ -50"wc inlet +10"wc outlet
Blower Surge point (Do not operate blower below this point)	460 scfm
Flue Gas	
Optimal Operating Temperature/F	1625
High Temperature Shutdown/F	2000
Low Temperature Alarm/F	1400

Expected Flue gas composition base on 50% methane:

OPERATING TEMPERTURE

Vol%	1600 F
CO2	5.9
N2	73.5
O2	13.6
H2O	6.8

SITE CONDITIONS

Design Wind Speed	100 MPH standard design
Site Elevation	1000 MSL approx.
Electrical Area Classification	Non-hazardous

EMISSIONS

PARNEL BIOGAS guarantees that the flare will operate without smoke at the design Conditions.

Resident times are in excess of .8 seconds

Expected stack gas emissions

OPERATING TEMPERTURE

	1650 F
Total Hydrocarbon (THC) Destruction Efficiency	>98.9%
Total Non-methane Hydrocarbon (NMHC)Destruction Efficiency	>98.9%
Nox (lbs/MMBtu)	0.06
CO (lbs/MMBtu)	0.20

The above emission values are expected values based on test results of operating Units. Guaranteed values are twice the expected values.

Sulfur emissions will be on a "Mole in = Mole out" basis

UTILITIES

Pilot gas	22 scfh of propane at 20 psig (only used on startup)
Compressed Air or Bottled Nitrogen	Only for fail closed valve. Two standard bottles regulated To 80 psig. One bottle lasts about 6-12 months.
Electricity	480v/3ph/60Hz Parnel Biogas Inc. will provide one 480v/110v step down transformer for the Control panels.

LANDFILL GAS FLARE SYSTEM with BLOWER SKID

FLARE STACK ASSEMBLY:

The Stack assembly is a 9 ft diameter x 45 ft overall height vertical, cylindrical, self- supporting vessel with installed ceramic fiber blanket refractory and burner systems.. System has a thermocouple access ladder to aid in the replacement of the thermocouples if needed.

A-36 or equal material 3/8" minimum thickness welded to A W S standards for maximum structural integrity.

Two (2) 1" layers of ceramic blanket (2600F hot face and 2100F backup/ staggered layers) on I-601 pins and keepers. All seams are overlapped in all directions to accommodate the shrinkage of the blanket after contact with high temperatures

Nozzle projections are as follows:

One (1) 10" 150# flanged inlet

Three (3) Thermocouple connections are located every 10 Ft up the stack. If the flare operates at low flow rates, the lower connections may be used for accurate temperature measurement.

Four (4) flanged 4" flanged flue gas sample points located 90 degrees apart, five feet below the flare exit.

Parnel Biogas Inc. stainless steel rain cap/ refractory protector to prevent rain end soak of the refractory

Trunnion lift lugs located approximately 5 ft from the top of the flame. These lugs do not need to be cut off and can be used again after the flare has been in service.

Thermocouple conduit with standoffs will be mounted to the flare prior to shipment to aid with the installation of the flare.

Installed individual burners with stainless steel flame arrestor tips and Parnel Biogas Inc. flame retention rings.

One (1) Parnel Biogas Inc. proprietary pilot and ignition system. Pilot is accessible from outside the flare.

One (1) flanged 4" sight port assembly

One (2) 2"x 1 1/4" swedge connection for flame scanner

One (1) purge blower connection with 3/4hp purge blower installed

Three (3) heavy-duty air dampers, one with electric actuator for automatic temperature control and two with manual locking hand quadrant, one of manual dampers is hinged to allow access to the base of the flare..

SKID ASSEMBLY

18' x 8' Structural steel skid with decking in accessible areas.

304 Stainless steel process piping

Two HSI model 5204 blower inlet driven mounted on unitary bases with vibration isolators. Coated internals, AMCA B spark resistant construction, explosion proof motors, case drains, expansion joints, pressure, vacuum, and temperature gauges.

Two (2) 5' Check valves

Two (2) 8" Manual valves at blower inlets

One (1) 3' x 6' 304 stainless steel knock-out pot with 2" drain PVC sight glass, removable lid, stainless steel demister pad, 12" inlet and 8" outlet.

CONTROL SYSTEM OPERATION

The following is a brief outline of the control system operation (see section 2 for a more detailed description):

System start-up would begin with a timed purge cycle to purge out any fugitive gas in the stack. After the purge cycle is completed, the pilot is energized and the self-checking flame scanner proves that a pilot is present. Upon pilot prove the Landfill gas fail close valve is opened and the Landfill gas blower is started. Once the self-checking flame scanner proves main flame, the pilot is shut down to limit propane usage. Upon reaching the minimum flare temperature (1400F) the low temperature shutdown or alarm is activated to shut down the system should flare operating temperature drop below the minimum operating temperature. Unit temperature is maintained at the optimal operating temperature by the automatic temperature control louver. Should flare temperature rise above the High temperature set point the flare will be shutdown to protect flare integrity. If main flame prove is lost the flare will go into the auto startup mode. The flare will not attempt to restart after a high temperature shutdown without first clearing the alarm. Cycling of the control panel power will reset all shutdown trips.

CONTROL SYSTEM COMPONENTS

One (1) Yokogawa paperless recorder six inputs.

Master control cabinet including PLC, recorder, panel heater, interior panel light, high and low temperature shutdowns, pilot and automatic temperature control systems.

Pilot gas pressure control

Pilot and main flame detection

Motor starter panel including landfill gas blower motor starters, purge air blower motor starter, blower control circuit breakers

All necessary lights and switches for proper operation of flare system in manual and automatic modes

Safety disconnect

One (1) 480v/110v step down transformer

One (1) 15amp convenience outlet

One (1) 100 watt skid light with manual and photocell control

One (1) 200 amp disconnect

One (1) Xomox fail close pneumatic valve

SERIAL NUMBER 2006160 05-17-2006

COMPONENT VALUES DETERMINED AT CALIBRATION

Integral Transducer

PCB 100385	PCB 100389
R5 800	R10 2610
R7 800	
R8 100	
R9 909	
R15 5760	

FLOW SENSOR - 50 OHMS NI @ 75 deg F
TEMP SENSOR - 100 OHMS NI @ 75 deg F

CALIBRATION POTENTIOMETERS
TA 328 TC 576

OPERATING RANGE

	minimum	maximum	
FLOW	0	2000	SCFM OF LFG 10" SCH.40
TEMPERATURE	40	200	F
PRESSURE	0	15	PSIG

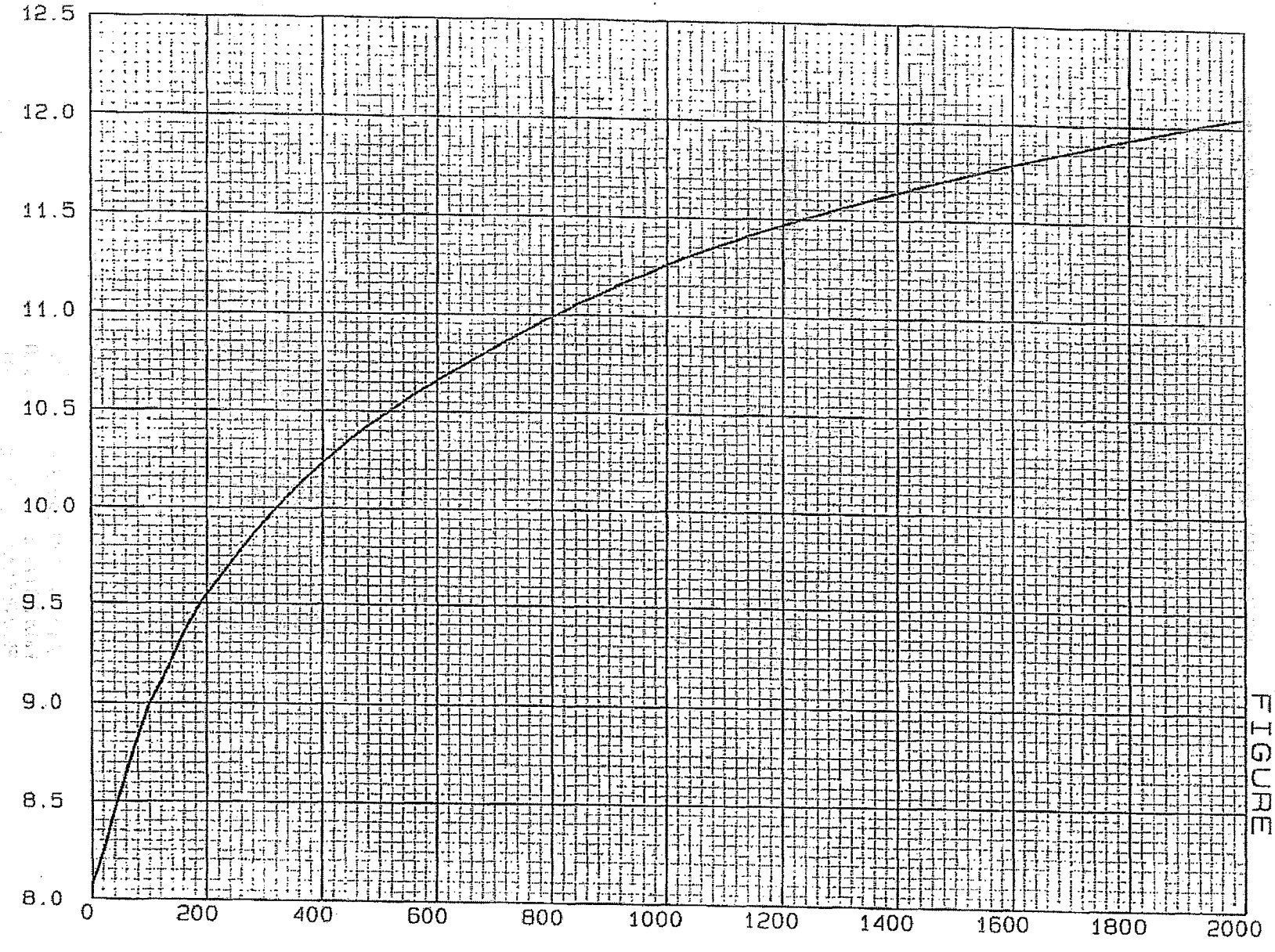
COMMENTS --
TOTALIZER = X 10 SCF

METER OUTPUT SIGNAL CALIBRATION

mA	SCFM OF LFG 10" SCH.40	EXC Volts
4	0	8.070
4.32	40	8.460
4.64	80	8.830
4.96	120	9.100
5.28	160	9.350
5.6	200	9.550
7.2	400	10.230
8.8	600	10.660
10.4	800	10.990
12	1000	11.260
13.6	1200	11.470
15.2	1400	11.640
16.8	1600	11.790
18.4	1800	11.930
20	2000	12.050

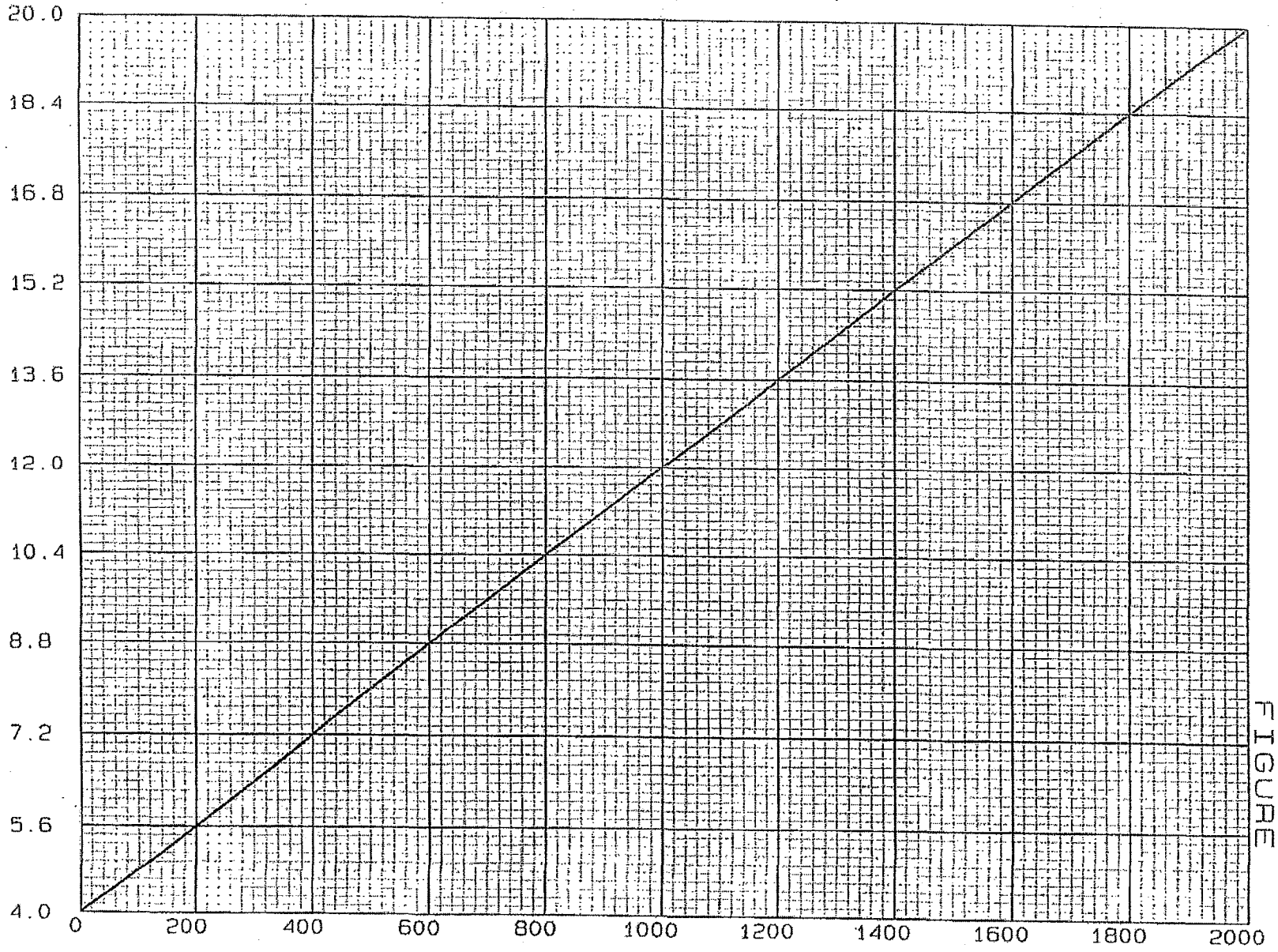
9500 EEPROM Setup Data

Maximum Calibrated Flow	2000
Flow FS at 20ma	2000.0
Flow Full Scale Displayed	2000.0
Totalizer Counts per/minute	200
Totalizer Decimal Point	0
Zero Offset	0
Display Cutoff	4% FS
Filter Time Constant	1 Sec



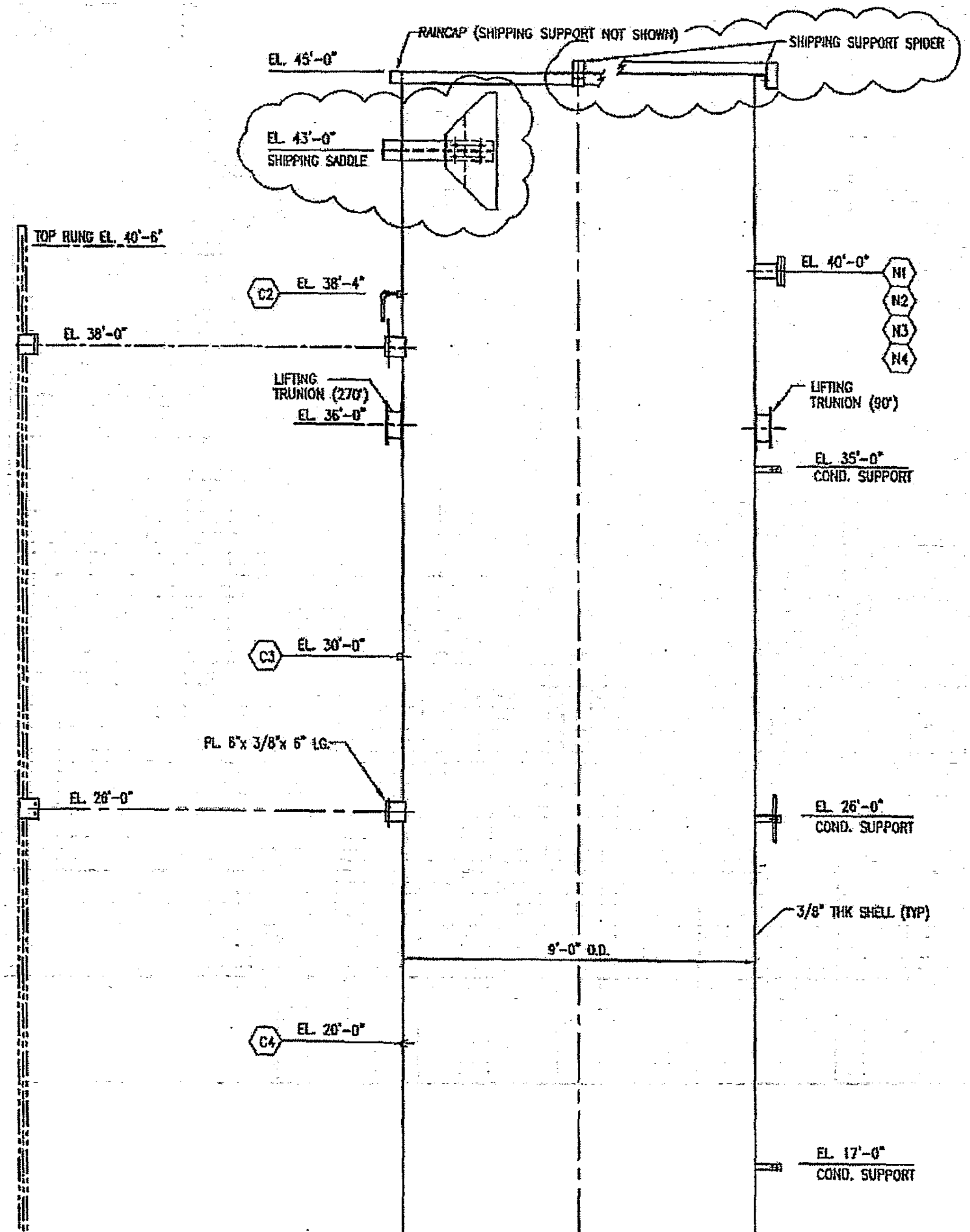
FIGURE

S/N 2006160.0
05-17-2006



FIGURE

S/N 2006160.0
05-17-2006

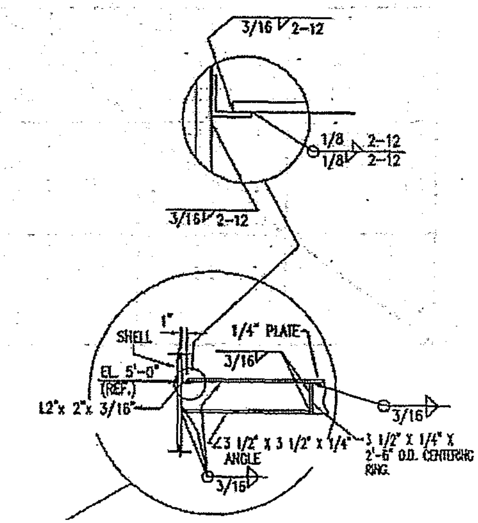


NOZZLE LEGEND

MK	QTY	DESCRIPTION
N1-N4	4	TEST PORTS - 4"-150# RFSO W/ BLIND (STD. WT.)
N5	1	2" PILOT MTG.-2" SCR'D CAP (SEE DETAIL)
N6	1	4" SIGHT PORT MTG.- 4"-150# FFSO (STD. WT.)
N7-9	4	DAMPER MTG. 36" X 48" FAB FLG.-SEE DAMPER MTG. DETAIL
N11	1	10" GAS INLET- 10"-150# FFSO (STD. WT.)
N12	1	6" BLOWER MTG.- SEE DETAIL
C1	1	1 1/4" SCANNER CONN.- 2"x 1 1/4" M.N.P.T.
C2-C4	3	1" TEMP. CONN.- 1" F.N.P.T. W/ PLUG
C5	1	1/2" PILOT GAS CONN. - 1/2" M.N.P.T.

REFRACTORY LEGEND

A	1" CERWOOL 2600° HTZ 6# DENSITY OR EQUAL BACKED W/ 1" CERWOOL 2100° HT 4# DENSITY OR EQUAL W/ INCONEL 601 ANCHORS AND RETAINERS (SPACE PER DETAIL)
B	1" CERWOOL 2100° HT 4# DENSITY OR EQUAL W/ INCONEL 601 ANCHORS AND RETAINERS, COVERED W/ 19 GA. GALV. HARDWARE CLOTH. (2 GRIDS PER INCH)
C	2" THERMOTECH "A" BOARD W/ INCONEL 601 ANCHORS AND RETAINERS (2300° F)

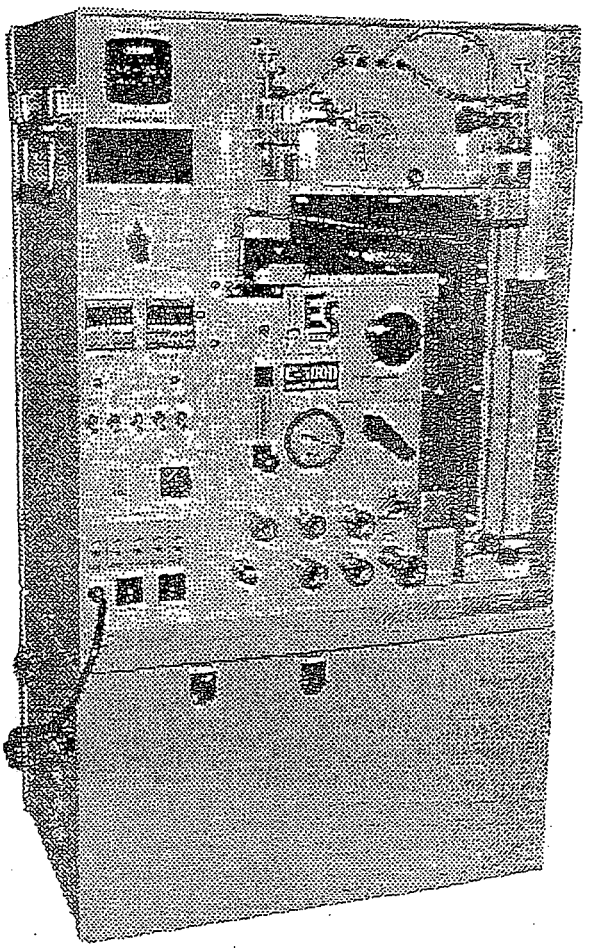


Appendix E

Quality Assurance Data

2.1 CONTROL CONSOLE

Periodic inspection of the C-5000 Source Sampler console components is essential to maintain proper operation of the system. Regular maintenance will insure a long system lifetime.



2.1.1 Maintenance Access

The C-5000 console components are designed to be easily accessible by removal of only the rear panel for periodic inspections and maintenance. Having the plumbing and electical panels mounted independently will be much appreciated. The front and rear covers can be removed by releasing the eight cover latches (four on each). It is seldom necessary to remove the casing wrap, however, if this becomes necessary, first unscrew the eight electrical and plumbing panel securing screws located on the sides and top of the casing wrap. Second, the ventilating fan wires must be disconnected at the terminal plug located on the side of the fan housing. Finally, unscrew the 6 base securing screw and remove the casing wrap by lifting straight up with care not to disturb the remaining assembly. To maintain stability of the console plumbing and electrical panel assemblies the screws securing these panels to the base should remain in place. Alternatively, the plumbing and electrical panel assemblies may be individually removed for specific maintenance procedures by unscrewing the top, side and base panel securing screws. For ease of removal, unscrew the 3 casing wrap-to-base securing screws on the side corresponding to the electrical or plumbing panel that is being removed. Pull the lower edge of the casing wrap slightly away from the base to release the panel from behind the curled edge of the casing wrap and maneuver the panel carefully towards the front of the unit.

Check the general condition of all components and make necessary repairs. The oil level in the small oiler bottle must be maintained to prevent damage to the vacuum pump.

2.1.2 Pump

A Gast fiber vane vacuum pump draws the stack gases through the sample train. This rotary pump is a precision instrument with .002 clearance at the top and .0025"–.0035" total at the ends of the rotor. The vanes self-adjust with wear and should last 5,000–15,000 hours depending upon operating conditions. It is designed for pumping dry air and should be protected against dirt and excessive moisture. With proper treatment and regular lubrication this pump requires little additional maintenance to insure a long working life.

Regular Pump Maintenance

There is a small hole in the top of the rear panel for regular inspection of the knockout jar. This jar should be emptied when accumulated oil interferes with the normal flow of air to the dry gas meter.

Frequent removal and cleaning of the oiler jar is required when the oil level is low or the oil is dirty. An inspection port and removable panel are located on the right rear side of the unit. Unscrew the oiler jar and fill with clean oil as

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 2/6/2007 | METER SERIAL #: m-2 | BAROMETRIC PRESSURE (in Hg): INITIAL 30.03, FINAL 30.03, AVG (P_{bar}) 30.03

METER PART #: | CRITICAL ORIFICE SET SERIAL #:

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
16	1	0.4208	20	542.485	548.579	6.094	59	62	62	62	63	62.25	11.00	0.85	6.1978	6.1034	0.9848		1.5531
16	2	0.4208	20	548.579	557.987	9.408	59	62	63	63	64	63	17.00	0.85	9.5545	9.4325	0.9872		1.5531
16	3	0.4208	20	557.987	564.640	6.653	59	63	64	63	63	63.25	12.00	0.85	6.7534	6.6582	0.9859		1.5531
																AVG =	0.9860	0.21	
19	1	0.5003	19	525.376	530.630	5.254	59	62	61	61	61	61.25	8.00	1.2	5.3583	5.2774	0.9849		1.5511
19	2	0.5003	19	530.630	537.218	6.588	59	62	62	61	61	61.5	10.00	1.2	6.7156	6.5968	0.9823		1.5511
19	3	0.5003	19	537.218	542.485	5.267	59	62	63	62	63	62.5	8.00	1.2	5.3587	5.2774	0.9848		1.5511
																AVG =	0.9840	0.02	
23	1	0.6384	19	496.005	506.059	10.054	58	57	58	58	58	57.75	12.00	2	10.3432	10.1110	0.9776		1.5846
23	2	0.6384	19	515.350	520.362	5.012	58	58	58	59	59	58.5	6.00	2	5.1487	5.0555	0.9819		1.5846
23	3	0.6384	19	520.362	525.376	5.014	58	60	60	61	61	60.5	6.00	2	5.1310	5.0555	0.9853		1.5846
																AVG =	0.9816	-0.23	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.9839

AVERAGE $\Delta H_@$ = 1.5629

(1) $V_m(std) = K_1 V_m \frac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \frac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H$

Outlet DGM

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

ENVIRONMENTAL SUPPLY COMPANY

Quality - Service - Reliability

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 8/13/2006 | METER SERIAL #: M1 | BAROMETRIC PRESSURE (in Hg): INITIAL 29.97, FINAL 29.91, AVG (P_{bar}) 29.94

METER PART #: | CRITICAL ORIFICE SET SERIAL #:

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (In Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
19	1	0.5032	19.0	680.80	687.020	6.220	62	65	66	66	65	65.5	10.00	1.7	6.2811	6.5961	1.0502		2.1979
	2	0.5032	19	687.020	693.198	6.178	62	66	68	65	66	66.25	10.00	1.7	6.2298	6.5961	1.0588		2.1979
	3	0.5032	19.0	693.198	700.0	6.802	62	68	69	66	67	67.5	11.00	1.7	6.8427	7.2557	1.0604		2.1979
																AVG =	1.0564	0.29	
16	1	0.4208	20	700.0	705.136	5.136	62	69	69	69	71	69.5	10.00	1.2	5.1409	5.5160	1.0730		2.2185
	2	0.4208	20.0	705.136	710.308	5.172	62	69	72	71	70	70.5	10.00	1.2	5.1672	5.5160	1.0675		2.2185
	3	0.4208	20	710.308	716.024	5.716	62	72	73	70	71	71.5	11.00	1.2	5.6999	6.0676	1.0645		2.2185
																AVG =	1.0683	1.42	
23	1	0.6384	18.0	716.024	723.30	7.276	63	73	76	71	72	73	9.00	2.7	7.2617	7.5243	1.0362		2.1729
	2	0.6384	18.0	723.30	732.248	8.948	63	76	74	72	78	75	11.00	2.7	8.8970	9.1963	1.0336		2.1729
	3	0.6384	18	732.248	740.395	8.147	63	74	81	78	75	77	10.00	2.7	8.0704	8.3603	1.0359		2.1729
																AVG =	1.0352	-1.72	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.0533

AVERAGE $\Delta H_@$ = 2.1964

(1) $V_m(std) = K_1 V_m \frac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

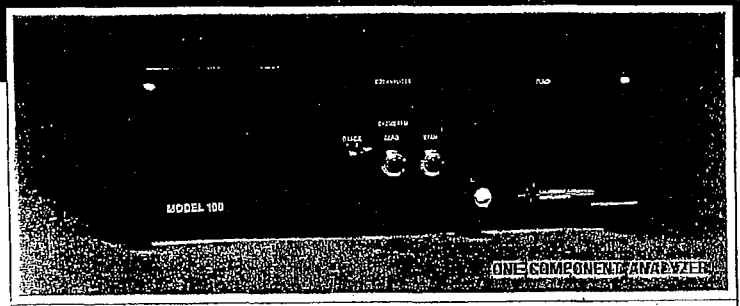
(3) $Y = \frac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

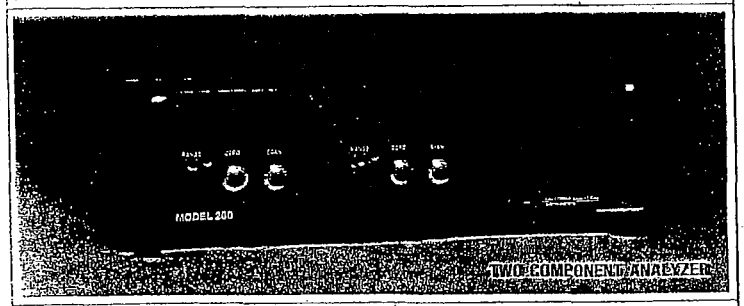
$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H$

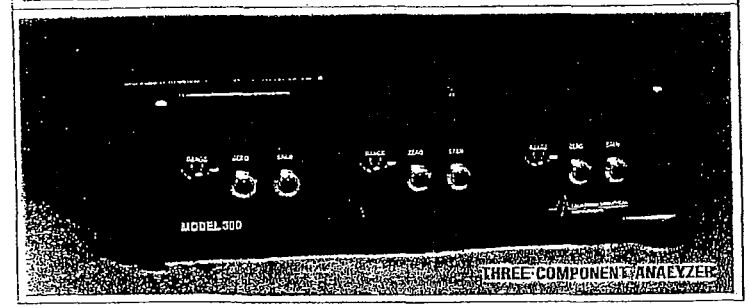
Inlet DGM

CONFIGURE-YOUR-OWN

$CO \bullet CO_2 \bullet CH_4 \bullet O_2 \bullet SO_2$ GAS ANALYZERS







California Analytical Instruments, Inc.

SPECIFICATIONS

SPECIFICATION	NONDISPERSIVE INFRARED (NDIR)				OXYGEN	
	CO	CO_2	CH_4	SO_2	O_2	O_2
DETECTOR	Microflow				Paramagnetic	Galvanic Fuel Cell
SAMPLE CONTACT MATERIAL	Stainless steel and Tygon® disposable gold plated cell liner. Window material CaF_2				Platinum, Glass, Stainless Steel, Viton and Tygon®	Stainless Steel and Tygon®
RANGES	See Table, Page 3				See Table, Page 3	See Table, Page 3
LINEARITY	Better than 1% Full Scale				Better than 1% Full Scale	Better than 1% Full Scale
REPEATABILITY	Better than 1% Full Scale				Better than 1% Full Scale	Better than 1% Full Scale
RESPONSE TIME	90% of Full Scale in less than 1 second*				90% of Full Scale in 2 seconds	90% of Full Scale in 5 seconds
SAMPLE FLOW RATE	0.5 to 2 liters/minute				1 liter/minute	1 liter/minute
NOISE	Less than 1% Full Scale				Less than 1% Full Scale	Less than 1% Full Scale
ZERO & SPAN DRIFT	Less than 1% of Full Scale in 24 hours				Less than 1% of Full Scale in 24 hours	Less than 1% of Full Scale in 24 hours
ZERO & SPAN, ADJUSTMENT	Ten turn potentiometer				Ten turn potentiometer	Ten turn potentiometer
DISPLAY	Individual 4½ digit panel meter				3½ digit panel meter	3½ digit panel meter
OUTPUTS	Select: 0-10VDC or 4-20 or 0-20mA (RS-232 optional)				Select: 0-10VDC and 4-20 or 0-20mA (RS-232 optional)	Select: 0-10VDC and 4-20 or 0-20mA (RS-232 optional)
ALARMS (optional)	2 each Form C-10A SPDT and Form A-5A SPST (Dry Relay Contacts)				Single or Dual SPDT-5A (Dry Relay Contacts)	Single or Dual SPDT-5A (Dry Relay Contacts)
AMBIENT TEMPERATURE	–5 to 45°C				–5 to 45°C	–5 to 45°C
SAMPLE TEMPERATURE	0 to 50°C				0 to 50°C	0 to 50°C
SAMPLE CONDITION	Clean, non-condensing gas				Clean, non-condensing gas	Clean, non-condensing gas
FITTINGS	1/4" tube				1/4" tube	1/4" tube
POWER REQUIREMENTS	115/220/240 VAC, 50/60 Hz, 70 watts/channel				115/220/240 VAC, 50/60 Hz, 70 watts/channel	115/220/240 VAC, 50/60 Hz, 70 watts/channel
DIMENSIONS	5¼"H x 19"W x 23"D 133mm x 483mm x 508mm				5¼"H x 19"W x 15"D 133mm x 483mm x 381mm	5¼"H x 19"W x 15"D 133mm x 483mm x 381mm
RELATIVE HUMIDITY	Less than 90% R.H.**				Less than 90% R.H.**	Less than 90% R.H.**
WEIGHT (single unit)	24 lbs. (approximate) 10.8 Kg				15 lbs. (approximate) 6.8 Kg	10 lbs. (approximate) 4.8 Kg

*Depending on cell length and flow rate **Non-condensing

Specifications are subject to change without notice.

California Analytical Instruments, Inc.

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Telephone: (714) 974-5560 • Fax: (714) 921-2531
Web site: www.gasanalyzers.com

CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section No. 2.2, Procedure . G-1

Cylinder Number: CC202253

Customer: AIR LIQUIDE ALASKA
ANCHORAGE, AK

P.O. Number: 15163
Item Number:

Shipping Order Number: 22353923
Transfer Number:
Lot Number: SFS100348
Valve: CGA 590
Cyl. Pressure:* 2000PSIG

*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 18-Sep-06

Expiration Date: 18-Sep-09

COMPONENT	REQUESTED Concentration	ASSAY Concentration
Carbon Dioxide	4 %	4.00 ± 0.05 %
Oxygen	14 %	14.0 ± 0.2 %
Nitrogen	Balance	Balance

Reference Standard Employed For Analysis:

Concentration				Component	Balance	SRM Cyl. No.	NTRM No.	Exp. Date	Sample No.	Type
5.012	±	0.035	%	Carbon Dioxide	Nitrogen	CC62828	950808	06/29/08	PA	GMIS
21.19	±	0.11	%	Oxygen	Nitrogen	CC62828	950808	06/29/08	PA	GMIS

Analysis Information

Component	Carbon Dioxide		First Triad Analysis: 9/18/2006			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units
Manufacturer:	Hewlett Packard	Zero	0	0	0	%
Model Number:	5890A	Reference	5.008	5.011	5.007	%
Serial Number:	3336A54620	Candidate	3.998	4.004	4.003	%
MPR Last Calibrated:	09/08/06	Result	4.001	4.005	4.007	%
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:		4.004	%

Component	Oxygen		First Triad Analysis: 9/18/2006			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units
Manufacturer:	Hewlett Packard	Zero	0	0	0	%
Model Number:	5890A	Reference	21.10	21.12	21.13	%
Serial Number:	3336A54620	Candidate	13.99	13.99	13.97	%
MPR Last Calibrated:	09/15/06	Result	14.05	14.04	14.01	%
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:		14.03	%

Analyst Signature: _____ Eric Barron

Approved by: _____ David Connolly

AIR LIQUIDE AMERICA, L.P. Region Office • 8832 Dice Road, Santa Fe Springs, CA 90670-2516
Phone: (562) 945-1383 • Fax: (562) 693-1156

CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section No. 2.2, Procedure . G-1

Cylinder Number: CC140375

Customer: AIR LIQUIDE ALASKA
ANCHORAGE, AK
P.O. Number: 13459
Item Number:

Shipping Order Number: 20054030
Transfer Number:
Lot Number: SFS94846
Valve: CGA 590
Cyl. Pressure:* 2000PSIG
*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 22-Mar-06

Expiration Date: 22-Mar-09

COMPONENT	REQUESTED Concentration	ASSAY Concentration
Oxygen	**8 %**	**8.00 ± 0.12 %**
Carbon Dioxide	**8 %**	**8.00 ± 0.12 %**
Nitrogen	**Balance**	**Balance**

Reference Standard Employed For Analysis:

Concentration				Component	Balance	SRM Cyl. No.	NTRM No.	Exp. Date	Sample No.	Type
8.99	±	0.10	%	Oxygen	Nitrogen	CC62873	SFS69605	10/26/06	QN	GMIS
18.0	±	0.2	%	Carbon Dioxide	Nitrogen	CC62873	SFS69605	10/26/06	QN	GMIS

Analysis Information

Component	Oxygen		First Triad Analysis: 3/22/2006			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units
Manufacturer:	Hewlett Packard	Zero	0	0	0	%
Model Number:	5890A	Reference	8.973	8.992	9.004	%
Serial Number:	3336A54620	Candidate	7.999	8.008	8.003	%
MPR Last Calibrated:	03/16/06	Result	8.014	8.006	7.991	%
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:		8.004	%

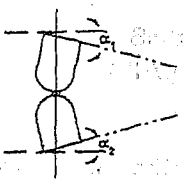
Component	Carbon Dioxide		First Triad Analysis: 3/22/2006			
Analyzer Information			Trial 1	Trial 2	Trial 3	Units
Manufacturer:	Hewlett Packard	Zero	0	0	0	%
Model Number:	5890A	Reference	18.078	18.011	17.971	%
Serial Number:	3336A54620	Candidate	8.016	8.008	8.013	%
MPR Last Calibrated:	03/07/06	Result	7.981	8.003	8.026	%
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID	
			MEAN ANALYTICAL RESULT:		8.003	%

Analyst Signature: _____ Eric Barron

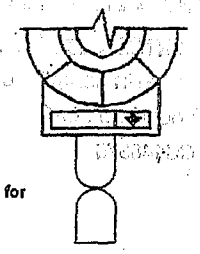
Approved by: _____ Jason Unger

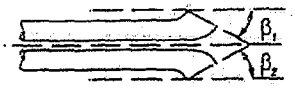
AIR LIQUIDE AMERICA, L.P. Region Office • 8832 Dice Road, Santa Fe Springs, CA 90670-2516
Phone: (562) 945-1383 • Fax: (562) 693-1156

CALIBRATION DATA SHEET 2
Type S Pitot Tube Inspection

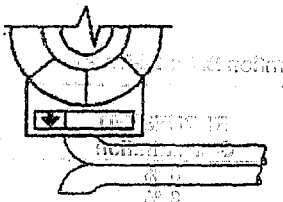


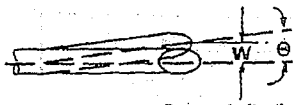
Degree indicating level position for determining α_1 and α_2.



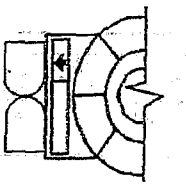


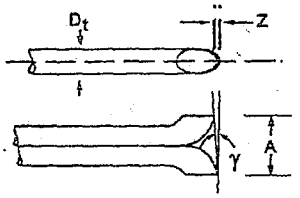
Degree indicating level position for determining β_1 and β_2.

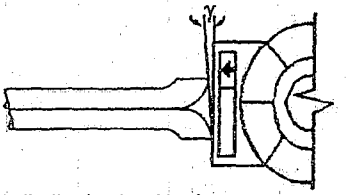




Degree indicating level position for determining Θ.







Degree indicating level position for detemining γ then calculate Z.

Level and Perpendicular?	Yes
Obstruction?	NO
Damaged?	NO
α_1 $(-10° \le \alpha_1 \le +10°)$	-1°
α_2 $(-10° \le \alpha_2 \le +10°)$	0°
β_1 $(-5° \le \beta_1 \le +5°)$	+1°
β_2 $(-5° \le \beta_2 \le +5°)$	+1°
γ	0
Θ	0
z = A tan γ (≤ 0.125")	✓
w = A tan Θ (≤ 0.03125")	✓
D_t (3/16" ≤ D_t ≤ 3/8")	3/8
A	.95
$A/2D_t$ $(1.05 \le P_A/D_t \le 1.5)$	1.26

t-couple	Thermo
59	59.1
301	302.1

QA/QC Check

Completeness ____ ✓ Legibility ____ ✓ Accuracy ____ ✓ Specifications ____ ✓ Reasonableness ____ ✓

Certification

I certify that the Type S pitot tube/probe ID# S-1 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor C_p of 0.84.

Certified by: W.W. [signature]
Personnel (Signature/Date)

[signature]
Team Leader (Signature/Date)

2/6/17

Appendix F

Project Participants

Project Participant	Role
Bill Hudson	AST Project Manager
Russ Butler	BC Excavating
Pat Sullivan	SCS Engineers
Steve Cooper	MOA Solid Waste Services
Mike Porter	AtmAA Laboratory
Shelley Hokenson	Technical Writer

Appendix G

Project Correspondence

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION
DIVISION OF AIR QUALITY
AIR PERMITS PROGRAM

SARAH PALIN, GOVERNOR
555 Cordova Street
Anchorage, AK 99501-2617
PHONE: (907) 269-7577
FAX : (907) 269-7508
http://www.dec.state.ak.us/

CERTIFIED MAIL: 7006 0100 0002 9149 0452
Return Receipt Requested

January 16, 2007

Robert Hall, Director
MOA Solid Waste Services
PO Box 196650
Anchorage, AK 99519-6650

Subject: Proposed Source Test Plan for the Anchorage Regional Landfill Gas Collection and Control System, Operating Permit No. AQ0624TVP01, File No. 2100.16.039

The Alaska Department of Environmental Conservation (ADEC) received and reviewed your source test plan dated December 5, 2006. The test is currently scheduled for January 19, 2007.

The plan proposed to conduct the source test in accordance with prescribed Reference Methods identified in 18 AAC 50.040, including 40 CFR Part 60 – Appendices A-F. The adaptation of Methods 25C and TO-14 to sample and analyze for non-methane organic compounds (NMOC), volatile organic compounds (VOC), and methane is acceptable. At this time, you are approved to conduct the source test in accordance with the plan.

Please Note: Although not required by EPA methods, ADEC suggests that a field blank be collected to evaluate potential residual contamination and sample bias from the heated sample lines. ADEC also requests that Alaska Source Testing, LLC submit with the source test report, the AtmAA Quality Assurance/ Quality Control data package.

If you feel you must modify or deviate from the plan, please contact Bob Morgan at (907) 269-7685 as soon as possible. You must receive written approval of any modifications or deviations before conducting the test. Bob Morgan and Ann Mason will be on-site the morning of January 19th to observe the source test.

The final test results are due within 60 days of test completion. When submitting the final report, please make sure to include the responsible official's signature and certification required by 18 AAC 50.205.

Please contact me if you have any questions concerning this letter. I can be reached by phone, 907-269-7685, or email, Bob_Morgan@dec.state.ak.us.

Sincerely,

Bob Morgan

Bob Morgan
Environmental Program Specialist III
Air Permits Program

cc: Mark Madden, P.E., MOA SWS, Manager Planning & Engineering
Steve Cooper, MOA SWS, Environmental Specialist
Patrick Sullivan, SCS Engineers, Vice President
Bill Hudson, President Alaska Source Testing, LLC
P. Moses Coss, APP/ Files/ Fairbanks
C. Espinoza, APP Files/Anchorage
J. Baumgartner, APP Files/Juneau

G:\AQ\Permits\Awq-permits\Airfacs\Anchorage Regional Landfill\Source Testing\624 ADEC Test Plan Approval Ltr.doc

W. M. HUDSON
President

ALASKA SOURCE TESTING, LLC
ALASKAN OWNED AND OPERATED

January 5, 2007

Environmental Technician
Division of Air and Water Quality
State of Alaska
610 University Ave.
Fairbanks, AK 99709

Subject: Municipality of Anchorage 10-Day Notification of Source Test

Dear Environmental Technician:

On behalf of the Municipality of Anchorage (permit 624TVP01, Revision 1), we would like to provide the Department with a 10-day notification of source testing the gas collection and control system (flare) at the Anchorage Regional Landfill. Alaska Source Testing is scheduled to perform the test on January 18, 2007. The test will be performed as outlined in the test plan submitted December 5, 2006.

If you, or anyone else in your office, have any questions or would like any additional information, please call at the number listed in the footer of this letter.

Sincerely,

Shelley Hokenson
Alaska Source Testing

Cc: Russ Butler, BC Excavating
Pat Sullivan, SCS Engineers
Bill Hudson, AST

520 W. 58th, UNIT A • ANCHORAGE, ALASKA 99518 • PHONE 907.562.2880 • FAX 907.569.4225 • CELL 907.351.3216
E-MAIL: AKSourceTesting@acsalaska.net

W. M. HUDSON
President

ALASKA SOURCE TESTING, LLC
ALASKAN OWNED AND OPERATED

December 5, 2006

Environmental Technician
Division of Air and Water Quality
State of Alaska
610 University Ave.
Fairbanks, AK 99709

Subject: Municipality of Anchorage

Dear Environmental Technician:

On behalf of the Municipality of Anchorage, please find enclosed two copies of a test plan for the gas collection and control system (flare) source test. Testing is tentatively scheduled for January 2007.

If you, or anyone else in your office, have any questions or would like any additional information, please call at the number listed in the footer of this letter.

Sincerely,

Shelley Hokenson
Alaska Source Testing

Cc: Russ Butler, BC Excavating
Pat Sullivan, SCS Engineers
Bill Hudson, AST

520 W. 58th, UNIT A • ANCHORAGE, ALASKA 99518 • PHONE 907.562.2880 • FAX 907.569.4225 • CELL 907.351.3216
E-MAIL: AKSourceTesting@acsalaska.net

ADEC Source Test Plan Summary Form

For EACH source being tested, attach a completed version of this form to the source test plans that are submitted to ADEC within 30 to 60 days prior to testing.

Municipality of Anchorage

Name of Permittee Anchorage Regional Landfill

Facility Name

1. Reason for the Source Test:

X Permit Requirement: provide the following information.

Permit # 624TVP01 Revision 1

Condition 5.3b

Deadline for Completion of Source Testing: _____

θ ADEC Request: provide the following information.

Type of request: circle one of the following.

COBC NOV Letter Email Verbal Other (describe below)

If COBC or NOV, provide #_____

Date of the Request: _____

Deadline for Completion of Source Testing: _____

1. Source Test Information:

Source ID No.	
Source Name	Gas Collection and Control System (Flare)
Air Pollution Control Device Being Tested	Flare
Scheduled Testing Dates	January 2007
Pollutants Measured	NMOC, TO-14 Voc, CH_4
Reference Methods	1, 2, 2D, 3A, 4, 25C (field methods)
Number of Tests	1
Test Conditions (Operational Loads)	Normal operation
Number of Runs per Test Condition	3
Duration of Each Test Run	60 minutes

3. Alternative Test Plans (these require administrator approval): Detail proposed deviations from reference method protocol.

3. Sample Port Location: See page 2 of test plan

3. Traverse Point Locations for Velocity, Particulate, and Other Sampling: See page 2 of test plan.

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.

Shelley Hokenson — Printed Name

S Holz — Signature

Dec 5, 2006 — Date

Source Test Plan
Municipality of Anchorage, Solid Waste Services
Anchorage Landfill
Gas Collection and Control System
Inlet/Outlet NMOCs, TO-14 VOCs, O_2, CO_2, CH_4, and N_2,
Inlet Total Reduced Sulfur Compounds

Prepared for:
BC Excavating, Inc.
2251 Cinnabar Loop
Anchorage, AK 99507

Prepared by:
Alaska Source Testing LLC
520 W 58th Unit A
Anchorage, Alaska 99518

December 4, 2006

1 Introduction

The Municipality of Anchorage – Solid Waste Services (MOA-SWS) owns and operates the Anchorage Regional Landfill. The landfill is located at 15500 East Eagle River Loop Road, Eagle River, Alaska.

In accordance with operating permit 624TVP01, Revision 1, the MOA-SWS recently installed a flare as a collection and control system to capture the gas generated within the landfill as required by Condition 5.2.

BC Excavating, Inc., the MOA-SWS contractor for the project, engaged Alaska Source Testing, LLC to conduct the source testing on the flare. The scope of this testing, measured in accordance with *40 CFR 60* Appendix A, includes:

- Inlet and outlet flow and moisture measurements, Method 2, 2D & 4
- inlet and outlet non-methane hydrocarbons (NMOC), Method 25C
- inlet and outlet testing for toxics, EPA Method TO-14
- inlet and outlet testing for oxygen (O_2), methane (CH_4), carbon dioxide (CO_2), and nitrogen (N_2)
- inlet testing for total reduced sulfur compounds, SCAQMD Method 307.91 (this method is compliant with EPA Method 15/16)
- inlet and outlet BTU testing

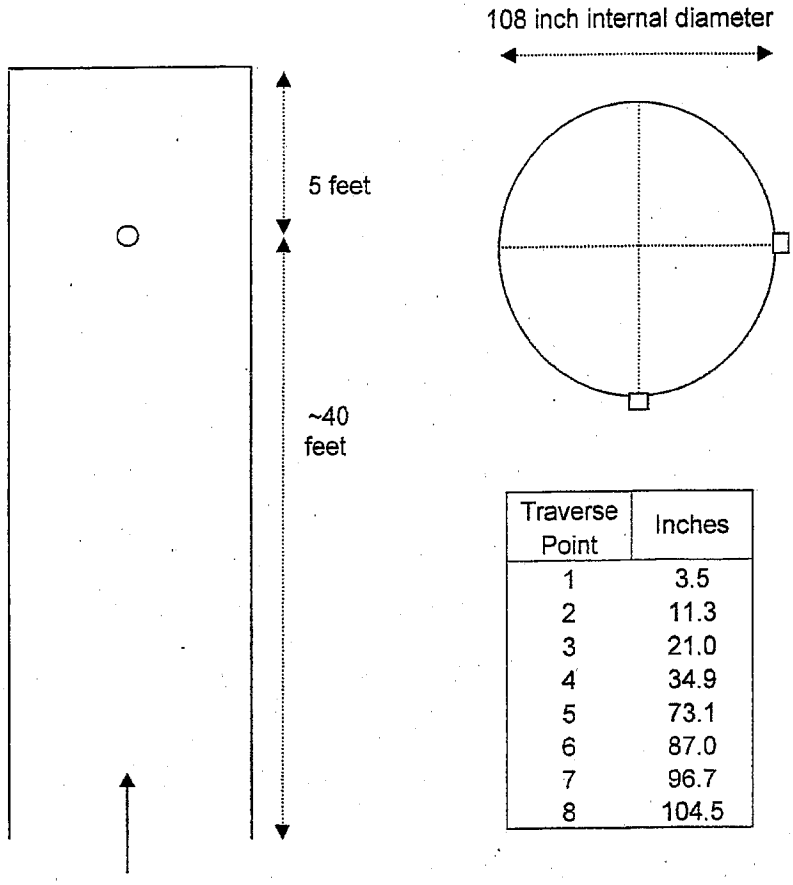
2 Source Description

The landfill gas flare system with blower skid is manufactured by Parnel Biogas Inc. The flare system will process landfill gases at a rate of 200 – 2000 scfm. The optimal operating temperature is 1625°F; the low/high temperature alarm/shutdown is 1400/ 2000°F.

The stack assembly is 9 feet in diameter and 45 feet high. The stack is equipped with four, four-inch sample ports. The ports are located five feet upstream of the stack exit and more than two stack diameters downstream of the flare.

The sample ports meet USEPA Method 1 siting criteria. A schematic of the port locations and traverse points follows.

Municipality of Anchorage Landfill Flare Stack Schematic



Traverse Point	Inches
1	3.5
2	11.3
3	21.0
4	34.9
5	73.1
6	87.0
7	96.7
8	104.5

Drawing not to scale

3 Source Test Description

3.1 Test Objectives

The main objective is to calculate the NMOC destruction efficiency by weight percent and outlet concentration expressed as hexane at 3% oxygen.

3.2 Data Analysis

AtmAA, Inc. laboratory of California will analyze the collected samples for the following:

- Inlet/outlet O_2, CO_2, N_2, and CH_4, emissions in percent
- Inlet/outlet N_2, and CH_4, emissions in dry volumetric parts per million (dvppm)
- Inlet/outlet NMOC emissions in dvppm, pounds per million British Thermal Units (lb/MMBtu), and pounds per hour (lbs/hr)
- Inlet total reduced sulfur compounds
- Inlet/outlet Btu content

AtmAA, Inc. is an independent, full-service laboratory. AtmAA will provide all applicable quality control data as specified in the reference methods. Custody transfer records will be maintained throughout shipping and testing.

Alaska Source Testing will perform the following calculations from the AtmAA results:

- Inlet/outlet NMOC emissions in pounds per million British Thermal Units (lb/MMBtu), and pounds per hour (lbs/hr)
- Calculation of sulfur dioxide (SO_2) emissions assuming 100% conversion from inlet total reduced sulfur compounds

Per Condition 18.3 of air permit 624TVP01, emissions will also be converted to kilograms per hour (kg/hr)

Inlet/ outlet flow and moisture content (Method 2/2D and 4) will be measured in order complete calculations.

3.3 Test Methods

The on site source testing program will be performed in accordance with USEPA Reference Methods as prescribed in 40 *CFR* 60, Appendix A. The specific methods are listed below.

• Method 1	Sample and Velocity Traverses for Stationary Sources
• Method 2	Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot tube)
• Method 2D	Measurement of Gas Volume Flow Rates in Small Pipes and Ducts
• Method 3A	Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)
• Method 4	Determination of Moisture Content in Stack Gases
• Method 25C	Determination of Non-Methane Organic Compounds (NMOC) in Landfill Gases

3.4 Description of Field Procedures

Prior to the source test, SUMMA canisters and flow control units for sample collection will be supplied from AtmAA, Inc. laboratory. The SUMMA canisters will be evacuated and leak checked by the laboratory. A copy of the leak check will be included in the source test report. Additionally, AtmAA will supply Tedlar bags for sulfur compound testing from the inlet gas site.
Three samples from the inlet location and three samples from the outlet location will be collected. Three Tedlar bags for the sulfur testing will be collected.

Method 2/2D measurements for velocity and Method 4 measurements for moisture content will be performed either immediately prior to or after each Method 25C sample is drawn.

The velocity will be measured by using a standard type Pitot tube connected to a calibrated magnahelix differential pressure gauge. Temperatures will be recorded using a type K thermocouple and a hand held Omega reader.

The oxygen/carbon dioxide measurements will be taken by inserting a stainless steel probe equipped with a filter into the stack. The ports will be sealed with hot cloth to stop air in-leakage. Sample will be withdrawn through heated sample lines that flowed through an Alfa Lavel sample chiller. Individual sample pumps draw the sample from the stack through the heated line and chiller, discharge into a flow distribution box, and then to the individual analyzers. Initial analyzer calibration was performed by introducing USEPA Protocol I gasses directly to the back of the analyzers. Subsequent zero and span checks will be performed by introducing calibration gas through the entire sample systems.

Stack moisture will be measured using a second dedicated probe. Stack gas will be drawn through the probe through and an impinger train in accordance with Method 4. AST utilizes an ESC model C-5000 source sampling system for the moisture determination. Configuration of the test trains and the individual components are shown in Figure 4-1.

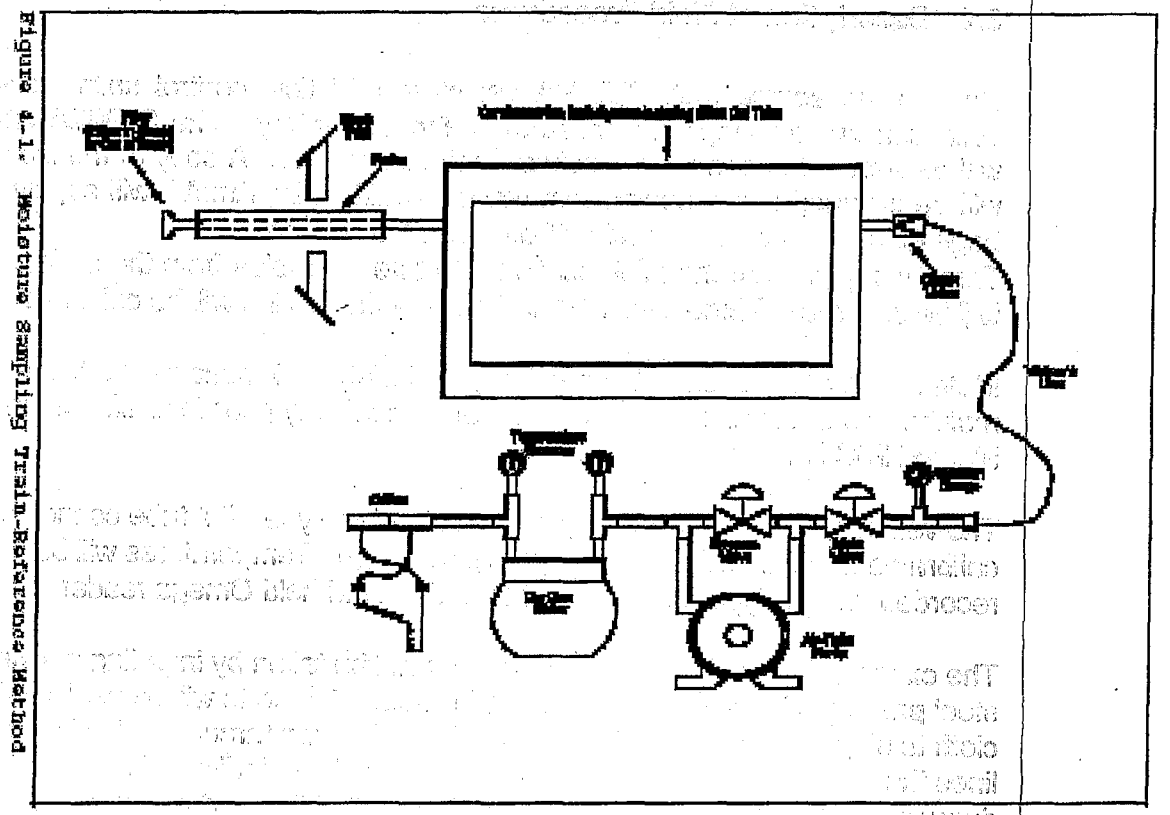


Figure 4-1: Moisture Sampling Train-Reference Method

Internal stack sampling points will be determined in accordance with Method 1 as the first step in the test. An 8-point O_2 traverse will be performed. If stratification is detected, a point that represents average emissions will be chosen for the source test. Otherwise, the probe will be positioned in the center of the stack.

Prior to assembling the sample train, the sample tank vacuum will be measured by using a pressure gauge. The vacuum, ambient temperature and the barometric pressure will be recorded. The sampling probe purging system will be assembled as shown in figure 25C-1.

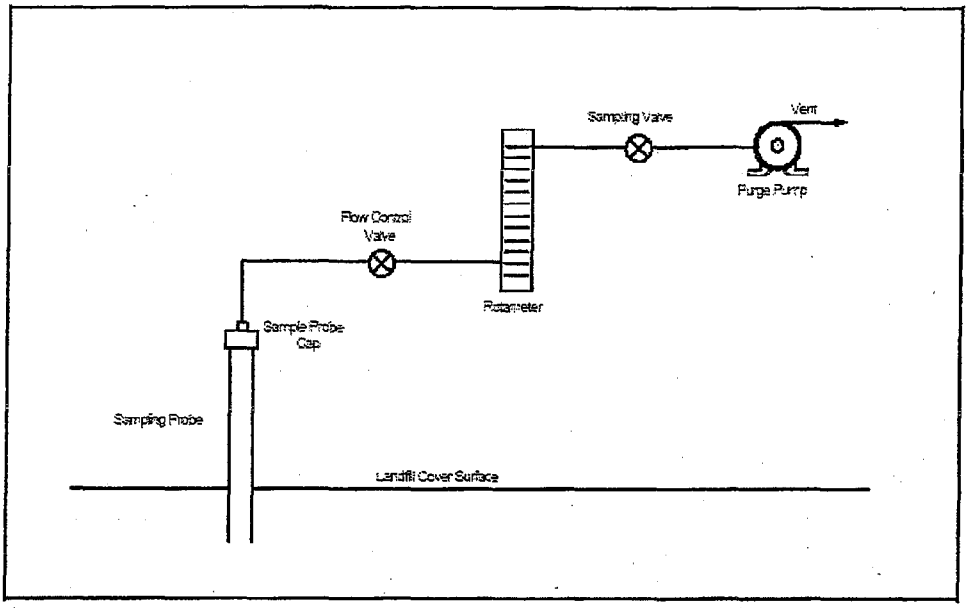


Figure 25C-1. Schematic of Sampling Probe Purging System

At least two sample probe volumes will be evacuated from the system at a flow rate of 500 ml/min or less. The sampling valve will be closed and the purge pump replaced with a SUMMA canister as shown in figure 25C-2.

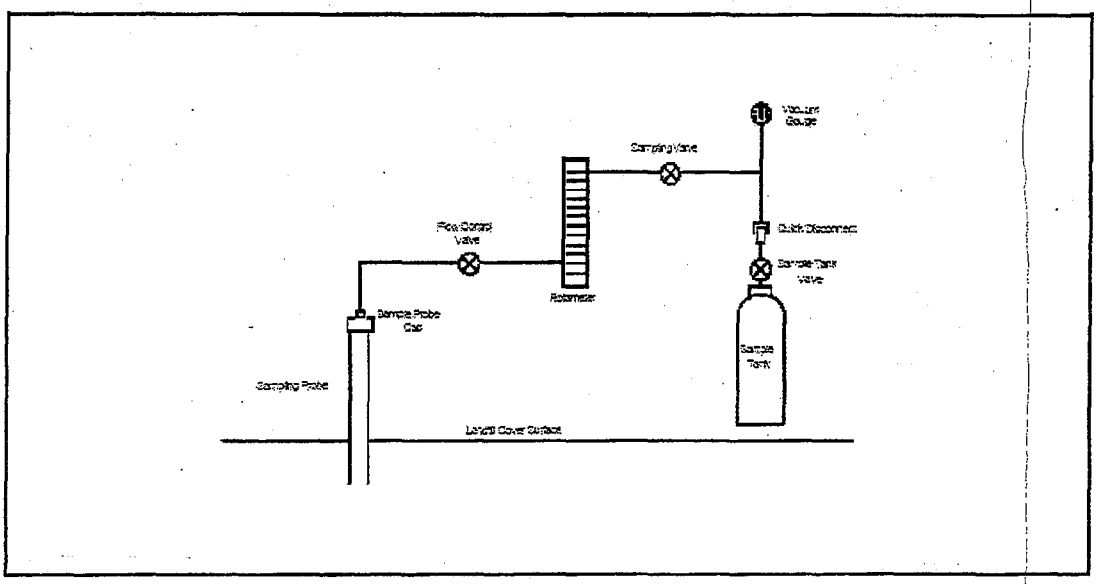


Figure 25C-2. Schematic of Sampling Train.

Sample will be drawn at a flow rate of 500 ml/min or less until either a constant flow rate can no longer be maintained because of reduced sample tank vacuum or the appropriate composite volume is attained. The SUMMA will then be disconnected.

The SUMMA canister will then be prepared for shipment to AtmAA where it will be pressurized to approximately 1060 mm Hg (567 in. H_2O) absolute pressure with helium; the final pressure will be recorded.

Six SUMMA samples will be taken, three from the inlet and three from the outlet. Three Tedlar bags will be filled at the inlet location for sulfur compound analysis.

AtmAA, Inc. will perform all analysis of the SUMMA and Tedlar bags. A copy of the laboratory quote with a description of the analyses is attached.

3.4 List of the Field Testing Equipment

Method 2 – 4 equipment and associated hardware are listed below.

- Test Console with sample flow control, dry gas test meter, temperature controllers for probe and sample box heater, thermocouple readouts and dual incline manometers for delta H and delta P.
- Leak free vacuum pump
- Thermostatically controlled heated filter box
- Ice bath impinger tray with sample-out thermocouple sensor
- Umbilical with Pitot lines, thermocouple wire, and control wiring
- Method 4 Glassware Set
- A high temperature Pitot tube/probe assembly including type-S Pitot tube, K-type thermocouple attached to an inconel sheath containing an inconel heated probe liner.
- Stainless steel nozzles
- Analytical balance capable of determinations to 0.1 mg

All of the Method 4 equipment specified above was provided and/or manufactured by the Environmental Supply Company of Durham, North Carolina.

Method 3A equipment is described below. O_2/CO_2 analysis for the combustion gas sample will be performed using a California Analytical Model 200 Analyzer. The instrument specifications are listed below.

Oxygen Analyzer Components	Carbon Dioxide Components
Principle of Operation: Paramagnetic	Principle of Operation: NDIR
Span: 0-5%, 0-10%, 0-25%	Span: 0-10%, 0-20%
Linearity: Better than ± 1 % full scale	Linearity: Better than ± 1 % full scale
Zero/Span Drift: Less than ± 1 % full scale in 24 hours	Zero/Span Drift: Less than ± 1 % full scale in 24 hours

The sample conditioning system that will be used is an Alfa Laval MAK 6-2.

AtmAA, Inc. will provide SUMMA canisters with flow control units and Tedlar bags for sample collection.

3.5 Operational and Process Data to be Collected

The following operational data will be recorded once every minute during the test:

- Fuel consumption
- Waste gas flow
- Flare temperature

AtmAA, Inc. will analyze each SUMMA canister for Btu content.

4 QA/QC Requirements

The activities of this project will be conducted in accordance with the EPA *Quality Assurance Handbook for Air Pollution Measurement Systems Vol. III* and the AST Quality Program Manual QPM-1. Quality control and quality assurance for all sampling and analytical procedures will be performed as required by the appropriate USEPA Reference Methods.

A documented chain of custody of the SUMMA canisters and Tedlar bag samples will be maintained.

5 Report Preparation

The Final Report will include the following sections:

Note: To the extent practical the format given in the Source Test Report Outline in Vol. III, section IV.3 of the state Air Quality Control Plan will be followed.

a) Test rationale;
b) Test objectives;
c) Description of test location and testing condition;
d) Description of sampling procedures and analytical methods, detailing any exceptions to established reference methods and procedures;
e) Summary of test results; and
f) Description of QA/QC methods and results.

Report appendices will include the following elements:

a) Tabulation of all reduced test results;
b) Example calculations for all test and emission determinations;
c) Raw test data including field data sheets, operational data sheets, strip charts, analytical data sheets, and computer printouts;
d) QA/QC documentation including analyzer response and performance checks, sensor calibration sheets, results of analytical spikes and blanks, traceability certificates of calibration standards, and opacity reader certification;
e) Relevant agency correspondence; and
f) Listing of project personnel, affiliation, and role.

A draft report shall be submitted to BC Excavating for review within 30 days of completing on-site testing. Four copies of the final report shall be provided within 5 days of receiving comments.

6 Tentative Test Schedule

The testing is scheduled for January 2007.