SULLIVAN
ENVIRONMENTAL

October 30, 2013

Ms. Rita-Felton Smith
Waste and Air Resources Management
FDEP Northeast District Office
8800 Baymeadows Way West, Suite 100
Jacksonville, Florida 32256

RE: City of Jacksonville, East Municipal Solid Waste Landfill
Title V Permit 0310318-004-AV
Permit Renewal Application
Project No.: 0310318-005-AV

Dear Ms. [illegible]-Smith:

Please find attached two copies of the East Municipal Solid Waste Landfill Title V Air Operating Permit Renewal application.

Please contact me with any questions or comments on the application.

Sincerely,

Kristine Sullivan
President
Sullivan Environmental

xc: Jeffrey Foster, P.E., P.G., City of Jacksonville (Solid Waste Division)
Rebecca Kelner, PE, Kelner Engineering
Ron Moore, Sullivan Environmental

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EAST MUNICIPAL SOLID WASTE LANDFILL
FACILITY 0310318

TITLE V AIR OPERATIONS PERMIT RENEWAL APPLICATION

Prepared for:

THE CITY OF JACKSONVILLE
1031 Superior Street
Jacksonville, Florida 32254

Presented to:

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
8800 Baymeadows Way West, Suite 100
Jacksonville, Florida 32256

Prepared by:

SULLIVAN ENVIRONMENTAL
4448 13TH Lane NE
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And:

KELNER ENGINEERING
5844 Blue Savannah Drive
Leesburg, Florida 34748

November 2013

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PART I

PERMIT APPLICATION REPORT

EAST MUNICIPAL SOLID WASTE LANDFILL AIR OPERATIONS PERMIT RENEWAL APPLICATION

1.0 INTRODUCTION

The City of Jacksonville's closed East Municipal Solid Waste Landfill (Facility) is currently permitted under Air Operations Permit 0310318-004-AV. The Facility is a closed +/- 71 acre Municipal Solid Waste (MSW) landfill that accepted waste from 1974 until 1992. The Facility has two permitted emissions units:

EU001: Municipal Solid Waste Landfill
EU002: Four Stationary Caterpillar Internal Combustion Engines with back-up flare

The City supplies LFG to the internal combustion engines / generator sets which are owned and operated by the Jacksonville Electrical Authority (JEA). Both the City and JEA wish to discontinue use of the internal combustion engines / generator sets at the Facility. As part of this permit renewal application, the City requests that the internal combustion / generator sets be removed from the permit; the enclosed flare will serve as the sole control device for LFG generated by the closed landfill.

The Title V permit application expires June 16, 2014; the deadline to submit the permit renewal application is November 3, 2013. The City is required to complete a NMOC destruction efficiency test on the destruction device prior to permit renewal. The results of the testing will be submitted to FDEP under separate cover prior to the permit expiration date.

2.0 LANDFILL EMISSIONS

Landfill gas is generated by the anaerobic degradation of waste; methane (CH_4) and carbon dioxide (CO_2) are the primary constituents of landfill gas. Landfill gas also contains a small amount of non methane organic compounds (NMOC), including hazardous air pollutants (HAP) and volatile organic compounds (VOC). Other emissions associated with landfills include combustion byproducts from the control (combustion) of landfill gas, including carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter (PM), sulfur dioxide (SO_2), and hydrochloric acid (HCl).

Landfill fugitive emissions (EU001) were calculated using the U.S. EPA's *Landfill Gas Emissions Model* (LandGEM) and equations in the US EPA's *Compilation of Air Pollutant Emission Factors* (AP-42). The LandGEM model uses a first-order decay equation to predict landfill gas and pollutant generation based on the amount and age of waste in place. The values recommended in AP-42 for methane generation potential (L_o=100m^3/MG) and methane generation rate constant (k=0.04) were used in the model along with estimated waste acceptance rates based on the total amount of waste in place divided by the number of years the landfill was open. The NMOC concentration in the landfill gas was input using the average of three recent Method 25C tests conducted at the Facility ($C_{NMOCAVE}$=75 ppmv hexane). VOCs were assumed to be equal to NMOC.

Model year 2013 was used as the worst-case year for pollutant emissions, as landfill gas generation will decrease over time in the closed landfill. The LandGEM model results are provided in Attachment 1. The Method 25C lab reports are provided in Attachment G to Part II of this application.

The enclosed flare pollutant emissions (EU002) were calculated using the maximum rated capacity of the flare. Default pollutant concentrations from Draft Section 2.4 of the EPAs *Compilation of Air Pollutant Emissions Factors* were used to calculate emissions of HAPs, NO_x, CO, PM, HCl, and SO_x.

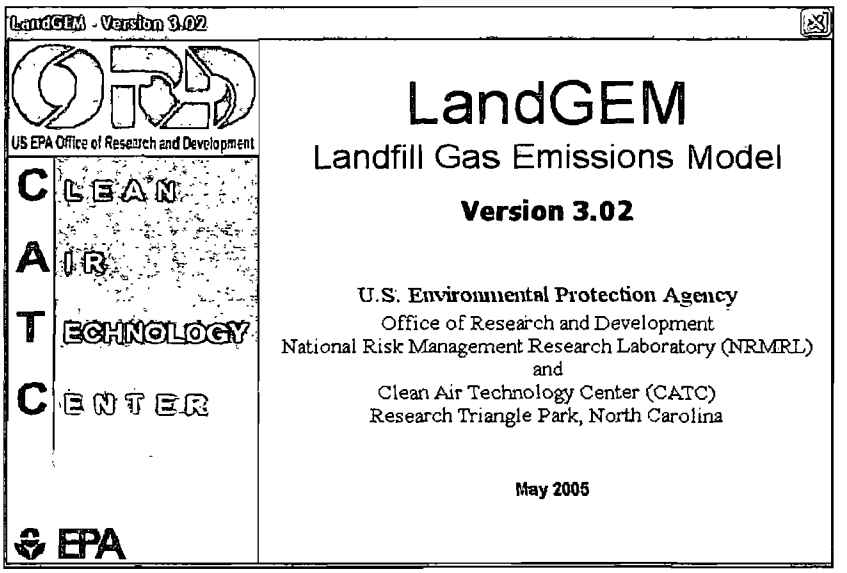
Table 1 summarizes the maximum annual air pollutant emissions for the Facility over the permitting period. Detailed calculations are provided in Attachment 2.

TABLE 1
SUMMARY OF EAST MUNICIPAL LANDFILL EMISSIONS

Air Pollutant / LFG Constituent	Maximum Mass-Based Emission Rate (TPY)
EU001 MSW Landfill	
NMOC	0.7
VOC (taken as NMOC)	0.7
HAPS (total)	1.1
HAPS (single)	0.4 (toluene)
EU002 Enclosed Flare	
NO_x	12.3
CO	14.5
HCl	4.8
SO_2	4.8
PM10 (all PM assumed to be PM10)	4.7

ATTACHMENT 1

LANDGEM RESULTS



Summary Report

Landfill Name or Identifier: EAST LANDFILL

Date: Monday, October 28, 2013

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_o \left(\frac{M_i}{10}\right) e^{-kt_{ij}}$$

Where,

Q_{CH_4} = annual methane generation in the year of the calculation ($m^3/year$)
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate ($year^{-1}$)
L_o = potential methane generation capacity (m^3/Mg)
M_i = mass of waste accepted in the i^{th} year (Mg)
t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (decimal years, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1974**	
Landfill Closure Year (with 80-year limit)	**1992**	
Actual Closure Year (without limit)	***1992***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity	**3,500,000**	*megagrams*

MODEL PARAMETERS

Methane Generation Rate, k	**0.040**	$year^{-1}$
Potential Methane Generation Capacity, L_o	**100**	m^3/Mg
NMOC Concentration	**75**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1974	184,210	202,631	0	0
1975	184,210	202,631	184,210	202,631
1976	184,210	202,631	368,420	405,262
1977	184,210	202,631	552,630	607,893
1978	184,210	202,631	736,840	810,524
1979	184,210	202,631	921,050	1,013,155
1980	184,210	202,631	1,105,260	1,215,786
1981	184,210	202,631	1,289,470	1,418,417
1982	184,210	202,631	1,473,680	1,621,048
1983	184,210	202,631	1,657,890	1,823,679
1984	184,210	202,631	1,842,100	2,026,310
1985	184,210	202,631	2,026,310	2,228,941
1986	184,210	202,631	2,210,520	2,431,572
1987	184,210	202,631	2,394,730	2,634,203
1988	184,210	202,631	2,578,940	2,836,834
1989	184,210	202,631	2,763,150	3,039,465
1990	184,210	202,631	2,947,360	3,242,096
1991	184,210	202,631	3,131,570	3,444,727
1992	184,210	202,631	3,315,780	3,647,358
1993	0	0	3,499,990	3,849,989
1994	0	0	3,499,990	3,849,989
1995	0	0	3,499,990	3,849,989
1996	0	0	3,499,990	3,849,989
1997	0	0	3,499,990	3,849,989
1998	0	0	3,499,990	3,849,989
1999	0	0	3,499,990	3,849,989
2000	0	0	3,499,990	3,849,989
2001	0	0	3,499,990	3,849,989
2002	0	0	3,499,990	3,849,989
2003	0	0	3,499,990	3,849,989
2004	0	0	3,499,990	3,849,989
2005	0	0	3,499,990	3,849,989
2006	0	0	3,499,990	3,849,989
2007	0	0	3,499,990	3,849,989
2008	0	0	3,499,990	3,849,989
2009	0	0	3,499,990	3,849,989
2010	0	0	3,499,990	3,849,989
2011	0	0	3,499,990	3,849,989
2012	0	0	3,499,990	3,849,989
2013	0	0	3,499,990	3,849,989

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
2014	0	0	3,499,990	3,849,989
2015	0	0	3,499,990	3,849,989
2016	0	0	3,499,990	3,849,989
2017	0	0	3,499,990	3,849,989
2018	0	0	3,499,990	3,849,989
2019	0	0	3,499,990	3,849,989
2020	0	0	3,499,990	3,849,989
2021	0	0	3,499,990	3,849,989
2022	0	0	3,499,990	3,849,989
2023	0	0	3,499,990	3,849,989
2024	0	0	3,499,990	3,849,989
2025	0	0	3,499,990	3,849,989
2026	0	0	3,499,990	3,849,989
2027	0	0	3,499,990	3,849,989
2028	0	0	3,499,990	3,849,989
2029	0	0	3,499,990	3,849,989
2030	0	0	3,499,990	3,849,989
2031	0	0	3,499,990	3,849,989
2032	0	0	3,499,990	3,849,989
2033	0	0	3,499,990	3,849,989
2034	0	0	3,499,990	3,849,989
2035	0	0	3,499,990	3,849,989
2036	0	0	3,499,990	3,849,989
2037	0	0	3,499,990	3,849,989
2038	0	0	3,499,990	3,849,989
2039	0	0	3,499,990	3,849,989
2040	0	0	3,499,990	3,849,989
2041	0	0	3,499,990	3,849,989
2042	0	0	3,499,990	3,849,989
2043	0	0	3,499,990	3,849,989
2044	0	0	3,499,990	3,849,989
2045	0	0	3,499,990	3,849,989
2046	0	0	3,499,990	3,849,989
2047	0	0	3,499,990	3,849,989
2048	0	0	3,499,990	3,849,989
2049	0	0	3,499,990	3,849,989
2050	0	0	3,499,990	3,849,989
2051	0	0	3,499,990	3,849,989
2052	0	0	3,499,990	3,849,989
2053	0	0	3,499,990	3,849,989

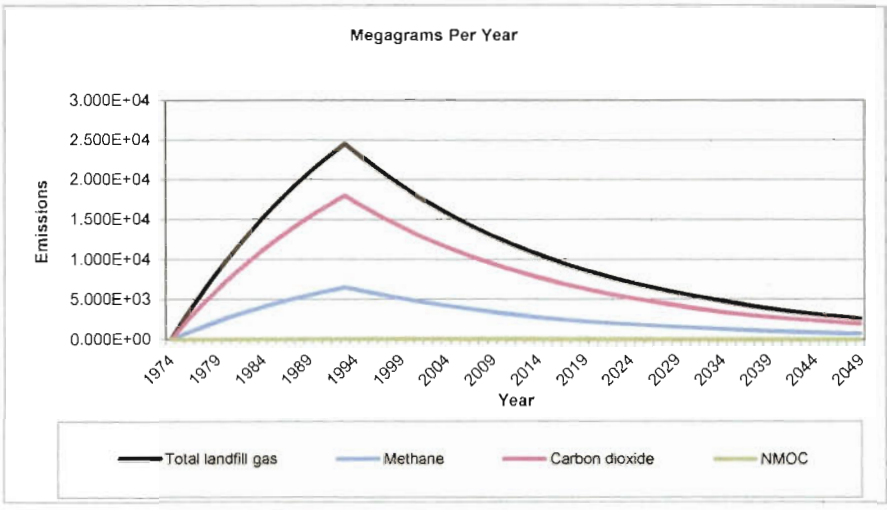
Pollutant Parameters

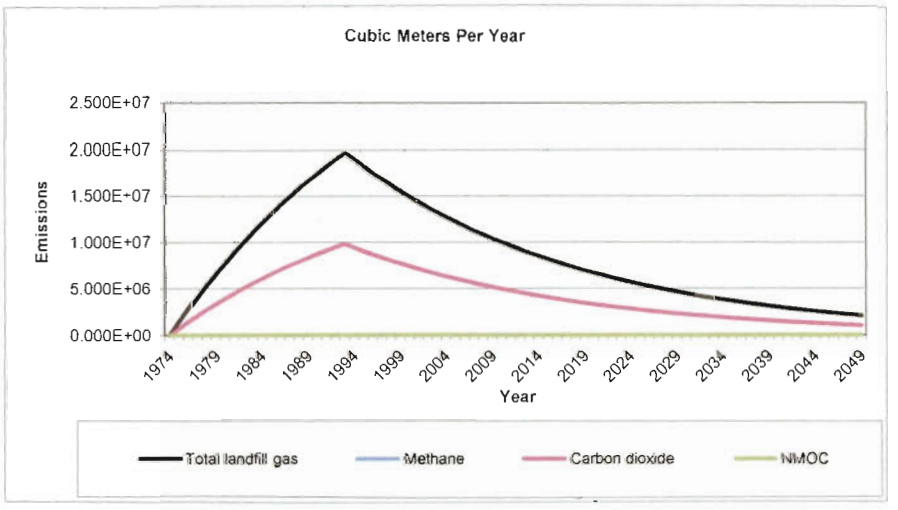
		Gas / Pollutant Default Parameters:		*User-specified Pollutant Parameters:*	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

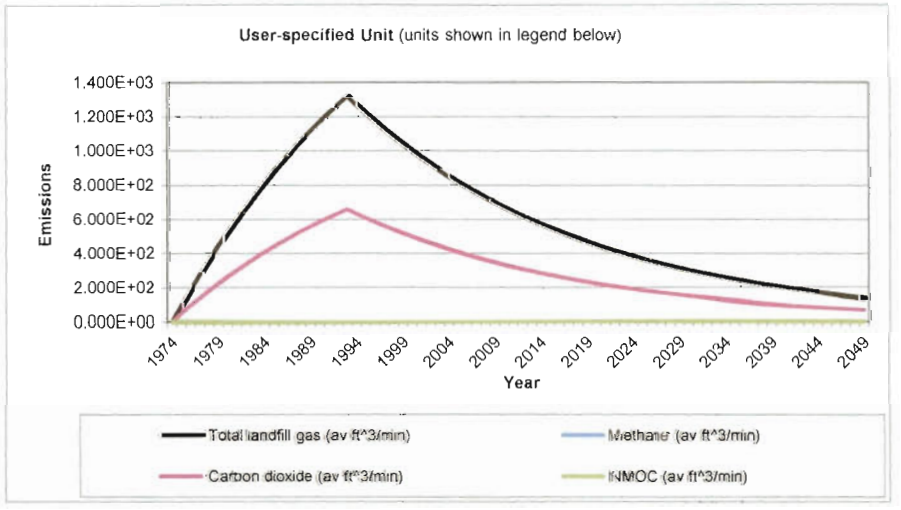
Pollutant Parameters (Continued)

		Gas / Pollutant Default Parameters:		*User-specified Pollutant Parameters:*	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
3.000E+04
2.500E+04
2.000E+04
1.500E+04
1.000E+04
5.000E+03
0.000E+00
1974 1979 1984 1989 1994 1999 2004 2009 2014 2019 2024 2029 2034 2039 2044 2049
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
2.500E+07
2.000E+07
1.500E+07
1.000E+07
5.000E+06
0.000E+00
1974 1979 1984 1989 1994 1999 2004 2009 2014 2019 2024 2029 2034 2039 2044 2049
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
1.400E+03
1.200E+03
1.000E+03
8.000E+02
6.000E+02
4.000E+02
2.000E+02
0.000E+00
1974 1979 1984 1989 1994 1999 2004 2009 2014 2019 2024 2029 2034 2039 2044 2049
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1974	0	0	0	0	0	0
1975	1.808E+03	1.447E+06	9.726E+01	4.828E+02	7.237E+05	4.863E+01
1976	3.544E+03	2.838E+06	1.907E+02	9.468E+02	1.419E+06	9.535E+01
1977	5.213E+03	4.174E+06	2.805E+02	1.392E+03	2.087E+06	1.402E+02
1978	6.816E+03	5.458E+06	3.667E+02	1.821E+03	2.729E+06	1.834E+02
1979	8.357E+03	6.692E+06	4.496E+02	2.232E+03	3.346E+06	2.248E+02
1980	9.837E+03	7.877E+06	5.292E+02	2.627E+03	3.938E+06	2.646E+02
1981	1.126E+04	9.015E+06	6.057E+02	3.007E+03	4.508E+06	3.029E+02
1982	1.262E+04	1.011E+07	6.792E+02	3.372E+03	5.055E+06	3.396E+02
1983	1.394E+04	1.116E+07	7.499E+02	3.723E+03	5.580E+06	3.749E+02
1984	1.520E+04	1.217E+07	8.177E+02	4.060E+03	6.085E+06	4.089E+02
1985	1.641E+04	1.314E+07	8.829E+02	4.383E+03	6.570E+06	4.415E+02
1986	1.757E+04	1.407E+07	9.456E+02	4.694E+03	7.036E+06	4.728E+02
1987	1.869E+04	1.497E+07	1.006E+03	4.993E+03	7.484E+06	5.029E+02
1988	1.977E+04	1.583E+07	1.064E+03	5.280E+03	7.915E+06	5.318E+02
1989	2.080E+04	1.666E+07	1.119E+03	5.556E+03	8.328E+06	5.596E+02
1990	2.179E+04	1.745E+07	1.172E+03	5.821E+03	8.725E+06	5.862E+02
1991	2.275E+04	1.821E+07	1.224E+03	6.076E+03	9.107E+06	6.119E+02
1992	2.366E+04	1.895E+07	1.273E+03	6.320E+03	9.473E+06	6.365E+02
1993	2.454E+04	1.965E+07	1.320E+03	6.555E+03	9.826E+06	6.602E+02
1994	2.358E+04	1.888E+07	1.269E+03	6.298E+03	9.440E+06	6.343E+02
1995	2.265E+04	1.814E+07	1.219E+03	6.051E+03	9.070E+06	6.094E+02
1996	2.177E+04	1.743E+07	1.171E+03	5.814E+03	8.715E+06	5.855E+02
1997	2.091E+04	1.675E+07	1.125E+03	5.586E+03	8.373E+06	5.626E+02
1998	2.009E+04	1.609E+07	1.081E+03	5.367E+03	8.045E+06	5.405E+02
1999	1.930E+04	1.546E+07	1.039E+03	5.157E+03	7.729E+06	5.193E+02
2000	1.855E+04	1.485E+07	9.979E+02	4.954E+03	7.426E+06	4.990E+02
2001	1.782E+04	1.427E+07	9.588E+02	4.760E+03	7.135E+06	4.794E+02
2002	1.712E+04	1.371E+07	9.212E+02	4.573E+03	6.855E+06	4.606E+02
2003	1.645E+04	1.317E+07	8.851E+02	4.394E+03	6.586E+06	4.425E+02
2004	1.581E+04	1.266E+07	8.504E+02	4.222E+03	6.328E+06	4.252E+02
2005	1.519E+04	1.216E+07	8.170E+02	4.056E+03	6.080E+06	4.085E+02
2006	1.459E+04	1.168E+07	7.850E+02	3.897E+03	5.842E+06	3.925E+02
2007	1.402E+04	1.123E+07	7.542E+02	3.744E+03	5.613E+06	3.771E+02
2008	1.347E+04	1.078E+07	7.246E+02	3.598E+03	5.392E+06	3.623E+02
2009	1.294E+04	1.036E+07	6.962E+02	3.457E+03	5.181E+06	3.481E+02
2010	1.243E+04	9.956E+06	6.689E+02	3.321E+03	4.978E+06	3.345E+02
2011	1.195E+04	9.565E+06	6.427E+02	3.191E+03	4.783E+06	3.213E+02
2012	1.148E+04	9.190E+06	6.175E+02	3.066E+03	4.595E+06	3.087E+02
2013	1.103E+04	8.830E+06	5.933E+02	2.945E+03	4.415E+06	2.966E+02
2014	1.059E+04	8.484E+06	5.700E+02	2.830E+03	4.242E+06	2.850E+02
2015	1.018E+04	8.151E+06	5.477E+02	2.719E+03	4.076E+06	2.738E+02
2016	9.780E+03	7.831E+06	5.262E+02	2.612E+03	3.916E+06	2.631E+02
2017	9.397E+03	7.524E+06	5.056E+02	2.510E+03	3.762E+06	2.528E+02
2018	9.028E+03	7.229E+06	4.857E+02	2.412E+03	3.615E+06	2.429E+02
2019	8.674E+03	6.946E+06	4.667E+02	2.317E+03	3.473E+06	2.333E+02
2020	8.334E+03	6.674E+06	4.484E+02	2.226E+03	3.337E+06	2.242E+02
2021	8.007E+03	6.412E+06	4.308E+02	2.139E+03	3.206E+06	2.154E+02
2022	7.693E+03	6.160E+06	4.139E+02	2.055E+03	3.080E+06	2.070E+02
2023	7.392E+03	5.919E+06	3.977E+02	1.974E+03	2.959E+06	1.988E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2024	7.102E+03	5.687E+06	3.821E+02	1.897E+03	2.843E+06	1.910E+02
2025	6.823E+03	5.464E+06	3.671E+02	1.823E+03	2.732E+06	1.836E+02
2026	6.556E+03	5.250E+06	3.527E+02	1.751E+03	2.625E+06	1.764E+02
2027	6.299E+03	5.044E+06	3.389E+02	1.682E+03	2.522E+06	1.694E+02
2028	6.052E+03	4.846E+06	3.256E+02	1.616E+03	2.423E+06	1.628E+02
2029	5.815E+03	4.656E+06	3.128E+02	1.553E+03	2.328E+06	1.564E+02
2030	5.587E+03	4.473E+06	3.006E+02	1.492E+03	2.237E+06	1.503E+02
2031	5.367E+03	4.298E+06	2.888E+02	1.434E+03	2.149E+06	1.444E+02
2032	5.157E+03	4.129E+06	2.775E+02	1.377E+03	2.065E+06	1.387E+02
2033	4.955E+03	3.968E+06	2.666E+02	1.323E+03	1.984E+06	1.333E+02
2034	4.761E+03	3.812E+06	2.561E+02	1.272E+03	1.906E+06	1.281E+02
2035	4.574E+03	3.663E+06	2.461E+02	1.222E+03	1.831E+06	1.230E+02
2036	4.395E+03	3.519E+06	2.364E+02	1.174E+03	1.759E+06	1.182E+02
2037	4.222E+03	3.381E+06	2.272E+02	1.128E+03	1.690E+06	1.136E+02
2038	4.057E+03	3.248E+06	2.183E+02	1.084E+03	1.624E+06	1.091E+02
2039	3.898E+03	3.121E+06	2.097E+02	1.041E+03	1.560E+06	1.048E+02
2040	3.745E+03	2.999E+06	2.015E+02	1.000E+03	1.499E+06	1.007E+02
2041	3.598E+03	2.881E+06	1.936E+02	9.610E+02	1.441E+06	9.679E+01
2042	3.457E+03	2.768E+06	1.860E+02	9.234E+02	1.384E+06	9.299E+01
2043	3.321E+03	2.660E+06	1.787E+02	8.872E+02	1.330E+06	8.935E+01
2044	3.191E+03	2.555E+06	1.717E+02	8.524E+02	1.278E+06	8.584E+01
2045	3.066E+03	2.455E+06	1.650E+02	8.189E+02	1.228E+06	8.248E+01
2046	2.946E+03	2.359E+06	1.585E+02	7.868E+02	1.179E+06	7.924E+01
2047	2.830E+03	2.266E+06	1.523E+02	7.560E+02	1.133E+06	7.614E+01
2048	2.719E+03	2.177E+06	1.463E+02	7.263E+02	1.089E+06	7.315E+01
2049	2.613E+03	2.092E+06	1.406E+02	6.979E+02	1.046E+06	7.028E+01
2050	2.510E+03	2.010E+06	1.351E+02	6.705E+02	1.005E+06	6.753E+01
2051	2.412E+03	1.931E+06	1.298E+02	6.442E+02	9.656E+05	6.488E+01
2052	2.317E+03	1.855E+06	1.247E+02	6.189E+02	9.277E+05	6.234E+01
2053	2.226E+03	1.783E+06	1.198E+02	5.947E+02	8.914E+05	5.989E+01
2054	2.139E+03	1.713E+06	1.151E+02	5.714E+02	8.564E+05	5.754E+01
2055	2.055E+03	1.646E+06	1.106E+02	5.490E+02	8.228E+05	5.529E+01
2056	1.975E+03	1.581E+06	1.062E+02	5.274E+02	7.906E+05	5.312E+01
2057	1.897E+03	1.519E+06	1.021E+02	5.068E+02	7.596E+05	5.104E+01
2058	1.823E+03	1.460E+06	9.807E+01	4.869E+02	7.298E+05	4.903E+01
2059	1.751E+03	1.402E+06	9.422E+01	4.678E+02	7.012E+05	4.711E+01
2060	1.683E+03	1.347E+06	9.053E+01	4.494E+02	6.737E+05	4.526E+01
2061	1.617E+03	1.295E+06	8.698E+01	4.318E+02	6.473E+05	4.349E+01
2062	1.553E+03	1.244E+06	8.357E+01	4.149E+02	6.219E+05	4.178E+01
2063	1.492E+03	1.195E+06	8.029E+01	3.986E+02	5.975E+05	4.015E+01
2064	1.434E+03	1.148E+06	7.714E+01	3.830E+02	5.741E+05	3.857E+01
2065	1.378E+03	1.103E+06	7.412E+01	3.680E+02	5.516E+05	3.706E+01
2066	1.324E+03	1.060E+06	7.121E+01	3.535E+02	5.299E+05	3.561E+01
2067	1.272E+03	1.018E+06	6.842E+01	3.397E+02	5.092E+05	3.421E+01
2068	1.222E+03	9.784E+05	6.574E+01	3.264E+02	4.892E+05	3.287E+01
2069	1.174E+03	9.400E+05	6.316E+01	3.136E+02	4.700E+05	3.158E+01
2070	1.128E+03	9.032E+05	6.068E+01	3.013E+02	4.516E+05	3.034E+01
2071	1.084E+03	8.678E+05	5.830E+01	2.895E+02	4.339E+05	2.915E+01
2072	1.041E+03	8.337E+05	5.602E+01	2.781E+02	4.169E+05	2.801E+01
2073	1.000E+03	8.010E+05	5.382E+01	2.672E+02	4.005E+05	2.691E+01
2074	9.611E+02	7.696E+05	5.171E+01	2.567E+02	3.848E+05	2.586E+01

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2075	9.234E+02	7.395E+05	4.968E+01	2.467E+02	3.697E+05	2.484E+01
2076	8.872E+02	7.105E+05	4.774E+01	2.370E+02	3.552E+05	2.387E+01
2077	8.524E+02	6.826E+05	4.586E+01	2.277E+02	3.413E+05	2.293E+01
2078	8.190E+02	6.558E+05	4.407E+01	2.188E+02	3.279E+05	2.203E+01
2079	7.869E+02	6.301E+05	4.234E+01	2.102E+02	3.151E+05	2.117E+01
2080	7.561E+02	6.054E+05	4.068E+01	2.019E+02	3.027E+05	2.034E+01
2081	7.264E+02	5.817E+05	3.908E+01	1.940E+02	2.908E+05	1.954E+01
2082	6.979E+02	5.589E+05	3.755E+01	1.864E+02	2.794E+05	1.878E+01
2083	6.706E+02	5.370E+05	3.608E+01	1.791E+02	2.685E+05	1.804E+01
2084	6.443E+02	5.159E+05	3.466E+01	1.721E+02	2.579E+05	1.733E+01
2085	6.190E+02	4.957E+05	3.330E+01	1.653E+02	2.478E+05	1.665E+01
2086	5.947E+02	4.762E+05	3.200E+01	1.589E+02	2.381E+05	1.600E+01
2087	5.714E+02	4.576E+05	3.074E+01	1.526E+02	2.288E+05	1.537E+01
2088	5.490E+02	4.396E+05	2.954E+01	1.466E+02	2.198E+05	1.477E+01
2089	5.275E+02	4.224E+05	2.838E+01	1.409E+02	2.112E+05	1.419E+01
2090	5.068E+02	4.058E+05	2.727E+01	1.354E+02	2.029E+05	1.363E+01
2091	4.869E+02	3.899E+05	2.620E+01	1.301E+02	1.950E+05	1.310E+01
2092	4.678E+02	3.746E+05	2.517E+01	1.250E+02	1.873E+05	1.259E+01
2093	4.495E+02	3.599E+05	2.418E+01	1.201E+02	1.800E+05	1.209E+01
2094	4.319E+02	3.458E+05	2.324E+01	1.154E+02	1.729E+05	1.162E+01
2095	4.149E+02	3.323E+05	2.232E+01	1.108E+02	1.661E+05	1.116E+01
2096	3.987E+02	3.192E+05	2.145E+01	1.065E+02	1.596E+05	1.072E+01
2097	3.830E+02	3.067E+05	2.061E+01	1.023E+02	1.534E+05	1.030E+01
2098	3.680E+02	2.947E+05	1.980E+01	9.830E+01	1.473E+05	9.900E+00
2099	3.536E+02	2.831E+05	1.902E+01	9.445E+01	1.416E+05	9.512E+00
2100	3.397E+02	2.720E+05	1.828E+01	9.074E+01	1.360E+05	9.139E+00
2101	3.264E+02	2.614E+05	1.756E+01	8.718E+01	1.307E+05	8.780E+00
2102	3.136E+02	2.511E+05	1.687E+01	8.377E+01	1.256E+05	8.436E+00
2103	3.013E+02	2.413E+05	1.621E+01	8.048E+01	1.206E+05	8.105E+00
2104	2.895E+02	2.318E+05	1.558E+01	7.733E+01	1.159E+05	7.788E+00
2105	2.781E+02	2.227E+05	1.496E+01	7.429E+01	1.114E+05	7.482E+00
2106	2.672E+02	2.140E+05	1.438E+01	7.138E+01	1.070E+05	7.189E+00
2107	2.568E+02	2.056E+05	1.381E+01	6.858E+01	1.028E+05	6.907E+00
2108	2.467E+02	1.975E+05	1.327E+01	6.589E+01	9.877E+04	6.636E+00
2109	2.370E+02	1.898E+05	1.275E+01	6.331E+01	9.489E+04	6.376E+00
2110	2.277E+02	1.823E+05	1.225E+01	6.083E+01	9.117E+04	6.126E+00
2111	2.188E+02	1.752E+05	1.177E+01	5.844E+01	8.760E+04	5.886E+00
2112	2.102E+02	1.683E+05	1.131E+01	5.615E+01	8.416E+04	5.655E+00
2113	2.020E+02	1.617E+05	1.087E+01	5.395E+01	8.086E+04	5.433E+00
2114	1.940E+02	1.554E+05	1.044E+01	5.183E+01	7.769E+04	5.220E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1974	0	0	0	0	0	0
1975	1.325E+03	7.237E+05	4.863E+01	3.891E-01	1.086E+02	7.294E-03
1976	2.598E+03	1.419E+06	9.535E+01	7.630E-01	2.129E+02	1.430E-02
1977	3.821E+03	2.087E+06	1.402E+02	1.122E+00	3.131E+02	2.104E-02
1978	4.996E+03	2.729E+06	1.834E+02	1.467E+00	4.094E+02	2.751E-02
1979	6.125E+03	3.346E+06	2.248E+02	1.799E+00	5.019E+02	3.372E-02
1980	7.209E+03	3.938E+06	2.646E+02	2.118E+00	5.908E+02	3.969E-02
1981	8.251E+03	4.508E+06	3.029E+02	2.424E+00	6.762E+02	4.543E-02
1982	9.253E+03	5.055E+06	3.396E+02	2.718E+00	7.582E+02	5.094E-02
1983	1.021E+04	5.580E+06	3.749E+02	3.000E+00	8.370E+02	5.624E-02
1984	1.114E+04	6.085E+06	4.089E+02	3.272E+00	9.128E+02	6.133E-02
1985	1.203E+04	6.570E+06	4.415E+02	3.533E+00	9.855E+02	6.622E-02
1986	1.288E+04	7.036E+06	4.728E+02	3.783E+00	1.055E+03	7.092E-02
1987	1.370E+04	7.484E+06	5.029E+02	4.024E+00	1.123E+03	7.543E-02
1988	1.449E+04	7.915E+06	5.318E+02	4.255E+00	1.187E+03	7.977E-02
1989	1.524E+04	8.328E+06	5.596E+02	4.478E+00	1.249E+03	8.393E-02
1990	1.597E+04	8.725E+06	5.862E+02	4.691E+00	1.309E+03	8.794E-02
1991	1.667E+04	9.107E+06	6.119E+02	4.896E+00	1.366E+03	9.178E-02
1992	1.734E+04	9.473E+06	6.365E+02	5.094E+00	1.421E+03	9.548E-02
1993	1.799E+04	9.826E+06	6.602E+02	5.283E+00	1.474E+03	9.903E-02
1994	1.728E+04	9.440E+06	6.343E+02	5.076E+00	1.416E+03	9.515E-02
1995	1.660E+04	9.070E+06	6.094E+02	4.877E+00	1.361E+03	9.141E-02
1996	1.595E+04	8.715E+06	5.855E+02	4.686E+00	1.307E+03	8.783E-02
1997	1.533E+04	8.373E+06	5.626E+02	4.502E+00	1.256E+03	8.439E-02
1998	1.473E+04	8.045E+06	5.405E+02	4.325E+00	1.207E+03	8.108E-02
1999	1.415E+04	7.729E+06	5.193E+02	4.156E+00	1.159E+03	7.790E-02
2000	1.359E+04	7.426E+06	4.990E+02	3.993E+00	1.114E+03	7.484E-02
2001	1.306E+04	7.135E+06	4.794E+02	3.836E+00	1.070E+03	7.191E-02
2002	1.255E+04	6.855E+06	4.606E+02	3.686E+00	1.028E+03	6.909E-02
2003	1.206E+04	6.586E+06	4.425E+02	3.541E+00	9.880E+02	6.638E-02
2004	1.158E+04	6.328E+06	4.252E+02	3.402E+00	9.492E+02	6.378E-02
2005	1.113E+04	6.080E+06	4.085E+02	3.269E+00	9.120E+02	6.128E-02
2006	1.069E+04	5.842E+06	3.925E+02	3.141E+00	8.762E+02	5.887E-02
2007	1.027E+04	5.613E+06	3.771E+02	3.018E+00	8.419E+02	5.657E-02
2008	9.871E+03	5.392E+06	3.623E+02	2.899E+00	8.089E+02	5.435E-02
2009	9.484E+03	5.181E+06	3.481E+02	2.786E+00	7.772E+02	5.222E-02
2010	9.112E+03	4.978E+06	3.345E+02	2.676E+00	7.467E+02	5.017E-02
2011	8.755E+03	4.783E+06	3.213E+02	2.572E+00	7.174E+02	4.820E-02
2012	8.411E+03	4.595E+06	3.087E+02	2.471E+00	6.893E+02	4.631E-02
2013	8.082E+03	4.415E+06	2.966E+02	2.374E+00	6.622E+02	4.450E-02
2014	7.765E+03	4.242E+06	2.850E+02	2.281E+00	6.363E+02	4.275E-02
2015	7.460E+03	4.076E+06	2.738E+02	2.191E+00	6.113E+02	4.108E-02
2016	7.168E+03	3.916E+06	2.631E+02	2.105E+00	5.874E+02	3.946E-02
2017	6.887E+03	3.762E+06	2.528E+02	2.023E+00	5.643E+02	3.792E-02
2018	6.617E+03	3.615E+06	2.429E+02	1.944E+00	5.422E+02	3.643E-02
2019	6.357E+03	3.473E+06	2.333E+02	1.867E+00	5.209E+02	3.500E-02
2020	6.108E+03	3.337E+06	2.242E+02	1.794E+00	5.005E+02	3.363E-02
2021	5.868E+03	3.206E+06	2.154E+02	1.724E+00	4.809E+02	3.231E-02
2022	5.638E+03	3.080E+06	2.070E+02	1.656E+00	4.620E+02	3.104E-02
2023	5.417E+03	2.959E+06	1.988E+02	1.591E+00	4.439E+02	2.983E-02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2024	5.205E+03	2.843E+06	1.910E+02	1.529E+00	4.265E+02	2.866E-02
2025	5.001E+03	2.732E+06	1.836E+02	1.469E+00	4.098E+02	2.753E-02
2026	4.805E+03	2.625E+06	1.764E+02	1.411E+00	3.937E+02	2.645E-02
2027	4.616E+03	2.522E+06	1.694E+02	1.356E+00	3.783E+02	2.542E-02
2028	4.435E+03	2.423E+06	1.628E+02	1.303E+00	3.634E+02	2.442E-02
2029	4.261E+03	2.328E+06	1.564E+02	1.252E+00	3.492E+02	2.346E-02
2030	4.094E+03	2.237E+06	1.503E+02	1.203E+00	3.355E+02	2.254E-02
2031	3.934E+03	2.149E+06	1.444E+02	1.155E+00	3.224E+02	2.166E-02
2032	3.780E+03	2.065E+06	1.387E+02	1.110E+00	3.097E+02	2.081E-02
2033	3.631E+03	1.984E+06	1.333E+02	1.067E+00	2.976E+02	1.999E-02
2034	3.489E+03	1.906E+06	1.281E+02	1.025E+00	2.859E+02	1.921E-02
2035	3.352E+03	1.831E+06	1.230E+02	9.846E-01	2.747E+02	1.846E-02
2036	3.221E+03	1.759E+06	1.182E+02	9.460E-01	2.639E+02	1.773E-02
2037	3.094E+03	1.690E+06	1.136E+02	9.089E-01	2.536E+02	1.704E-02
2038	2.973E+03	1.624E+06	1.091E+02	8.733E-01	2.436E+02	1.637E-02
2039	2.856E+03	1.560E+06	1.048E+02	8.390E-01	2.341E+02	1.573E-02
2040	2.744E+03	1.499E+06	1.007E+02	8.061E-01	2.249E+02	1.511E-02
2041	2.637E+03	1.441E+06	9.679E+01	7.745E-01	2.161E+02	1.452E-02
2042	2.533E+03	1.384E+06	9.299E+01	7.442E-01	2.076E+02	1.395E-02
2043	2.434E+03	1.330E+06	8.935E+01	7.150E-01	1.995E+02	1.340E-02
2044	2.339E+03	1.278E+06	8.584E+01	6.869E-01	1.916E+02	1.288E-02
2045	2.247E+03	1.228E+06	8.248E+01	6.600E-01	1.841E+02	1.237E-02
2046	2.159E+03	1.179E+06	7.924E+01	6.341E-01	1.769E+02	1.189E-02
2047	2.074E+03	1.133E+06	7.614E+01	6.093E-01	1.700E+02	1.142E-02
2048	1.993E+03	1.089E+06	7.315E+01	5.854E-01	1.633E+02	1.097E-02
2049	1.915E+03	1.046E+06	7.028E+01	5.624E-01	1.569E+02	1.054E-02
2050	1.840E+03	1.005E+06	6.753E+01	5.404E-01	1.508E+02	1.013E-02
2051	1.768E+03	9.656E+05	6.488E+01	5.192E-01	1.448E+02	9.732E-03
2052	1.698E+03	9.277E+05	6.234E+01	4.988E-01	1.392E+02	9.350E-03
2053	1.632E+03	8.914E+05	5.989E+01	4.793E-01	1.337E+02	8.984E-03
2054	1.568E+03	8.564E+05	5.754E+01	4.605E-01	1.285E+02	8.631E-03
2055	1.506E+03	8.228E+05	5.529E+01	4.424E-01	1.234E+02	8.293E-03
2056	1.447E+03	7.906E+05	5.312E+01	4.251E-01	1.186E+02	7.968E-03
2057	1.390E+03	7.596E+05	5.104E+01	4.084E-01	1.139E+02	7.655E-03
2058	1.336E+03	7.298E+05	4.903E+01	3.924E-01	1.095E+02	7.355E-03
2059	1.284E+03	7.012E+05	4.711E+01	3.770E-01	1.052E+02	7.067E-03
2060	1.233E+03	6.737E+05	4.526E+01	3.622E-01	1.011E+02	6.790E-03
2061	1.185E+03	6.473E+05	4.349E+01	3.480E-01	9.709E+01	6.523E-03
2062	1.138E+03	6.219E+05	4.178E+01	3.344E-01	9.328E+01	6.268E-03
2063	1.094E+03	5.975E+05	4.015E+01	3.213E-01	8.963E+01	6.022E-03
2064	1.051E+03	5.741E+05	3.857E+01	3.087E-01	8.611E+01	5.786E-03
2065	1.010E+03	5.516E+05	3.706E+01	2.966E-01	8.273E+01	5.559E-03
2066	9.701E+02	5.299E+05	3.561E+01	2.849E-01	7.949E+01	5.341E-03
2067	9.320E+02	5.092E+05	3.421E+01	2.738E-01	7.637E+01	5.132E-03
2068	8.955E+02	4.892E+05	3.287E+01	2.630E-01	7.338E+01	4.930E-03
2069	8.604E+02	4.700E+05	3.158E+01	2.527E-01	7.050E+01	4.737E-03
2070	8.266E+02	4.516E+05	3.034E+01	2.428E-01	6.774E+01	4.551E-03
2071	7.942E+02	4.339E+05	2.915E+01	2.333E-01	6.508E+01	4.373E-03
2072	7.631E+02	4.169E+05	2.801E+01	2.241E-01	6.253E+01	4.201E-03
2073	7.331E+02	4.005E+05	2.691E+01	2.153E-01	6.008E+01	4.037E-03
2074	7.044E+02	3.848E+05	2.586E+01	2.069E-01	5.772E+01	3.878E-03

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2075	6.768E+02	3.697E+05	2.484E+01	1.988E-01	5.546E+01	3.726E-03
2076	6.502E+02	3.552E+05	2.387E+01	1.910E-01	5.328E+01	3.580E-03
2077	6.247E+02	3.413E+05	2.293E+01	1.835E-01	5.119E+01	3.440E-03
2078	6.003E+02	3.279E+05	2.203E+01	1.763E-01	4.919E+01	3.305E-03
2079	5.767E+02	3.151E+05	2.117E+01	1.694E-01	4.726E+01	3.175E-03
2080	5.541E+02	3.027E+05	2.034E+01	1.628E-01	4.541E+01	3.051E-03
2081	5.324E+02	2.908E+05	1.954E+01	1.564E-01	4.363E+01	2.931E-03
2082	5.115E+02	2.794E+05	1.878E+01	1.502E-01	4.191E+01	2.816E-03
2083	4.914E+02	2.685E+05	1.804E+01	1.444E-01	4.027E+01	2.706E-03
2084	4.722E+02	2.579E+05	1.733E+01	1.387E-01	3.869E+01	2.600E-03
2085	4.537E+02	2.478E+05	1.665E+01	1.333E-01	3.718E+01	2.498E-03
2086	4.359E+02	2.381E+05	1.600E+01	1.280E-01	3.572E+01	2.400E-03
2087	4.188E+02	2.288E+05	1.537E+01	1.230E-01	3.432E+01	2.306E-03
2088	4.024E+02	2.198E+05	1.477E+01	1.182E-01	3.297E+01	2.215E-03
2089	3.866E+02	2.112E+05	1.419E+01	1.136E-01	3.168E+01	2.128E-03
2090	3.714E+02	2.029E+05	1.363E+01	1.091E-01	3.044E+01	2.045E-03
2091	3.569E+02	1.950E+05	1.310E+01	1.048E-01	2.924E+01	1.965E-03
2092	3.429E+02	1.873E+05	1.259E+01	1.007E-01	2.810E+01	1.888E-03
2093	3.294E+02	1.800E+05	1.209E+01	9.676E-02	2.699E+01	1.814E-03
2094	3.165E+02	1.729E+05	1.162E+01	9.297E-02	2.594E+01	1.743E-03
2095	3.041E+02	1.661E+05	1.116E+01	8.932E-02	2.492E+01	1.674E-03
2096	2.922E+02	1.596E+05	1.072E+01	8.582E-02	2.394E+01	1.609E-03
2097	2.807E+02	1.534E+05	1.030E+01	8.245E-02	2.300E+01	1.546E-03
2098	2.697E+02	1.473E+05	9.900E+00	7.922E-02	2.210E+01	1.485E-03
2099	2.591E+02	1.416E+05	9.512E+00	7.612E-02	2.123E+01	1.427E-03
2100	2.490E+02	1.360E+05	9.139E+00	7.313E-02	2.040E+01	1.371E-03
2101	2.392E+02	1.307E+05	8.780E+00	7.026E-02	1.960E+01	1.317E-03
2102	2.298E+02	1.256E+05	8.436E+00	6.751E-02	1.883E+01	1.265E-03
2103	2.208E+02	1.206E+05	8.105E+00	6.486E-02	1.810E+01	1.216E-03
2104	2.122E+02	1.159E+05	7.788E+00	6.232E-02	1.739E+01	1.168E-03
2105	2.038E+02	1.114E+05	7.482E+00	5.987E-02	1.670E+01	1.122E-03
2106	1.959E+02	1.070E+05	7.189E+00	5.753E-02	1.605E+01	1.078E-03
2107	1.882E+02	1.028E+05	6.907E+00	5.527E-02	1.542E+01	1.036E-03
2108	1.808E+02	9.877E+04	6.636E+00	5.310E-02	1.482E+01	9.954E-04
2109	1.737E+02	9.489E+04	6.376E+00	5.102E-02	1.423E+01	9.564E-04
2110	1.669E+02	9.117E+04	6.126E+00	4.902E-02	1.368E+01	9.189E-04
2111	1.603E+02	8.760E+04	5.886E+00	4.710E-02	1.314E+01	8.829E-04
2112	1.541E+02	8.416E+04	5.655E+00	4.525E-02	1.262E+01	8.482E-04
2113	1.480E+02	8.086E+04	5.433E+00	4.348E-02	1.213E+01	8.150E-04
2114	1.422E+02	7.769E+04	5.220E+00	4.177E-02	1.165E+01	7.830E-04

ATTACHMENT 2

EMISSIONS CALCULATIONS

OBJECTIVE: 1. Calculate pollutant emissions for EU001 and EU002
EU001 - *Municipal Solid Waste Landfill*
EU002 - *Enclosed Flare*

APPROACH: 1. Use site-specific emissions factors where available, and published emissions factors where site-specific data is not available
2. Use maximum modeled landfill gas generation for year 2013 (LandGEM Model, Att 1) EU001
3. Use maximum rated capacity for flare emissions (EU002)

CALCULATIONS:

Table 1 - Assumptions		Units	Source
Maximum LFG generation rate	593	scfm landfill gas	LandGEM model (2013) (LandGEM model Att 1)
Maximum Flare Capacity	2,400	scfm landfill gas	Manufacturer's Information
Methane %	0.50	ppmv	Assumed
Collection System Efficiency	75	%	Assumed
Control System Efficiency	98	%	Manufacturer's Information
Temperature LFG	25	C	AP-42, Section 2.4.4.1

Table 2 - Landfill Emissions Factors (EU001):			
Pollutant	Emission Factor	Units	Source
NMOC	75	ppm as hexane	Site specific testing - Refer to Part II, Att G
VOC	75	ppm	VOCs assumed to be equal to NMOC
HAPs	Varies	N/A	AP-42 (Draft Section2.4 -Table 2.4-2)

Table 3 - Flare Emissions Factors (EU002):			
Pollutant	Emission Factor	Units	Source
NO_x	3.90E+01	lb/MMCF CH4	AP-42 (Draft Section2.4 -Table 2.4-4)
CO	4.60E+01	lb/MMCF CH4	AP-42 (Draft Section2.4 -Table 2.4-4)
PM	15	$lb/10^6$ scf CH_4	AP-42 (Draft Section2.4 -Table 2.4-4)
Total Chloride	42	ppmv	AP-42 (Draft Section2.4)
Total Sulfur	47	ppmv	AP-42 (Draft Section2.4)

LANDFILL EMISSIONS (EU001):

Landfill emissions generated using EPA's Landfill Gas Emissions Model, Version 3.02 - see Attachment 1

NMOC Emissions

NMOC Generated	2.7 ton/yr	Per LandGEM, see Att 1
NMOC Collected	2.0 ton/yr	75% assumed collection efficiency
Fugitive NMOC	**0.7 ton/yr**	

VOC Emissions

Fugitive VOC	**0.7 ton/yr**	VOC assumed equal to NMOC

HAPs Emissions

Total HAPs	**1.1 ton/yr**	Refer to Page 5 for HAPs calculations
Single HAP	**0.4 ton/yr**	Refer to Page 5 for HAPs calculations

FLARE EMISSIONS (EU002):

Flare emissions based on maximum rated flare capacity

NO_x Emissions

NO_X emissions factor	3.90E+01	lb/10^6 scf CH_4
Flow rate (LFG)	2,400	scfm

$$CM_{NOx} = Q_{LFG} \cdot C_{NO_x} \cdot 60\frac{\min}{hr}$$

CM_{NOx}= 2.8 lb/hr
12.3 ton/yr

CO Emissions

CO emissions factor	4.60E+01	lb/scf
Flow rate (LFG)	2,400	scfm

$$CM_{CO} = Q_{LFG} \cdot C_{CO} \cdot 60\frac{\min}{hr}$$

CM_{CO}= 3.31 lb/hr
14.51 ton/yr

PM_{10} Emissions
All particulate emissions assumed to be under 10 microns

PM emissions factor	15	lb/10^6 scf CH_4
Flow rate (LFG)	2,400	scfm
Flow rate (CH_4)	1,200	scfm

$$CM_{PM_{10}} = Q_{CH_4} \cdot C_{PM_{10}} \cdot 60\frac{\min}{hr} \cdot \frac{1}{1 \cdot 10^6}$$

CM_{PM10}= 1.08 lb/hr
4.7 ton/yr

SO_x Emissions
Total sulfur oxidized to SOx

Total sulfur emissions factor	47	ppmv
Flow rate (LFG)	2,400	scfm
	3.57E+07	m^3/yr
Flow rate (CH_4)	1.79E+07	m^3/yr

$$Q_S = 2.0 \cdot Q_{CH4} \cdot \frac{C_S}{1 \cdot 10^6}$$

Q_S= 1678.6 m^3/yr

$$UM_S = Q_S \cdot \left[\frac{MW_S \cdot 1atm}{(8.205 \cdot 10^{-5} m^3 \cdot atm / gmol \cdot {}^\circ K) \cdot (1000g / gmol) \cdot (273 + T^\circ C)} \right]$$

UM_S= 2201.0 kg/yr
2.4 ton/yr

$$CM_{SO_2} = \left[UM_S \cdot \frac{\eta_{coll}}{100} \cdot \frac{\eta_{ctl}}{100} \frac{2.0 lb SO_2}{lbS} \right]$$

η_{coll}= 100 since calc is based on actual flow rate
η_{ctl}= 98 destruction efficiency
CM_{SO2}= **4.8 ton/yr**

HCl Emissions

Total Chloride emissions factor	42	ppmv
Flow rate (LFG)	2400	scfm
	3.57E+07	m^3/yr
Flow rate (CH_4)	1.79E+07	m^3/yr

$$Q_{HCl} = \frac{Q_{CH4}}{C_{CH4}} \cdot \frac{C_{HCl}}{1 \cdot 10^6}$$

Q_{HCl}= 1500.0 m^3/yr

$$UM_{HCl} = Q_{HCl} \cdot \left[\frac{MW_{HCl} \cdot 1atm}{(8.205 \cdot 10^{-5} m^3 \cdot atm / gmol \cdot {}^\circ K) \cdot (1000g / gmol) \cdot (273 + T^\circ C)} \right]$$

UM_{HCl}= 2236.8 kg/yr
2.5 ton/yr

$$CM_{HCl} = \left[UM_{HCl} \cdot \frac{\eta_{coll}}{100} \cdot \frac{\eta_{ctl}}{100} \frac{1.03 lb HCl}{lbCl^-} \right]$$

η_{coll}= 100 since calc is based on actual flow rate
η_{ctl}= 98 destruction efficiency
CM_{HCl}= **4.8 ton/yr**

SUMMARY:

Pollutant	EU001 Fugitive LFG (tn/yr)	EU002 Enclosed Flare (tn/yr)
NOx	-	12.3
CO	-	14.5
VOC	0.7	-
NMOC	0.7	-
PM10	-	4.7
HAPs - Total	1.1	-
HAPs - Single	0.4	-
HCl	-	4.8
SO_2	-	4.8

kelner engineering
1050 Northeast Tenth Place • Gainesville, Florida, 32601 • 352.672.8060

PROJECT NUMBER: 04701001E SHEET: 5 OF 5
PROJECT NAME: East Landfill Operations Permit Renewal
SUBJECT: Att. 2 - Emissions Calculations: HAPs
BY: RKelner Date: 10/15/13
CHECKED BY: Date:

City of Jacksonville East Landfill, Facility 031318
Title V Operating Permit Renewal
HAPS Emissions

Efficiency of collection system	75%	Ref: AP-42, Section 2.4	
Fugitive emissions	25%		
Maximum LFG Generation Rate	593	SCFM (Ref: LandGEM model, Att 1)	
Total gas generated	311.7	MMSCF	8.83 MMm^3

						Potential to Emit		Fugitive
CAS number	Compound	Median (ppmv)[3]	Data Source	Molecular Weight	Gravimetric Concentration (mg/m^3)	MG/YR	TONS/YR	Uncontrolled (tons/yr)
71-55-6	1,1,1-Trichloroethane (methyl chloroform)	0.48	AP-42	133.41	2.66	2.35E-02	2.59E-02	6.48E-03
79-34-5	1,1,2,2-Tetrachloroethane	1.11	AP-42	167.85	7.75	6.84E-02	7.55E-02	1.89E-02
75-34-3	1,1-Dichloroethane (ethylidene dichloride)	2.35	AP-42	98.97	9.67	8.54E-02	9.42E-02	2.35E-02
75-35-4	1,1,-Dichloroethene (vinylidene chloride)	0.20	AP-42	96.94	0.81	7.12E-03	7.85E-03	1.96E-03
107-06-2	1,2-Dichloroethane (ethylene dichloride)	0.41	AP-42	98.96	1.69	1.49E-02	1.64E-02	4.11E-03
78-87-5	1,2-Dichloropropane (propylene dichloride)	0.18	AP-42	112.99	0.85	7.47E-03	8.24E-03	2.06E-03
107-13-1	Acrylonitrile	6.33	AP-42	53.06	13.97	1.23E-01	1.36E-01	3.40E-02
75-15-0	Carbon disulfide	0.58	AP-42	76.13	1.84	1.62E-02	1.79E-02	4.47E-03
56-23-5	Carbon Tetrachloride	4.00E-03	AP-42	153.84	0.03	2.26E-04	2.49E-04	6.23E-05
463-58-1	Carbonyl sulfide	0.49	AP-42	60.07	1.22	1.08E-02	1.19E-02	2.98E-03
108-90-7	Chlorobenzene	0.25	AP-42	112.56	1.17	1.03E-02	1.14E-02	2.85E-03
75-00-3	Chloroethane (ethyl chloride)	1.25	AP-42	64.52	3.35	2.96E-02	3.27E-02	8.17E-03
67-66-3	Chloroform	0.03	AP-42	119.39	0.15	1.32E-03	1.45E-03	3.63E-04
75-09-2	Dichloromethane (methylene chloride)	14.30	AP-42	84.94	50.53	4.46E-01	4.92E-01	1.23E-01
100-41-4	Ethylbenzene	4.61	AP-42	106.16	20.36	1.80E-01	1.98E-01	4.96E-02
110-54-3	n-Hexane	6.57	AP-42	86.18	23.55	2.08E-01	2.29E-01	5.73E-02
7439-97-6	Mercury[2]	2.94E-04	AP-42	200.61	2.45E-03	2.17E-05	2.39E-05	5.97E-06
78-93-3	Methyl ethyl ketone	7.09	AP-42	72.11	21.27	1.88E-01	2.07E-01	5.18E-02
108-10-1	Methyl isobutyl ketone	1.87	AP-42	100.16	7.79	6.88E-02	7.59E-02	1.90E-02
127-18-4	Perchloroethylene (tetrachloroethylene)	3.73	AP-42	165.83	25.73	2.27E-01	2.51E-01	6.26E-02
79-01-6	Trichloroethylene (trichloroethane)	2.82	AP-42	131.40	15.41	1.36E-01	1.50E-01	3.75E-02
75-01-4	Vinyl Chloride	7.34	AP-42	62.50	19.08	1.68E-01	1.86E-01	4.64E-02
71-43-2	Benzene	1.91	AP-42	78.11	6.21	5.48E-02	6.04E-02	1.51E-02
	Toluene	39.30	AP-42	92.13	150.61	1.33E+00	1.47E+00	3.67E-01
1330-20-7	Xylenes	12.10	AP-42	106.16	53.43	4.72E-01	5.20E-01	1.30E-01
	Total HAPS							**1.07**

Notes:
(1) - VOCs calculated as NMOC
(2) - Assumed 0% combustion efficiency for mercury, per AP-42
(3) - No or Unknown Co-disposal

PART II

FDEP FORM 62-210.900(1)
APPLICATION FOR AIR PERMIT, LONG FORM

Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit:

- For any required purpose at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air operation permit;
- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment new source review, or maximum achievable control technology (MACT);
- To assume a restriction on the potential emissions of one or more pollutants to escape a requirement such as PSD review, nonattainment new source review, MACT, or Title V; or
- To establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

- An initial federally enforceable state air operation permit (FESOP); or
- An initial, revised, or renewal Title V air operation permit.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **City of Jacksonville**	
2. Site Name: **East Municipal Solid Waste Landfill**	
3. Facility Identification Number: **0310318**	
4. Facility Location... Street Address or Other Locator: **515 Girvin Road** City: **Jacksonvillle** County: **Duval** Zip Code: **32225**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **John Sullivan**
2. Application Contact Mailing Address... Organization/Firm: **Sullivan Environmental** Street Address: **4448 13th Lane NE** City: **St. Petersburg** State: **Florida** Zip Code: **33703**
3. Application Contact Telephone Numbers... Telephone: (**813**) **625** - **2952** ext. Fax: **N/A**
4. Application Contact E-mail Address: **john@sullivanenv.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application: 11-4-2013	3. PSD Number (if applicable):
2. Project Number(s): 0310318-005-AV	4. Siting Number (if applicable):

Purpose of Application

This application for air permit is being submitted to obtain: (Check one)

Air Construction Permit

☐ Air construction permit.

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

Air Operation Permit

☐ Initial Title V air operation permit.

☐ Title V air operation permit revision.

☒ Title V air operation permit renewal.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

☐ Air construction permit and Title V permit revision, incorporating the proposed project.

☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

The City of Jacksonville is submitting this permit renewal application and supporting documents to obtain a renewal Title V Operating Permit. The existing permit 0310318-004-AV expires June 16, 2014.

The primary control device for landfill gas is currently four internal combustion engines (with backup enclosed flare). Due to low gas flow and the age of the internal combustion engines, the applicant requests that the enclosed flare be permitted as the sole control device. The four internal combustion engines will be disconnected from the collection system and put out of service. Where disconnected, the collection system will be secured with a blind flange to prevent uncontrolled emissions of landfill gas.

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Processing Fee
001	Municipal Solid Waste Landfill	N/A	N/A
002	Enclosed Landfill Gas Flare	N/A	N/A

Application Processing Fee

Check one: ☐ Attached - Amount: $_____ ☒ Not Applicable

Owner/Authorized Representative Statement **N/A**

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name :
2. Owner/Authorized Representative Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Owner/Authorized Representative Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
4. Owner/Authorized Representative E-mail Address:
5. Owner/Authorized Representative Statement: *I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.* _____ _____ Signature Date

Application Responsible Official Certification

Complete if applying for an initial, revised, or renewal Title V air operation permit or concurrent processing of an air construction permit and revised or renewal Title V air operation permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name: Cleveland Ferguson
   Chief Administrative Officer

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):

   ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.

   ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively.

   ☒ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.

   ☐ The designated representative at an Acid Rain source or CAIR source.

3. Application Responsible Official Mailing Address...
   Organization/Firm: City of Jacksonville
   Street Address: 1031 Superior Street
   City: Jacksonville State: Florida Zip Code: 32254

4. Application Responsible Official Telephone Numbers...
   Telephone: (904) 387-8837 ext. Fax: ( ) - 904-387-8905

5. Application Responsible Official E-mail Address: cferguson@coj.net

6. Application Responsible Official Certification:

I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

Signature _____ Date 11/3/13

Professional Engineer Certification

1. Professional Engineer Name: **Rebecca Kelner, PE**
   Registration Number: **FL PE 66470**
2. Professional Engineer Mailing Address...
   Organization/Firm: **Kelner Engineering, Inc.**
   Street Address: **5844 Blue Savannah Drive**
   City: **Leesburg** State: **Florida** Zip Code: **34748**
3. Professional Engineer Telephone Numbers...
   Telephone: **(352) 672 - 8060** ext. Fax: **(866) 722 - 0656**
4. Professional Engineer E-mail Address: **Rebecca@kelnerinc.com**
5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here [X] *, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.*

(4) If the purpose of this application is to obtain an air construction permit (check here [ ] *, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here* [ ] *, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.*

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here , if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

Signature 10-21-13 Date

(seal)

* Attach any exception to certification statement.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone **17** East (km) **454.950** North (km) **3355.570**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **30/19/58** Longitude (DD/MM/SS) **81/28/07**	
3. Governmental Facility Code: **4**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **49**	6. Facility SIC(s): **4953**
7. Facility Comment : **Closed municipal solid waste landfill with gas collection and control system**			

Facility Contact

1. Facility Contact Name: **Jeffrey S. Foster, PE, PG**
2. Facility Contact Mailing Address... Organization/Firm: **City of Jacksonville** Street Address: **1031 Superior St** City: **Jacksonville** State: **Florida** Zip Code: **32254**
3. Facility Contact Telephone Numbers: Telephone: **(904)255 -7500** ext. Fax:**(904) 387-8905**
4. Facility Contact E-mail Address: **jsfoster@coj.net**

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
4. Facility Primary Responsible Official E-mail Address:

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. ☐ Small Business Stationary Source	☐ Unknown
2. ☐ Synthetic Non-Title V Source	
3. [x] Title V Source	
4. ☐ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. ☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. ☐ Major Source of Hazardous Air Pollutants (HAPs)	
7. ☐ Synthetic Minor Source of HAPs	
8. [x] One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. ☐ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. [x] One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. ☐ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	

12. Facility Regulatory Classifications Comment:

The Facility is subject to the Landfill NSPS, 40 CFR 60 Subpart WWW.

The Facility is subject to the Landfill NESHAP, 40 CFR 63, Subpart AAAA.

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps - N/A

1. Pollutant Subject to Emissions Cap	2. Facility-Wide Cap [Y or N]? (all units)	3. Emissions Unit ID's Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [x] Attached, Document ID: **Att A** [ ] Previously Submitted, Date:_____

2. Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [x] Attached, Document ID: **Att B** [ ] Previously Submitted, Date:_____

3. Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [x] Attached, Document ID: **Att C** [ ] Previously Submitted, Date:_____

Additional Requirements for Air Construction Permit Applications N/A

1. Area Map Showing Facility Location:
   [ ] Attached, Document ID:_____ [ ] Not Applicable (existing permitted facility)

2. Description of Proposed Construction, Modification, or Plantwide Applicability Limit (PAL):
   [ ] Attached, Document ID:_____

3. Rule Applicability Analysis:
   [ ] Attached, Document ID:_____

4. List of Exempt Emissions Units:
   [ ] Attached, Document ID:_____ [ ] Not Applicable (no exempt units at facility)

5. Fugitive Emissions Identification:
   [ ] Attached, Document ID:_____ [ ] Not Applicable

6. Air Quality Analysis (Rule 62-212.400(7), F.A.C.):
   [ ] Attached, Document ID:_____ [ ] Not Applicable

7. Source Impact Analysis (Rule 62-212.400(5), F.A.C.):
   [ ] Attached, Document ID:_____ [ ] Not Applicable

8. Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.):
   [ ] Attached, Document ID:_____ [ ] Not Applicable

9. Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.):
   [ ] Attached, Document ID:_____ [ ] Not Applicable

10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.):
    [ ] Attached, Document ID:_____ [ ] Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for FESOP Applications N/A

1. List of Exempt Emissions Units:
   ☐ Attached, Document ID:_____ ☐ Not Applicable (no exempt units at facility)

Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities: (Required for initial/renewal applications only)
   ☒ Attached, Document ID: **Att D** ☐ Not Applicable (revision application)

2. Identification of Applicable Requirements: (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought)
   ☐ Attached, Document ID:_____
   ☒ Not Applicable (revision application with no change in applicable requirements)

3. Compliance Report and Plan: (Required for all initial/revision/renewal applications)
   ☒ Attached, Document ID: **Att E**
   Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.

4. List of Equipment/Activities Regulated under Title VI: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____
   ☐ Equipment/Activities Onsite but Not Required to be Individually Listed
   ☒ Not Applicable

5. Verification of Risk Management Plan Submission to EPA: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____ ☒ Not Applicable

6. Requested Changes to Current Title V Air Operation Permit:
   ☒ Attached, Document ID: **Att F** ☐ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Facilities Subject to Acid Rain, CAIR, or Hg Budget Program

1. Acid Rain Program Forms: **N/A**

   Acid Rain Part Application (DEP Form No. 62-210.900(1)(a)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☐ Not Applicable (not an Acid Rain source)

   Phase II NO_X Averaging Plan (DEP Form No. 62-210.900(1)(a)1.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☐ Not Applicable

   New Unit Exemption (DEP Form No. 62-210.900(1)(a)2.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☐ Not Applicable

2. CAIR Part (DEP Form No. 62-210.900(1)(b)): **N/A**
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☐ Not Applicable (not a CAIR source)

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

EMISSIONS UNIT INFORMATION
Section [1] of [2]

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

[x] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[x] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
Municipal Solid Waste Landfill

3. Emissions Unit Identification Number: **001**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A	**N/A**	**N/A**	**4953**

8. Federal Program Applicability: (Check all that apply)

[ ] Acid Rain Unit

[ ] CAIR Unit

9. Package Unit:
Manufacturer: **N/A** Model Number: **N/A**

10. Generator Nameplate Rating: MW **N/A**

11. Emissions Unit Comment: **The emissions unit consists of the closed East Municipal Landfill. The landfill gas is collected and sent to an enclosed flare (EU002). Landfill gas that is not collected is assumed to be fugitive.**

EMISSIONS UNIT INFORMATION
Section [1] of [2]

Emissions Unit Control Equipment/Method: Control **1** of **1**

1. Control Equipment/Method Description: **1,300 cfm enclosed flare**
2. Control Device or Method Code: **023 (flaring)**

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: **593 cfm**	
2. Maximum Production Rate: **N/A**	
3. Maximum Heat Input Rate: **N/A**	
4. Maximum Incineration Rate: **N/A** pounds/hr **N/A** tons/day	
5. Requested Maximum Operating Schedule:	
24 hours/day	**7** days/week
52 weeks/year	**8,760** hours/year

6. Operating Capacity/Schedule Comment:

Maximum rate is the maximum calculated landfill gas generation rate (2013). Landfill gas generation will continue to decrease over time.

Please refer to Part I, Attachment 1 for LFG generation model (LandGEM model).

C. EMISSION POINT (STACK/VENT) INFORMATION

(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **EU001**	2. Emission Point Type Code: **4**	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: **Fugitive Emissions**		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: **EU002 Enclosed Flare**		
5. Discharge Type Code: **N/A**	6. Stack Height: **N/A**	7. Exit Diameter: **N/A**
8. Exit Temperature: **N/A**	9. Actual Volumetric Flow Rate: **N/A**	10. Water Vapor: **N/A %**
11. Maximum Dry Standard Flow Rate: **N/A** dscfm	12. Nonstack Emission Point Height: **N/A feet**	
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)	
15. Emission Point Comment:		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Landfill gas generated by anaerobic decay of municipal solid waste**		
2. Source Classification Code (SCC): **50100402**	3. SCC Units: **N/A**	
4. Maximum Hourly Rate: **N/A**	5. Maximum Annual Rate: **N/A**	6. Estimated Annual Activity Factor: **N/A**
7. Maximum % Sulfur: **N/A**	8. Maximum % Ash: **N/A**	9. Million Btu per SCC Unit: **N/A**
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **N/A**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? ☐ Yes ☐ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **There were no Emissions Limited pollutants released by the facility.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code: **N/A**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation **0** of **0**

1. Visible Emissions Subtype: **N/A**	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed	
4. Method of Compliance:	
5. Visible Emissions Comment:	

Visible Emissions Limitation: Visible Emissions Limitation __ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor **0** of **0**

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor __ of __

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

H. CONTINUOUS MONITOR INFORMATION (CONTINUED)

Continuous Monitoring System: Continuous Monitor ___ of ___

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor ___ of ___

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: **Att B** [ ] Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: **Att G** [ ] Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: **Att H** [ ] Previously Submitted, Date _____

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: **Att I** [ ] Previously Submitted, Date _____
   [ ] Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: **Att J** [ ] Previously Submitted, Date _____
   [ ] Not Applicable

6. Compliance Demonstration Reports/Records:
   [ ] Attached, Document ID: _____
   Test Date(s)/Pollutant(s) Tested: _____
   [ ] Previously Submitted, Date: _____
   Test Date(s)/Pollutant(s) Tested: _____
   [ ] To be Submitted, Date (if known): _____
   Test Date(s)/Pollutant(s) Tested: _____
   [X] Not Applicable

   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
   [ ] Attached, Document ID: _____ [X] Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications N/A

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☐ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☐ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☐ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☒ Attached, Document ID: **Att K**
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☒ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements Comment

EMISSIONS UNIT INFORMATION
Section [2] of [2]

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

[X] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

[ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

[X] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
Enclosed flare for LFG combustion

3. Emissions Unit Identification Number: **EU002**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A	**N/A**	**N/A**	**4953**

8. Federal Program Applicability: (Check all that apply)

[ ] Acid Rain Unit

[ ] CAIR Unit

9. Package Unit:
Manufacturer: **N/A** Model Number: **N/A**

10. Generator Nameplate Rating: MW **N/A**

11. Emissions Unit Comment: **Landfill gas collected from EU001 (*Municipal Solid Waste Landfill)* is routed to the enclosed flare. Four LFG-fired electrical generators are requested to be disconnected from the control system; the enclosed flare will be the sole means of LFG destruction.**

EMISSIONS UNIT INFORMATION
Section [2] of [2]

Emissions Unit Control Equipment/Method: Control 1 of 1

1. Control Equipment/Method Description: **2,400 cfm enclosed flare**
2. Control Device or Method Code: **023 (flaring)**

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: **2,400 cfm**	
2. Maximum Production Rate: **N/A**	
3. Maximum Heat Input Rate: **73.7** million Btu/hr	
4. Maximum Incineration Rate: **N/A** pounds/hr **N/A** tons/day	
5. Requested Maximum Operating Schedule: **24** hours/day **52** weeks/year	 **7** days/week **8,760** hours/year
6. Operating Capacity/Schedule Comment: **Maximum heat input is based on 512 BTU/CF LFG**	

EMISSIONS UNIT INFORMATION
Section [2] of [2]

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **EU002**	2. Emission Point Type Code: **1**	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: **Enclosed Flare**		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: **EU001 Closed MSW Landfill**		
5. Discharge Type Code: **V**	6. Stack Height: **40 Feet**	7. Exit Diameter: **7.6 feet**
8. Exit Temperature: **1400 °F**	9. Actual Volumetric Flow Rate: **+/- 2,400 acfm**	10. Water Vapor: %
11. Maximum Dry Standard Flow Rate: **N/A** dscfm	12. Nonstack Emission Point Height: **N/A feet**	
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)	
15. Emission Point Comment:		

EMISSIONS UNIT INFORMATION
Section [2] of [2]

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): **Landfill gas generated by anaerobic decay of municipal solid waste**		
2. Source Classification Code (SCC): **50100410**	3. SCC Units: **MMSCF waste gas burned**	
4. Maximum Hourly Rate:	5. Maximum Annual Rate: **311**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit: **512**
10. Segment Comment: Based on maximum 593 scfm LFG generated by the LF (refer to Part I, Att 1, year 2013)		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

EMISSIONS UNIT INFORMATION
Section [2] of [2]

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
NOx			**NS**
CO			**NS**

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **N/A**	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour tons/year	4. Synthetically Limited? ☐ Yes ☐ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference:	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **There were no Emissions Limited pollutants released by the facility.**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code: **N/A**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: **VE00**	2. Basis for Allowable Opacity: [x] Rule [ ] Other
3. Allowable Opacity: **no visible emissions** Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: **5 min/ 2 hour period**	
4. Method of Compliance: **EPA Method 22**	
5. Visible Emissions Comment:	

Visible Emissions Limitation: Visible Emissions Limitation __ of ___

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: [ ] Rule [ ] Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor **1** of **2**

1. Parameter Code: **TEMP**	2. Pollutant(s): **N/A**
3. CMS Requirement:	[x] Rule [ ] Other
4. Monitor Information... **Thermocouple** Manufacturer: **LFG Specialties** Model Number: **FE840S4** Serial Number:	
5. Installation Date: **1993**	6. Performance Specification Test Date: **December 16 – 17, 2008**
7. Continuous Monitor Comment: **Specific Condition A.18 of permit 0310318-004-AV** **40 CFR 60.756(b)** **Performance test results for the current permit period will be submitted under separate cover prior to permit expiration.**	

Continuous Monitoring System: Continuous Monitor **2** of **2**

1. Parameter Code: **FLOW**	2. Pollutant(s): **N/A**
3. CMS Requirement:	[x] Rule [ ] Other
4. Monitor Information... Manufacturer: **Dieterich Standard, Inc.** Model Number: Serial Number:	
5. Installation Date: **1997**	6. Performance Specification Test Date:
7. Continuous Monitor Comment: **Specific Condition A.18 of permit 0310318-004-AV** **40 CFR 60.756(b)**	

H. CONTINUOUS MONITOR INFORMATION (CONTINUED)

Continuous Monitoring System: Continuous Monitor ___ of ___

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor ___ of ___

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

EMISSIONS UNIT INFORMATION
Section [2] of [2]

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: **Att B** [ ] Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: **Att G** [ ] Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: **Att H** [ ] Previously Submitted, Date _____

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: **Att I** [ ] Previously Submitted, Date _____
[ ] Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: **Att J** [ ] Previously Submitted, Date _____
[ ] Not Applicable

6. Compliance Demonstration Reports/Records:
[ ] Attached, Document ID: _____
Test Date(s)/Pollutant(s) Tested: _____
[ ] Previously Submitted, Date: _____
Test Date(s)/Pollutant(s) Tested: _____
[ ] To be Submitted, Date (if known): _____
Test Date(s)/Pollutant(s) Tested: _____
[X] Not Applicable

Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
[ ] Attached, Document ID: _____ [X] Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications N/A

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☐ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☐ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☐ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☒ Attached, Document ID: **Att K**
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☒ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements Comment

ATTACHMENT A

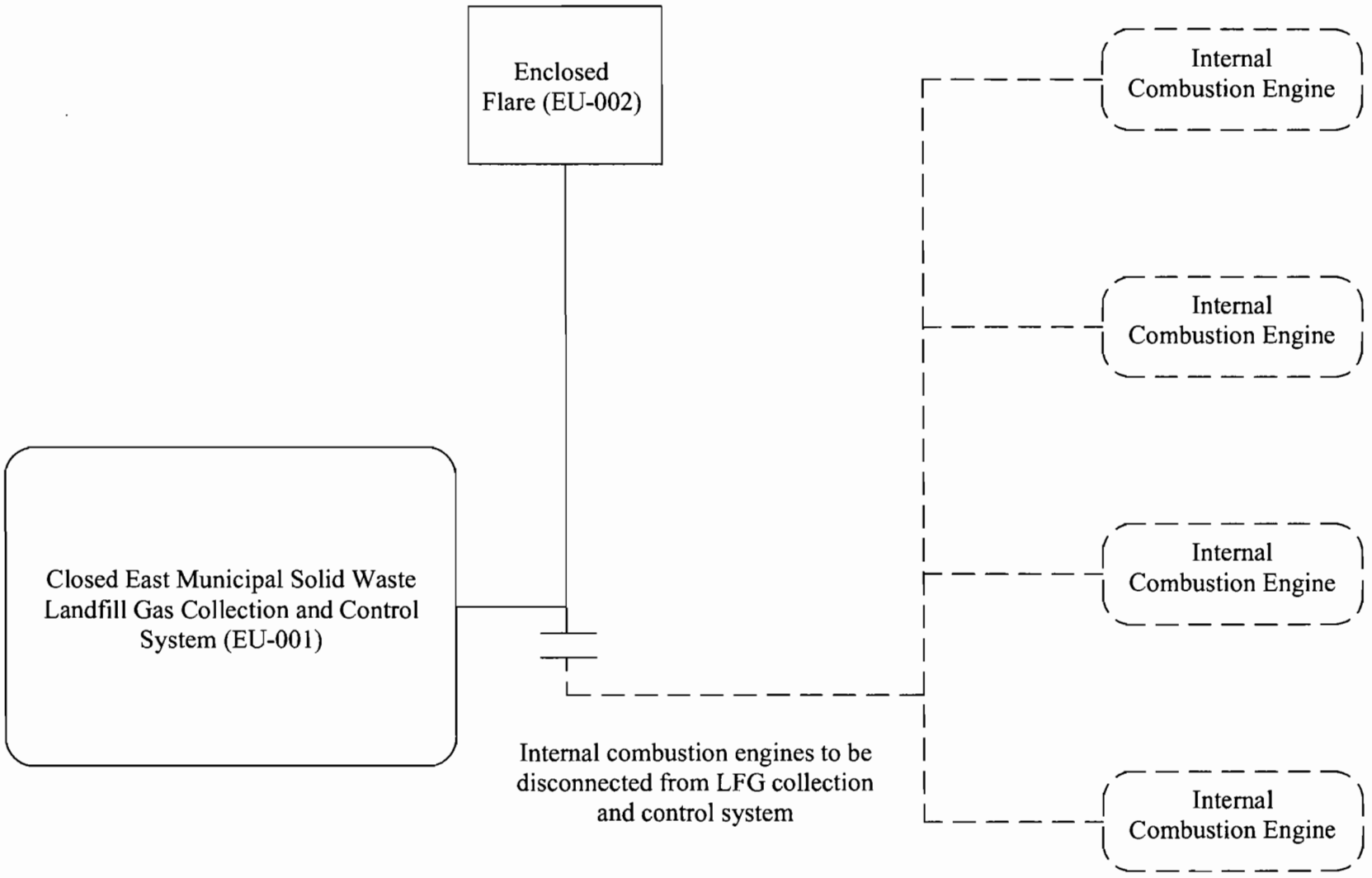
FACILITY PLOT PLAN

Attachment A – Facility Plot Plan

kelner engineering

ATTACHMENT B

PROCESS FLOW DIAGRAM



10/06/2013	City of Jacksonville East Municipal Solid Waste Landfill (Facility 0310318)		
	Scale: NTS	Sheet: 1 of 1	Kelner Engineering Project: 0470-02

Attachment B
Process Flow Diagram

ATTACHMENT C

PRECAUTIONS TO PREVENT EMISSIONS OF UNCONFINED PARTICULATE MATTER

PRECAUTIONS TO PREVENT EMISSIONS OF UNCONFINED PARTICULATE MATTER

The facility has negligible amounts of unconfined particulate matter – the facility is closed and has limited vehicular traffic.

Several precautionary measures were taken in the original design of the facility to prevent emissions of unconfined particulate matter. These include:

- Paving of roads, parking areas and equipment yards
- Landscaping and planting of vegetation

Additional operational measures are taken at the facility to minimize unconfined particulate matter emissions, including:

- Maintenance of paved areas as needed
- Regular mowing of grass and care of vegetation
- Limited access to the property by unnecessary vehicles

ATTACHMENT D

LIST OF INSIGNIFICANT ACTIVITIES

LIST OF INSIGNIFICANT ACTIVITIES

The below listed emissions units and / or activities are considered insignificant pursuant to Rule 62-213.430(6), F.A.C.

- Propane above ground storage tanks
- Flare ignition system (propane fired)
- On-site maintenance vehicles, machinery and heavy equipment
- Fugitive particulate matter emissions from mobile equipment operations on site

ATTACHMENT E

COMPLIANCE REPORT AND PLAN

COMPLIANCE REPORT AND PLAN

The facility is in compliance with all permit requirements, except as noted below:

Description of Non-Compliance (1 of 1)

1. Emissions unit identification number
   EU-002

2. Specific permit condition number
   A.5

3. Description of the requirement of the permit condition
   Operate the control device within the parameters established during the compliance test.

4. Basis for determination of non-compliance
   Engine exhaust temperature was not monitored continuously to document compliance with the minimum exhaust temperature established in the December 17 – 18, 2008 compliance tests.

5. Beginning and ending dates of periods of non-compliance
   The beginning date is June 16, 2009 when the condition was added to the permit.

6. Identification of the probable cause of non-compliance and description of corrective action or preventative measures.
   Due to decreased gas flow from the closed landfill and age of the internal combustion engines, the City proposes to discontinue use of the internal combustion engines and use the enclosed flare as the sole control device.

7. Dates of any reports previously submitted identifying this incident of non-compliance
   This incident was first identified to FDEP at a December 14, 2010 meeting with FDEP, Northeast District and has been identified in all subsequent Annual Reports (Form 62-213.900(2))

8. Compliance Schedule
   The permittee will be in compliance with this condition upon approval to discontinue using the internal combustion engines and to use the enclosed flare as the sole control device.

ATTACHMENT F

REQUESTED CHANGES TO CURRENT TITLE V AIR OPERATIONS PERMIT

REQUESTED CHANGES TO CURRENT TITLE V AIR OPERATIONS PERMIT

The applicant requests that Emissions Unit 002 (*Four Stationary Caterpillar Internal Combustion Engines with back-up flare*) be revised so that the enclosed flare is the sole control device for collected landfill gas.

The Caterpillar internal combustion engines are operated infrequently due to low gas flows and the age of the equipment. The applicant requests to disconnect the internal combustion engines from the collection and control system and use the enclosed flare as the sole combustion device. The landfill gas collection header supplying the internal combustion engines will be cut and capped to prevent uncontrolled emissions of landfill gas.

ATTACHMENT G

FUEL ANALYSIS OR SPECIFICATION

FUEL ANALYSIS OR SPECIFICATION

Landfill gas generated by the anaerobic decomposition of municipal solid waste generally consists of approximately 50% methane and 50% CO_2 by volume. Landfill gas composition was provided as part of the initial Title V Air Permit application, dated May, 1995 and attached here for your reference.

The NMOC fraction of LFG was recently tested on three separate occasions by the City, with analysis conducted by Triangle Environmental Services. The laboratory reports are attached and relevant data is summarized below:

Compound	**Reported Value – Triangle Report Dated**		
	3-22-2013	**10-18-2012**	**5-17-2012**
NMOC (ppm, as hexane)	21	137	68
Average (ppm, as hexane)	75		

CORE LABORATORIES

SAMPLE DELIVERY GROUP NARRATIVE

November 17, 1994

Customer: Jacksonville Electric Authority
Project: P940001 Landfill Gas Utilization
Core Laboratories Project Number: 942724

On 10-27-94 Core Laboratories received samples for analysis. The following information is pertinent to the interpretation of the data package.

GC/MS Analysis:

The internal standard area counts for samples 942724-1 (GCMS/Tenax/50CC) and 942724-4 (GCMS/Tenax/25CC) were below the - 50/+100% acceptance criteria when compared to the internal standard area counts in the continuing calibration verification standard.. The surrogate recoveries for dichlorobenzene d4 for samples 942724-1 (GCMS/Tenax/50CC) and 942724-4 (GCMS/Tenax/25CC) were at 171% and 181% respectively. This is above expected recoveries for this method. There was inadequate sample for reanalysis to confirm the recoveries for surrogates or internal standards.

Linda L. Benkers
QA/QC Coordinator

James H. Travis
Laboratory Supervisor

CORE LAB

CORE LABORATORIES

LABORATORY TESTS RESULTS
11/17/94

JOB NUMBER: 942724 CUSTOMER: JACKSONVILLE ELECTRIC AUTHORITY ATTN: STEVE MOSER

CLIENT I.D.....: LANDFILL GAS UTILIZATION
DATE SAMPLED.....: 10/24/94
TIME SAMPLED.....: 10:20
WORK DESCRIPTION...: EVACUATED CYLINDER

LABORATORY I.D...: 942724-0003
DATE RECEIVED....: 10/26/94
TIME RECEIVED....: 11:15
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Ethyl Methyl Sulfide	<1	1	ppm v/v			
Ethyl Sulfide	<1	1	ppm v/v			
Methyl Disulfide	<1	1	ppm v/v			
Ethyl Methyl Disulfide	<1	1	ppm v/v			
Ethyl Disulfide	<1	1	ppm v/v			
Thiophene	<1	1	ppm v/v			
Tetrahydrothiophene	<1	1	ppm v/v			
2-Methyl Thiophene	<1	1	ppm v/v			
3-Methyl Thiophene	<1	1	ppm v/v			
2-Ethyl Thiophene	<1	1	ppm v/v			
3-Ethyl Thiophene	<1	1	ppm v/v			
2,5-dimethyl Thiophene	<1	1	ppm v/v			
Benzothiophene	<1	1	ppm v/v			
Unidentified Sulfur Compounds	0	0	ppm v/v			

10703 East Bethany Drive
Aurora, CO 80014
(303) 751-1780

CORE LAB

CORE LABORATORIES

LABORATORY TESTS RESULTS
11/17/94

JOB NUMBER: 942724 CUSTOMER: JACKSONVILLE ELECTRIC AUTHORITY ATTN: STEVE MOSER

CLIENT I.D.....: LANDFILL GAS UTILIZATION
DATE SAMPLED.....: 10/24/94
TIME SAMPLED.....: 10:20
WORK DESCRIPTION...: EVACUATED CYLINDER

LABORATORY I.D...: 942724-0003
DATE RECEIVED....: 10/26/94
TIME RECEIVED....: 11:15
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Natural Gas Analysis		*1		GPA 2261/2172/2145	11/08/94	*HP
Oxygen	0.76	0.01	Mol %			
Nitrogen	3.67	0.01	Mol %			
Carbon Dioxide	36.66	0.01	Mol %			
Methane	58.38	0.01	Mol %			
Ethane	<0.01	0.01	Mol %			
Propane	<0.01	0.01	Mol %			
Isobutane	<0.01	0.01	Mol %			
n-Butane	<0.01	0.01	Mol %			
Isopentane	<0.01	0.01	Mol %			
n-Pentane	<0.01	0.01	Mol %			
Hexane Plus	0.53	0.01	Mol %			
Total	100.00	0.01				
Molar Mass Ratio	0.94129	0				
Relative Density	0.94387	0				
Compressibility Factor	0.99687	0				
Gross Heating Value (Dry)	616.6	0	BTU/CF (Ideal)			
Gross Heating Value (Dry)	618.6	0	BTU/CF (Real)			
Gross Heating Value (Wet)	606.8	0	BTU/CF (Ideal)			
Pressure Base	14.696	0	psia			
Ethane	<0.001	0.001	GPM			
Propane	<0.001	0.001	GPM			
Isobutane	<0.001	0.001	GPM			
n-Butane	<0.001	0.001	GPM			
Isopentane	<0.001	0.001	GPM			
n-Pentane	<0.001	0.001	GPM			
Hexane Plus	0.229	0.001	GPM			
Total	0.229	0.001	GPM			
8000 - SULFUR COMPOUNDS		*1		ASTM D-5504	11/03/94	*HP
Hydrogen Sulfide	1	1	ppm v/v			
Carbonyl Sulfide	1	1	ppm v/v			
Sulfur Dioxide	<1	1	ppm v/v			
Carbon Disulfide	<1	1	ppm v/v			
Methyl Mercaptan	<1	1	ppm v/v			
Ethyl Mercaptan	<1	1	ppm v/v			
iso-Propyl Mercaptan	<1	1	ppm v/v			
n-Propyl Mercaptan	<1	1	ppm v/v			
tert-Butyl Mercaptan	<1	1	ppm v/v			
sec-Butyl Mercaptan	<1	1	ppm v/v			
iso-Butyl Mercaptan	<1	1	ppm v/v			
n-Butyl Mercaptan	<1	1	ppm v/v			
Methyl Sulfide	1	1	ppm v/v			

10703 East Bethany Drive
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(303) 751-1780

CORE LABORATORIES

LABORATORY TESTS RESULTS
11/17/94

JOB NUMBER: 942724 | CUSTOMER: JACKSONVILLE ELECTRIC AUTHORITY | ATTN: STEVE MOSER

CLIENT I.D.....: LANDFILL GAS UTILIZATION
DATE SAMPLED.....: 10/24/94
TIME SAMPLED.....: 10:15
WORK DESCRIPTION...: CARBON ABSORPTION

LABORATORY I.D...: 942724-0002
DATE RECEIVED....: 10/26/94
TIME RECEIVED....: 11:15
REMARKS.....:

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
TOTAL ORGANIC HALIDE (TOH/Cl)	20	10	ug/L as Cl	dam/llb	11/11/94	DKB

10703 East Bethany Drive
Aurora, CO 80014
(303) 751-1780

CORELAB

CORE LABORATORIES

ANALYTICAL REPORT
11-17-94

Customer: JACKSONVILLE ELECTRIC AUTHORITY File No.: 942724

Client Sample I.D..... GCMS/TENAX (50CC)
Remark/Project..... P940001 LANDFILL GAS UTILIZATION
Date/Time Sampled..... 10-24-94 1010
Date/Time Received..... 10-26-94
Laboratory Sample I.D..... 942724-1

All Values Reported At STP (760mm Hg, 0 degrees C)
TOH/CL = ug/L Total Organic Halide as Chloride

VOLATILE ORGANIC COMPOUND	Analyzed Value ug/L at STP	Chloride ug/L	Fluoride ug/L	Bromide ug/L	TOH/CL Total ug/L as Cl
CALCULATED TOTALS - ug/L	144	1.0	0	0	1.0
2-Butanone	5.5	--	--	--	--
Ethyl benzene	29.2	--	--	--	--
Tetrachloroethene	1.2	1.0	--	--	1.0
Toluene	28.8	--	--	--	--
o-Xylene	25.3	--	--	--	--
m & p-Xylene	53.7	--	--	--	--

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Aurora, Colorado 80014
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CORE LAB

CORE LABORATORIES

ANALYTICAL REPORT
11-17-94

Customer: JACKSONVILLE ELECTRIC AUTHORITY File No.: 942724

Client Sample I.D..... GCMS/TENAX (50CC)
Remark/Project..... P940001 LANDFILL GAS UTILIZATION
Date/Time Sampled..... 10-24-94 1010
Date/Time Received..... 10-26-94
Laboratory Sample I.D..... 942724-1

All Values Reported At STP (760mm Hg, 0 degrees C)
TOH/CL = PPMV Total Organic Halide as Chloride

VOLATILE ORGANIC COMPOUND	Analyzed Value PPMV at STP	Chloride PPMV	Fluoride PPMV	Bromide PPMV	TOH/CL Total PPMV as Cl
CALCULATED TOTALS - PPMV	31.7	0.1	0	0	0.1
2-Butanone	1.7	--	--	--	--
Ethyl benzene	6.2	--	--	--	--
Tetrachloroethene	0.2	0.1	--	--	0.1
Toluene	7.0	--	--	--	--
o-Xylene	5.3	--	--	--	--
m & p-Xylene	11.3	--	--	--	--

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CORE LAB

CORE LABORATORIES

ANALYTICAL REPORT
11-17-94

Customer: JACKSONVILLE ELECTRIC AUTHORITY File No.: 942724

Client Sample I.D..... GCMS/TENAX (25CC)
Remark/Project..... P940001 LANDFILL GAS UTILIZATION
Date/Time Sampled.....
Date/Time Received..... 10-26-94
Laboratory Sample I.D..... 942724-4

All Values Reported At STP (760mm Hg, 0 degrees C)
TOH/CL = PPMV Total Organic Halide as Chloride

VOLATILE ORGANIC COMPOUND	Analyzed Value PPMV at STP	Chloride PPMV	Fluoride PPMV	Bromide PPMV	TOH/CL Total PPMV as Cl
CALCULATED TOTALS - PPMV	21.5	0	0	0	0
Ethyl benzene	4.0	--	--	--	--
Toluene	5.9	--	--	--	--
o-Xylene	3.1	--	--	--	--
m & p-Xylene	8.5	--	--	--	--

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CORE LAB

CORE LABORATORIES

ANALYTICAL REPORT
11-17-94

Customer: JACKSONVILLE ELECTRIC AUTHORITY File No.: 942724

Client Sample I.D..... GCMS/TENAX (25CC)
Remark/Project..... P940001 LANDFILL GAS UTILIZATION
Date/Time Sampled.....
Date/Time Received..... 10-26-94
Laboratory Sample I.D..... 942724-4

All Values Reported At STP (760mm Hg, 0 degrees C)
TOH/CL = ug/L Total Organic Halide as Chloride

VOLATILE ORGANIC COMPOUND	Analyzed Value ug/L at STP	Chloride ug/L	Fluoride ug/L	Bromide ug/L	TOH/CL Total ug/L as Cl
CALCULATED TOTALS - ug/L	98.1	0	0	0	0
Ethyl benzene	18.9	--	--	--	--
Toluene	24.3	--	--	--	--
o-Xylene	14.6	--	--	--	--
m & p-Xylene	40.3	--	--	--	--

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CORE LAB

CORE LABORATORIES

QUALITY CONTROL REPORT
11/17/94

JOB NUMBER: 942724 CUSTOMER: JACKSONVILLE ELECTRIC AUTHORITY ATTN: STEVE MOSER

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:TOTAL ORGANIC HALIDE (TOH/Cl)				DATE/TIME ANALYZED:11/11/94 09:00						QC BATCH NUMBER:314260
REPORTING LIMIT/DF: 10		UNITS:ug/L as Cl		METHOD REFERENCE :dam/llb						TECHNICIAN:DKB
BLANK	MB	941111	<10							
STANDARD	LCS	G931206A	4900			5000	98			
STANDARD	LCS	941553	2600			2700	96			
DUPLICATE	MD	942724-2	20	25	5					

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(303) 751-1780

CORE LABORATORIES

QUALITY CONTROL FOOTER

METHOD REFERENCES

(1) EPA 600/4-79-020, Methods For Chemical Analysis Of Water And Wastes, March 1983

(2) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, November 1986

(3) Standard Methods For The Examination Of Water And Wastewater, 17th Edition, 1989

(4) EPA 600/4-80-032, Prescribed Procedures For Measurement Of Radioactivity In Drinking Water, August 1980

(5) EPA 600/8-78-017, Microbiological Methods For Monitoring The Environment, December 1978

(6) Federal Register, July 1, 1990 (40 CFR Part 136)

(7) EPA 600/4-88-039, Methods For The Determination Of Organics Compounds In Drinking Water, December 1988

(8) U.S.G.S. Methods For The Determination Of Inorganic Substances In Water And Fluvial Sediments, Book 5, Chapter A1, 1985

(9) Federal Register, Friday, June 7, 1991, (40 CFR Parts 141 and 142)

(10) Standard Methods For The Examination Of Water And Wastewater, 16th Edition, 1985

(11) ASTM, Section 11 Water And Environmental Technology, Volume 11.01 Water (1), 1991

(12) Methods Of Soil Analysis, American Society Of Agronomy, Agronomy No. 9, 1965

(13) EPA SW-846, Test Methods For Evaluating Solid Waste, Third Edition, Revision 1, November 1990

(14) ASTM, Section 5, Petroleum Products, Lubricants, and Fossil Fuels, Volume 05.05, Gaseous Fuels, Coal and Coke

(15) EPA 600/2-78-054, Field and Laboratory Methods Applicable To Overburdens and Mine Soils, March 1978

(16) ASTM, Part 19, Soils and Rock; Building Stones, 1981

Comments: Data in QA report may differ from final results due to digestion and/or dilution of sample into analytical ranges. The "Time Analyzed" in the QA report refers to the start time of the analytical batch which may not reflect the actual time of each analysis. The "Date Analyzed" is the actual date of analysis. Results for soil and sludge samples are reported on a wet weight basis (i.e. not corrected for percent moisture) unless otherwise indicated.

NC = Not Calculable Due To Value(s) Lower Than The Detection Limit.

Blank QC Sample Identification		Spike QC Sample Identification	
MB	Method Blank	MS	Method (Matrix) Spike
ICB	Initial Calibration Blank	MSD	Method (Matrix) Spike Duplicate
CCB	Continuing Calibration Blank	PDS	Post Digestion Spike
Reference Standard QC Sample Identification		SB	Spiked Blank
LCS	Laboratory Control Standard	SBD	Spiked Blank Duplicate
RS	Reference Standard	**Duplicate QC Sample Identification**	
ICV	Initial Calibration Verification Standard	MD	Method (Matrix) Duplicate
CCV	Continuing Calibration Verification Standard	ED	Extraction Duplicate
ISA/ISB	ICP Interference Check Samples	DD	Digestion Duplicate

Analyses performed by a subcontract laboratory are indicated on the analytical and/or quality control reports under "Technician" using the following codes:

Subcontract Laboratory	Code	Subcontract Laboratory	Code
Core Laboratories - Anaheim, CA	* AN	Core Laboratories - Lake Charles, LA	* LC
Core Laboratories - Casper, WY	* CA	Core Laboratories - Long Beach, CA	* LB
Core Laboratories - Corpus Christi, TX	* CC	Other Subcontract Laboratories	* XX
Core Laboratories - Houston, TX	* HP		

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Method 3-C/25-C
Analytical Results

prepared for

SULLIVAN ENVIRONMENTAL
4448 13th Lane NE
St. Petersburg, FL 33703

by

Triangle Environmental Services, Inc.

We, the undersigned, certify to the best of our knowledge that all analytical data presented in this report have been checked for completeness; that the results are accurate, error-free, legible, and have been obtained in accordance with approved protocol; and that all deviations and analytical problems are summarized in the "Comments on the Analyses" page(s).

Approved by:
Wayne A. Stollings
President

Reviewed by:
Donna Nolen-Weathington
Method 25 Supervisor

Report
12048-25C

May 17, 2012

P.O. Box 13294 Research Triangle Park, NC 27709 (800) 367-4862

Triangle Environmental Services, Inc.
COMMENTS ON THE ANALYSES

Report #12048-25C for Sullivan Environmental
Project ID: none supplied

Tanks Received: 4/30/12

Samples Analyzed: 5/7-14/12 (25-C on Analyzer B)
Client Chain-of-Custody forms: 1 pg

Abbreviations and Definitions:

DF: dilution factor(s)
CL: calibration limit = lowest concentration of initial calibration standard ×DF*
RL: report limit = (Method 3-C) minimum detection limit (MDL) × DF*
= (Method 25-C) calibration limit (CL)
J: flag for reported concentrations between RL and CL (applicable for 3-C results only)

* and any applicable water vapor and air correction

All Samples: Laboratory preshipment and receipt pressure and temperature readings were used for the tank pre- and post-test tank data, respectively. Laboratory post-test barometric pressure and temperature data were used to determine the water vapor fraction.

The tank contents were diluted so as to bring the measured CH_4 and CO_2 concentrations for each of these samples within the Method 25 calibration range. The reported final tank pressure is the original final tank pressure multiplied by the dilution factor.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C TABLE OF RESULTS

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-14/12

Project ID: Landfill

	Sample Description	Concentrations (ppm) CH4	CO2	As Carbon NMOC (ppm)	As Carbon Mass Conc. (mg/cu.m)
1	East LF	627104	414888	406	203
2	North LF	629665	389246	359	179

Correction of concentrations for the presence of air was made
(2 sample(s) corrected using oxygen)

* Please refer to the "Comments on the Analyses" page of the report for additional information.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C TABLE OF RESULTS

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-10/12

Project ID: Landfill

	Sample Description	Concentrations (ppm) O2	N2	CH4	CO2
1	East LF	12559	78837	559637	373371
2	North LF	25249	138466	528357	329552

Triangle Environmental Services, Inc.
CALIBRATION DATA FOR THE ANALYSES

Client: Sullivan Environmental ID#12048-25C

Project ID: none supplied

Method 3-C
10-MAY-12: Analyzer f
Preanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
O2	24600.0	694312	692755	692597	693221	0.1%	28.18	30.01	-6.10%
N2	99500.0	3068012	3061269	3061919	3063733	0.1%	30.79	31.27	-1.53%
CH4	20500.0	516283	515404	515847	515845	0.1%	25.16	25.50	-1.32%
CO2	243000.0	8848540	8835663	8845726	8843310	0.1%	36.39	36.61	-0.59%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
O2	24600	705085	704462	704284	704610	28.64	28.18	1.6%
N2	99500	3116522	3114151	3114012	3114895	31.31	30.79	1.7%
CH4	20500	522441	523101	523512	523018	25.51	25.16	1.4%
CO2	243000	8985682	8979876	8981276	8982278	36.96	36.39	1.6%

Sample # 1 N79
2 N146

Method 25-C
14-MAY-1: Analyzer b
Preanalysis Calibration

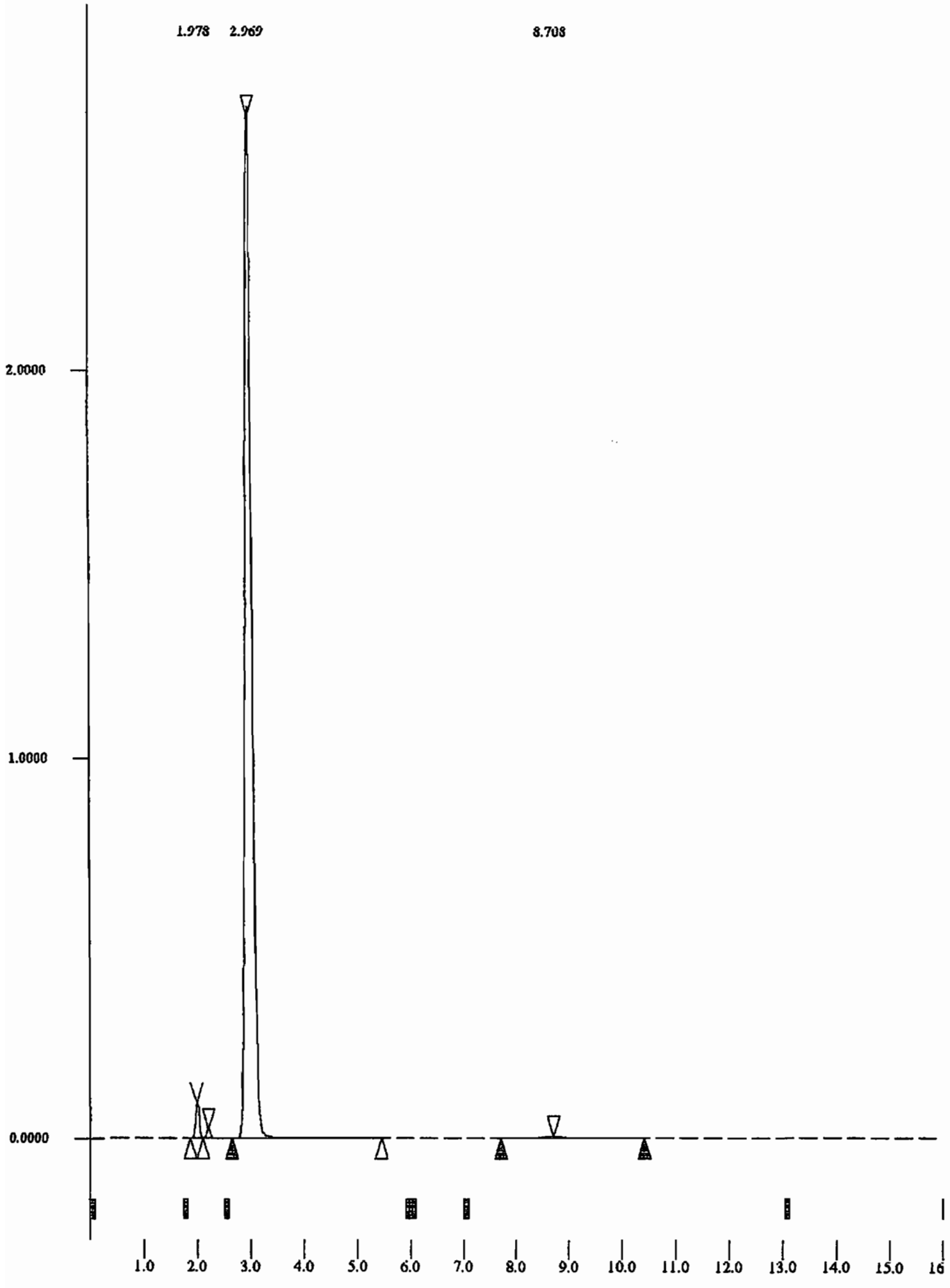
Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
CO	200.5	43544	43422	43671	43546	0.3%	217.2	220.3	-1.4%
CH4	49.1	11742	11609	11647	11666	0.6%	237.5	243.1	-2.3%
CO2	9950.0	2460965	2462798	2458426	2460730	0.1%	247.3	241.2	2.5%
C2+	61.7	14456	14539	14483	14493	0.3%	235.1	242.4	-3.0%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
CO	200.5	43807	43691	43765	43754	218.2	217.2	0.5%
CH4	49.1	11737	11748	11747	11744	239.0	237.5	0.7%
CO2	9950.0	2464920	2464707	2463650	2464426	247.7	247.3	0.2%
C2+	61.7	14456	14681	14583	14573	236.4	235.1	0.6%

Sample # 1 N79
2 N146

Conc. = concentration in ppmC, %RSD = % relative standard deviation,
RF = response factor = Average Area/Conc., IRF = response factor from initial calibration,
%Diff. = %(RF-IRF)/IRF for preanalysis/= %(RF(post)-RF(pre)/RF(pre), C2+ = propane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9.0
10.0
11.0
12.0
13.0
14.0
15.0
16
Filename: C:\STAR\RECALCB\TES_B194.RUN Channel: A – M25

[redacted]rint Date: Tue May 15 09:48:57 2012 Page 1 of 1

Title :
[redacted]un File : C:\STAR\RECALCB\TES_B194.RUN
[redacted]ethod File : C:\STAR\RECALCB.MTH
[redacted]ample ID : 1- P mix CC61467

Injection Date: 14-MAY-12 11:13 AM Calculation Date: 15-MAY-12 9:11 AM

[redacted]perator :
Workstation: VOLUME 1
Instrument : Varian Star #1
[redacted]hannel : A = M25

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 16.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

[redacted]un Mode : Analysis - Subtract Blank Baseline
[redacted]eak Measurement: Peak Area
Calculation Type: External Standard

[redacted]eak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
[redacted] 1	CO	176.0274	1.978	0.002	43544	BV	4.2	U
2	CH4	46.9535	2.190	0.016	11742	VB	4.4	U
3	CO2	9842.6777	2.969	0.042	2460965	BB	8.6	
4	C2+	57.7043	11.500	0.000	14456	GR	0.0	U
[redacted]	Totals:	10123.3629		0.060	2530707			

Status Codes:
[redacted] - User-defined peak endpoint(s)

Total Unidentified Counts : 0 counts

[redacted]etected Peaks: 4 Rejected Peaks: 0 Identified Peaks: 4

Multiplier: 1 Divisor: 1

[redacted]aseline Offset: -2 microVolts

Noise (used): 50 microVolts - monitored before this run

[redacted]ould not format the injection information for this run.
[redacted]nstall the driver for the module at address 17 (type 8) to format this data.

[redacted]rror Log:

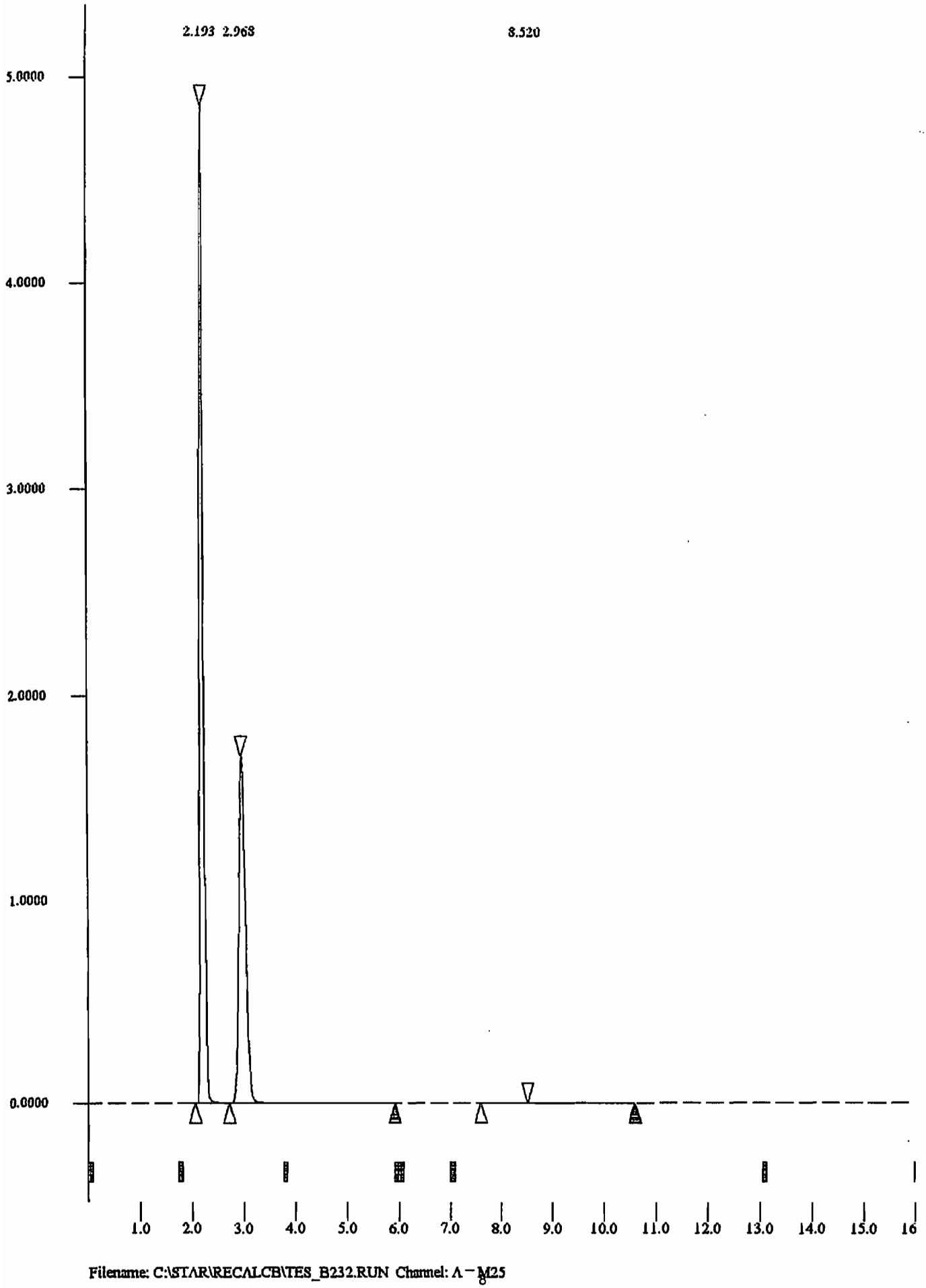
[redacted]ould not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

[redacted]DC Board:

Original Notes:

[redacted]ppended Notes:

****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5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16
Filename: C:\STAR\RECALCB\TES_B232.RUN Channel: A - M25

rint Date: Tue May 15 09:49:13 2012 Page 1 of 1

Title :
Run File : C:\STAR\RECALCB\TES_B232.RUN
ethod File : C:\STAR\RECALCB.MTH
ample ID : 13- tank N79

Injection Date: 14-MAY-12 11:09 PM Calculation Date: 15-MAY-12 9:44 AM

perator :
Workstation: VOLUME 1
Instrument : Varian Star #1
hannel : A = M25

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 16.002 min

********** Star Chromatography Workstation ******* Version 4.5 ***************

un Mode : Analysis - Subtract Blank Baseline
eak Measurement: Peak Area
Calculation Type: External Standard

eak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	CH4	9065.9414	2.193	0.019	2267120	BV	4.3	UC
2	CO2	6252.0762	2.967	0.040	1563207	VB	8.5	U
3	C2+	5.6887	11.500	0.000	1425	GR	0.0	U
	Totals:	15323.7063		0.059	3831752			

Status Codes:
U - User-defined peak endpoint(s)
- Out of calibration range

Total Unidentified Counts : 0 counts

etected Peaks: 3 Rejected Peaks: 0 Identified Peaks: 3

Multiplier: 1 Divisor: 1

aseline Offset: 4 microVolts

Noise (used): 60 microVolts - monitored before this run

ould not format the injection information for this run.
nstall the driver for the module at address 17 (type 8) to format this data.

Calib. out of range; No Recovery Action Specified

rror Log:

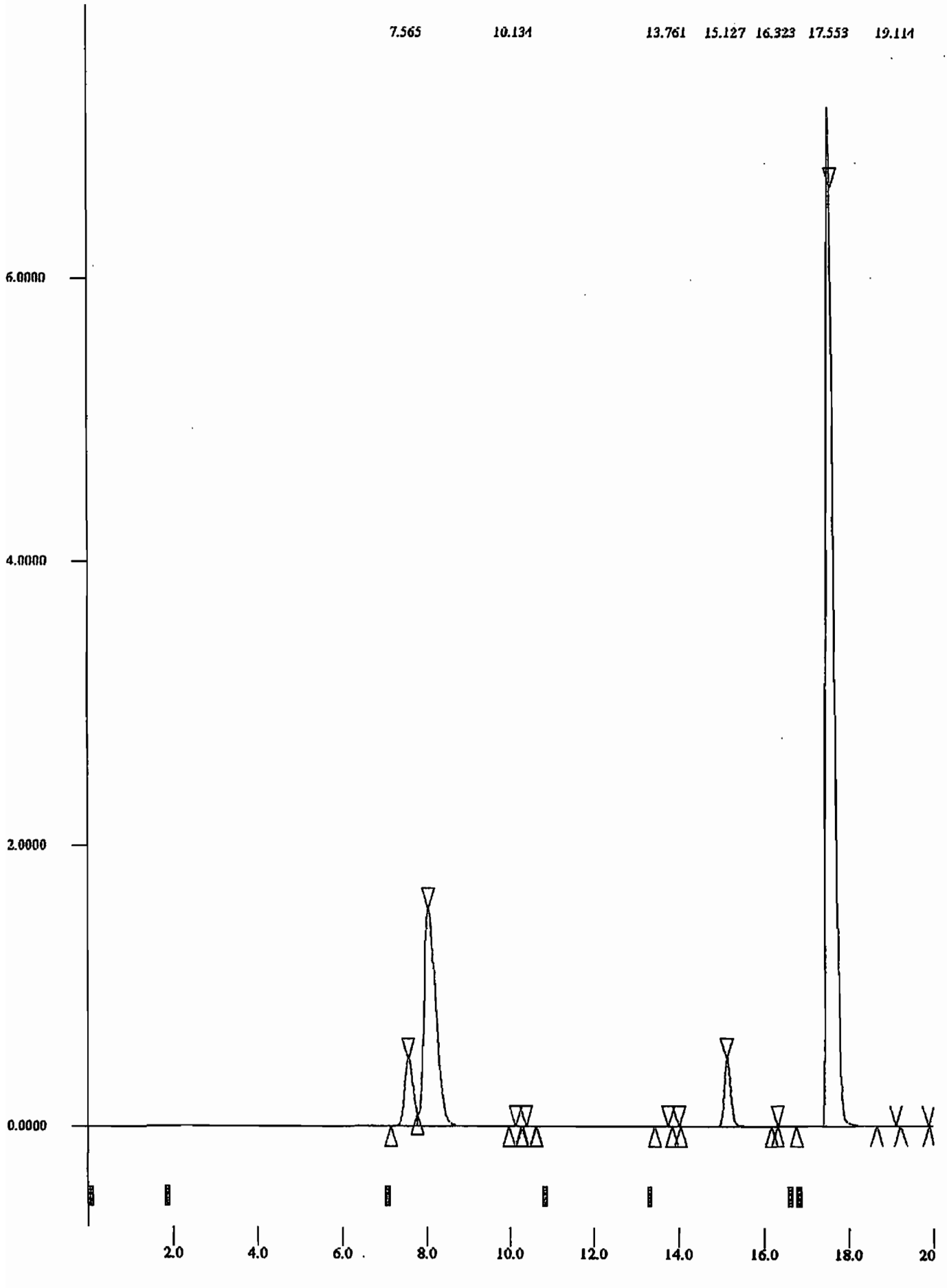
Could not format the error log for the module at address 17 (type 8).
nstall the appropriate module driver to format this data.

ADC Board:

riginal Notes:

Appended Notes:

****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8.0
10.0
12.0
14.0
16.0
18.0
20
Filename: C:\STAR\RECALCF\TES_F030.RUN Channel: A - 4

rint Date: Fri May 11 10:08:59 2012 Page 1 of 1

Title :
Run File : C:\STAR\RECALCF\TES_F030.RUN
ethod File : C:\STAR\CAL3C.MTH
ample ID : 1- 3C MIX CC93314

Injection Date: 10-MAY-12 1:51 PM Calculation Date: 10-MAY-12 2:11 PM

perator :
Workstation: MS-DOS_6
Instrument : Varian Star #1
hannel : A = A

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

un Mode : Analysis
eak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	O2	5.2891	7.565	-0.035	694312	BV	13.7	
2	N2	23.3715	8.042	-0.028	3068012	VB	18.4	
3	CH4	3.9329	15.127	-0.073	516283	PB	0.0	
4	CO2	67.4064	17.553	-0.147	8848540	BB	12.5	
	Totals:	99.9999		-0.283	13127147			

Total Unidentified Counts : 0 counts

etected Peaks: 11 Rejected Peaks: 7 Identified Peaks: 4

Multiplier: 1 Divisor: 1

aseline Offset: 22 microVolts

Noise (used): 30 microVolts - fixed value
oise (monitored before this run): 180 microVolts

Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

evision Log:

10-MAY-12 2:11 PM: Calculated results from channel A using method:
'C:\STAR\CAL3C.MTH'

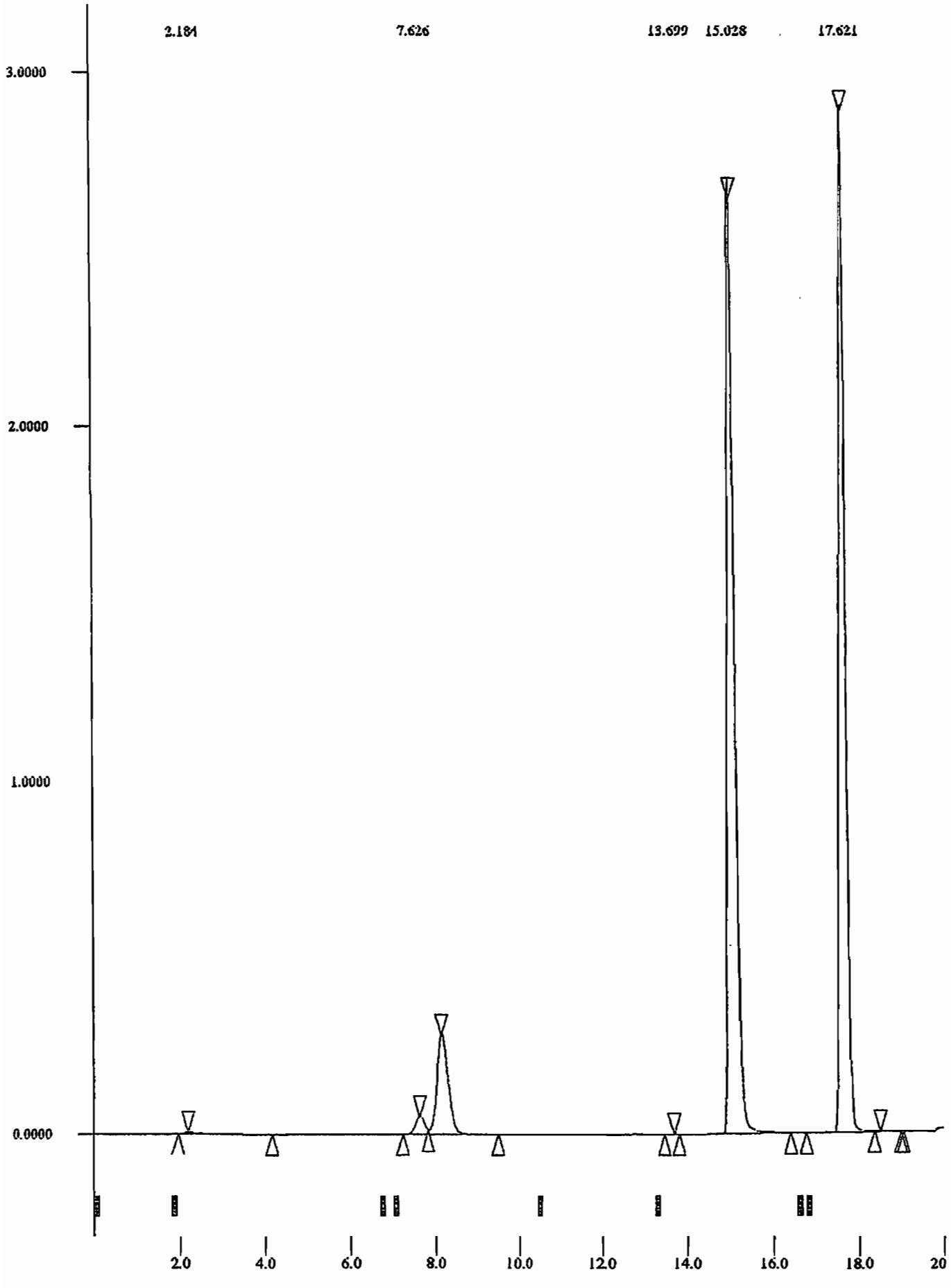
Error Log:

ould not format the error log for the module at address 17 (type 8).
nstall the appropriate module driver to format this data.

ADC Board:

riginal Notes:

****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7.626
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1.0000
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2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20
Filename: C:\STAR\RECALCF\TES_F036.RUN Channel: A

[redacted]rint Date: Fri May 11 10:09:10 2012 Page 1 of 1

Title :
Run File : C:\STAR\RECALCF\TES_F036.RUN
[redacted]ethod File : C:\STAR\3C.MTH
[redacted]ample ID : 12~ tank N79

Injection Date: 10-MAY-12 4:45 PM Calculation Date: 10-MAY-12 5:05 PM

[redacted]perator :
Workstation: MS-DOS_6
Instrument : Varian Star #1
[redacted]hannel : A = A

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

[redacted]un Mode : Analysis
[redacted]eak Measurement: Peak Area
Calculation Type: Percent

[redacted]eak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
[redacted] 1	O2	1.1611	7.626	0.026	77519	BV	14.6	
2	N2	7.9698	8.154	0.084	532099	VB	17.3	
3	CH4	46.1860	15.028	-0.172	3083578	PB	10.8	
4	CO2	44.4543	17.621	-0.079	2967960	BB	9.7	
[redacted]	Totals:	99.7712		-0.141	6661156			

Total Unidentified Counts : 15280 counts

[redacted]etected Peaks: 7 Rejected Peaks: 1 Identified Peaks: 4

Multiplier: 1 Divisor: 1

[redacted]aseline Offset: 19 microVolts

Noise (used): 60 microVolts - monitored before this run

[redacted]ould not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

[redacted]rror Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

[redacted]DC Board:

****

Triangle Environmental Services, Inc.
METHOD 25-C PROCEDURES

Report #12048-25C

CALIBRATION

The calibrations satisfy the requirements for Methods 25, 25-C, and 10-B.

Triplicate injections of a calibration gas mixture consisting of carbon monoxide (≈200 ppm), methane (≈50 ppm), carbon dioxide (≈10,000 ppm), and propane (≈20 ppm) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppmC) and must agree within 10% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 2% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

ANALYSIS

All samples, which include the daily calibration gas mixture and sample tanks, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a flame ionization detector (FID). CO, CH_4, and CO_2 are eluted from the Unibead 1S-Carbosieve G column and pass through the analytical oxidation and reduction catalyst to the FID. The column is then backflushed to elute the nonmethane organic (NMO) fraction, which passes through the analytical oxidation and reduction catalysts to the FID.

CALCULATIONS

Calculations are done in accord with USEPA Method 25-C procedures. A sample calculation for one of the samples is provided in the report.

EQUIPMENT

Tanks are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppmC NMO, and stored for later use. Prior to shipping, tanks are evacuated to ≈325 mm Hg absolute. The tank absolute pressure and temperature and the barometric pressure are recorded on a data sheet enclosed with the shipment. The absolute pressure can be verified by measurement in the field.

Sampling units are reconditioned by checking that all sections operate properly. The unit is flushed with zero air for at least thirty minutes before an aliquot of this flow is injected into the analyzer. If the total carbon concentration is below 10 ppm, the unit is made ready for use and stored for shipment.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-14/12

Project ID: Landfill

Sample # 1 East LF

D A T A

Tank N79:
Volume = 0.004548 cu.m

	Pressure (mm Hg)	Temp.(K)
Presampling	324.0	296.2
Postsampling	760.0	301.2
Final	25577.0	301.2
Barometric	757.0	
Water Vapor	28.3	

Water fraction = 0.0374
O2 fraction = 0.012559 (dry basis)

Calibration Data:

	CH4	CO2	NMOC
Response Factor (area units/ppmC)	237.5	247.3	235.1

Areas:

CH4	2,267,120	2,268,657	2,275,441
CO2	1,563,207	1,565,126	1,563,865
NMOC	1,425	1,477	1,464

C A L C U L A T I O N S

Measured Concentrations (ppmC):

Cm(CH4) = Area(CH4)/RF(CH4)
= 2267120 /237.5 = 9545.8
= 2268657 /237.5 = 9552.2
= 2275441 /237.5 = 9580.8

Cm(CO2) = Area(CO2)/RF(CO2)
= 1563207 /247.3 = 6321.1
= 1565126 /247.3 = 6328.9
= 1563865 /247.3 = 6323.8

Cm(NMOC) = Area(NMOC)/RF(NMOC)
= 1425 /235.1 = 6.1
= 1477 /235.1 = 6.3
= 1464 /235.1 = 6.2

TRIANGLE ENVIRONMENTAL SERVICES, INC. METHOD 25-C SAMPLE CALCULATION
ID#12048-25C

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 760 / 301.15 = 2.52366
presampling tank: Q(2) = 324 / 296.15 = 1.09404
final tank: Q(3) = 25577.04 / 301.15 = 84.93122

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .004548 x [2.5237 - 1.0940]
= 0.002508

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C = %RSD of Cm)

Moisture and Air (Oxygen dry basis) Correction Factor, CF:

CF = 1 - Water fraction - (99/21)xOxygen fraction (wet basis)
= (1 - Water fraction)x(1 - (99/21)xOxygen fraction (dry basis))
= (1 - 0.0374) x (1 - (99/21)x0.012559) = 0.9056

Calculated Concentrations (ppm):

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)/CF
= 84.9312/(2.5237 - 1.0940) x 9559.6/0.9056 = 627104.3

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)/CF
= 84.9312/(2.5237 - 1.0940) x 6324.6/0.9056 = 414888.0

C(NMOC as Carbon) = Q(3)/[Q(1)-Q(2)] x Cm(NMOC)/(CF x Carbon Number)
= 84.9312/(2.5237 - 1.0940) x 6.2/(0.9056 x 1)
= 406.1

Carbon Mass Concentration (mg/cu.m)
= (12.011 /24.056) x C(NMOC)
= 0.4993 x 406.1 = 202.8

Triangle Environmental Services, Inc.
METHOD 25-C SAMPLE QA/QC DATA

Report #12048-25C

DAILY ANALYZER CHECKS

10.2* **Daily Calibration**

Response Factor (RF) Checks

Requirement: Daily RF = Initial RF ± 10%

Triplicate injections of a mixture of CO, CH_4, CO_2, and C_3H_8 are made before and after each batch of samples.

See the individual sample data sheet for the daily response factor

10.1.2.3* **Initial Calibration/Linearity**

Triplicate injections of a calibration gas is made for each compound at four levels:

	Nominal Concentrations (ppm)				Initial RF for Analyzer A 10/22/10	Initial RF for Analyzer B 03/23/12
CO	5	200	1,000	5,000	175.65	220.28
CH_4	3	50	500	10,000	181.49	243.06
CO_2	3	50	500	10,000	173.94	241.20
propane	2	20	3,000	10,000	178.80	242.35

INITIAL NMO ANALYZER PERFORMANCE CHECKS

10.1.2.1* **Oxidation Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

FID response with reduction catalyst in bypass mode = 0, 0

Requirement: ≤1%

10.1.2.2* **Reduction Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

Response of CH_4 with oxidation and reduction catalysts in series mode and response with both catalysts in bypass mode to be within 5% of the average:

1.05 x Average Response > Response > 0.95 x Average Response

or Higher Response/Lower Response < 1.105263

100.0%, 100.0% Requirement: <110.5%

* USEPA Method 25 Protocol (2000) Reference Number

Report #12048-25C

10.1.2.3* **Analyzer Linearity Check+NMO Calibration** Analyzer A, 10/22/10;Analyzer B, 03/23/12

	$100\times(1-RF/RF_{average})$	Requirement:
max. dev. CO:	+1.876%,-1.697%	± 2.5%
max. dev. CH_4:	-1.775%,+2.476%	± 2.5%
max. dev. CO_2:	+1.738%,-2.231%	± 2.5%
max. dev. NMO:	+2.427%,-1.674%	± 2.5%
max. %RSD:	1.67%, 1.05%	≤ 2%
$\frac{RF\ (NMO)}{RF\ (CO_2)}$ =	0.97, 1.00	1.0 ± 0.1

10.1.2.4* **System Performance Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98, 5/1/98

	Measured Value, Expected Value		Requirement
	Analyzer A	Analyzer B	
Propane in Mix	19.6, 20.0	20.22, 20.0	± 5%
Hexane	50.6, 51.6	51.6, 51.6	± 5%
Toluene	20.3, 20.0	19.34, 20.0	± 5%
Methanol	104.5, 109.1	109.55, 109.0	± 5%

EQUIPMENT CHECKS

8.1.1* **Clean Sampling Equipment Check** (Method 25)

Sample Unit	< 10	ppmC total C	@ 100%
Tank	< 2	ppmC NMO	@ 100%

8.1.2* **Sample Tank Evacuation and Leak Check** (Method 25)

Tank evacuated to ≤ 10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted. (Method 25C: ± 2 mm Hg after 30 minutes)

10.3* **Sample Tank Volumes**

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

* USEPA Method 25 Protocol (2000) Reference Number

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C DATA REPORT

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-14/12

Project ID: Landfill

Sample # 1 East LF

TANK N79:
Volume = 0.004548 cu.m

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	324.0	296.15	1.094
Postsampling	760.0	301.15	2.524
Lab receipt	760.0	301.15	2.524
Final	25577.0	301.15	84.931
Barometric	757.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled = 0.002508 dscm
Water fraction = 0.0374
Oxygen fraction = 0.012559 (dry basis)

Calibration Data:

	CH4	CO2	NMOC	
Response Factor (area units/ppmC)	237.5	247.3	235.1	
Report Limit (ppm)	198	198	132	(as Carbon)

Areas:

CH4	2,267,120	2,268,657	2,275,441
CO2	1,563,207	1,565,126	1,563,865
NMOC	1,425	1,477	1,464

Concentrations:

	ppm		
	Amount	± SD	%RSD
CH4	627104	±1223	0.2
CO2	414888	± 259	0.1
NMOC as Carbon	406	± 8	1.9
	(= 203 mg Carbon/cu.m)		

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C DATA REPORT

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-14/12

Project ID: Landfill

Sample # 2 North LF

TANK N146:
Volume = 0.004541 cu.m

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	324.0	296.15	1.094
Postsampling	748.0	301.15	2.484
Lab receipt	748.0	301.15	2.484
Final	26225.8	301.15	87.086
Barometric	757.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled = 0.002434 dscm
Water fraction = 0.0374
Oxygen fraction = 0.025249 (dry basis)

Calibration Data:

	CH4	CO2	NMOC	
Response Factor (area units/ppmC)	237.5	247.3	235.1	
Report Limit (ppm)	222	222	149	(as Carbon)

Areas:

CH4	2,022,754	2,027,024	2,021,851
CO2	1,303,202	1,303,887	1,301,145
NMOC	1,145	1,149	1,132

Concentrations:

	ppm	
	Amount ± SD	%RSD
CH4	629665 ± 860	0.1
CO2	389246 ± 426	0.1
NMOC as Carbon	359 ± 3	0.8
	(= 179 mg Carbon/cu.m)	

Triangle Environmental Services, Inc.
METHOD 3-C PROCEDURES

Report #12048-25C

CALIBRATION

Triplicate injections of a calibration gas mixture consisting of oxygen (≈2.5%), nitrogen (≈10%), carbon dioxide (≈25%), and methane (≈2%) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppm) and must agree within 20% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 5% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

ANALYSIS

All samples, which include the daily calibration gas mixture and sample tanks, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a thermal conductivity detector (TCD). O_2, N_2, CO, CH_4, and CO_2 are eluted from the column and pass to the TCD.

CALCULATIONS

Calculations are done in accord with USEPA Method 3-C procedures. A sample calculation for one of the samples is provided in the report.

EQUIPMENT

Tanks are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppm CH_4 and < 20 ppm CO_2, and stored for later use.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-10/12
Project ID: Landfill

Sample # 1 East LF

D A T A

Tank N79:
Volume (cu.m) = 0.004548

	Pressure (mm Hg)	Temp.(K)
Presampling	324.0	296.15
Postsampling	760.0	301.15
Final	1892.0	301.15
Barometric	757.0	
Water Vapor	28.3	

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.18	30.79	25.16	36.39

Areas:

O2	77,519	77,287	77,760
N2	532,099	531,129	531,897
CH4	3,083,578	3,086,879	3,082,339
CO2	2,967,960	2,980,528	2,980,030

C A L C U L A T I O N S

Measured Concentrations (ppmC):

Cm(O2) = Area(O2) / RF(O2)
= 77519 / 28.2 = 2750.9
= 77287 / 28.2 = 2742.6
= 77760 / 28.2 = 2759.4

Cm(N2) = Area(N2)/RF(N2)
= 532099 / 30.8 = 17281.6
= 531129 / 30.8 = 17250.0
= 531897 / 30.8 = 17275.0

Cm(CH4) = Area(CH4)/RF(CH4)
= 3083578 / 25.2 = 122558.7
= 3086879 / 25.2 = 122690.0
= 3082339 / 25.2 = 122509.5

Cm(CO2) = Area(CO2)/RF(CO2)
= 2967960 / 36.4 = 81559.8
= 2980528 / 36.4 = 81905.1
= 2980030 / 36.4 = 81891.5

TRIANGLE ENVIRONMENTAL SERVICES, INC. ID#12048-25C

METHOD 3-C SAMPLE CALCULATION

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 760 / 301.15 = 2.52366
presampling tank: Q(2) = 324 / 296.15 = 1.09404
final tank: Q(3) = 1892 / 301.15 = 6.282584

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .004548 x [2.5237 - 1.0940]
= 0.002508

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C = %RSD of Cm)

Moisture Correction Factor, MCF:

MCF = 1 - Water Vapor Pressure/Barometric Pressure
= 1 - 28.3/ 757.0 = 0.9626

Calculated Concentrations (ppm):

C(O2) = Q(3)/[Q(1)-Q(2)] x Cm(O2)/MCF
= 6.2826/(2.5237 - 1.0940) x 2751.0/0.9626 = 12558.8

C(N2) = Q(3)/[Q(1)-Q(2)] x Cm(N2)/MCF
= 6.2826/(2.5237 - 1.0940) x 17268.9/0.9626 = 78836.8

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)/MCF
= 6.2826/(2.5237 - 1.0940) x 122586.1/0.9626 = 559636.6

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)/MCF
= 6.2826/(2.5237 - 1.0940) x 81785.5/0.9626 = 373371.4

Triangle Environmental Services, Inc.
METHOD 3-C SAMPLE QA/QC DATA

Report #12048-25C

DAILY ANALYZER CHECKS

Daily Calibration

Response Factor (RF) Checks

Requirement: Daily RF = Initial RF ± 20%

Triplicate injections of a mixture of O_2, N_2, CH_4, and CO_2 are made before and after each batch of samples.

Initial Calibration/Linearity

Triplicate injections of a calibration gas is made for each compound at three levels:

	Nominal Concentrations (ppm)			Initial RF 10/10/08
O_2	500	10,000	200,000	30.01
N_2	500	50,000	700,000	31.27
CH_4	500	50,000	500,000	25.50
CO_2	500	50,000	250,000	36.61

Analyzer Linearity Check 10/10/08

	$100x(1-RF/RF_{average})$	Requirement:
max. dev. O_2:	- 5.0%	± 10%
max. dev. N_2:	- 4.0%	± 10%
max. dev. CH_4:	- 0.8%	± 10%
max. dev. CO_2:	+ 2.5%	± 10%

EQUIPMENT CHECKS

Clean Sampling Equipment Check

Tank < 2 ppm CH_4 @ 100%
< 20 ppm CO_2 @ 100%

Sample Tank Evacuation and Leak Check

Tank evacuated to ≤ 10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted.

Sample Tank Volumes

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-10/12

Project ID: Landfill

Sample # 1 East LF

TANK N79:
Volume (cu.m) = 0.004548

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	324.0	296.15	1.094
Postsampling	760.0	301.15	2.524
Lab receipt	760.0	301.15	2.524
Final	1892.0	301.15	6.283
Barometric	757.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.002508

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.18	30.79	25.16	36.39
Report Limit [RL] (ppm)	160	343	69	115
Calibration Limit [CL] (ppm)	2293	2293	2242	2297

Areas:

O2	77,519	77,287	77,760
N2	532,099	531,129	531,897
CH4	3,083,578	3,086,879	3,082,339
CO2	2,967,960	2,980,528	2,980,030

Concentrations:

	ppm			
	Amount	±	SD	%RSD
O2	12559	±	38	0.3
N2	78837	±	76	0.1
CH4	559637	±	426	0.1
CO2	373371	±	893	0.2

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: Sullivan Environmental ID#12048-25C Analyzed: 5/7-10/12

Project ID: Landfill

Sample # 2 North LF

TANK N146:
Volume (cu.m) = 0.004541

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	324.0	296.15	1.094
Postsampling	748.0	301.15	2.484
Lab receipt	748.0	301.15	2.484
Final	1921.0	301.15	6.379
Barometric	757.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.002434

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.18	30.79	25.16	36.39
Report Limit [RL] (ppm)	168	359	72	120
Calibration Limit [CL] (ppm)	2395	2395	2342	2399

Areas:

O2	148,891	149,173	149,608
N2	893,122	894,149	895,151
CH4	2,783,122	2,794,878	2,785,950
CO2	2,515,986	2,506,956	2,522,407

Concentrations:

	ppm			
	Amount	±	SD	%RSD
O2	25249	±	61	0.2
N2	138466	±	157	0.1
CH4	528357	±	1163	0.2
CO2	329552	±	1017	0.3

Chain of Custody

Triangle Environmental Services, Inc.
LABORATORY SAMPLE INFORMATION AND CHAIN-OF-CUSTODY FORM

Company Name: Sullivan Environmental		Project/Client ID:	Date: 4/23/12
Contact Person: John Sullivan	Phone #: (813) 210-1295	Process Type:	
Email: john@sullivanenv.com	Note: Normal Turnaround is 15 working days after receipt of complete set of samples	Results Due Date:	Extra charge will apply for rush results
☒ Electronic Report ☐ Hard copy Report ☐ Fax Results		Report Package Due Date:	

Send Report to: (Street address required for Fed Ex shipment of report)	*Person* John Sullivan	Send Invoice to: (if different from report address)	*Person*
	Company Sullivan Environmental		*Company*
	Address 4448 13th Lane NE		*Address*
Phone #	*FAX #*		*PO#*

✓ all applicable boxes

Analysis

US EPA: ☐ Method 25 ☒ Method 3-C ☒ Method 25-C (NMOC as C [default]) ☐ Method 10-B ☐ Mod. M 3-C GHG/CO ☐ Mod. M25 Methane/Ethane

# of Tank & Trap Samples:	# of Tank-Only Samples: 2	# of Trap-Only Samples:	# of Bag Samples:
☐ Audit with Delay (*extra charge*)	☐ Rush Turnaround (*extra charge*)	☐ High Concentrations Possible ☐ Call if Concentrations High	☐ Dilute High Concentrations (*extra charge*)

Special Instructions:

Tanks for Analysis (Bags) (List IDs): N79, N146

Traps for Analysis (List IDs): _____

☒ TES Equipment	☐ Client Equipment	☐ Client Equipment to be Reconditioned
Tanks, Unused for Reconditioning (List IDs): _____		Traps, Unused for Reconditioning (List IDs): _____

Relinquished by:		Date: 4/26/12	Time: 856	To: (Carrier) FED EX			
Tanks received at TES by:	Condition: good	Date: 4/30/12	Time: 12:30	Traps received at TES by:	Condition:	Date:	Time:

Method 3-C/25-C
Analytical Results

prepared for

SULLIVAN ENVIRONMENTAL
4448 13th Lane NE
St. Petersburg, FL 33703

by

Triangle Environmental Services, Inc.

We, the undersigned, certify to the best of our knowledge that all analytical data presented in this report have been checked for completeness; that the results are accurate, error-free, legible, and have been obtained in accordance with approved protocol; and that all deviations and analytical problems are summarized in the "Comments on the Analyses" page(s).

Approved by:

Wayne A. Stollings
President

Reviewed by:

Donna Nolen-Weathington
Method 25 Supervisor

Report
12110-25C

October 18, 2012

P.O. Box 13294 Research Triangle Park, NC 27709 (800) 367-4862

Triangle Environmental Services, Inc.
COMMENTS ON THE ANALYSES

Report #12110-25C for Sullivan Environmental
Project ID: Landfill Gas

Tanks Received: 9/27/12

Samples Analyzed: 10/2-16/12 (25-C on Analyzer B)
Client Chain-of-Custody forms: 1 pg

Abbreviations and Definitions:

DF: dilution factor(s)
CL: calibration limit = lowest concentration of initial calibration standard ×DF*
RL: report limit = (Method 3-C) minimum detection limit (MDL) × DF*
= (Method 25-C) calibration limit (CL)
J: flag for reported concentrations between RL and CL (applicable for 3-C results only)

* and any applicable water vapor and air correction

All Samples: Laboratory preshipment and receipt pressure and temperature readings were used for the tank pre- and post-test tank data, respectively. However, client post-test barometric pressure and temperature data were used to determine the water vapor fraction.

The tank contents were diluted so as to bring the measured CH_4 and CO_2 concentrations for each of these samples within the Method 25 calibration range. The reported final tank pressure is the original final tank pressure multiplied by the dilution factor.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C TABLE OF RESULTS

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2-16/12

Project ID: Landfill Gas

	Sample Description	Concentrations (ppm) CH4	CO2	As Carbon NMOC (ppm)	As Carbon Mass Conc. (mg/cu.m)
1	East LF	554583	395407	821	410
2	North LF	590861	371072	800	400

Correction of concentrations for the presence of air was made
(2 sample(s) corrected using oxygen)

* Please refer to the "Comments on the Analyses" page of the report for additional information.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C TABLE OF RESULTS

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2/12

Project ID: Landfill Gas

	Sample Description	Concentrations (ppm) O2	N2	CH4	CO2
1	East LF	4197	78107	544678	380806
2	North LF	9815	87569	562135	346478

Triangle Environmental Services, Inc.
CALIBRATION DATA FOR THE ANALYSES

Client: Sullivan Environmental

ID#12110-25C

Project ID: Landfill Gas

Method 3-C

2-OCT-12: Analyzer f

Preanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
O2	24600.0	695194	695337	695935	695489	0.1%	28.27	30.01	-5.79%
N2	99500.0	3068508	3067490	3071504	3069167	0.1%	30.85	31.27	-1.36%
CH4	20500.0	519695	518570	520773	519679	0.2%	25.35	25.50	-0.59%
CO2	243000.0	8896750	8891320	8900205	8896092	0.1%	36.61	36.61	-0.00%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
O2	24600	696218	698620	696973	697270	28.34	28.27	0.3%
N2	99500	3076018	3083657	3078952	3079542	30.95	30.85	0.3%
CH4	20500	519780	521689	521677	521049	25.42	25.35	0.3%
CO2	243000	8912939	8936892	8920405	8923412	36.72	36.61	0.3%

Sample # 1 N407
2 N10

Method 25-C

16-OCT-1: Analyzer B

Preanalysis Calibration

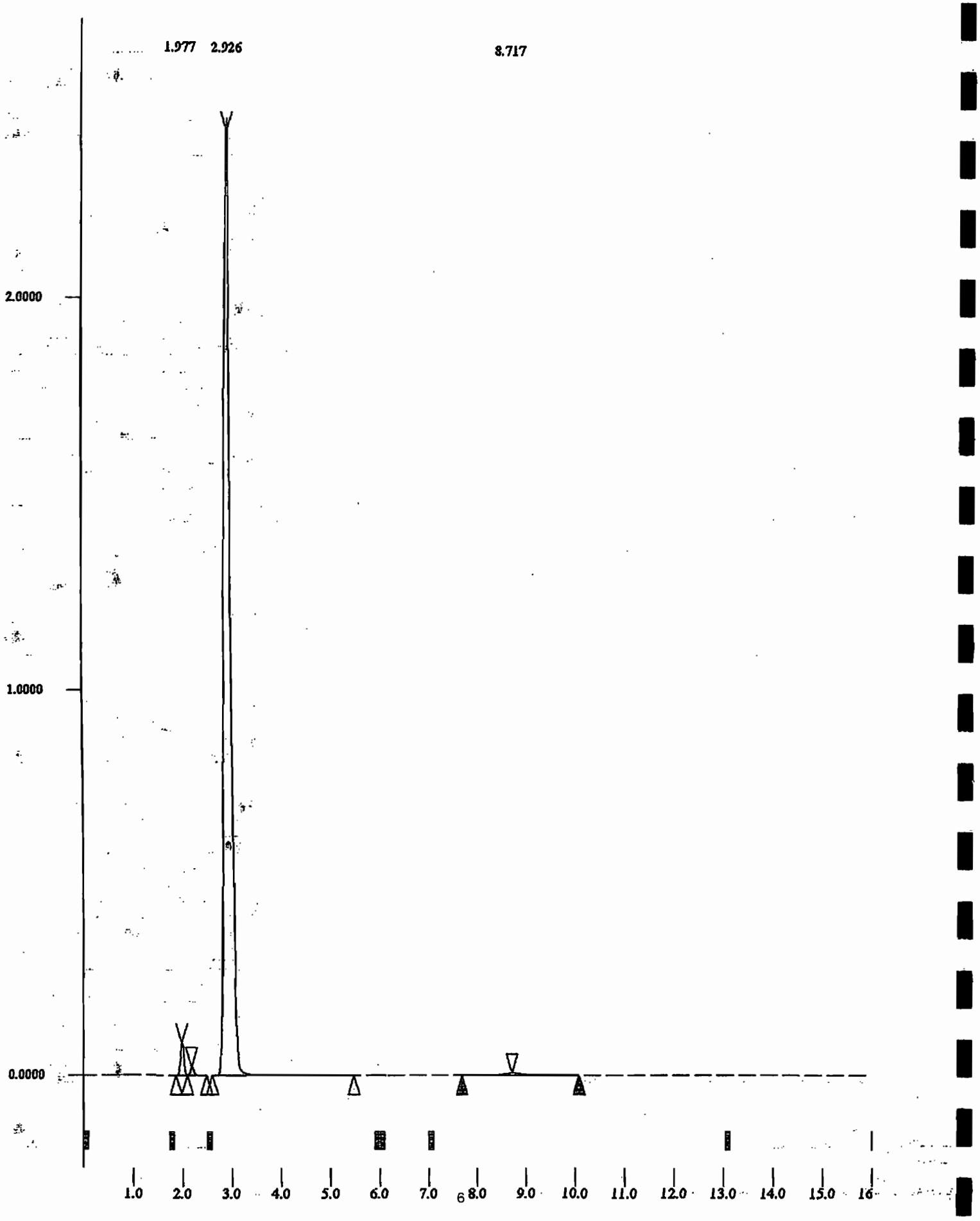
Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
CO	200.5	40181	40338	40024	40181	0.4%	200.4	220.3	-9.0%
CH4	49.1	11163	11101	11056	11107	0.5%	226.1	243.1	-7.0%
CO2	9950.0	2281155	2277328	2279476	2279320	0.1%	229.1	241.2	-5.0%
C2+	61.7	13847	13757	13857	13820	0.4%	224.2	242.4	-7.5%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
CO	200.5	39997	40013	40045	40018	199.6	200.4	-0.4%
CH4	49.1	11273	11209	11211	11231	228.6	226.1	1.1%
CO2	9950.0	2265110	2269544	2264435	2266363	227.8	229.1	-0.6%
C2+	61.7	13744	13810	13523	13692	222.1	224.2	-0.9%

Sample # 1 N407
2 N10

Conc. = concentration in ppmC, %RSD = % relative standard deviation,
RF = response factor = Average Area/Conc., IRF = response factor from initial calibration,
%Diff. = %(RF-IRF)/IRF for preanalysis/= %(RF(post)-RF(pre)/RF(pre), C2+ = propane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4.0
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8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16

rint Date: Wed Oct 17 10:52:53 2012 Page 1 of 1

tle :
an File : C:\STAR\RECALCB\TES_B403.RUN
ethod File : C:\STAR\MODULE16.MTH
ample ID : 1- P mix CC61467

jection Date: 16-OCT-12 8:11 AM Calculation Date: 16-OCT-12 11:06 AM

erator :
rkstation: VOLUME 1
strument : Varian Star #1
hannel : A = M25

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 16.002 min

********* Star Chromatography Workstation ******* Version 4.5 ***************

un Mode : Analysis - Subtract Blank Baseline
ak Measurement: Peak Area
lculation Type: External Standard

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	CO	162.4316	1.977	0.001	40181	BV	4.2	
2	CH4	44.6395	2.180	0.006	11163	VB	4.5	
3	CO2	9123.5244	2.926	-0.001	2281155	BB	8.8	
4	C2+	55.2714	11.500	0.000	13847	GR	0.0	U
	Totals:	9385.8669		0.006	2346346			

tatus Codes:
- User-defined peak endpoint(s)

tal Unidentified Counts : 0 counts

etected Peaks: 4 Rejected Peaks: 0 Identified Peaks: 4

ltiplier: 1 Divisor: 1

aseline Offset: -3 microVolts

ise (used): 40 microVolts - monitored before this run

ould not format the injection information for this run.
stall the driver for the module at address 17 (type 8) to format this data.

rror Log:

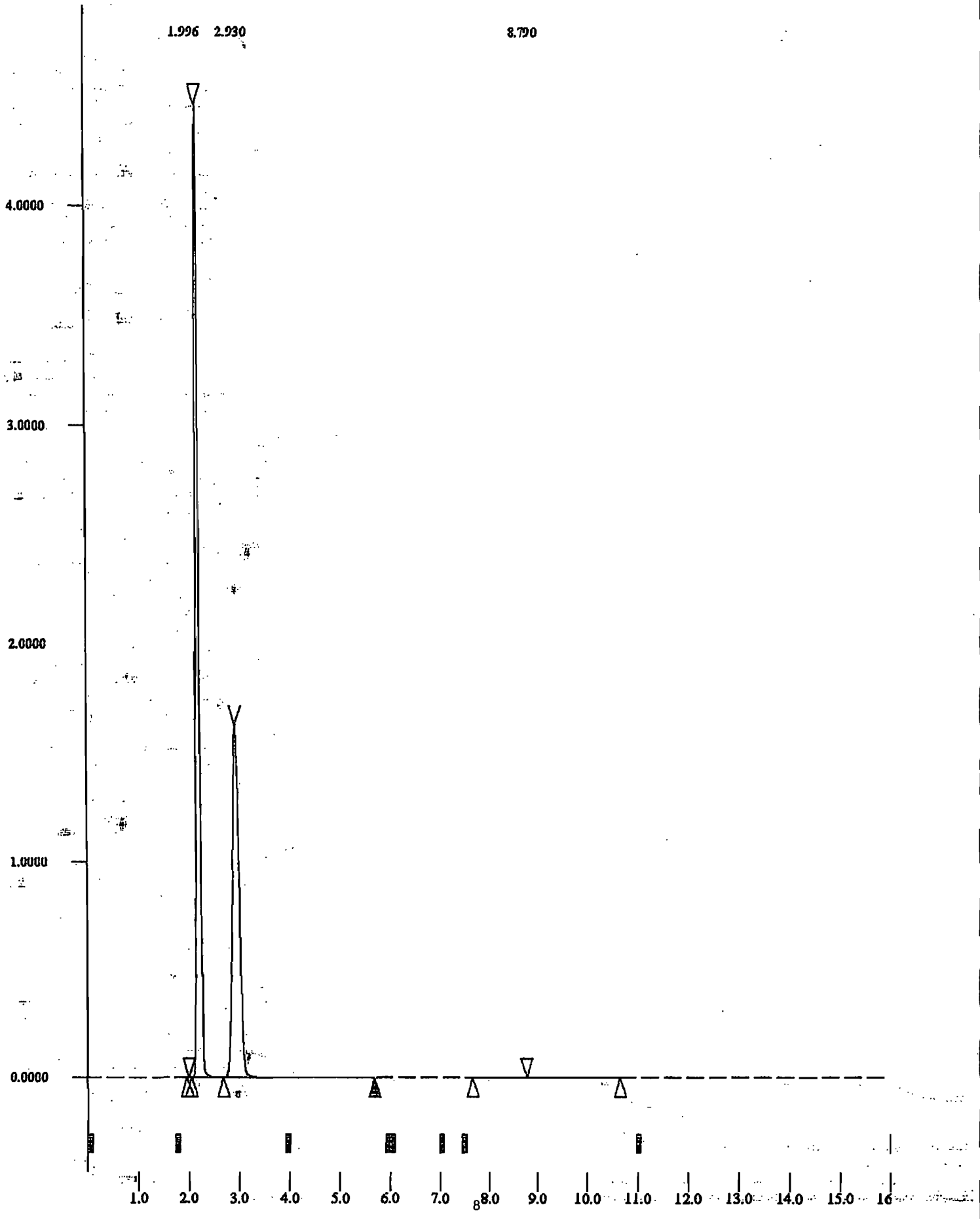
uld not format the error log for the module at address 17 (type 8).
stall the appropriate module driver to format this data.

ADC Board:

iginal Notes:

ppended Notes:

****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7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16

Print Date: Wed Oct 17 10:53:04 2012 Page 1 of 1

Title :
Run File : C:\STAR\RECALCB\TES_B420.RUN
Method File : C:\STAR\RECALCB.MTH
Sample ID : 5- tank N407

Injection Date: 16-OCT-12 2:01 PM Calculation Date: 17-OCT-12 10:04 AM

Operator :
Workstation: VOLUME 1
Instrument : Varian Star #1
Channel : A = M25

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 16.002 min

********* Star Chromatography Workstation ******* Version 4.5 ***************

Run Mode : Analysis - Subtract Blank Baseline
Peak Measurement: Peak Area
Calculation Type: External Standard

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	CO	0.1229	1.996	0.020	30	BP	2.4	
2	CH4	8392.2510	2.186	0.012	2098650	PV	4.4	UC
3	CO2	6054.0459	2.930	0.003	1513693	VB	8.6	U
4	C2+	12.5295	11.500	0.000	3139	GR	0.0	U
	Totals:	14458.9493		0.035	3615512			

Status Codes:
U - User-defined peak endpoint(s)
C - Out of calibration range

Total Unidentified Counts : 0 counts

Detected Peaks: 4 Rejected Peaks: 0 Identified Peaks: 4

Multiplier: 1 Divisor: 1

Baseline Offset: -1 microVolts

Noise (used): 40 microVolts - monitored before this run

Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

Calib. out of range; No Recovery Action Specified

Error Log:

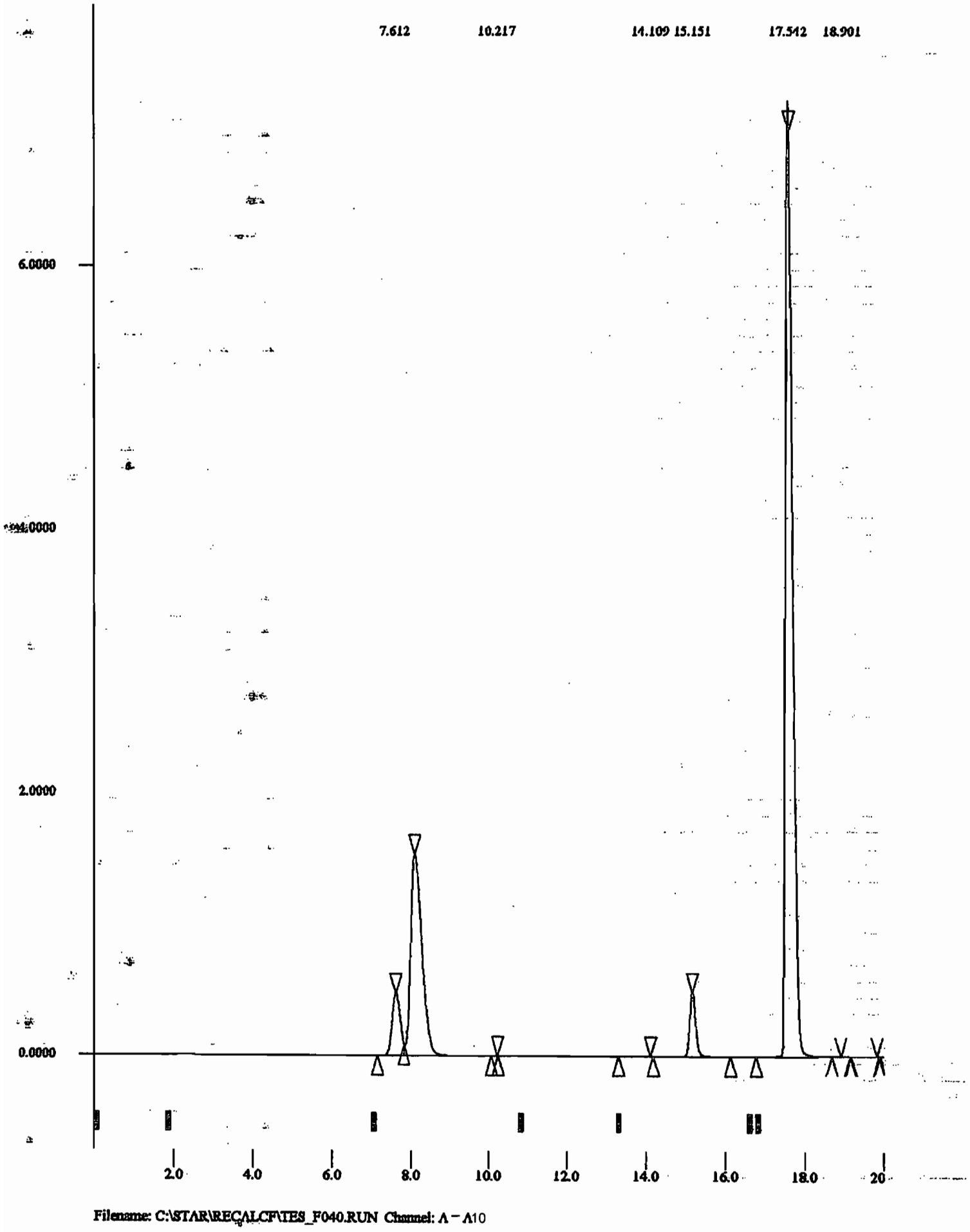
Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

ADC Board:

Original Notes:

Appended Notes:

****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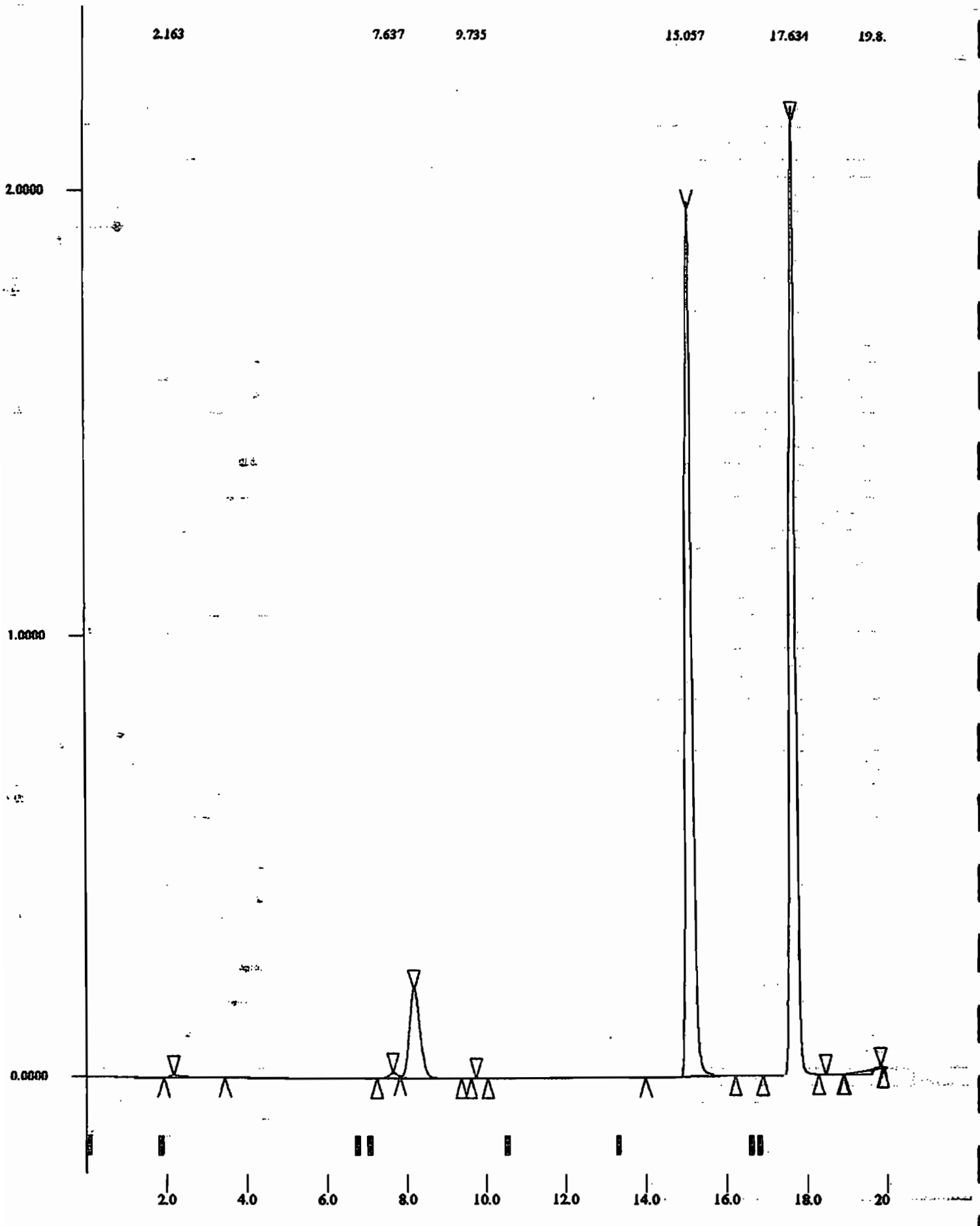
10.217
14.109
15.151
17.542
18.901
6.0000
4.0000
2.0000
0.0000
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20
Filename: C:\STAR\RECALCF\IES_F040.RUN Channel: A - A10

```
Title       :
un File     : C:\STAR\RECALCF\TES_F040.RUN
ethod File  : C:\STAR\CAL3C.MTH
ample ID    : 1- 3C MIX CC93314

njection Date: 2-OCT-12 3:10 PM     Calculation Date: 2-OCT-12 3:30 PM

perator     :                       Detector Type: ADCB (10 Volts)
orkstation: MS-DOS_6                Bus Address  : 16
nstrument : Varian Star #1          Sample Rate  : 10.00 Hz
annel     : A = A                   Run Time     : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 ***************

n Mode          : Analysis
eak Measurement: Peak Area
alculation Type: Percent
```

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	O2	5.2746	7.612	0.012	695194	BV	13.8	
2	N2	23.2813	8.096	0.026	3068508	VP	18.5	
3	CH4	3.9430	15.151	-0.049	519695	PB	9.7	
4	CO2	67.5011	17.542	-0.159	8896750	BB	12.1	
	Totals:	100.0000		-0.170	13180147			

```
tal Unidentified Counts :          0 counts

etected Peaks: 8          Rejected Peaks: 4      Identified Peaks: 4

ltiplier: 1          Divisor: 1

aseline Offset: 9 microVolts

oise (used): 30 microVolts - fixed value
oise (monitored before this run): 180 microVolts

ould not format the injection information for this run.
nstall the driver for the module at address 17 (type 8) to format this data.

evision Log:

-OCT-12 3:30 PM: Calculated results from channel A using method:
   'C:\STAR\CAL3C.MTH'

rror Log:

ould not format the error log for the module at address 17 (type 8).
nstall the appropriate module driver to format this data.

C Board:

riginal Notes:

**********
```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9.735
15.057
17.634
19.8.
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1.0000
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2.0
4.0
6.0
8.0
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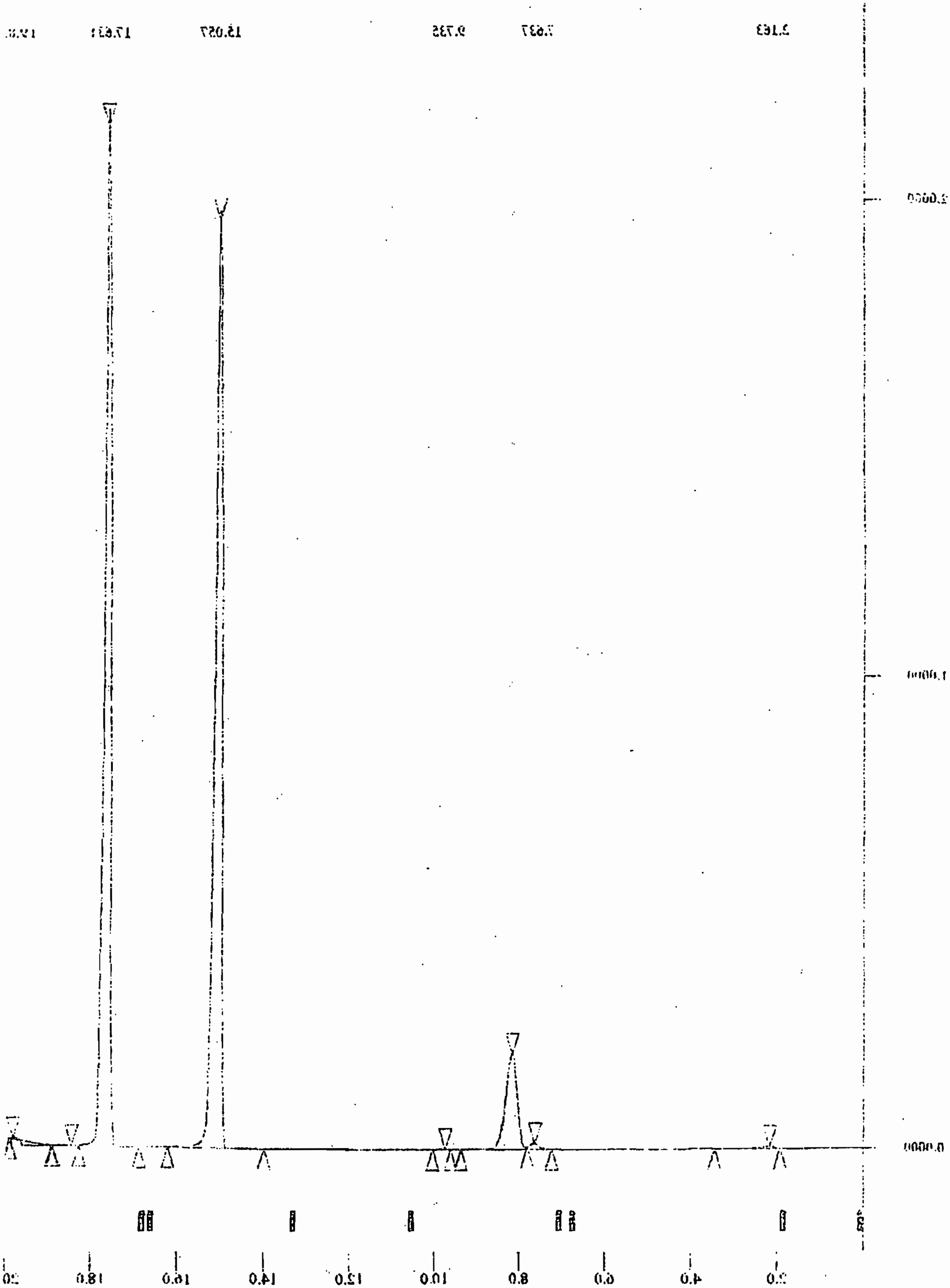
12.0
14.0
16.0
18.0
20
Filename: C:\STAR\RECALCF\IES_F052.RUN Channel: A - A2



Filename: c:\STAR\RECALCF\TES_F052.RUN Channel: A

Print Date: Fri Oct 05 15:48:39 2012 Page 1 of 1

Title :
Run File : C:\STAR\RECALCF\TES_F052.RUN
Method File : C:\STAR\3C.MTH
Sample ID : 5- tank N407

Injection Date: 2-OCT-12 9:15 PM Calculation Date: 2-OCT-12 9:35 PM

Operator :
Workstation: MS-DOS_6
Instrument : Varian Star #1
Channel : A = A

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 ***************

Run Mode : Analysis
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	O2	0.3896	7.637	0.037	18650	BV	15.1	
2	N2	7.9270	8.167	0.097	379481	VB	17.2	
3	CH4	45.5407	15.057	-0.143	2180133	BB	10.3	
4	CO2	45.8384	17.634	-0.066	2194383	BP	9.5	
	Totals:	99.6957		-0.075	4772647			

Total Unidentified Counts : 14567 counts

Detected Peaks: 8 Rejected Peaks: 2 Identified Peaks: 4

Multiplier: 1 Divisor: 1

Baseline Offset: -7 microVolts

Noise (used): 80 microVolts - monitored before this run

Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

Error Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

ADC Board:

****

Triangle Environmental Services, Inc.
METHOD 25-C PROCEDURES

Report #12110-25C

CALIBRATION

The calibrations satisfy the requirements for Methods 25, 25-C, and 10-B.

Triplicate injections of a calibration gas mixture consisting of carbon monoxide (≈200 ppm), methane (≈50 ppm), carbon dioxide (≈10,000 ppm), and propane (≈20 ppm) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppmC) and must agree within 10% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 2% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

ANALYSIS

All samples, which include the daily calibration gas mixture and sample tanks, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a flame ionization detector (FID). CO, CH_4, and CO_2 are eluted from the Unibead 1S-Carbosieve G column and pass through the analytical oxidation and reduction catalyst to the FID. The column is then backflushed to elute the nonmethane organic (NMO) fraction, which passes through the analytical oxidation and reduction catalysts to the FID.

CALCULATIONS

Calculations are done in accord with USEPA Method 25-C procedures. A sample calculation for one of the samples is provided in the report.

EQUIPMENT

Tanks are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppmC NMO, and stored for later use. Prior to shipping, tanks are evacuated to ≈325 mm Hg absolute. The tank absolute pressure and temperature and the barometric pressure are recorded on a data sheet enclosed with the shipment. The absolute pressure can be verified by measurement in the field.

Sampling units are reconditioned by checking that all sections operate properly. The unit is flushed with zero air for at least thirty minutes before an aliquot of this flow is injected into the analyzer. If the total carbon concentration is below 10 ppm, the unit is made ready for use and stored for shipment.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2-16/12

Project ID: Landfill Gas

Sample # 1 East LF

D A T A

Tank N407:
Volume = 0.004480 cu.m

	Pressure (mm Hg)	Temp.(K)
Presampling	324.0	296.2
Postsampling	650.0	301.2
Final	18115.6	301.2
Barometric	760.0	
Water Vapor	28.3	

Water fraction = 0.0372
O2 fraction = 0.004197 (dry basis)

Calibration Data:

	CH4	CO2	NMOC
Response Factor (area units/ppmC)	226.1	229.1	224.2

Areas:

CH4	2,098,650	2,090,170	2,092,407
CO2	1,513,693	1,512,628	1,511,490
NMOC	3,139	3,076	3,010

C A L C U L A T I O N S

Measured Concentrations (ppmC):

Cm(CH4) = Area(CH4)/RF(CH4)
= 2098650 /226.1 = 9282.0
= 2090170 /226.1 = 9244.4
= 2092407 /226.1 = 9254.3

Cm(CO2) = Area(CO2)/RF(CO2)
= 1513693 /229.1 = 6607.1
= 1512628 /229.1 = 6602.5
= 1511490 /229.1 = 6597.5

Cm(NMOC) = Area(NMOC)/RF(NMOC)
= 3139 /224.2 = 14.0
= 3076 /224.2 = 13.7
= 3010 /224.2 = 13.4

TRIANGLE ENVIRONMENTAL SERVICES, INC. METHOD 25-C SAMPLE CALCULATION
ID#12110-25C

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 650 / 301.15 = 2.158393
presampling tank: Q(2) = 324 / 296.15 = 1.09404
final tank: Q(3) = 18115.57 / 301.15 = 60.15464

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .00448 x [2.1584 - 1.0940]
= 0.001839

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C = %RSD of Cm)

Moisture and Air (Oxygen dry basis) Correction Factor, CF:

CF = 1 - Water fraction - (99/21)xOxygen fraction (wet basis)
= (1 - Water fraction)x(1 - (99/21)xOxygen fraction (dry basis))
= (1 - 0.0372) x (1 - (99/21)x0.004197) = 0.9437

Calculated Concentrations (ppm):

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)/CF
= 60.1546/(2.1584 - 1.0940) x 9260.2/0.9437 = 554583.0

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)/CF
= 60.1546/(2.1584 - 1.0940) x 6602.4/0.9437 = 395406.6

C(NMOC as Carbon) = Q(3)/[Q(1)-Q(2)] x Cm(NMOC)/(CF x Carbon Number)
= 60.1546/(2.1584 - 1.0940) x 13.7/(0.9437 x 1)
= 821.4

Carbon Mass Concentration (mg/cu.m)
= (12.011 /24.056) x C(NMOC)
= 0.4993 x 821.4 = 410.1

Triangle Environmental Services, Inc.
METHOD 25-C SAMPLE QA/QC DATA

Report #12110-25C

DAILY ANALYZER CHECKS

10.2* **Daily Calibration**

Response Factor (RF) Checks

Requirement: Daily RF = Initial RF ± 10%

Triplicate injections of a mixture of CO, CH_4, CO_2, and C_3H_8 are made before and after each batch of samples. See the individual sample data sheet for the daily response factor

10.1.2.3* **Initial Calibration/Linearity**

Triplicate injections of a calibration gas is made for each compound at four levels:

	Nominal Concentrations (ppm)				Initial RF for Analyzer A 10/22/10	Initial RF for Analyzer B 03/23/12
CO	5	200	1,000	5,000	175.65	220.28
CH_4	3	50	500	10,000	181.49	243.06
CO_2	3	50	500	10,000	173.94	241.20
propane	2	20	3,000	10,000	178.80	242.35

INITIAL NMO ANALYZER PERFORMANCE CHECKS

10.1.2.1* **Oxidation Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

FID response with reduction catalyst in bypass mode = 0, 0

Requirement: ≤1%

10.1.2.2* **Reduction Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

Response of CH_4 with oxidation and reduction catalysts in series mode and response with both catalysts in bypass mode to be within 5% of the average:

1.05 x Average Response > Response > 0.95 x Average Response

or Higher Response/Lower Response < 1.105263

100.0%, 100.0% Requirement: <110.5%

* USEPA Method 25 Protocol (2000) Reference Number

Report #12110-25C

10.1.2.3* **Analyzer Linearity Check+NMO Calibration** Analyzer A, 10/22/10;Analyzer B, 03/23/12

	$100\times(1-RF/RF_{average})$	Requirement:
max. dev. CO:	+1.876%,-1.697%	± 2.5%
max. dev. CH_4:	-1.775%,+2.476%	± 2.5%
max. dev. CO_2:	+1.738%,-2.231%	± 2.5%
max. dev. NMO:	+2.427%,-1.674%	± 2.5%
max. %RSD:	1.67%, 1.05%	≤ 2%
$\frac{RF\ (NMO)}{RF\ (CO_2)}$ =	0.97, 1.00	1.0 ± 0.1

10.1.2.4* **System Performance Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98, 5/1/98

	Measured Value, Expected Value		Requirement
	Analyzer A	Analyzer B	
Propane in Mix	19.6, 20.0	20.22, 20.0	± 5%
Hexane	50.6, 51.6	51.6, 51.6	± 5%
Toluene	20.3, 20.0	19.34, 20.0	± 5%
Methanol	104.5, 109.1	109.55, 109.0	± 5%

EQUIPMENT CHECKS

8.1.1* **Clean Sampling Equipment Check** (Method 25)

Sample Unit	<10	ppmC total C	@ 100%
Tank	< 2	ppmC NMO	@ 100%

8.1.2* **Sample Tank Evacuation and Leak Check** (Method 25)

Tank evacuated to ≤10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted. (Method 25C: ± 2 mm Hg after 30 minutes)

10.3* **Sample Tank Volumes**

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

* USEPA Method 25 Protocol (2000) Reference Number

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C DATA REPORT

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2-16/12

Project ID: Landfill Gas

Sample # 1 East LF

TANK N407:
Volume = 0.004480 cu.m

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	324.0	296.15	1.094
Postsampling	650.0	301.15	2.158
Lab receipt	650.0	301.15	2.158
Final	18115.6	301.15	60.155
Barometric	760.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled = 0.001839 dscm
Water fraction = 0.0372
Oxygen fraction = 0.004197 (dry basis)

Calibration Data:

	CH4	CO2	NMOC	
Response Factor (area units/ppmC)	226.1	229.1	224.2	
Report Limit (ppm)	181	181	121	(as Carbon)

Areas:

CH4	2,098,650	2,090,170	2,092,407
CO2	1,513,693	1,512,628	1,511,490
NMOC	3,139	3,076	3,010

Concentrations:

	ppm		
	Amount	± SD	%RSD
CH4	554583	±1164	0.2
CO2	395407	± 288	0.1
NMOC as Carbon	821	± 17	2.1
	(= 410 mg Carbon/cu.m)		

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C DATA REPORT

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2-16/12

Project ID: Landfill Gas

Sample # 2 North LF

TANK N10:
Volume = 0.004525 cu.m

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	325.0	296.15	1.097
Postsampling	652.0	301.15	2.165
Lab receipt	652.0	301.15	2.165
Final	19131.6	301.15	63.529
Barometric	760.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled = 0.001863 dscm
Water fraction = 0.0372
Oxygen fraction = 0.009815 (dry basis)

Calibration Data:

	CH4	CO2	NMOC	
Response Factor (area units/ppmC)	226.1	229.1	224.2	
Report Limit (ppm)	195	195	131	(as Carbon)

Areas:

CH4	2,066,971	2,061,026	2,056,399
CO2	1,312,706	1,311,461	1,311,287
NMOC	2,746	2,759	2,800

Concentrations:

	ppm Amount ± SD	%RSD
CH4	590861 ±1519	0.3
CO2	371072 ± 219	0.1
NMOC as Carbon	800 ± 8	1.0
	(= 400 mg Carbon/cu.m)	

Triangle Environmental Services, Inc.
METHOD 3-C PROCEDURES

Report #12110-25C

CALIBRATION

Triplicate injections of a calibration gas mixture consisting of oxygen (≈2.5%), nitrogen (≈10%), carbon dioxide (≈25%), and methane (≈2%) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppm) and must agree within 20% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 5% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

ANALYSIS

All samples, which include the daily calibration gas mixture and sample tanks, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a thermal conductivity detector (TCD). O_2, N_2, CO, CH_4, and CO_2 are eluted from the column and pass to the TCD.

CALCULATIONS

Calculations are done in accord with USEPA Method 3-C procedures. A sample calculation for one of the samples is provided in the report.

EQUIPMENT

Tanks are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppm CH_4 and < 20 ppm CO_2, and stored for later use.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2/12
Project ID: Landfill Gas

Sample # 1 East LF

D A T A

Tank N407:
Volume (cu.m) = 0.004480

	Pressure (mm Hg)	Temp.(K)
Presampling	324.0	296.15
Postsampling	650.0	301.15
Final	1956.0	301.15
Barometric	760.0	
Water Vapor	28.3	

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.27	30.85	25.35	36.61

Areas:

O2	18,650	18,722	18,781
N2	379,481	381,052	379,934
CH4	2,180,133	2,175,612	2,179,434
CO2	2,194,383	2,201,648	2,202,433

C A L C U L A T I O N S

Measured Concentrations (ppmC):

Cm(O2) = Area(O2) / RF(O2)
= 18650 / 28.3 = 659.7
= 18722 / 28.3 = 662.3
= 18781 / 28.3 = 664.3

Cm(N2) = Area(N2)/RF(N2)
= 379481 / 30.9 = 12300.8
= 381052 / 30.9 = 12351.8
= 379934 / 30.9 = 12315.5

Cm(CH4) = Area(CH4)/RF(CH4)
= 2180133 / 25.4 = 86001.3
= 2175612 / 25.4 = 85823.0
= 2179434 / 25.4 = 85973.7

Cm(CO2) = Area(CO2)/RF(CO2)
= 2194383 / 36.6 = 59939.4
= 2201648 / 36.6 = 60137.9
= 2202433 / 36.6 = 60159.3

TRIANGLE ENVIRONMENTAL SERVICES, INC. ID#12110-25C

METHOD 3-C SAMPLE CALCULATION

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 650 / 301.15 = 2.158393
presampling tank: Q(2) = 324 / 296.15 = 1.09404
final tank: Q(3) = 1956 / 301.15 = 6.495103

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .00448 x [2.1584 - 1.0940]
= 0.001839

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C = %RSD of Cm)

Moisture Correction Factor, MCF:

MCF = 1 - Water Vapor Pressure/Barometric Pressure
= 1 - 28.3/ 760.0 = 0.9628

Calculated Concentrations (ppm):

C(O2) = Q(3)/[Q(1)-Q(2)] x Cm(O2)/MCF
= 6.4951/(2.1584 - 1.0940) x 662.1/0.9628 = 4196.7

C(N2) = Q(3)/[Q(1)-Q(2)] x Cm(N2)/MCF
= 6.4951/(2.1584 - 1.0940) x 12322.7/0.9628 = 78106.6

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)/MCF
= 6.4951/(2.1584 - 1.0940) x 85932.7/0.9628 = 544678.1

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)/MCF
= 6.4951/(2.1584 - 1.0940) x 60078.9/0.9628 = 380805.8

Triangle Environmental Services, Inc.
METHOD 3-C SAMPLE QA/QC DATA

Report #12110-25C

DAILY ANALYZER CHECKS

Daily Calibration

Response Factor (RF) Checks

Requirement: Daily RF = Initial RF ± 20%

Triplicate injections of a mixture of O_2, N_2, CH_4, and CO_2 are made before and after each batch of samples.

Initial Calibration/Linearity

Triplicate injections of a calibration gas is made for each compound at three levels:

	Nominal Concentrations (ppm)			Initial RF 10/10/08
O_2	500	10,000	200,000	30.01
N_2	500	50,000	700,000	31.27
CH_4	500	50,000	500,000	25.50
CO_2	500	50,000	250,000	36.61

Analyzer Linearity Check 10/10/08

	$100x(1-RF/RF_{average})$	Requirement:
max. dev. O_2:	- 5.0%	± 10%
max. dev. N_2:	- 4.0%	± 10%
max. dev. CH_4:	- 0.8%	± 10%
max. dev. CO_2:	+ 2.5%	± 10%

EQUIPMENT CHECKS

Clean Sampling Equipment Check

Tank < 2 ppm CH_4 @ 100%
< 20 ppm CO_2 @ 100%

Sample Tank Evacuation and Leak Check

Tank evacuated to ≤ 10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted.

Sample Tank Volumes

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2/12

Project ID: Landfill Gas

Sample # 1 East LF

TANK N407:
Volume (cu.m) = 0.004480

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	324.0	296.15	1.094
Postsampling	650.0	301.15	2.158
Lab receipt	650.0	301.15	2.158
Final	1956.0	301.15	6.495
Barometric	760.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.001839

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.27	30.85	25.35	36.61
Report Limit [RL] (ppm)	223	476	96	159
Calibration Limit [CL] (ppm)	3183	3183	3113	3189

Areas:

O2	18,650	18,722	18,781
N2	379,481	381,052	379,934
CH4	2,180,133	2,175,612	2,179,434
CO2	2,194,383	2,201,648	2,202,433

Concentrations:

	ppm Amount	± SD	%RSD
O2	4197	± 15	0.4
N2	78107	± 166	0.2
CH4	544678	± 608	0.1
CO2	380806	± 768	0.2

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: Sullivan Environmental ID#12110-25C Analyzed: 10/2/12

Project ID: Landfill Gas

Sample # 2 North LF

TANK N10:
Volume (cu.m) = 0.004525

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	325.0	296.15	1.097
Postsampling	652.0	301.15	2.165
Lab receipt	652.0	301.15	2.165
Final	1952.0	301.15	6.482
Barometric	760.0		
Water Vapor	28.3		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.001863

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.27	30.85	25.35	36.61
Report Limit [RL] (ppm)	222	474	96	158
Calibration Limit [CL] (ppm)	3166	3166	3098	3173

Areas:

O2	44,130	43,968	43,903
N2	428,063	428,944	428,170
CH4	2,259,072	2,258,002	2,262,110
CO2	2,007,078	2,010,516	2,016,806

Concentrations:

	ppm			
	Amount	±	SD	%RSD
O2	9815	±	26	0.3
N2	87569	±	98	0.1
CH4	562135	±	530	0.1
CO2	346478	±	850	0.2

Chain of Custody

Triangle Environmental Services, Inc.
LABORATORY SAMPLE INFORMATION AND CHAIN-OF-CUSTODY FORM

Company Name: Sullivan Environmental		Project/Client ID:	Date: 9/21/12
Contact Person: John Sullivan	Phone #: (813) 210-1295	Process Type:	
Email: john@sullivanenv.com	Note: Normal Turnaround is 15 working days after receipt of complete set of samples	Results Due Date: Normal turnaround	Extra charge will apply for rush results
☒ Electronic Report ☐ Hard copy Report ☐ Fax Results		Report Package Due Date: Same	

Send Report to: (Street address required for Fed Ex shipment of report)	*Person* John Sullivan	Send Invoice to: (if different from report address)	*Person*
	Company Sullivan Environmental		*Company*
	Address 4448 13th Lane NE		*Address*
	St. Petersburg, FL 33703		
Phone # (813) 210-1295	*FAX #* (727) 498-2930		*PO#*

✓ all applicable boxes

Analysis

US EPA: ☒ Method 25 ☒ Method 3-C ☐ Method 25-C (NMOC as C [default]) ☐ Method 10-B ☐ Mod. M 3-C GHG/CO ☐ Mod. M25 Methane/Ethane

# of Tank & Trap Samples: 2	# of Tank-Only Samples: 2	# of Trap-Only Samples:	# of Bag Samples:
☐ Audit with Delay (*extra charge*)	☐ Rush Turnaround (*extra charge*)	☐ High Concentrations Possible ☐ Call if Concentrations High	☐ Dilute High Concentrations (*extra charge*)

Special Instructions:

Tanks for Analysis (Bags) (List IDs): N10, N407	Traps for Analysis (List IDs):

☒ TES Equipment	☐ Client Equipment	☐ Client Equipment to be Reconditioned
Tanks, Unused for Reconditioning (List IDs):		Traps, Unused for Reconditioning (List IDs):

Relinquished by: John Sullivan		Date: 9/28/12	Time: 9:22	To: (Carrier) Fed Ex			
Tanks received at TES by:	Condition: good	Date: 9-27-12	Time: 9:45	Traps received at TES by:	Condition:	Date:	Time:

Method 3-C/25-C
Analytical Results

prepared for

SULLIVAN ENVIRONMENTAL
4448 13th Lane NE
St. Petersburg, FL 33703

by

Triangle Environmental Services, Inc.

We, the undersigned, certify to the best of our knowledge that all analytical data presented in this report have been checked for completeness; that the results are accurate, error-free, legible, and have been obtained in accordance with approved protocol; and that all deviations and analytical problems are summarized in the "Comments on the Analyses" page(s).

Approved by:

Wayne A. Stollings
President

Reviewed by:

Donna Nolen-Weathington
Method 25 Supervisor

Report
13018-25C

March 22, 2013

P.O. Box 13294 Research Triangle Park, NC 27709 (800) 367-4862

SCAQMD #94 LA 0401
NJ NELAP ID - NC004
PADEP Registration #68-3321

Triangle Environmental Services, Inc.
COMMENTS ON THE ANALYSES

Report #13018-25C for Sullivan Environmental
Project ID: City of Jacksonville

Tanks Received: 3/5/13

Samples Analyzed: 3/14-21/13 (25-C on Analyzer B)
Client Chain-of-Custody forms: 1 pg

Abbreviations and Definitions:

DF: dilution factor(s)
CL: calibration limit = lowest concentration of initial calibration standard ×DF*
RL: report limit = (Method 3-C) minimum detection limit (MDL) × DF*
= (Method 25-C) calibration limit (CL)
J: flag for reported concentrations between RL and CL (applicable for 3-C results only)

* and any applicable water vapor and air correction

All Samples: Laboratory preshipment and receipt pressure and temperature readings were used for the tank pre- and post-test tank data, respectively. Laboratory post-test barometric pressure and temperature data were used to determine the water vapor fraction.

The tank contents were diluted so as to bring the measured CH_4 and CO_2 concentrations for each of these samples within the Method 25 calibration range. The reported final tank pressure is the original final tank pressure multiplied by the dilution factor.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C TABLE OF RESULTS

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14-21/13

Project ID: City of Jacksonville

	Sample Description	Concentrations (ppm) CH4	CO2	As Carbon NMOC (ppm)	As Carbon Mass Conc. (mg/cu.m)
1	Run 1	544500	412030	< 128	< 64
2	Run 2	557063	383378	< 131	< 65

< # = Concentration Below Report Limit
Correction of concentrations for the presence of air was made
(2 sample(s) corrected using oxygen)

* Please refer to the "Comments on the Analyses" page of the report for additional information.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C TABLE OF RESULTS

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14/18

Project ID: City of Jacksonville

	Sample Description	Concentrations (ppm) O2	N2	CH4	CO2
1	Run 1	5410	26544	585167	386272
2	Run 2	9544	56467	575602	351491

Triangle Environmental Services, Inc.
CALIBRATION DATA FOR THE ANALYSES

Client: Sullivan Environmental ID#13018-25C

Project ID: City of Jacksonville

Method 3-C
14-MAR-13: Analyzer f
Preanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
O2	24600.0	701619	702333	701866	701939	0.1%	28.53	30.01	-4.92%
N2	99500.0	3099150	3103095	3101976	3101407	0.1%	31.17	31.27	-0.32%
CH4	20500.0	523429	524635	523281	523782	0.1%	25.55	25.50	0.20%
CO2	243000.0	8897858	8904449	8901898	8901402	0.0%	36.63	36.61	0.06%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
O2	24600	693558	693106	692301	692988	28.17	28.53	-1.3%
N2	99500	3069343	3066827	3063786	3066652	30.82	31.17	-1.1%
CH4	20500	515719	516593	515445	515919	25.17	25.55	-1.5%
CO2	243000	8816874	8794251	8791531	8800885	36.22	36.63	-1.1%

Sample # 1 N435
2 N81

Method 25-C
21-MAR-1: Analyzer b
Preanalysis Calibration

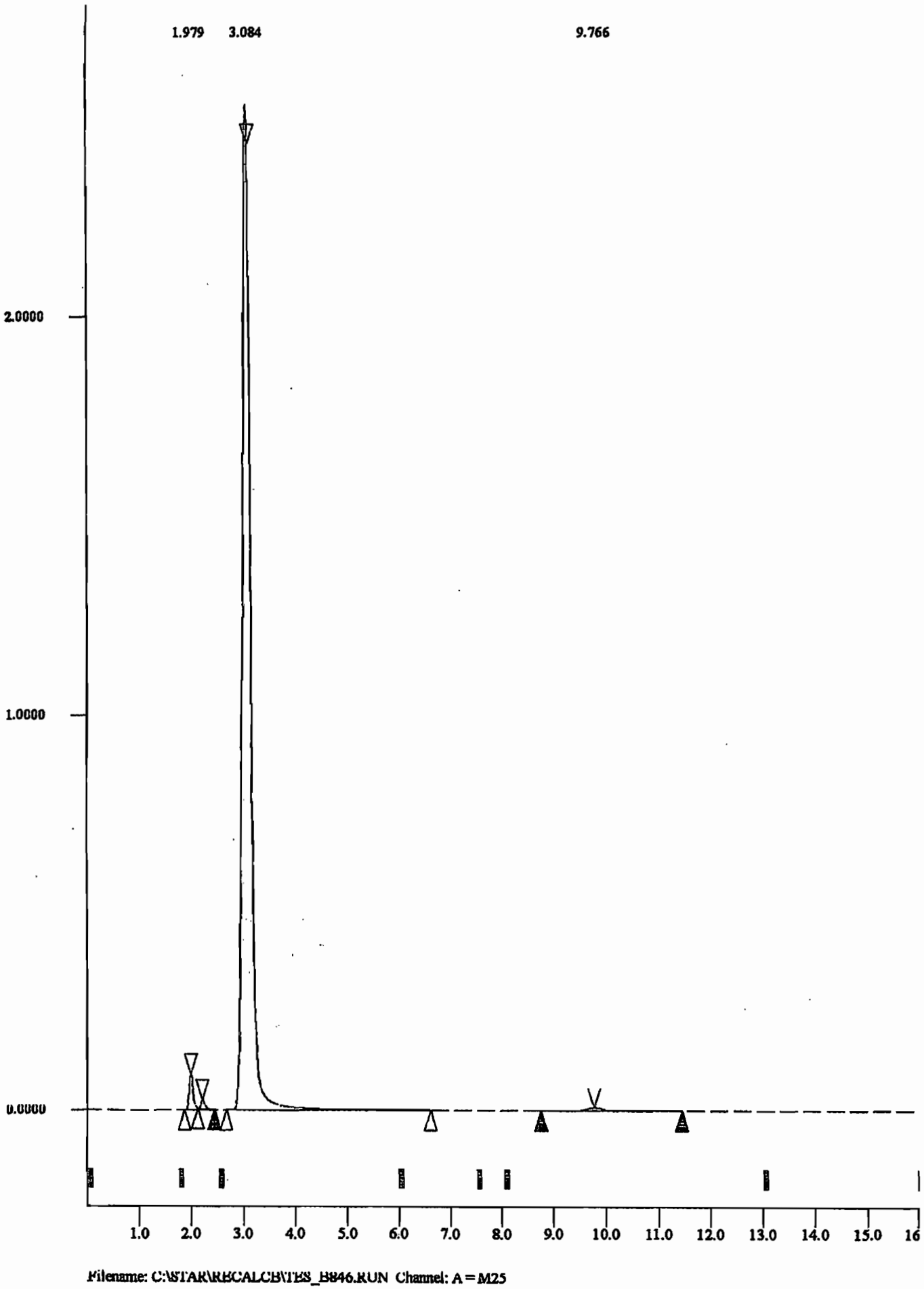
Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
CO	200.5	47558	47716	47651	47642	0.2%	237.6	258.6	-8.1%
CH4	49.1	14630	14820	14655	14702	0.7%	299.2	284.1	5.3%
CO2	9950.0	2719625	2714687	2716512	2716941	0.1%	273.1	269.7	1.3%
C2+	61.7	15848	15440	15808	15699	1.4%	254.6	272.0	-6.4%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
CO	200.5	48389	48325	48312	48342	241.1	237.6	1.5%
CH4	49.1	14815	14870	14797	14827	301.8	299.2	0.9%
CO2	9950.0	2739734	2739630	2730901	2736755	275.1	273.1	0.7%
C2+	61.7	15320	15648	15816	15595	253.0	254.6	-0.7%

Sample # 1 N435
2 N81

Conc. = concentration in ppmC, %RSD = % relative standard deviation,
RF = response factor = Average Area/Conc., IRF = response factor from initial calibration,
%Diff. = %(RF-IRF)/IRF for preanalysis/= %(RF(post)-RF(pre)/RF(pre), C2+ = propane


1.979
3.084
9.766
2.0000
1.0000
0.0000
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16
Filename: C:\STAR\RECALCB\TES_B846.RUN Channel: A = M25

Title :
Run File : C:\STAR\RECALCB\TES_B846.RUN
Method File : C:\STAR\RECALCB.MTH
Sample ID : 1- P mix CC61467

Injection Date: 21-MAR-13 5:40 PM Calculation Date: 22-MAR-13 10:53 AM

Operator : Donna Nolen-Weathi
Workstation: MS-DOS_6
Instrument : Varian Star #1
Channel : A = M25

Detector Type: ADCB (10 Volts)
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 16.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

Run Mode : Analysis - Subtract Blank Baseline
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	CO	1.6999	1.979	-0.021	47558	BV	4.7	U
2	CH4	0.5229	2.201	0.001	14630	VB	5.3	U
3	CO2	97.2107	3.084	0.084	2719625	BB	10.1	
4	C2+	0.5665	11.000	0.000	15848	GR	0.0	U
	Totals:	100.0000		0.064	2797661			

Status Codes:
U - User-defined peak endpoint(s)

Total Unidentified Counts : 0 counts

Detected Peaks: 4 Rejected Peaks: 0 Identified Peaks: 4

Multiplier: 1 Divisor: 1

Baseline Offset: 8 microVolts

Noise (used): 50 microVolts - fixed value
Noise (monitored before this run): 140 microVolts

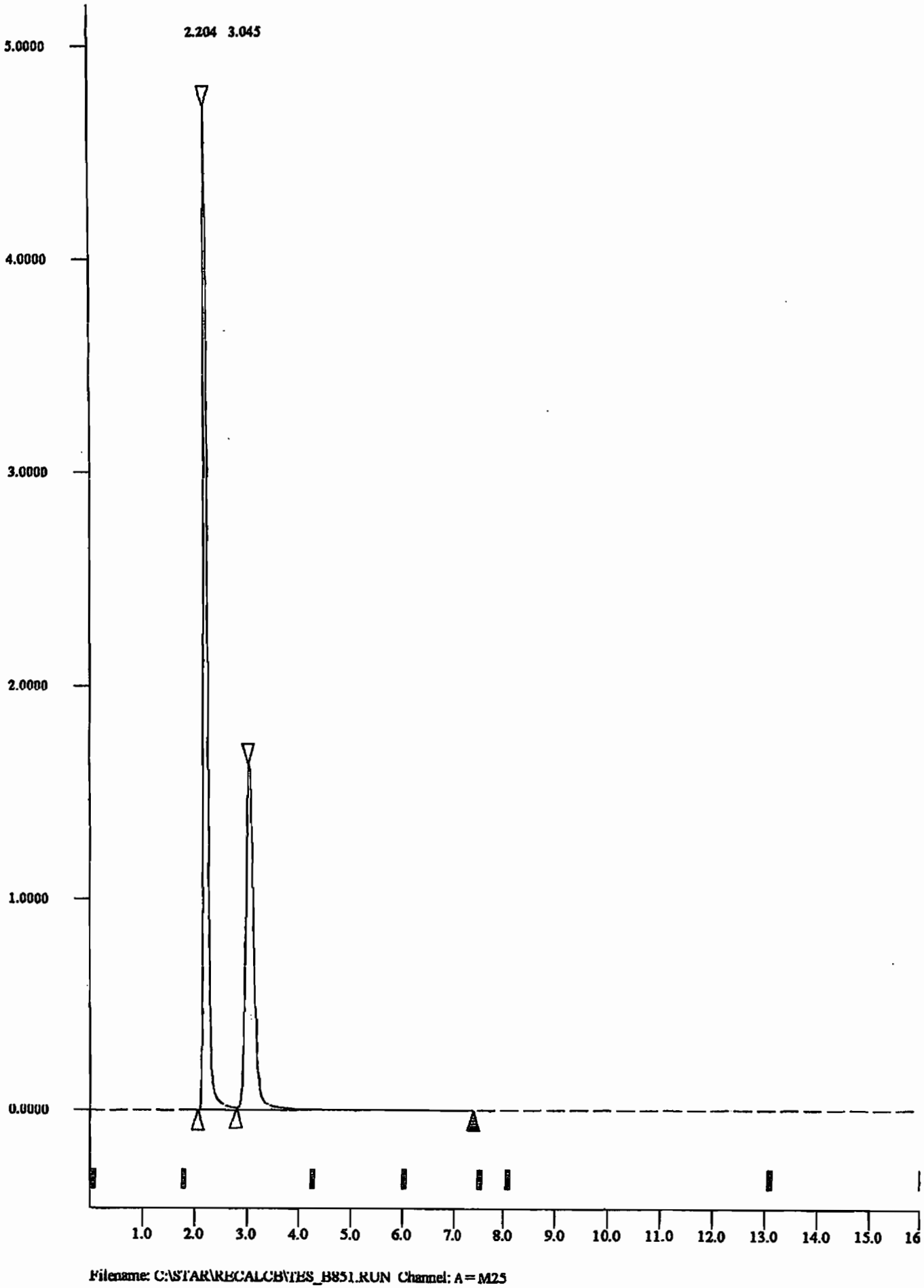
Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

Error Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

ADC Board:

****


2.204 3.045
5.0000
4.0000
3.0000
2.0000
1.0000
0.0000
1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 16
Filename: C:\STAR\RECALCB\TES_B851.RUN Channel: A = M25

Title :
Run File : C:\STAR\RECALCB\TES_B851.RUN
Method File : C:\STAR\RECALCB.MTH
Sample ID : 13- tank N435

Injection Date: 21-MAR-13 7:20 PM Calculation Date: 22-MAR-13 10:57 AM

Operator : Donna Nolen-Weathi
Workstation: MS-DOS_6
Instrument : Varian Star #1
Channel : A = M25

Detector Type: **ADCB (10 Volts)**
Bus Address : 16
Sample Rate : 10.00 Hz
Run Time : 16.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

Run Mode : Analysis - Subtract Blank Baseline
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	CH4	58.9666	2.204	0.004	2556525	BV	4.8	U
2	CO2	41.0334	3.045	0.045	1779020	VB	9.5	U
	Totals:	100.0000		0.049	4335545			

Status Codes:
U - User-defined peak endpoint(s)

Total Unidentified Counts : 0 counts

Detected Peaks: 2 Rejected Peaks: 0 **Identified Peaks: 2**

Multiplier: 1 Divisor: 1

Baseline Offset: 14 microVolts

Noise (used): 50 microVolts - fixed value
Noise (monitored before this run): **150 microVolts**

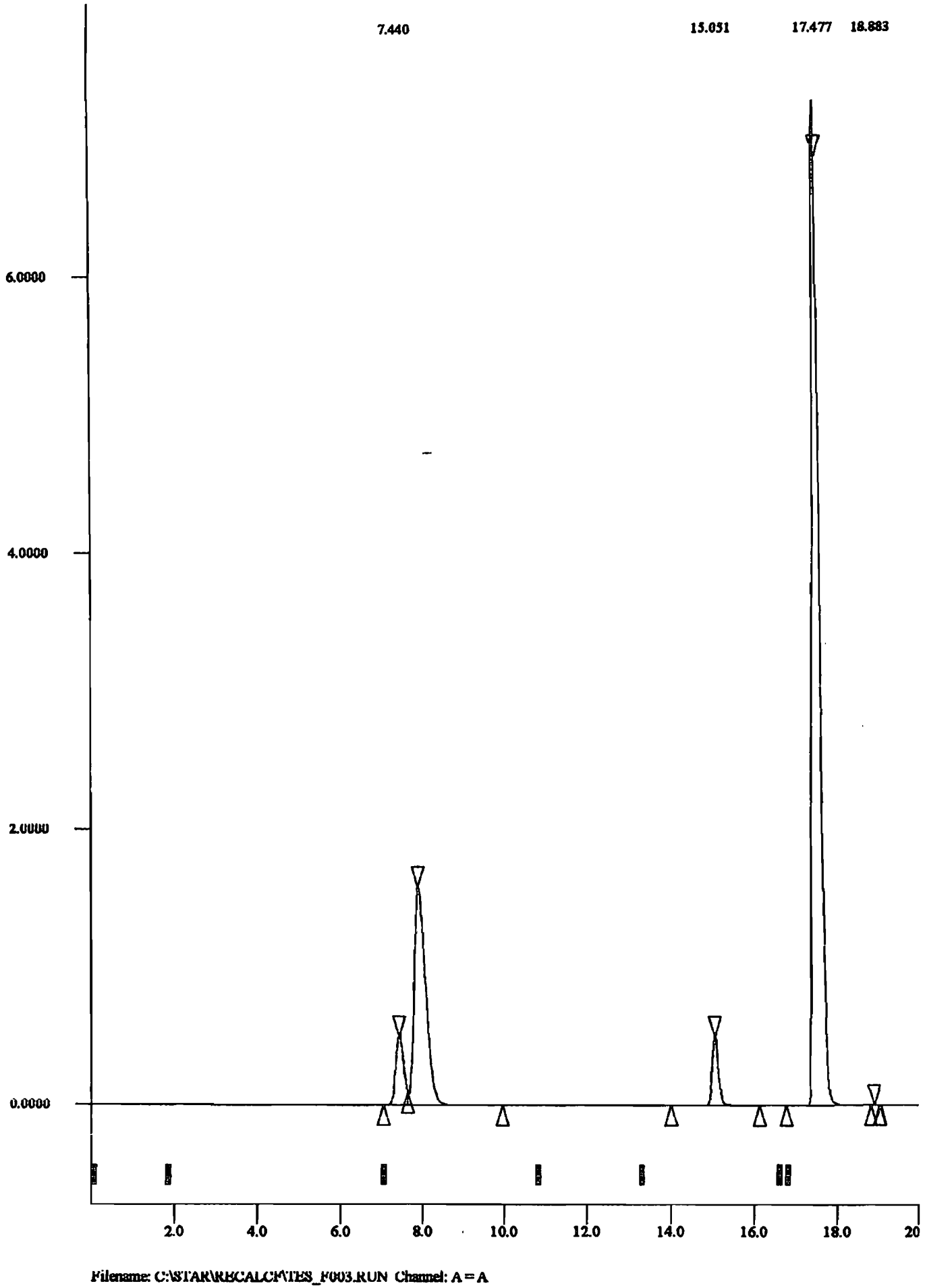
Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

Error Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

ADC Board:

****


7.440
15.051
17.477
18.883
6.0000
4.0000
2.0000
0.0000
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20
Filename: C:\STAR\RECALC\TES_F003.RUN Channel: A = A

Title :
Run File : C:\STAR\RECALCF\TES_F003.RUN
Method File : C:\STAR\CAL3C.MTH
Sample ID : 1- 3C MIX CC93314

Injection Date: 14-MAR-13 2:40 PM Calculation Date: **14-MAR-13 3:00 PM**

Operator : Donna Nolen-Weathi **Detector Type: ADCB (10 Volts)**
Workstation: MS-DOS_6 **Bus Address : 16**
Instrument : Varian Star #1 **Sample Rate : 10.00 Hz**
Channel : A = A Run Time : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

Run Mode : Analysis
Peak Measurement: Peak Area
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	**O2**	**5.3064**	**7.440**	**0.140**	**701619**	**BV**	**13.4**	
2	N2	23.4392	7.906	0.106	3099150	VB	18.1	
3	**CH4**	**3.9588**	**15.051**	**-0.149**	**523429**	**BB**	**9.7**	
4	CO2	67.2956	17.477	-0.223	8897858	BB	12.2	
	Totals:	100.0000		-0.126	13222056			

Total Unidentified Counts : 0 counts

Detected Peaks: 5 Rejected Peaks: 1 **Identified Peaks: 4**

Multiplier: 1 Divisor: 1

Baseline **Offset: -7 microVolts**

Noise (used): 30 microVolts - fixed value
Noise (monitored before this run): **50 microVolts**

Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) **to format this data.**

Revision Log:

14-MAR-13 3:00 PM: Calculated results from channel A using method:
'C:\STAR\CAL3C.MTH'

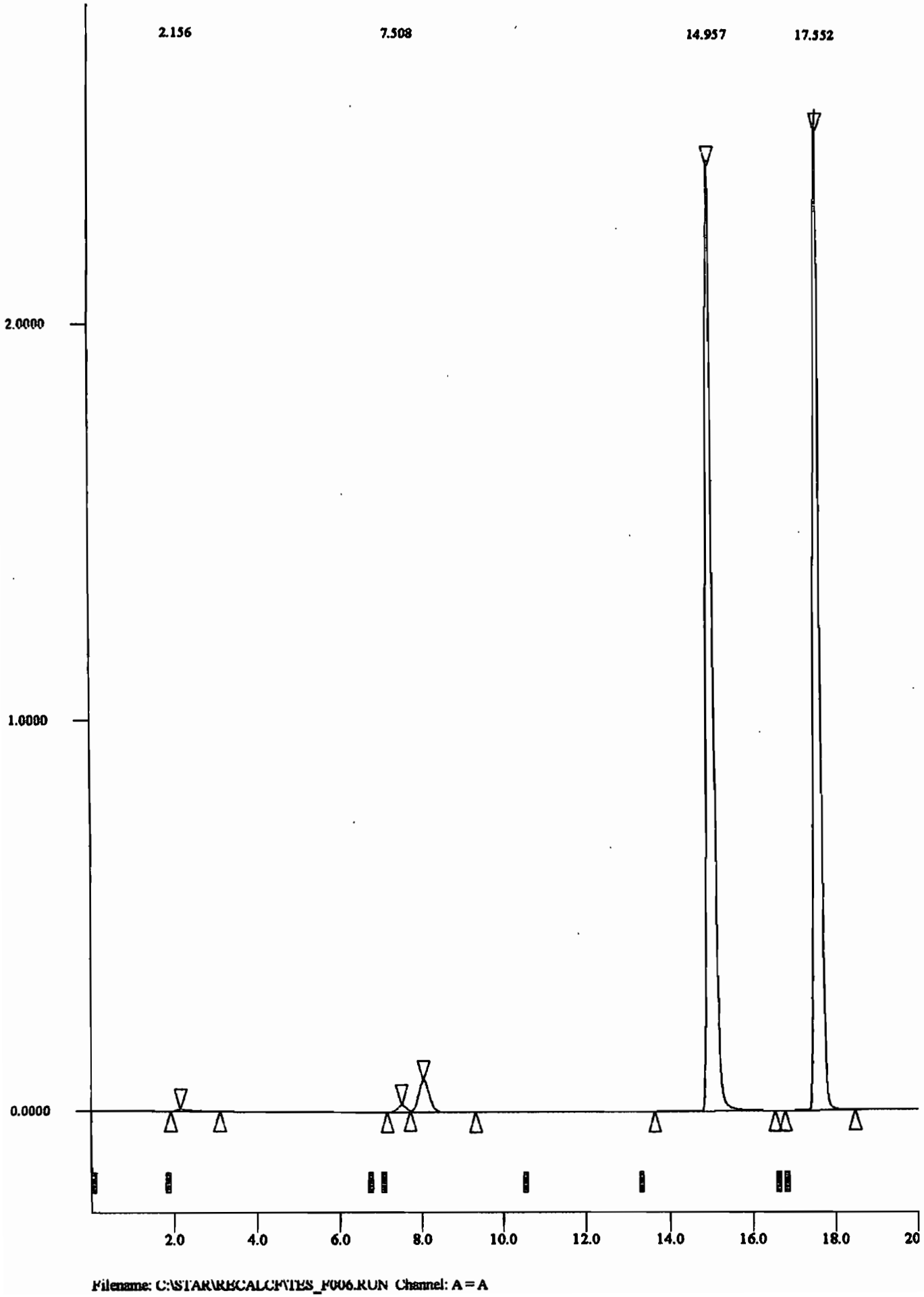
Error Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to **format this data.**

ADC Board:

Original **Notes:**

****


2.156
7.508
14.957
17.552
2.0000
1.0000
0.0000
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20
Filename: C:\STAR\RBCALC\TES_F006.RUN Channel: A = A

Title :
Run File : C:\STAR\RECALCF\TES_F006.RUN
Method File : C:\STAR\3C.MTH
Sample ID : 2- tank N435

Injection Date: 14-MAR-13 3:58 PM Calculation Date: 14-MAR-13 4:18 PM

Operator : Donna Nolen-Weathi
Workstation: MS-DOS_6
Instrument : Varian Star #1
Channel : A = A

Detector Type: **ADCB (10 Volts)**
Bus Address : 16
Sample Rate : 10.00 **Hz**
Run Time : 20.002 min

********** Star Chromatography Workstation ******* Version 4.5 **********

Run Mode : Analysis
Peak Measurement: **Peak Area**
Calculation Type: Percent

Peak No.	Peak Name	Result ()	Ret. Time (min)	Time Offset (min)	Area (counts)	Sep. Code	Width 1/2 (sec)	Status Codes
1	**O2**	**0.5115**	**7.508**	**0.108**	**27998**	**BV**	**14.5**	
2	N2	2.7414	8.038	0.138	150067	VB	16.8	
3	**CH4**	**49.6357**	**14.957**	**-0.243**	**2717091**	**BB**	**10.5**	
4	CO2	46.8707	17.552	-0.148	2565737	BB	9.6	
	Totals:	99.7593		-0.145	5460893			

Total Unidentified Counts : 13177 counts

Detected Peaks: 5 Rejected Peaks: 0 **Identified Peaks: 4**

Multiplier: 1 Divisor: 1

Baseline Offset: -12 microVolts

Noise (used): 50 microVolts - monitored before this run

Could not format the injection information for this run.
Install the driver for the module at address 17 (type 8) to format this data.

Error Log:

Could not format the error log for the module at address 17 (type 8).
Install the appropriate module driver to format this data.

ADC Board:

****

Triangle Environmental Services, Inc.
METHOD 25-C PROCEDURES

Report #13018-25C

CALIBRATION

The calibrations satisfy the requirements for Methods 25, 25-C, and 10-B.

Triplicate injections of a calibration gas mixture consisting of carbon monoxide (≈200 ppm), methane (≈50 ppm), carbon dioxide (≈10,000 ppm), and propane (≈20 ppm) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppmC) and must agree within 10% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 2% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

ANALYSIS

All samples, which include the daily calibration gas mixture and sample tanks, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a flame ionization detector (FID). CO, CH_4, and CO_2 are eluted from the Unibead 1S-Carbosieve G column and pass through the analytical oxidation and reduction catalyst to the FID. The column is then backflushed to elute the nonmethane organic (NMO) fraction, which passes through the analytical oxidation and reduction catalysts to the FID.

CALCULATIONS

Calculations are done in accord with USEPA Method 25-C procedures. A sample calculation for one of the samples is provided in the report.

EQUIPMENT

Tanks are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppmC NMO, and stored for later use. Prior to shipping, tanks are evacuated to ≈325 mm Hg absolute. The tank absolute pressure and temperature and the barometric pressure are recorded on a data sheet enclosed with the shipment. The absolute pressure can be verified by measurement in the field.

Sampling units are reconditioned by checking that all sections operate properly. The unit is flushed with zero air for at least thirty minutes before an aliquot of this flow is injected into the analyzer. If the total carbon concentration is below 10 ppm, the unit is made ready for use and stored for shipment.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14-21/13

Project ID: City of Jacksonville

Sample # 1 Run 1

D A T A

Tank N435:
Volume = 0.004486 cu.m

	Pressure (mm Hg)	Temp.(K)
Presampling	327.0	288.2
Postsampling	695.0	296.2
Final	21587.3	296.2
Barometric	772.0	
Water Vapor	21.1	

Water fraction = 0.0273
O2 fraction = 0.005410 (dry basis)

Calibration Data:

	CH4	CO2	NMOC
Response Factor (area units/ppmC)	299.2	273.1	254.6

Areas:

CH4	2,556,525	2,573,751	2,572,122
CO2	1,779,020	1,771,565	1,769,474
NMOC	0	0	0

C A L C U L A T I O N S

Measured Concentrations (ppmC):

Cm(CH4) = Area(CH4)/RF(CH4)
= 2556525 /299.2 = 8544.5
= 2573751 /299.2 = 8602.1
= 2572122 /299.2 = 8596.7

Cm(CO2) = Area(CO2)/RF(CO2)
= 1779020 /273.1 = 6514.2
= 1771565 /273.1 = 6486.9
= 1769474 /273.1 = 6479.2

Cm(NMOC) = Area(NMOC)/RF(NMOC)
= 0 /254.6 = 0.0
= 0 /254.6 = 0.0
= 0 /254.6 = 0.0

TRIANGLE ENVIRONMENTAL SERVICES, INC. METHOD 25-C SAMPLE CALCULATION
ID#13018-25C

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 695 / 296.15 = 2.346784
presampling tank: Q(2) = 327 / 288.15 = 1.134826
final tank: Q(3) = 21587.34 / 296.15 = 72.89328

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .004486 x [2.3468 - 1.1348]
= 0.002097

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C = %RSD of Cm)

Moisture and Air (Oxygen dry basis) Correction Factor, CF:

CF = 1 - Water fraction - (99/21)xOxygen fraction (wet basis)
= (1 - Water fraction)x(1 - (99/21)xOxygen fraction (dry basis))
= (1 - 0.0273) x (1 - (99/21)x0.005410) = 0.9479

Calculated Concentrations (ppm):

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)/CF
= 72.8933/(2.3468 - 1.1348) x 8581.1/0.9479 = 544500.3

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)/CF
= 72.8933/(2.3468 - 1.1348) x 6493.4/0.9479 = 412029.7

C(NMOC as Carbon) = Q(3)/[Q(1)-Q(2)] x Cm(NMOC)/(CF x Carbon Number)
= 72.8933/(2.3468 - 1.1348) x 0.0/(0.9479 x 1)
= 0.0 (<RL of 128)

Carbon Mass Concentration (mg/cu.m)
= (12.011 /24.056) x C(NMOC)
= 0.4993 x 0.0 = 0.0 (<RL of 64)

<RL of ### = Concentration Below Report Limit

Triangle Environmental Services, Inc.
METHOD 25-C SAMPLE QA/QC DATA

Report #13018-25C

DAILY ANALYZER CHECKS

10.2* **Daily Calibration**

Response Factor (RF) Checks

Requirement: Daily RF = Initial RF ± 10%

Triplicate injections of a mixture of CO, CH_4, CO_2, and C_3H_8 are made before and after each batch of samples. See the individual sample data sheet for the daily response factor

10.1.2.3* **Initial Calibration/Linearity**

Triplicate injections of a calibration gas is made for each compound at four levels:

	Nominal Concentrations (ppm)				Initial RF for Analyzer A 10/22/10	Initial RF for Analyzer B 02/04/13
CO	5	200	1000	5000	175.65	258.55
CH_4	3	50	500	10,000	181.49	284.14
CO_2	3	50	500	10,000	173.94	269.67
propane	2	20	3000	10,000	178.80	272.02

INITIAL NMO ANALYZER PERFORMANCE CHECKS

10.1.2.1* **Oxidation Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

FID response with reduction catalyst in bypass mode = 0, 0

Requirement: ≤ 1%

10.1.2.2* **Reduction Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

Response of CH_4 with oxidation and reduction catalysts in series mode and response with both catalysts in bypass mode to be within 5% of the average:

1.05 x Average Response > Response > 0.95 x Average Response

or Higher Response/Lower Response < 1.105263

100.0%, 100.0% Requirement: <110.5%

* USEPA Method 25 Protocol (2000) Reference Number

Report #13018-25C

10.1.2.3* **Analyzer Linearity Check+NMO Calibration** Analyzer A, 10/22/10;Analyzer B, 02/04/13

	$100\times(1-RF/RF_{average})$		Requirement:
max. dev. CO:	+1.876%,	+2.259%	± 2.5%
max. dev. CH_4:	-1.775%,	-2.500%	± 2.5%
max. dev. CO_2:	+1.738%,	-1.233%	± 2.5%
max. dev. NMO:	+2.427%,	+1.150%	± 2.5%
max. %RSD:	1.67%,	1.50%	≤ 2%
$\frac{RF\ (NMO)}{RF\ (CO_2)}$ =	0.97,	0.99	1.0 ± 0.1

10.1.2.4* **System Performance Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98, 5/1/98

	Measured Value, Expected Value		Requirement
	Analyzer A	Analyzer B	
Propane in Mix	19.6, 20.0	20.22, 20.0	± 5%
Hexane	50.6, 51.6	51.6, 51.6	± 5%
Toluene	20.3, 20.0	19.34, 20.0	± 5%
Methanol	104.5, 109.1	109.55, 109.0	± 5%

EQUIPMENT CHECKS

8.1.1* **Clean Sampling Equipment Check** (Method 25)

Sample Unit	<10 ppmC total C	@ 100%
Tank	< 2 ppmC NMO	@ 100%

8.1.2* **Sample Tank Evacuation and Leak Check** (Method 25)

Tank evacuated to ≤ 10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted. (Method 25C: ± 2 mm Hg after 30 minutes)

10.3* **Sample Tank Volumes**

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

* USEPA Method 25 Protocol (2000) Reference Number

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C DATA REPORT

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14-21/13

Project ID: City of Jacksonville

Sample # 1 Run 1

TANK N435:
Volume = 0.004486 cu.m

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	327.0	288.15	1.135
Postsampling	695.0	296.15	2.347
Lab receipt	695.0	296.15	2.347
Final	21587.3	296.15	72.893
Barometric	772.0		
Water Vapor	21.1		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled = 0.002097 dscm
Water fraction = 0.0273
Oxygen fraction = 0.005410 (dry basis)

Calibration Data:

	CH4	CO2	NMOC	
Response Factor (area units/ppmC)	299.2	273.1	254.6	
Report Limit (ppm)	191	191	128	(as Carbon)

Areas:

CH4	2,556,525	2,573,751	2,572,122
CO2	1,779,020	1,771,565	1,769,474
NMOC	0	0	0

Concentrations:

	ppm	
	Amount ± SD	%RSD
CH4	544500 ±2017	0.4
CO2	412030 ±1166	0.3
NMOC as Carbon	<128	
	(= < 64 mg Carbon/cu.m)	

< # = Concentration Below Report Limit

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 25-C DATA REPORT

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14-21/13

Project ID: City of Jacksonville

Sample # 2 Run 2

TANK N81:
Volume = 0.004544 cu.m

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	327.0	288.15	1.135
Postsampling	695.0	296.15	2.347
Lab receipt	695.0	296.15	2.347
Final	21604.8	296.15	72.952
Barometric	772.0		
Water Vapor	21.1		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled = 0.002124 dscm
Water fraction = 0.0273
Oxygen fraction = 0.009544 (dry basis)

Calibration Data:

	CH4	CO2	NMOC	
Response Factor (area units/ppmC)	299.2	273.1	254.6	
Report Limit (ppm)	195	195	131	(as Carbon)

Areas:

CH4	2,542,633	2,545,703	2,544,841
CO2	1,616,330	1,615,928	1,614,945
NMOC	0	0	0

Concentrations:

	ppm	
	Amount ± SD	%RSD
CH4	551063 ± 343	0.1
CO2	383378 ± 169	0.0
NMOC as Carbon	<131	
	(= < 65 mg Carbon/cu.m)	

< # = Concentration Below Report Limit

Triangle Environmental Services, Inc.
METHOD 3-C PROCEDURES

Report #13018-25C

CALIBRATION

Triplicate injections of a calibration gas mixture consisting of oxygen (≈2.5%), nitrogen (≈10%), carbon dioxide (≈25%), and methane (≈2%) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppm) and must agree within 20% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 5% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

ANALYSIS

All samples, which include the daily calibration gas mixture and sample tanks, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a thermal conductivity detector (TCD). O_2, N_2, CO, CH_4, and CO_2 are eluted from the column and pass to the TCD.

CALCULATIONS

Calculations are done in accord with USEPA Method 3-C procedures. A sample calculation for one of the samples is provided in the report.

EQUIPMENT

Tanks are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppm CH_4 and < 20 ppm CO_2, and stored for later use.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C SAMPLE CALCULATION

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14/18
Project ID: City of Jacksonville

Sample # 1 Run 1

D A T A

Tank N435:
Volume (cu.m) = 0.004486

	Pressure (mm Hg)	Temp.(K)
Presampling	327.0	288.15
Postsampling	695.0	296.15
Final	1922.0	296.15
Barometric	772.0	
Water Vapor	21.1	

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.53	31.17	25.55	36.63

Areas:

O2	27,998	28,083	28,033
N2	150,067	150,592	150,196
CH4	2,717,091	2,716,895	2,713,106
CO2	2,565,737	2,570,655	2,573,742

C A L C U L A T I O N S

Measured Concentrations (ppmC):

Cm(O2) = Area(O2) / RF(O2)
= 27998 / 28.5 = 981.4
= 28083 / 28.5 = 984.3
= 28033 / 28.5 = 982.6

Cm(N2) = Area(N2)/RF(N2)
= 150067 / 31.2 = 4814.5
= 150592 / 31.2 = 4831.3
= 150196 / 31.2 = 4818.6

Cm(CH4) = Area(CH4)/RF(CH4)
= 2717091 / 25.6 = 106344.1
= 2716895 / 25.6 = 106336.4
= 2713106 / 25.6 = 106188.1

Cm(CO2) = Area(CO2)/RF(CO2)
= 2565737 / 36.6 = 70044.7
= 2570655 / 36.6 = 70179.0
= 2573742 / 36.6 = 70263.2

TRIANGLE ENVIRONMENTAL SERVICES, INC. ID#13018-25C

METHOD 3-C SAMPLE CALCULATION

Pressure-Temperature Ratio, Q(i) = P(i)/T(i):

postsampling tank: Q(1) = 695 / 296.15 = 2.346784
presampling tank: Q(2) = 327 / 288.15 = 1.134826
final tank: Q(3) = 1922 / 296.15 = 6.489955

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x .004486 x [2.3468 - 1.1348]
= 0.002097

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated. (%RSD of C = %RSD of Cm)

Moisture Correction Factor, MCF:

MCF = 1 - Water Vapor Pressure/Barometric Pressure
= 1 - 21.1/ 772.0 = 0.9727

Calculated Concentrations (ppm):

C(O2) = Q(3)/[Q(1)-Q(2)] x Cm(O2)/MCF
= 6.4900/(2.3468 - 1.1348) x 982.8/0.9727 = 5410.5

C(N2) = Q(3)/[Q(1)-Q(2)] x Cm(N2)/MCF
= 6.4900/(2.3468 - 1.1348) x 4821.5/0.9727 = 26544.1

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)/MCF
= 6.4900/(2.3468 - 1.1348) x 106289.5/0.9727 = 585166.8

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)/MCF
= 6.4900/(2.3468 - 1.1348) x 70162.3/0.9727 = 386271.7

Triangle Environmental Services, Inc.
METHOD 3-C SAMPLE QA/QC DATA

Report #13018-25C

DAILY ANALYZER CHECKS

Daily Calibration

Response Factor (RF) Checks

Requirement: Daily RF = Initial RF ± 20%

Triplicate injections of a mixture of O_2, N_2, CH_4, and CO_2 are made before and after each batch of samples.

Initial Calibration/Linearity

Triplicate injections of a calibration gas is made for each compound at three levels:

	Nominal Concentrations (ppm)			Initial RF 10/10/08
O_2	500	10,000	200,000	30.01
N_2	500	50,000	700,000	31.27
CH_4	500	50,000	500,000	25.50
CO_2	500	50,000	250,000	36.61

Analyzer Linearity Check 10/10/08

	100x(1-RF/$RF_{average}$)	Requirement:
max. dev. O_2:	- 5.0%	± 10%
max. dev. N_2:	- 4.0%	± 10%
max. dev. CH_4:	- 0.8%	± 10%
max. dev. CO_2:	+ 2.5%	± 10%

EQUIPMENT CHECKS

Clean Sampling Equipment Check

Tank < 2 ppm CH_4 @ 100%
< 20 ppm CO_2 @ 100%

Sample Tank Evacuation and Leak Check

Tank evacuated to ≤ 10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted.

Sample Tank Volumes

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14/18

Project ID: City of Jacksonville

Sample # 1 Run 1

TANK N435:
Volume (cu.m) = 0.004486

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	327.0	288.15	1.135
Postsampling	695.0	296.15	2.347
Lab receipt	695.0	296.15	2.347
Final	1922.0	296.15	6.490
Barometric	772.0		
Water Vapor	21.1		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.002097

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.53	31.17	25.55	36.63
Report Limit [RL] (ppm)	194	414	84	138
Calibration Limit [CL] (ppm)	2765	2765	2704	2770

Areas:

O2	27,998	28,083	28,033
N2	150,067	150,592	150,196
CH4	2,717,091	2,716,895	2,713,106
CO2	2,565,737	2,570,655	2,573,742

Concentrations:

	ppm			
	Amount	±	SD	%RSD
O2	5410	±	8	0.2
N2	26544	±	48	0.2
CH4	585167	±	484	0.1
CO2	386272	±	607	0.2

TRIANGLE ENVIRONMENTAL SERVICES, INC.

METHOD 3-C DATA REPORT

Name: Sullivan Environmental ID#13018-25C Analyzed: 3/14/18

Project ID: City of Jacksonville

Sample # 2 Run 2

TANK N81:
Volume (cu.m) = 0.004544

	Pressure (mm Hg)	Temperature (K)	P/T
Presampling	327.0	288.15	1.135
Postsampling	695.0	296.15	2.347
Lab receipt	695.0	296.15	2.347
Final	1907.0	296.15	6.439
Barometric	772.0		
Water Vapor	21.1		

Field and laboratory postsampling pressure-temperature comparison:

Laboratory receipt P/T / Field postsampling P/T = 1.000

Volume Sampled (dscm) = 0.002124

Calibration Data:

	O2	N2	CH4	CO2
Response Factor (area units/ppmC)	28.53	31.17	25.55	36.63
Report Limit [RL] (ppm)	192	411	83	137
Calibration Limit [CL] (ppm)	2743	2743	2683	2749

Areas:

O2	50,003	49,730	49,807
N2	322,819	322,017	321,808
CH4	2,694,860	2,695,642	2,686,452
CO2	2,360,263	2,357,483	2,353,329

Concentrations:

	ppm			
	Amount	±	SD	%RSD
O2	9544	±	27	0.3
N2	56467	±	94	0.2
CH4	575602	±	1089	0.2
CO2	351491	±	520	0.1

Chain of Custody

Triangle Environmental Services, Inc.
LABORATORY SAMPLE INFORMATION AND CHAIN-OF-CUSTODY FORM

Company Name: Sullivan Environmental		Project/Client ID: City of Jacksonville	Date: 3/1/13
Contact Person: John Sullivan	Phone #:	Process Type:	
Email: john@sullivanenv.com	Note: Normal Turnaround is 15 working days after receipt of complete set of samples	Results Due Date: standard	Extra charge will apply for rush results
☒ Electronic Report ☐ Hard copy Report ☐ Fax Results		Report Package Due Date:	

Send Report to: (Street address required for Fed Ex shipment of report)	*Person* John Sullivan	Send Invoice to: (if different from report address)	*Person* John Sullivan
	Company Sullivan Environmental		*Company* Sullivan Environmental
	Address		*Address* 4448 13th Lane NE
			St. Petersburg, FL 33703
Phone #	*FAX #*		*PO#*

✓ all applicable boxes

Analysis

US EPA: ☐ Method 25 ☒ Method 3-C ☒ Method 25-C (NMOC as C [default]) ☐ Method 10-B ☐ Mod. M 3-C GHG/CO ☐ Mod. M25 Methane/Ethane

# of Tank & Trap Samples:	# of Tank-Only Samples: 2	# of Trap-Only Samples:	# of Bag Samples:
☐ Audit with Delay (*extra charge*)	☐ Rush Turnaround (*extra charge*)	☐ High Concentrations Possible ☐ Call if Concentrations High	☐ Dilute High Concentrations (*extra charge*)

Special Instructions:

Tanks for Analysis (Bags) (List IDs): N435, N181	**Traps** for Analysis (List IDs):

☐ TES Equipment	☐ Client Equipment	☐ Client Equipment to be Reconditioned
Tanks, Unused for Reconditioning (List IDs):		Traps, Unused for Reconditioning (List IDs):

Relinquished by:		Date: 3/1/13	Time: 1400	To: (Carrier)			
Tanks received at TES by:	Condition: good	Date: 3-5-13	Time: 3:30	Traps received at TES by:	Condition:	Date:	Time:

ATTACHMENT H

DETAILED DESCRIPTION OF CONTROL EQUIPMENT

DETAILED DESCRIPTION OF CONTROL EQUIPMENT

The enclosed flare is a LFG Specialties, Inc. Model FE840S4. The maximum flow rate indicated in the permit is 2,400 scfm. The flare is equipped with a thermocouple to continuously monitor combustion temperature. Additional information on the flare is provided in Attachment J.

ATTACHMENT I

PROCEDURES FOR STARTUP AND SHUTDOWN

CITY OF JACKSONVILLE, FLORIDA
MUNICIPAL SOLID WASTE LANDFILL GAS COLLECTION AND CONTROL SYSTEM

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

EAST LANDFILL
Jacksonville, Florida

Prepared by:
Earth Tech AECOM
10 Patewood Drive
Building VI, Suite 500
Greenville, South Carolina 29615

Date of Issuance
December 2008

¯ This version of the plan has been superseded
If the box above has been checked, complete the following information:

This copy of the plan may be discarded after _____.
(Enter the date that is five years after date on which this version was superseded by a newer version.)

MUNICIPAL SOLID WASTE LANDFILL
GAS COLLECTION AND CONTROL SYSTEM

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

City of Jacksonville East Municipal Landfill

This startup, shutdown, and malfunction (SSM) plan (SSM Plan) was prepared by Earth Tech AECOM in order to comply with the requirements of Title 40 of the Code of Federal Regulations (CFR) Part 63.6(e)(3), as this facility is subject to 40 CFR Part 63, Subpart AAAA, the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste (MSW) Landfills. The SSM Plan contains all of the required elements set forth within 40 CFR Part 63.6(e).

This SSM Plan will be revised if the procedures described herein do not adequately address any malfunction or startup/shutdown events that occur at the facility. A copy of the original plan and all revisions/addenda will be kept on file at the facility for at least five years. The Site/Facility Manager is responsible for assuring that the most recent copy of this SSM Plan is made available to all personnel involved with the landfill gas (LFG) collection and control system (GCCS) at the City of Jacksonville East Municipal Landfill (East Landfill) as well as to appropriate regulatory agency personnel for inspection.

Name of Plan Preparer: Justin Butler Date: December 04, 2008

Approved By: _____ Date: _____

Landfill Site Manager

TABLE OF CONTENTS

Section **Page**

Appendices

1.0 REVISION HISTORY

Add the effective date of the most-recent revision to the list below. Do not overwrite or delete any dates. This is intended to be a complete record of all revisions made to this Plan, and assists in making certain that all plan versions are retained for at least five years as required by Title 40 of the Code of Federal Regulations (CFR) Part 63.6(e)(3)(v).

Revision Number	Date
01	December 2008 (draft)

2.0 INTRODUCTION

2.1 Purpose and Scope

The municipal solid waste (MSW) landfill owner or operator of an affected source must develop and implement a written startup, shutdown, and malfunction (SSM) plan that describes, in detail, procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction; a program of corrective action for malfunctioning processes; and air pollution control and monitoring equipment used to comply with the relevant standard. The purpose of the SSM plan is to:

- Ensure that, at all times, the MSW landfill owner or operator operates and maintains the affected source, including associated air pollution control and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions to the levels required by the relevant standards;
- Ensure that MSW landfill owners or operators are prepared to correct malfunctions as soon as practicable after their occurrence in order to minimize excess emissions of hazardous air pollutants; and
- Reduce the reporting burden associated with periods of startup, shutdown, and malfunction (including corrective action taken to restore malfunctioning process and air pollution control equipment to its normal or usual manner of operation).

A more detailed summary of the regulatory background and summary of requirements for preparation and use of a SSM plan is included in the U.S. Environmental Protection Agency (EPA) guidance document "How to Prepare a Startup, Shutdown, Malfunction Plan for Collection and Control Systems at Municipal Solid Waste Landfills" (EPA-456 R-03-006, December 2003).

The City of Jacksonville East Municipal Landfill (East Landfill) is an existing landfill subject to the regulatory requirements listed in Appendix A. This SSM Plan has been prepared and implemented for this landfill site as required by the Title V operating permit and associated regulatory requirements.

2.2 Description of SSM Plan

This SSM Plan has been divided into three major sections comprising the major elements related to startup, shutdown, and/or malfunction of a GCCS at a MSW landfill. Malfunction events occur when the GCCS is not operating in accordance with the New Source Performance Standards (NSPS) for MSW landfills which result in, or have the potential to result in, an exceedance of one or more emission limitations or operational standards under the NSPS. Startup and shutdown events are generally planned events associated with system repair, maintenance, testing, and upgrade, and may or may not be related to or occur in association with a malfunction of the GCCS.

2.3 Site Equipment Subject To This SSM Plan

The following components of the GCCS are subject to this SSM Plan:

- Gas collection system
  - LFG lines
  - Gas collection wells
  - Gas collection trenches
  - Field valves
  - Blowers

- Condenser
- Gas control system
  - Enclosed flare
  - Internal combustion engines
- Monitoring equipment
  - Flame sensor
  - Flow monitoring device
  - Temperature thermocouple

3.0 STARTUP PLAN

This section details procedures for the startup of the GCCS to ensure that, at all times, good safety and air pollution control practices are used for minimizing emissions to the levels required by the relevant standards.

Pursuant to the requirements of the NSPS for MSW landfills, a GCCS must be installed and operated when the landfill exceeds a threshold of 50 Mg/year NMOC and meets all the applicable criteria for a controlled landfill.

3.1 How to Identify a GCCS Startup Event

The regulatory definition of startup is "the setting in operation of an affected source or portion of an affected source for any purpose" (40 CFR Part 63.2).

GCCS startup operations generally include startup of gas mover equipment, LFG control devices, and any ancillary equipment that could affect the operation of the GCCS (e.g., power supply, air compressors, etc.).

3.2 Actions to Take During GCCS Start-up

3.2.1 Gas Mover and Collection System

The following provides a preparation for startup procedure of the GCCS.

- Verify the following systems or components are in service:
  - Incoming electrical power supply.
  - 24 volt DC control power system
  - Explosive gas detection system
  - Heating, ventilating and air conditioning system
  - Auto-dialer system
  - Condensate pump system
  - Check all protective relays for red flags, reset if necessary.
  - Verify incoming electrical power supply pre-startup conditions.

The following provides the startup procedure for the GCCS.

- Ensure all prerequisites have been satisfied.
- Test control room annunciate alarm panel by depressing test push button.
- Verify using the Valve Line-up Checklist, Table 1 of this Procedure for correct valve positions.
- Verify inlet packed tower and coalescing filter levels are drained.
- Place the fuel gas compressor blower in service by depressing the PUSH TO START push button.
- Check fuel gas compressor for any unusual noises and vibration.
- Use 2 inch gas vent line to purge system (if necessary) and bring gas temperature to 100°F. Purge until gas fuel oxygen level is below 1%.
- Drain condensate from all piping low point drains between the blower discharge and the engine fuel connection.
- Verify gas final fuel pressure is approximately 4 psi.
- Reset engine/generator circuit breaker lockout relay if tripped.
- Transfer Engine Control Switch (ECS) to RUN from the OFF RESET position.
- Transfer Cooldown Initiate Switch (CIS) to LOAD from the COOLDOWN position.

- Depress and release the Warning Reset push button (WRE) to reset the warning circuits.
- Test each engine status and alarm light by depressing and releasing.
- Set engine load using keypad module for the PLC controller
- Set engine ramp time using keypad module
- Start engine by depressing START push button.
- Check engine for leaks and any other noises, vibrations, or abnormal conditions.
- Verify oil pressure is 50-60 psi.
- Allow engine to warm up 10 to 15 minutes.
- Insert synchroscope handle and turn on generator synchroscope to the ON position.
- Adjust voltage of generator to match system voltage.
- Adjust speed of engine so that generator frequency output matches system frequency. Generator is in SYNC when synchroscope is rotating very slowly in the FAST direction and sync lights fluctuate from bright to dark at approximately one cycle every four seconds or longer.
- CLOSE breaker control switch to parallel generator when synchroscope approaches "one minute to 12:00 o'clock" in the FAST direction.
- Place the synchroscope switch to the OFF Position and remove the handle.
- Check power factor. If not .99 lagging, adjust using power factor controller located inside generator control panel.
- Verify engine battery charger is ON.
- Repeat starting procedure for each engine generator.

The following activities may have the potential to emit regulated air pollutants to the atmosphere during startup of the collection system portion of the GCCS: (1) purging of gases trapped within the piping system prior to normal operation; (2) repair of system leaks discovered during startup; and (3) all other activities after construction of the system, but prior to full-time operation, which could release hazardous air pollutants (HAPs) from the collection system. These activities would be subject to the Startup Plan portion of the SSM Plan.

During such activities, work shall progress such that air emissions are minimized to the greatest extent possible by:

- Temporarily capping pipes venting gas if such capping does not impact safety or the effective construction of the system;
- Minimizing surface area allowing gas to emit to the atmosphere to the extent that it does not impact safety or the effective construction of the system;
- Ensuring that other parts of the system not impacted by the activity are operating in accordance with the applicable requirements NSPS; and
- Limiting the purging of piping to as short a duration as possible to ensure safe combustion of the gas in the control device.

Portions of collection systems or individual extraction points may be isolated by valves installed in the system from time to time and subsequently opened. Opening these valves shall not be considered a startup, unless such an activity causes the venting of gas to the atmosphere. If the activity results in emissions to the atmosphere, the actions listed above shall be followed.

The operation of the collection system, once installed, shall be consistent with the provisions of NSPS as well as the GCCS Design Plan, which has been developed and approved for the facility.

3.2.2 Control Device(s)

To assure personal and equipment safety, a qualified LFG specialties factory representative should be present for the initial start-up and commissioning of the enclosed flare system. The operation and maintenance manual located in Appendix D must be reviewed prior to proceeding with the start-up or adjustment of the control system.

The factory representative will check the following prior to attempting any flare start-up:

- Proper Installation – the equipment has been properly installed and all external piping and wiring connections are complete and correct.
- System Checkouts – all the piping, wiring and equipment is correctly assembled and no items have been removed or damaged in transport and/or installation.
- Flame Trol II – the flare control system is in proper running order and the preprogrammed setting in the controllers and timers are per factory specification.
- Valving – all automated and manual valves are correctly installed and operative.
- Blower – the blower is bumped to check rotation and verify the wiring is correctly installed.
- Pilot – there is a sufficient supply of pilot gas at the correct pressure.
- Extraction System – verify with customer/contractor that the gas extraction system is complete, all the control valves are in correct position, and the system is ready to operate and supply landfill gas to the flare station.

After all the preceding is checked and verified, the flare system is ready for initial startup.

3.2.2.1 Initial Manual Start-Up

- Verify that the pre-start checklist has been satisfactorily completed, and that all valves are operative and in proper position.
- Turn on the main power to the system and the individual equipment circuit breakers.
- Turn on Flame-Trol II controller master power switch.
- Place controller mode operation switch to "manual".
- Turn on the purge blower and allow enough time for the system to be purged completely, 3 to 5 times.
- Turn on the manual pilot gas switch or open the manual bypass valve on the pilot fuel supply.
- Depress the manual igniter button and hold until the pilot gas is ignited and burning. This can be verified by a rising temperature on the LED temperature readout of the pilot temperature controller (Temperature controller No. 1).
- Select the desired blower by turning the appropriate blower selector switch to the on position.
- Turn on the manual blower switch and turn the main header valve switch to the open position.
- The landfill gas will be ignited. The flame can be confirmed either by visual confirmation or by a rising temperature on the LED temperature readout of the flare chamber temperature controller (Temperature controller No. 2)
- On the initial start-up, allow the pilot to run until all the air is vented through the header system. Once the methane content of the gas is high enough to maintain a stable flame (30%), turn of the pilot bypass valve.
- The enclosed flare system is now operating in manual mode.
- The flare temperature can be controlled by adjusting the manual louver and/or by putting the louvers controller in the manual mode and then opening or closing the automatic louvers by pressing the increase or decrease keys on the louvers temperature controller.
- The flare can be shut-down by turning the blower switch to the off position and closing the header valve position switch.

3.2.2.2 Initial Automatic Start-Up

- The enclosed flare system should be started in manual mode to verify gas flows and mechanical systems prior to the initial automatic start-up.
- Check the settings on the pilot temperature controller. The pilot temperature controller uses two signal outputs which are used to sequence events during start-up. These are:
  - Blower On Temperature. (SV) Set Valve – (lower setting of the temperature controller. factory set to 200°F). This temperature setting will induce the starting of the blower and the opening of the main header valve.
  - Pilot Off Temperature, High Alarm – This temperature (factory set to 250°F) when reached during start-up will close the solenoid valve in the pilot fuel line (shutting off the pilot).
- Check the settings on the flare chamber temperature controller (Temperature controller No. 2) This temperature controller monitors the temperature in the flare chamber and utilizes two event settings which are used as safety shutdowns in cases of above or below normal temperatures. These are:
  - Lower Temperature Shutdown. (AL) Low Alarm Valve on the temperature controller – (factory set to 1400°F). This temperature setting. if reached during automatic flare operation, will induce the low temperature shutdown and permit the flare to go into the down time and the restart sequence.
  - High Temperature Shutdown. (SV) Set Value – This temperature setting (factory set to 2000°F) will induce the high temperature shutdown and lock out the automatic restart.

  These temperatures are set in the controllers at the factory. If site conditions dictate changes in the settings. refer to the Fuji Micro Controller PYZ 4 instruction manual in the Flame-Trol II section of this manual.
- Check the setting on the down time timer.
  - The function of the down time timer is to allow the operator to regulate the length of time the system will remain shut down before attempting automatic restart.
  - The down time timer is present at the factory and is in the minute range as indicated by the "M" on the time range selector. This gives the timer a range of 1 to 999 minutes. To change the setting in the down time timer. simply increase or decrease the number desired by pressing the + button above the number to increase or by pressing the – button below the number to decrease.
  - The timer will be powered only after the temperature controller has fallen below the blow on temperature. The down time timer will begin counting down the instant the timer activates.
- Check the setting on the purge time.
  - The purpose of the purge timer is to specify a set period of time to accomplish a complete purge of the flare chamber prior to the ignition cycle commencing.
  - The purge timer is preset at the factory and is in the minute range as indicated by the "M" on the time range selector. This gives the timer a range of 1 to 999 minutes. To change the setting in the down time timer, simply increase or decrease the number desired by pressing the + button above the number to increase or by pressing the – button below the number to decrease.
- Check the setting on the pilot timer.
  - The purpose of the pilot timer is to specify a set period of time to allow the pilot system to attain the pilot off (High Alarm) temperature set in the pilot temperature controller. For instance, if the pilot timer has been set at five minutes and the pilot off temperature is set at 300 degrees. the pilot will have five minutes to head the thermocouple to 250 degrees. If the pilot system fails. due to an exhausted pilot gas supply or other reasons. to attain the pilot off temperature in the time period allotted. the entire system will shut-down and the pilot failure

light will come on. The system will not go into the down time mode and therefore will not try to reignite until the pilot problem has been rectified. The setting on this timer may be changed in the same manner as the purge timer since both timers are identical.

- Check the setting on the igniter timer.
  - The purpose of the igniter timer is to control the sparking period of the spark plug during start-up. This timer has been set at the factory at thirty seconds which allows a constant sparking action by the igniter for this period of time. This should be adequate time to purge the pilot gas line of air and ignite the pilot. This timer should never have to be altered. But in the event the operator does wish to change the setting, this may be accomplished in the same manner as the purge timer.
- Check the setting on the auxiliary fuel valve controller.
  - The auxiliary fuel valve controller is preset at the factory to provide the appropriate flow of enrichment fuel to maintain the proper flare chamber temperature for efficient and stable combustion. The Set Valve (SV) setting is the temperature that the controller would try to maintain by controlling the enrichment fuel flow. To change the Set Valve (SV) on the louver temperature controller, simply press the Mode key and then increase or decrease the displayed value by pressing the increase or decrease buttons.
- Check the setting on the louver controller.
  - The louver temperature controller is preset at the factor to provide for an optimum response time in maintaining the flare chamber operating temperature (Process Valve) as close as possible to the temperature control set point (Set Valve). To change the Set Valve (SV) on the louver temperature controller, simply press the Mode key and then increase or decrease the displayed value by pressing the increase or decease buttons.
  - NOTE: The alarm setting on the louver temperature controller will determine the temperature above which the enrichment fuel system will be activated. The alarm temperature in the controller should be set to a high enough temperature to make sure that the enrichment fuel used during start-up is very limited.
- Select the desired blower blowers to operate by turning the appropriate selector switch to the on position.
- Turn the selector switch to "Auto". The Flame-Trol II will now run through the automatic start-up sequence and ignite the flare.

Once the initial automatic start-up is completed, all permissive and shutdowns of the system are checked out, and all site condition operating adjustments have been made, the flare station is considered commissioned and fully operative.

3.3 What to Record for All Startup Events

The operator shall record the following information on the Startup Report Form (Appendix C):

- Date and time the startup occurred.
- Duration of the startup,
- Actions taken to effect the startup,
- Whether procedures in this SSM Plan were followed (if the procedures in the SSM Plan were not followed, a SSM Plan Departure Report Form (Appendix C) must also be completed), and
- If an applicable emission limitation was exceeded, a description of the exceeded emission standard.

3.4 Whom to Notify at the Facility in Case of a Startup Event

The Maintenance Manager or Operations Manager should be notified immediately of the startup.

The Maintenance Manager or Operations Manager should be notified within a reasonable timeframe of progress of the diagnosis and resolution of the startup.

The Maintenance Manager or Operations Manager should be notified when the alternative timeframe for startup has been established if it is outside of the timeframes currently allowed by the NSPS for particular compliance elements.

The Startup Report Form should be initially prepared upon startup, discovery of an automatic startup, and implementation of the SSM Plan. The form should be finalized by the operator on duty upon successful implementation of the SSM Plan and submitted to the Maintenance Manager or Operations Manager. The original form should be retained in the facility files for five years.

3.5 What to Report for a Startup Event

If the actions taken during the startup were consistent with this SSM Plan, the necessary information should be included in the semi-annual SSM report *(within 30 days following the end of each six-month period)*. Information includes:

- Name and title of the Maintenance Manager or Operations Manager;
- Certifying signature of the owner operator or other responsible official;
- Statement that the actions taken during the startup or shutdown were consistent with the SSM Plan; and
- A copy of the Startup Report Form.

If the actions taken during a startup were not consistent with this SSM Plan, and the startup resulted in an exceedance of an applicable emission standard, the Maintenance Manager or Operations Manager must report the actions taken to the enforcing authority by telephone or facsimile transmission within two working days after the startup or shutdown. A letter must then be sent to the enforcing authority within seven working days after the startup or shutdown. The letter should be sent by certified or registered mail or overnight delivery service, and must include the following information:

- Name and title of Maintenance Manager or Operations Manager;
- Certifying signature of the owner operator or other responsible official (note that "responsible official" has the same meaning as under the Title V permitting program; see previous corporate guidance on this topic);
- A copy of the Startup Report Form;
- Detailed explanation of the circumstances of the startup;
- The reasons the SSM Plan was not adequate and whether any excess emissions and/or parameter monitoring exceedances are believed to have occurred during the event; and
- A copy of the SSM Plan Departure Report Form.

Note: If the revisions to the SSM Plan alter the scope of the process activities at the East Landfill or otherwise modify the applicability of any emission limit, work practice requirement, or other requirement in the MACT rule and/or the NSPS, the revised SSM Plan is not effective until written notice has been provided to the permitting authority describing the SSM Plan revision(s).

4.0 SHUTDOWN PLAN

This section details procedures for the shutdown of the GCCS to ensure that, at all times, good safety and air pollution control practices are used for minimizing emissions to the levels required by the relevant standards.

Pursuant to the requirements of the NSPS for MSW landfills, a GCCS cannot be removed unless the landfill meets all the applicable criteria for removal of collection and control systems in 40 CFR Part 60 Subpart WWW.

4.1 How to Identify a GCCS Shutdown Event

The regulatory definition of shutdown is "the cessation of an affected source or portion of an affected source for any purpose" (40 CFR Part 63.2).

With GCCS, shutdown events would generally include shutdown of gas mover equipment, LFG control devices, and any ancillary equipment that could affect the operation of the GCCS (e.g., power supply, air compressors, etc.).

The following list includes potential events that may necessitate a shutdown of the GCCS at a MSW landfill. This list should not be considered exhaustive.

- Control device maintenance, repair, or cleaning;
- Addition of new GCCS components;
- Extraction well raising;
- Movement of LFG piping to accommodate new components or fill operations;
- Source testing;
- Gas mover equipment maintenance, repair, or cleaning;
- Gas processing equipment maintenance, repair, or cleaning;
- Ancillary equipment (e.g., compressors, etc.) maintenance, repair, or cleaning;
- New equipment testing and debugging;
- Shutdown and subsequent startup to address malfunctions or other occurrences;
- Planned electrical outages; and
- Other site-specific shutdown events.

1.

4.2 Actions to Take When the GCCS Is Shutdown

4.2.1 Collection System

Portions of collection systems or individual extraction points may be isolated by valves installed in the system from time to time. Closing these valves shall not be considered a shutdown, unless such an activity causes an exceedance of the provisions of NSPS and/or any subsequent approvals of alternatives in the facility's GCCS Design Plan or approved variances issued thereafter. If a shutdown occurs, the following actions shall occur.

4.2.1.1 Fuel Gas Compressor Shutdown Instructions

- Press compressor PUSH TO STOP push button.
- Turn the panel power switch to the OFF position.

4.2.1.2 Plant Shutdown Instructions

- After the fuel gas compressor has been shutdown, close fully clockwise the 10-inch suction valve.

4.2.2 Control Device(s)

Personnel shall follow the procedures as identified below when shutting down the respective control devices. Control devices operating at MSW landfills normally undergo planned shutdown for the various events listed in Section 4.1. Shutdowns for equipment malfunction or breakdown should be addressed in the Malfunction Plan (Section 5.0 of this SSM Plan). Control device shutdown procedures can be located in operations manuals, notes, reports, etc.

- Press the red emergency stop button.
- Close manual valve at inlet to the blower building.

4.3 What To Record for All Shutdown Events

The operator should record the following information on the Shutdown Report Form (Appendix C):

- Date and time the shutdown occurred;
- Duration of the shutdown;
- Actions taken to effect the shutdown;
- Whether procedures in this SSM Plan were followed (if the procedures in the Plan were not followed, a SSM Plan Departure Report Form must also be completed); and
- If an applicable emission limitation was exceeded, a description of the exceeded emission standard.

4.4 Whom to Notify at the Facility in Case of a Shutdown Event

The Maintenance Manager or Operations Manager should be notified immediately of the shutdown.

The Site Maintenance Manager or Operations Manager should be notified within a reasonable timeframe of progress of the diagnosis and resolution of the shutdown.
The Maintenance Manager or Operations Manager should be notified when the alternative timeframe for shutdown has been established if it is outside of the timeframes currently allowed by the NSPS for particular compliance elements.

The Shutdown Report Form should be initially prepared upon shutdown, discovery of an automatic shutdown, and implementation of the SSM Plan. The form should be finalized by the operator on duty upon successful implementation of the SSM Plan and submitted to the Maintenance Manager or Operations Manager. The original form should be retained in the facility files for five years.

4.5 What to Report for a Shutdown Event

If the actions taken during the shutdown were consistent with this SSM Plan, the necessary information should be filed using the semi-annual SSM report *(within 30 days following the end of each six-month period)*. The following information should be included:

- Name and title of Maintenance Manager or Operations Manager;
- Certifying signature of the owner/operator or other responsible official (note that "responsible

official" has the same meaning as under the Title V permitting program; see previous corporate guidance on this topic);

- Certifying signature of the owner/operator or other responsible official (note that "responsible official" has the same meaning as under the Title V permitting program; see previous corporate guidance on this topic);
- Statement that the actions taken during the shutdown were consistent with the SSM Plan; and
- A copy of the Shutdown Report Form.

If the actions taken during a shutdown were not consistent with this SSM Plan, and the shutdown resulted in an exceedance of an applicable emission standard, the Maintenance Manager or Operations Manager must report the actions taken to the enforcing authority by telephone or facsimile transmission within two working days after commencing the actions that were inconsistent with the Plan. A letter must then be sent to the enforcing authority within seven working days after the startup or shutdown. The letter should be sent by certified or registered mail or overnight delivery service, and must include the following information:

- Name and title of the Maintenance Manager or Operations Manager;
- Certifying signature of the owner operator or other responsible official (note that "responsible official" has the same meaning as under the Title V permitting program; see previous corporate guidance on this topic);
- A copy of the Shutdown Report Form;
- Detailed explanation of the circumstances of the shutdown;
- The reasons the SSM Plan was not adequate;
- Whether any excess emissions and or parameter monitoring exceedances are believed to have occurred during the event; and
- A copy of the SSM Plan Departure Report Form.

Note: If the revisions to the SSM Plan alter the scope of the process activities at the East Landfill or otherwise modify the applicability of any emission limit, work practice requirement, or other requirement in the MACT rule and/or the NSPS, the revised SSM Plan is not effective until written notice has been provided to the permitting authority describing the SSM Plan revision(s).

5.0 MALFUNCTION PLAN

5.1 How to Identify a GCCS Malfunction

The regulatory definition of malfunction is "any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions" (40 CFR Part 63.2, revised May 30, 2003).

The following list includes events that may constitute a potential malfunction of the GCCS at the East Landfill. The cause of these events should be investigated immediately in order to determine the best course of action to correct the malfunction. Each of these malfunctions could have multiple causes that need to be evaluated and possibly considered. It is the intent of this SSM Plan to include all possible causes for the specific malfunction events.

Table 5-1
Potential Malfunction Events

Potential Malfunction	Section Addressed in this SSM Plan
Loss of LFG flow gas mover malfunction	5.3
Loss of electrical power	5.4
Low temperature conditions at control device	5.5
Loss of flame at the control device	5.6
Malfunction of flow measuring recording device	5.7
Malfunction of temperature measuring recording device	5.8
Collection well and pipe failures	5.9
Malfunction procedures for loss of flame sensor	5.10
Malfunction procedures for loss of air compressor	5.11
Other control device malfunctions	5.12
Malfunctions of field monitoring equipment	5.13

For one of these occurrences to be considered a malfunction that is required to be addressed by this SSM Plan, it must result in, or have the potential to result in, an exceedance of one or more of the NSPS operational and compliance requirements or the provisions of the MACT rule (e.g., exceedance, reading outside of required operational range, etc). The following list constitutes the possible exceedances of the NSPS rule that could occur due to a malfunction of the GCCS, thereby necessitating implementation of this SSM Plan:

- GCCS downtime of greater than five days (if alternative timeframe has not been established);
- Free venting of collected LFG without control for greater than one hour;
- Any downtime for temperature monitoring and/or recording equipment (if alternative timeframe has not been established);
- Downtime for LFG flow monitoring and/or recording equipment of greater than 15 minutes (if alternative timeframe has not been established); and
- Reserved for modifications or reinterpretations of the NSPS rule by the EPA or state/local jurisdiction or state/local requirements that are in addition to or more stringent than NSPS.

If the occurrence does not result in an exceedance of an applicable emission limitation, or does not have the potential to result in such an exceedance, then it is not required to be corrected in accordance with this SSM Plan, although use of the Plan may still be advisable. Malfunctions should be considered actionable

under this SSM Plan whether they are discovered by the MSW landfill owner or operator during normal operations or by a regulatory agency during compliance inspections.

The operator should follow all the corrective action, notification, record keeping, and reporting procedures described herein in case of malfunction of the GCCS.

5.2 Actions to Take When the GCCS Malfunctions (All Malfunctions)

Determine whether the malfunction has caused an exceedance, or has the potential to cause an exceedance, of any applicable emission limitation contained in the NSPS or MACT.

Identify whether the malfunction is causing or has caused excess emissions to the atmosphere. If excess emissions are occurring, take necessary steps to reduce emissions to the maximum extent possible using good air pollution control practices and safety procedures.

Contact the Site Maintenance Manager or Operations Manager immediately and proceed with the malfunction diagnosis and correction procedures described in Appendix B (Common Causes and Response Actions for GCCS Malfunctions) for each specific malfunction.

If the procedures in this SSM Plan do not address or adequately address the malfunction that has occurred, the operator should attempt to correct the malfunction with the best resources available. The Maintenance Manager or Operations Manager for the site should be notified of this situation immediately. A SSM Plan Departure Report Form (Appendix C) should be completed as discussed in Section 5.14. The SSM Plan must be updated to better address this type of malfunction.

If the GCCS malfunction cannot be corrected within the timeframe specified in the NSPS, notify the Maintenance Manager or Operations Manager for the site and proceed to shutdown the control device and/or the process(es) venting to the control device, if this has not already occurred automatically.

If the GCCS malfunction cannot be corrected within the timeframe allowed by the NSPS rule for each specific malfunction, define the appropriate alternative timeframe for corrective action that is reasonable for the type of repair or maintenance that is required to correct the malfunction.

If the GCCS malfunction cannot be corrected within the alternative timeframe for corrective action specified above, notify the Maintenance Manager or Operations Manager for the site and conduct the appropriate record keeping and reporting required for deviations from the MACT rule and Title V permit. Once the malfunction is corrected, notify the Maintenance Manager or Operations Manager for the site as soon as the system is operational.

Complete the Malfunction Report Form (Appendix C) after the malfunction diagnosis and correction procedures are completed.

If the procedures in this SSM Plan do not address or adequately address the malfunction that has occurred, the operator should note the circumstances and the actual steps taken to correct the malfunction in the Malfunction Report Form (Appendix C). This SSM Plan will need to be revised based on this information, as described in Section 5.13.

Follow procedures in Sections 5.12 through 5.14, as appropriate, to adequately document, notify, and report the malfunction and corrective action.

5.3 Loss of LFG Flow/Gas Mover Malfunction

Follow the procedures in Section 5.2.

Check to see if the control device has shutdown. If the control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart control device to determine if system will remain operational.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction cannot be corrected within five days, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.4 Loss of Electrical Power

Follow the procedures in Section 5.2.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction cannot be corrected within the timeframe allowed by the NSPS rule, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.5 Low Temperature Conditions at the Control Device

Follow also the procedures in Section 5.2, above: What to Do When the GCCS Malfunctions-All Malfunctions.

Check to see if the control device has shutdown. If control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart control device to determine if system will remain operational.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction causes the GCCS to go off-line and cannot be corrected within the time frame allowed by the NSPS rule, follow the procedures under Section 5.2 above to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.6 Loss of Flame at the Control Device

Follow the procedures in Section 5.2.

Check to see if the control device has shutdown. If the control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart control device to determine if the system will remain operational.

If the system will not restart, follow the procedures in Section 5.3.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction cannot be corrected within the timeframe allowed by the NSPS rule, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete the necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.7 Malfunctions of Flow Monitoring/Recording Device

Follow the procedures in Section 5.2.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction cannot be corrected in the timeframe allowed by the NSPS rule, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.8 Malfunctions of Temperature Monitoring/Recording Device

Follow the procedures in Section 5.2.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction cannot be corrected within 15 minutes, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.9 Collection Well and Pipe Failures

Follow the procedures in Section 5.2.
Follow the procedures in Section 5.3.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction causes the entire GCCS to go off-line and cannot be corrected within five days, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.10 Malfunction Procedures for Loss of Flame Sensor

Follow the procedures in Section 5.2

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in the table below.

If the malfunction cannot be corrected in the time frame allowed by the NSPS rule, follow the procedures under Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.11 Malfunction Procedures for Loss of Air Compressor

Follow the procedures in Section 5.2

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in the table below.

If the malfunction cannot be corrected in the time frame allowed by the NSPS rule, follow the procedures under Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.12 Other Control Device Malfunctions

Follow the procedures in Section 5.2.

Check to see if the control device has shutdown. If the control device has shutdown, make sure that gas mover equipment has shutdown to prevent free venting of LFG. Attempt to restart the control device to determine if the system will remain operational.

Conduct diagnostic procedures to identify the cause of the malfunction. Potential causes and response actions for this type of malfunction are listed in Appendix B.

If the malfunction causes the entire GCCS to go off-line and cannot be corrected within five days, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction cannot be corrected within the established timeframe.

5.13 *Malfunctions of Field Monitoring Equipment*

Follow the procedures in Section 5.2.

Verify that malfunction of monitoring equipment will not cause a deviation of the NSPS requirements for wellhead and/or surface emissions monitoring.

Conduct diagnostic procedures to identify the cause of the malfunction.

Repair the device or obtain a replacement device to complete the monitoring as required by the NSPS. Conduct proper calibration procures before use of the device for NSPS compliance monitoring.

If the malfunction cannot be corrected so that the monitoring equipment can be used for the purposes required by the NSPS rule, follow the procedures in Section 5.2 to establish an appropriate alternative timeframe for corrective action and complete necessary record keeping and reporting if the malfunction

cannot be corrected within the established timeframe.

5.14 What to Record for a Malfunction

The operator must record the following information on the Malfunction Report Form:

- Date and time the malfunction occurred;
- Duration of the malfunction;
- Description of the affected equipment;
- Cause or reason for the malfunction (if known);
- Actions taken to correct the malfunction (checklist);
- Whether the procedures in this SSM Plan were followed (if the procedures in the Plan were not followed, a SSM Plan Departure Report Form must also be completed); and
- Description of the emission standard that was exceeded or had the potential to be exceeded.

5.15 Whom to Notify at the Facility in Case of a Malfunction

The Site/Facility Manager shall be notified immediately of the malfunction.

The Site/Facility Manager shall be notified within a reasonable timeframe of progress of the diagnosis and corrective action of the malfunction.

The Site Facility Manager and Compliance Manager for the site shall be notified when the alternative timeframe for corrective action has been established if it is outside of the timeframes currently allowed by the NSPS for particular compliance elements.

The Site/Facility Manager and Compliance Manager for the site shall be notified if the malfunction cannot be corrected within the timeframe allowed by the NSPS rule or the alternate timeframe established under this SSM Plan. Notification should also occur if the malfunction that occurred is not addressed by the current SSM Plan.

The Malfunction Report Form shall be initially prepared upon discovery of the malfunction and implementation of the SSM Plan. The form shall be finalized by the operator on duty upon successful implementation of the SSM Plan and submitted to the Site/Facility Manager. The original form must be retained in the facility files for five years.

5.16 What to Report for a Malfunction Event

If the actions taken during the malfunction were consistent with this SSM Plan, the necessary information should be filed in the semi-annual SSM report *(within 30 days following the end of each six-month period)*. The following information should be included:

- Name and title of Maintenance Manager or Operations Manager;
- Certifying signature of the owner/operator or other responsible official (note that "responsible official" has the same meaning as under the Title V permitting program; see previous corporate guidance on this topic);
- Statement that the actions taken during the malfunction were consistent with the SSM Plan; and
- A copy of the Malfunction Report Form.

If the actions taken during a malfunction were not consistent with this SSM Plan, and the malfunction

resulted in an exceedance of an applicable emission standard, the Maintenance Manager or Operations Manager must report the actions taken to the enforcing authority by telephone or facsimile transmission within two working days after commencing the actions that were inconsistent with the Plan. A letter must then be sent to the enforcing authority within seven working days after the malfunction. The letter should be sent by certified or registered mail or overnight delivery service, and must include the following information:

- Name and title of Maintenance Manager or Operations Manager;
- Certifying signature of the owner operator or other responsible official (note that "responsible official" has the same meaning as under the Title V permitting program; see previous corporate guidance on this topic);
- A copy of the Malfunction Report Form;
- Detailed explanation of the circumstances of the malfunction;
- The reasons the SSM Plan was not adequate;
- Whether any excess emissions and/or parameter monitoring exceedances are believed to have occurred during the event; and
- Prepare and include Deviation Report Form.

If the actions taken during the malfunction were not consistent with this SSM Plan, the Maintenance Manager or Operations Manager at the landfill must:

- Revise the SSM Plan within 45 days after the malfunction to include procedures for operating and maintaining the GCCS during similar malfunction events; and.
- Include the revised SSM Plan in the semi-annual report (within 30 days following the end of each six-month period).

Note: If the revisions to the SSM Plan alter the scope of the process activities at the East Landfill or otherwise modify the applicability of any emission limit, work practice requirement, or other requirement in the MACT rule and/or the NSPS, the revised SSM Plan is not effective until written notice has been provided to the permitting authority describing the SSM Plan revision(s).

APPENDIX A

Applicable Landfill Regulatory Requirements

- 40 CFR – PROTECTION OF ENVIRONMENT
  - Part 60 – STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES
    - Subpart A – General Provisions
    - Subpart B – Adoption and Submittal of State Plans for Designated Facilities
    - Subpart C – Emission Guidelines and Compliance Times
    - Subpart CC – Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills
    - Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills
  - Part 62 – APPROVAL AND PROMULGATION OF STATE PLANS FOR DESIGNATED FACILITIES AND POLLUTANTS
    - Subpart GGG – Federal Plan Requirements for Municipal Solid Waste Landfills that Commenced Construction Prior to May 30. 1991 and Have Not Been Modified or Reconstructed Since May 30. 1991
  - Part 63 – NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES
    - Subpart AAAA – National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills
  - Part 68 - CHEMICAL ACCIDENT PREVENTION PROVISIONS

- F.A.C. – FLORIDA ADMINISTRATIVE CODE
  - Chapter 62-4 – Permits
  - Chapter 62-204 – Air Pollution Control – General Provisions
  - Chapter 62-210 – Stationary Sources – General Requirements
  - Chapter 62-213 – Operation Permits for Major Sources of Air Pollution
  - Chapter 62-296 – Stationary Sources – Emissions Standards
  - Chapter 62-297 – Stationary Sources – Emissions Monitoring

- CITY OF JACKSONVILLE ORDINANCE CODE
  - Title X
    - Chapter 360 – Environmental Regulation
    - Chapter 362 – Air and Water Pollution
    - Chapter 376 – Odor Control

APPENDIX B

Common Causes and Response Actions for GCCS Malfunctions

Appendix B represents a summary of possible causes and response actions for GCCS malfunctions. The list is not considered to be exhaustive. The list of response actions is not intended to be a sequence of events that are to be implemented in order. Certain malfunction incidents may or may not be associated with the listed "common causes" nor will the "common response actions" be appropriate in all instances. Site-specific evaluation of the malfunctions and development of specific response actions is recommended in all cases.

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment	Applies vacuum to well field to extract LFG and transport to control device	Loss of LFG Flow/Blower Malfunction	-Flame arrestor fouling/deterioration -Automatic valve problems -Blower failure (e.g., belt, motor, impeller, coupling, seizing, etc.) -Loss of power -Extraction piping failure -Condensate knock-out problems -Extraction piping blockages	-Repair breakages in extraction piping -Clean flame arrestor -Repair blockages in extraction piping -Verify automatic valve operation, compressed air/nitrogen supply -Notify power utility, if appropriate -Provide/utilize auxiliary power source, if necessary -Repair Settlement in Collection Piping -Repair Blower -Activate back-up blower, if available -Clean knock-up pot/demister -Drain knock-out pot
Extraction Wells and Collection Piping	Conduits for extractions and movement of LFG flow	Collection well and pipe failures	-Break/crack in header or lateral piping -Leaks at wellheads, valves, flanges, test ports, seals, couplings, etc. -Collection piping blockages -Problems due to settlement (e.g., pipe separation, deformation, development of low points)	-Repair leaks or breaks in lines or wellheads -Follow procedures for loss of LFG flow/blower malfunction -Repair blockages in collection piping -Repair settlement in collection piping -Re-install, repair, or replace piping
Blower or Other Gas Mover Equipment And Control Device	Collection and control of LFG	Loss of electrical power	-Force majeure/Act of God (e.g., lightning, flood, earthquake, etc.) -Area-wide or local blackout or brown-out -Interruption in service (e.g., blown service fuse) -Electrical line failure -Breaker trip -Transformer failure -Motor starter failure/trip	-Check/reset breaker -Check/repair electrical panel components -Check/repair transformer -Check/repair motor starter -Check/repair electrical line -Test amperage to various equipment -Contact electricity supplier -Contact/contract electrician -Provide auxiliary power (if necessary)

			-Overdraw of power -Problems in electrical panel -Damage to electrical equipment from on-site operations	
LFG Control Device	Combusts LFG	Low temperature conditions at control device	-Problems with temperature-monitoring equipment -Problems/failure of thermocouple and/or thermocouple wiring -Change of LFG flow -Change of LFG quality -Problems with air louvers -Problems with air/fuel controls -Change in atmospheric conditions	-Check/repair temperature monitoring equipment -Check/repair thermocouple and/or wiring -Follow procedures for loss of flow/blower malfunction -Check/adjust louvers -Check/adjust air/fuel controls
LFG Control Device	Combusts LFG	Loss of Flame	-Problems;/failure of thermocouple -Loss/change of LFG flow -Loss/change of LFG quality -Problems with air/fuel controls -Problems/failure of flame sensor -Problems with temperature monitoring equipment	-Check/repair temperature monitoring equipment -Check/repair thermocouple -Follow procedures for loss of flow/blower malfunction -Check/adjust air/fuel controls -Check/adjust/repair flame sensor -Check/adjust LFG collectors
Flow Monitoring/ Recording Device	Measures and records gas flow from collection system to control	Malfunctions of Flow Monitoring/Recording Device	-Problems with orifice plate, pitot tube, or other in-line flow measuring device -Problems with device controls/and/or wiring -Problems with chart recorder	-Check/adjust/repair flow measuring device and/or wiring -Check/repair chart recorder -Replace paper in chart recorder
Flame Presence/Heat Sensing Device	Indicates continuous presence of a flame at the control device	Malfunctions of Flame Presence/Heat Sensing Device	-Problems with thermocouple or ultraviolet beam sensor -Problems with device controls and/or wiring	-Check/adjust/repair thermocouple or ultraviolet beam sensor -Check/adjust/repair controller and/or wiring -Check/adjust/repair electrical panel components
Control Device	Combusts LFG	Other Control Device	-Control device smoking (i.e.,	-Site-specific diagnosis procedures

		Malfunctions	visible emissions) -Problems with flare insulation -Problems with pilot light system -Problems with air louvers -Problems with air/fuel controllers -Problems with thermocouple -Problems with burners -Problems with flame arrester -Alarmed malfunction conditions not covered above -Unalarmed conditions discovered during inspection and covered above	-Site-specific responses actions based on diagnosis -Open manual louvers -Clean pitot orifice -Clean/drain flame arrestor -Refill propane supply -Check/repair pilot sparking system
Auto-Dialer	Monitors system and automatically makes notification calls if a malfunction occurs	Loss of power to control device or gas mover equipment	-Loss of phone service	-Check/repair electrical connections -Check/repair power source -Check/repair battery back-up -Check/repair system programming and settings
Add additional site-specific information as needed				

APPENDIX C

SSM Plan Reporting Forms

City of Jacksonville East Municipal Landfill
STARTUP REPORT FORM
Landfill Gas Collection and Control System

This form is intended to satisfy the record keeping requirements of 40 CFR Part 63.6(e)(3)(iii) and (iv) and Part 63.10(b)(2).

This form is used to document actions taken during any startup of any portion of the gas collection and system. If any of the steps taken are not consistent with this procedure. document the variations on a "SSM Departure Form" and follow the reporting requirements in the SSM			
1. Beginning of Startup Event	Date:	Time:	
2. End of Startup Event	Date:	Time:	
3. Duration of Startup Event (hours):			
4. Description of Affected Equipment:			
5. Cause/Reason for Startup:			
6. Name of Person Completing This Form (please print):			
7. Date Completed:			
8. Type of Shutdown (circle one):	Manual	Automatic	
• If this is an automatic startup. skip Sections 9 and 10 below and go to Section 11. • If this is a manual startup. the procedure listed in Section 9 should be followed. Check off the steps completed and continue on to Section 10.			
9. STARTUP PROCEDURE CHECKLIST			Check if procedures followed
10. Did the actual steps taken vary from the procedure specified above? (circle one) **If response is "Yes" proceed to section 11 below. If "No" stop.**		YES	NO
11. Did this startup result in an exceedance of any applicable emission limitation? (circle one) **If response is "Yes" proceed to Section 12 below. If "No" stop.**		YES	NO
12. Describe the emission standard that was exceeded below. Complete a "SSM Plan Departure Report Form." Notify the appropriate regulatory agency verbally or by facsimile within two working days after commencing the actions that an event inconsistent with the SSM Plan and which resulted in an exceedance of an applicable emission limitation has occurred. Follow-up in writing to the agency within seven working days after the end of the event.			

CITY OF JACKSONVILLE EAST MUNICIPAL LANDFILL
SHUTDOWN REPORT FORM
Landfill Gas Collection and Control System

This form is intended to satisfy the record keeping requirements of 40 CFR Part 63.6(e)(3)(iii) and (iv) and Part 63.10(b)(2).

This form is used to document actions taken during any shutdown of any portion of the gas collection and system. If any of the steps taken are not consistent with this procedure, document the variations on a "SSM Departure Form" and follow the reporting requirements in the SSM			
1. Beginning of Shutdown Event	Date:	Time:	
2. End of Shutdown Event	Date:	Time:	
3. Duration of Shutdown Event (hours):			
4. Description of Affected Equipment:			
5. Cause Reason for Shutdown:			
6. Name of Person Completing This Form (print):			
7. Date Completed:			
8. Type of Shutdown (circle one):	Manual	Automatic	
• If this is an automatic shutdown, skip Sections 9 and 10 below and go to Section 11. • If this is a manual shutdown, the procedure listed in Section 9 below should be followed. Check off the steps completed and continue on to Section 10.			
9. SHUTDOWN PROCEDURE CHECKLIST		Check if procedure was followed	
10. Did the actual steps taken vary from the procedure specified above? **If response is "Yes" proceed to Section 11 below. If "No" stop.**		YES	NO
11. Did this shutdown result in an exceedance of any applicable emission limitation? **If response is "Yes" proceed to Section 12 below. If "No" stop.**		YES	NO
12. Describe the emission standard that was exceeded below. Complete a "SSM Plan Departure Report Form." Notify the appropriate regulatory agency verbally or by facsimile within two working days after commencing the actions that an event inconsistent with the SSM Plan and which resulted in an exceedance of an applicable emission limitation has occurred. Follow up in writing to the agency within seven working days after the end of the event.			

CITY OF JACKSONVILLE EAST MUNICIPAL LANDFILL
MALFUNCTION REPORT FORM
Landfill Gas Collection and Control System

This form is intended to satisfy the record keeping requirements of 40 CFR Part 63.6(e)(3)(iii) and (iv) and Part 63.10(b)(2).

This form is used to document actions taken during a malfunction of any portion of the gas collection and contr system. If any of the steps taken are not consistent with this procedure, document the variations on a "SSM Plan Departure Form" and follow the reporting requirements in the SSM Plan.			
1. Beginning of Malfunction Event	Date:	Time:	
2. End of Malfunction Event	Date:	Time:	
3. Duration of Malfunction Event (hours):			
4. Description of Affected Equipment:			
5. Cause Reason for Malfunction:			
6. Name of Person Completing This Form (please print):			
7. Date Completed:			
Follow the procedure listed below for each malfunction. This form is to be used to document the actions taken during each malfunction. Check off the steps completed.			
8. MALFUNCTION PROCEDURE CHECKLIST			Check if procedure was followed
9. Did the actual steps taken vary from the procedure specified above? **If response is "Yes" proceed to box 10 below. If "No" stop.**		YES	NO
10. Did this malfunction result in an exceedance of any applicable emission limitation? **If response is "Yes" proceed to box 11 below. If "No" stop.**		YES	NO
11. Describe the emission standard that was exceeded below. Complete a "SSM Plan Departure Report Form." Notify the appropriate regulatory agency verbally or by facsimile within two working days after commencing the actions that an event inconsistent with the SSM Plan and which resulted in an exceedance of an applicable emission limitation has occurred. Follow up in writing to the agency within seven working days after the end of the event.			

CITY OF JACKSONVILLE EAST MUNICIPAL LANDFILL
SSM PLAN DEPARTURE REPORT FORM

1. Type of Event (circle one):	☐	Startup	☐	Shutdown	☐ Malfunction
2. Date:	Time:		Duration:		
3. Provide detailed explanation of the circumstances of the startup, shutdown, or malfunction: *					
4. Provide description of corrective actions taken:*					
5. Describe the reasons the SSM Plan was not followed: *					
6. Describe any proposed revisions to the SSM Plan:*					
7. Name (print):					
8. Title:					

*Use additional sheets if necessary.

Note: If the event documented in this form was a malfunction and if the SSM Plan needs to be revised to address the particular type of malfunction that occurred, the revision of the SSM Plan must be made within 45 days of the event.

This form is intended to assist in meeting the recordkeeping and reporting requirements of 40 CFR 63.6(e)(3)(iv).

OPERATIONS (FLARE)

The LFG Specialties enclosed flare system is designed for fully automatic, unattended operation. To familiarize you with the features and flexibility of the complete system, please review this operation and maintenance manual prior to proceeding with the start-up or adjustment of the control system.

To assure personal and equipment safety, a qualified LFG Specialties factory representative should have completed the initial start-up and commissioning of the enclosed flare station before standard operation is commenced. The qualified representative will also conduct and on-site training session with the customer's operating personnel to assure safe and efficient operation of the enclosed flare station.

Under standard operating conditions, all that is required to start the enclosed flare is to turn the operation mode switch in the Flame-Trol II controller to "Auto". The controller will then automatically start the system proceeding through the following logic sequence.

- Placing the operation mode switch to "Auto", will activate the purge timer and start the purge blower.
  Permissive: Pilot temperature reading must be below the set point in the pilot temperature monitor. Landfill gas header valve must be in closed position.

- When purging is complete the pilot and igniter timers are activated, powering the pilot gas solenoid valve and the ignition system.
  Permissive: Purge pressure switch must sense the purge air flow to confirm that the flare stack is being purged.

- The pilot will ignite and raise the pilot thermocouple temperature to the blower-on set point.

- At the blower-on set point the controller will start the blower and open the landfill gas main header valve.
  Permissive: Pilot must achieve the pilot off temperature within the time set in the pilot timer or the system will shutdown indicating "pilot failure".
  Ultraviolet scanner must confirm the pilot flame.
  Flow sensors on ever blower selected must sense the gas flow within 30 seconds, otherwise the blower will shutdown and a blower failure light will start flashing.
  Header valve must reach the fully open position within 30 seconds.

- The pilot will ignite the landfill gas and raise the thermocouple temperature to the pilot-off setting, which is the High Alarm setting on the pilot temperature controller
  Permissive: Header valve must be in the open position, otherwise the system will shutdown.

- At the pilot-off temperature (High Alarm setting on the pilot temperature controller), the controller will close the pilot gas solenoid valve.

- The flare will continue to operate if and only if all of the following conditions are met:

- Header valve is maintained in the open position.
- Flame is confirmed by ultraviolet scanner.
- Flare chamber temperature is maintained above the low temperature shutdown setting (Low Alarm) on the flare chamber temperature controller.
- Flare chamber temperature is maintained below the high temperature shutdown setting (Set Value) on the flare chamber temperature controller.
- None of the other alarm signals is activated such as high oxygen alarm, landfill gas leak alarm or remote shutdown.

- The flare will shutdown, activate the down timer and go into the automatic restate sequence if:

  - Flame is not confirmed by the ultraviolet scanner for more than 4 seconds.
  - Flare chamber temperature fails below the low temperature shutdown (Low Alarm) on the flare chamber temperature controller. The low temperature shutdown is locked out for 15 minutes on start-up.

- The flare will shutdown and will not go to down time or try to reignite automatically if:

  - Purge pressure switch does not confirm the purge air flow prior to ignition cycle on start-up.
  - Pilot does not achieve the pilot off temperature (High Alarm) on the pilot temperature controller within the time set in the pilot timer.
  - Header valve does not make the open position contact (Override: 30 seconds on start-up).
  - Low temperature shutdown is not reached within 15 minutes from start-up.
  - Flare chamber temperature rises above the high temperature shutdown (Set Valve) on the flare chamber temperature controller.
  - Blowers selected failed to maintain the proper flow and the gas low flow sensors activated the blower's failure.
  - Any of the other alarm signals is activated as the high oxygen level, LFG leak or remote shutdown signal.

    NOTE: When the flare is shutdown, the beacon alarm light on the control rack will go on, and alarm lights on the front of the control panel will start flashing annunciating the cause of the shutdown. Once the alarms acknowledge button is pressed, the alarm lights will stop flashing, but would stay on until the system is reset by pressing the alarm reset button. To reinstate the automatic controls, the system must be manually reset by pushing the reset button on the face panel of the Flame-Trol II controller.

ATTACHMENT J

OPERATIONS AND MAINTENANCE PLAN

OPERATIONS AND MAINTENANCE PLAN

The Operations and Maintenance information for the enclosed flare was provided as Attachment 3 to the *East Duval Sanitary Landfill FDER Permit No. AC16-186047 Flare Construction Certification and Operations Permit Application* prepared by PBSJ and dated 1993. The Attachment is provided here for your reference.

ATTACHMENT 3

MANUFACTURER'S DESIGN SPECIFICATIONS

SECTION ONE - PROCESS SUMMARY

DESIGN BASIS

Gas Composition (Vol. %)

CH4	52% max.
CO2, Air, Inerts	48%
	100%
LHV	473 Btu/SCF
Temperature	100°F (45 - 120°F)
Mole Weight	29.46

Flare Gas

Type:	Landfill Gas
Max. Flow Rate:	2100 scfm
Waste Heat Release:	59.6 MMBtu/hr (Design Basis)
Min. Flow Rate:	10% of max. flow
Smokeless Flow:	100%
Pressure Drop:	12" WG

Unit Design

Operating Temp:	1600 - 2000°F (2100°F shutdown)	
Retention Time:	1600°F	.66 Seconds
	1800°F	.69 Seconds
	2000°F	.72 Seconds
Overall Unit Turndown:	6:1 (to hold 2000°F)	
Flame Stability Turndown:	20:1 minimum	
Fired Fuel Req'd:	None (pilot only)	

UTILITIES

Pilot Gas	22 SCFH propane (intermittent)
Compressed Air	Not required
Electricity	460V/3Ph/60 Hz (McGill will step down to 110V for control usage.)

MECHANICAL DESIGN

Design Wind Speed	90 mph
Ambient Temp	-20 to 120°F
Electrical Area	Non-hazardous

FLAME STABILITY

Low methane concentrations may require auxiliary fuel to initiate combustion and maintain temperature.

Flashback will not occur if the landfill gas 02 level is 6% or less.

SECTION TWO - EQUIPMENT DESCRIPTION

ITEM I - ENCLOSED FLARE SYSTEM

A. Enclosed Flare Stack

One McGill Landfill Gas Flare System, with:

.. 2" layer A.P. Green (or equal) ceramic fiber refractory on Inconel pins and keepers. (2600°F hot face refractory).

.. A-36 carbon steel shell (1/4" nom.).

.. Stainless steel gas burner(s) with flame stabilizers for high temperature corrosion resistance.

.. 12" flanged flare gas inlet.

.. One (1) pilot assembly designed for 60,000 Btu/hr propane with electric spark ignitor. The pilot only operates during start-up.

.. Heavy duty, galvanized, opposed blade combustion air dampers. Opposed blade design provides a 6:1 air turndown control. Galvanized finish and stainless steel press-fit bearings ensure smooth, long term operation.

.. Four 3" NPT sample ports at 90° located 1/2 diameter from the top for accurate emission testing.

.. Inorganic zinc primer coat for superior corrosion protection and 600°F temperature resistance.

.. Continuous base plate for high wind stability.

.. Lift lugs to assist in erection.

B. Control System Operation

The following is a brief outline of the control system start-up and operating sequence:

System start-up would begin with a timed air purge cycle to evacuate any fugitive hydrocarbons from the flare enclosure. After purge is completed, the pilot will be lit. Upon proving the pilot flame by the flame scanner, the landfill gas valve will be opened and the landfill gas blower (by others) will be started allowing landfill gas to flow to the flare enclosure. This allows use of the landfill gas for system warm-up.

Upon proving a flame on the pilot, the system will continue its warm-up sequence. The landfill gas valve will be opened allowing normal operation of the unit.

After the landfill gas valve has been opened, the pilot gas will then shut off to limit propane gas usage. If a flame is still sensed on the main burner the system will continue operation, if not it will shutdown on flame failure.

The unit temperature is set by adjusting the air dampers (manually or optional automatic). Opening the dampers will reduce the flue gas temperature by adding quench air. In the manual system, the operating temperature is set at 1800-2000°F at the maximum design flow and will fluctuate between 600-2100°F at variable gas flows.

Due to the presence of an open flame, the ground flare should be located in a "non-hazardous" electrical area.

C. Base Case Control Features - Manual Operation

.. Manually operated combustion air dampers to control the operating temperature.

.. High temperature shutdown switch with panel mounted temperature indicator.

.. Pilot gas control system including pressure regulator, fail-closed shutdown valves, manual block valve and pressure indicator.

.. Ignition system including ignition transformer, pilot spark electrode and ignition timer.

.. Flame safeguard controls including self-checking flame scanner and panel mounted flame relay.

.. Purge air blower with pressure proved switch and motor starter.

.. All high voltage (440/220V) items are enclosed in a separate panel for electrical safety including:

Main power supply disconnect.

Power transformer. Client will supply 220-460V/3Ph/60 Hz electricity. McGill will stepdown to 110V/1 Ph for use as required.

Motor starter for client's landfill gas blower motor. (Client to specify horsepower).

Amp meter for waste gas blower motor (200% scale).

.. "Manual-Off-Auto" blower selector switch.

.. The following indicating lights:

a. Panel Power ON
b. Purging
c. Purge Complete
d. Pilot Gas ON
e. Flame Proved
f. High Stack Temperature (SD)
g Flame Failure (SD)

- Contacts for control room monitoring of the system.
- 15A convenience outlet (duplex) with weatherproof cover.
- 100W high pressure sodium security light with manual switch and photocell (shipped loose).
- Additional relays, timers, controllers, etc. required for system operation.
- The appropriate items will be enclosed in a weatherproof (NEMA 4) panel.
- Controls and valving are prepiped and wired onto a support rack.

The control system will be given a functional test simulating actual operation in our shop to ensure that it is properly wired and will perform as designed.

Units can be operated in the manual mode which requires an operator at the flare to start and restart the system using a pushbutton sequence. If the units shutdown for any reason, operator assisted restart is required.

The flare operating temperature is set by manually adjusting the air dampers.

The base case is recommended for sites with stable gas flow and constant electrical supply.

OPTION I: AUTOMATIC START/RESTART

In the automatic mode, the unit will automatically start when power is applied. If the unit shuts down for any reason except high stack temperature, the auto mode will allow the unit to attempt to purge and restart for a specified time period. A remote signal is sent if the unit fails to restart.

OPTION II: INLET FLAME ARRESTOR

Varec 12" flame arrestor (or equal). Aluminum housing and aluminum internals. Internal elements can be cleaned without removing the flame arrestor body from the pipe.

OPTION III: INLET BLOCK VALVE WITH PNEUMATIC ACTUATOR

12" Pliaxseal high performance butterfly valve, ANSI 150# with carbon steel body, 316 stainless steel disk, PTFE seal with Bettis pneumatic, fail-closed actuator, 3-way solenoid valve, speed control valves and Bettis Auxiliary switches. (Nitrogen bottles supplied by others).

Although nitrogen cylinders are required to be installed, the advantage of this option is that the actuator is a highly reliable standard industrial actuator that will have less maintenance than an electric fail-closed actuator.

OPTION V: AUTOMATIC TEMPERATURE CONTROL (AIR)

Flue gas temperature would be automatically controlled by adjusting the air flow into the unit. Lower waste gas flows or lower methane concentrations would automatically close the inlet air louvers. The control loop consists of a thermocouple and temperature indicator/controller and two electric operated actuators on the air louvers.

OTHER ENCLOSED FLARE OPTIONS

McGill will design the Enclosed Flare system to meet most requirements or restrictions that our client's may have. Following are a number of optional features provided on previous projects:

.. Temperature recorder for the flue gas. May be required for some local authorities.

.. Landfill gas blower with explosion-proof motor (Arrg. 8).

.. Caged access ladder to 30' elevation for access to thermocouples and flame scanner.

.. 360° platform for access to sample connections. McGill does not recommend this option due to the proximity to the hot exit flue gas.

.. Hinged manway (18") for access into the flare base. Normal access is through the air dampers, however, this option should be considered if automatic louvers are used.

.. Inconel mesh cover for the ceramic fiber refractory. The mesh provides additional mechanical strength. If the unit is not used for extended periods, the mesh will extend the refractory life.

.. Visual alarm beacon or audible alarm horn.

.. Automatic telephone dialing system (requires phone line at flare).

.. Finish coat of high temperature paint (aluminum color).

.. Service agreement for a McGill technician to periodically check the operating characteristics and safety shutdown points.

Safety Controls and Other Features

We are providing "self-checking" type flame scanners and relay system, which affords a fail-safe shutdown. Without this feature an unsafe failure mode may occur. A normal scanner may be substituted at a substantial cost deduct, but all liability resulting from such a change must be borne by the purchaser.

Heat Tracing

It is not necessary to heat trace the piping between the blower and the flare.

McGILL FLARE MANUFACTURING STANDARDS

Following is a summary of our fabrication standards as they apply to the supply of this equipment.

The McGill shop is qualified to meet ASME boiler and pressure vessel codes and maintains quality control documentation and welder's qualifications which are available for our client's review. Inspectors have access to our company and subcontractors upon short notice.

McGill regularly uses local subcontract shops to assist in fabrication and assembly of our products. These shops work under McGill direction and project management and will meet our fabrication quality control standards.

1. General Industry Standards

Welding - Gas Piping:	ASME IX	Electrical Wiring:	NEC
- Burners:	AWS	Pipe Flanges:	150 lb. ANSI
- Structural:	AWS	Pipe Threads:	NPT
Weld Inspection:	ASME V	Structural Design:	AISC A58.1
Drawing Dimensions:	English		

2. Nondestructive Testing

X	Dimensional Check:	All exterior and mounting dimensions
X	All Welds:	100% Visual Inspection
X	Ignition Transformers:	Functional Check
X	Control System:	Function Check

3. Quality Control Documentation

- X Welder Qualifications (on request)
- X Welding Procedures (on request)
- X Instrument Data Sheet/Catalog Sheet
- X Other Standard McGill Inspection Reports
- X Review Drawings (1R/3P)
- X As Built Drawings (1R/3P)
- X Operating & Maintenance Manual (3)

ATTACHMENT K

IDENTIFICATION OF APPLICABLE REQUIREMENTS

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Federal Rule:

40 CFR 60, Subpart A: Standards of Performance for New Stationary Sources (NSPS)
40 CFR 60, Subpart WWW: Standards of Performance for Municipal Solid Waste Landfills
40 CFR 61, Subpart A: General Provisions
40 CFR 61, Subpart M: NESHAP for Asbestos.
40 CFR 82: Protection of Stratospheric Ozone.

State Rule:

CHAPTER 62-4, F.A.C.: PERMITS, effective 12-01-11

62-4.030, F.A.C.: General Prohibition.
62-4.040, F.A.C.: Exemptions.
62-4.050, F.A.C.: Procedure to Obtain Permits; Application. 10-31-07
62-4.055, F.A.C.: Permit Processing. 8-16-98
62-4.060, F.A.C.: Consultation.
62-4.070, F.A.C.: Standards for Issuing or Denying Permits; Issuance; Denial.
62-4.080, F.A.C.: Modification of Permit Conditions.
62-4.090, F.A.C.: Renewals. 3-16-08
62-4.100, F.A.C.: Suspension and Revocation.
62-4.110, F.A.C.: Financial Responsibility.
62-4.120, F.A.C.: Transfer of Permits.
62-4.130, F.A.C.: Plant Operation - Problems.
62-4.150, F.A.C.: Review.
62-4.160, F.A.C.: Permit Conditions.
62-4.210, F.A.C.: Construction Permits.
62-4.220, F.A.C.: Operation Permit for New Sources.

CHAPTER 62-210, F.A.C.: STATIONARY SOURCES - GENERAL REQUIREMENTS, effective 6-29-11.

62-210.300, F.A.C.: Permits Required.
62-210.300(1), F.A.C.: Air Construction Permits.
62-210.300(2), F.A.C.: Air Operation Permits.
62-210.300(3), F.A.C.: Exemptions from Permitting.
62-210.300(5), F.A.C.: Notification of Startup.
62-210.300(6), F.A.C.: Emissions Unit Reclassification.
62-210.300(7), F.A.C.: Transfer of Air Permits.
62-210.350, F.A.C.: Public Notice and Comment. 10-12-08.
62-210.350(1), F.A.C.: Public Notice of Proposed Agency Action.
62-210.350(2), F.A.C.: Additional Public Notice Requirements for Emissions Units Subject to Prevention of Significant Deterioration or Nonattainment-Area Preconstruction Review.
62-210.350(3), F.A.C.: Additional Public Notice Requirements for Sources Subject to Operation Permits for Title V Sources.
62-210.360, F.A.C.: Administrative Permit Corrections and Amendments. 3-16-08

62-210.370(3), F.A.C.: Annual Operating Report for Air Pollutant Emitting Facility. 7-3-08
62-210.650, F.A.C.: Circumvention.
62-210.700, F.A.C.: Excess Emissions.
62-210.900, F.A.C.: Forms and Instructions.
62-210.900(1), F.A.C.: Application for Air Permit – Long Form, Form and Instructions. 3-11-10
62-210.900(5), F.A.C.: Annual Operating Report for Air Pollutant Emitting Facility, Form and Instructions. 7-3-08
62-210.900(7), F.A.C.: Application for Transfer of Air Permit – Title V and Non-Title V Source. 7-3-08

CHAPTER 62-213, F.A.C.: OPERATION PERMITS FOR MAJOR SOURCES OF AIR POLLUTION, effective 6/29/11

62-213.205, F.A.C.: Annual Emissions Fee.
62-213.400, F.A.C.: Permits and Permit Revisions Required.
62-213.410, F.A.C.: Changes Without Permit Revision.
62-213.412, F.A.C.: Immediate Implementation Pending Revision Process.
62-213.415, F.A.C.: Trading of Emissions Within a Source.
62-213.420, F.A.C.: Permit Applications.
62-213.430, F.A.C.: Permit Issuance, Renewal, and Revision.
62-213.440, F.A.C.: Permit Content.
62-213.450, F.A.C.: Permit Review by EPA and Affected States
62-213.460, F.A.C.: Permit Shield.
62-213.900, F.A.C.: Forms and Instructions.
62-213.900(1), F.A.C.: Major Air Pollution Source Annual Emissions Fee Form.
62-213.900(2), F.A.C.: Statement of Compliance Form.
62-213.900(3), F.A.C.: Responsible Official Notification Form.

CHAPTER 62-296, F.A.C.: STATIONARY SOURCES - EMISSION STANDARDS, effective 03-11-10

62-296.320(4)(c), F.A.C.: Unconfined Emissions of Particulate Matter.
62-296.320(2), F.A.C.: Objectionable Odor Prohibited.

CHAPTER 62-297, F.A.C.: STATIONARY SOURCES - EMISSIONS MONITORING, effective 02-12-04

62-297.310, F.A.C.: General Compliance Test Requirements.
62-297.620, F.A.C.: Exceptions and Approval of Alternate Procedures and Requirements.

Miscellaneous:

CHAPTER 28-106, F.A.C.: Decisions Determining Substantial Interests
CHAPTER 62-110, F.A.C.: Exception to the Uniform Rules of Procedure, effective 07-01-98
Chapter 62-256, F.A.C.: OPEN BURNING AND FROST PROTECTION FIRES, EFFECTIVE 10-6-08
Chapter 62-257, F.A.C.: ASBESTOS PROGRAM, EFFECTIVE 10-12-08
CHAPTER 62-281, F.A.C.: Motor Vehicle Air Conditioning Refrigerant Recovery and Recycling, effective 09-10-96