SCEC

2008 COMPLIANCE SOURCE TEST CENTRAL MAUI MUNICIPAL LANDFILL GAS COLLECTION AND CONTROL SYSTEM (FLARE)

PREPARED FOR:
SCS Field Services
3900 Kilroy Airport Way, Suite 100
Long Beach, CA 90806-6816

EQUIPMENT LOCATION:
Central Maui Municipal Solid Waste Landfill
Pulehu Road
Puunene, Maui 96784

Covered Source Permit (CSP) No. 0652-01-C

TEST DATE:
November 19, 2008

SUBMITTAL DATE:
January 7, 2009

PARAMETERS MEASURED:
NO_x, CO, and TGNMO Emissions, and Volume Flow

TESTED BY:
Leslie A. Johnson
SCEC
1582-1 N. Batavia
Orange, CA 92867

Report No: 2170.3001.rpt

Written By: _____
Aaron E. Lord

Reviewed By: _____
Leslie A. Johnson

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1.0 INTRODUCTION

SCEC was contracted to perform the 2008 source testing on one (1) landfill gas fired flare located at the Central Maui Landfill. The testing was performed to satisfy requirements delineated by the State of Hawaii Department of Health (HDOH) CSP No. 0652-01-C.

Measurements of the flare emissions and operating parameters were conducted at the flare exhaust and at the inlet (landfill gas) of the flare. Table 1-1 provides a test matrix of the parameters tested at each sample location.

The tests were conducted on November 19, 2008 and were performed by Leslie A. Johnson – Project Manager and Aaron E. Lord - Project Specialist, of SCEC. Michael P. Murphy of SCS Field Services coordinated the source test program. On-site flare operations were coordinated by Dave Fisher of SCS Field Services.

The results of the emission tests are summarized in Table 1-2. Table 1-2 presents all data as recorded during the test program. The source tests demonstrate that the flare operates with criteria pollutant emissions below the permit limits. Detailed test results are presented in Section 4.0. All raw data, laboratory results, calculations and QA/QC data can be found in the Appendices.

TABLE 1-1
TEST MATRIX
CENTRAL MAUI LANDFILL
November 19, 2008

Parameter	Inlet	Exhaust
Oxygen (O_2)	X	X
Carbon Dioxide (CO_2)	X	X
Carbon Monoxide (CO)		X
Nitrogen Oxides (NO_x)		X
Moisture (H_2O)	X	X
Flow Rate (dscfm)	X	X
Temperature (°F)	X	X
Total Gaseous Non-Methane Organics (TGNMO)	X	X

TABLE 1-2
SUMMARY OF TEST RESULTS
SCS Field Services
Central Maui Landfill
November 19, 2008

PARAMETER	INLET	EXHAUST	PERMIT LIMIT
O_2, %	0.54	14.73	
CO_2, %	38.70	5.85	
N_2, %	11.53	79.42	
Flow Rate, wscfm	525	-	
Flow Rate, dscfm	-	8,488	
Temperature, °F	106	1,481	>1,400
Btu/scf	476.7		
MMBtu/Hr	15.01		
NOx:			
ppm		9.9	
ppm @ 3% O_2		28.7	
lb/hr (as NO_2)		0.60	
lb/MMBtu (as NO_2)		0.040	0.06
CO:			
ppm		40.0	
ppm @ 3% O_2		116.0	
lb/hr		1.48	
lb/MMBtu		0.099	0.15
Hydrocarbons:			
CH_4, ppm	466,000	< 1	
TGNMO, ppm (as CH_4)	7,460	1.83	
TGNMO, lb/hr (as CH_4)	9.8	0.04	
TGNMO, ppm (as hexane)		0.30	
TGNMO, ppm @ 3% O_2 (as hexane)		0.88	<20 NSPS
TGNMO, lb/hr (as hexane)		0.03	
Destruction Eff. %		99.59	>98%

Notes:
The results in this table are the averages of all measurements.

2.0 TEST UNIT DESCRIPTION

The landfill gas control system and flare station at the Central Maui Landfill includes a gas collection system, gas wells, and an enclosed flare to incinerate the landfill gas.

The flare tested was manufactured by Perennial Energy, Inc. Model FL-132-36-E and is 123.25 inches inside diameter by 36.75 feet high; propane fueled pilot, two Houston Service Industries 700 scfm multi-stage direct drive centrifugal blowers, two 20 HP air compressors, condensate tank and transfer system for condensate injection into flare, and a UV flame sensor. The flare has four thermocouple reading locations and one full-time thermocouple sensor. The flare was set to operate at 1475 °F while being monitored from the middle thermocouple.

3.0 TEST DESCRIPTION

3.1 Test Conditions

The landfill gas flow rate averaged 525 scfm during the source testing. Given the present state of the landfill the flare was operated at maximum throughput. Temperature and fuel flow rate were monitored and recorded by the automatic operation control system throughout the test period. In addition, SCEC recorded the flare temperature, gas flow rate and landfill gas temperature during the test runs. These data can be found in Appendix A field data sheets.

3.2 Sample Locations

Samples were collected at the flare exhaust and at the inlet (landfill gas fuel) to the flare. The sample point calculations and a schematic drawing of the sample locations are included in Appendix G.

The flare has an inside diameter of 123.25 inches. The ports are 31 feet above the ground; the stack exit is 37 feet above ground. Sixteen traverse points were used on all flow rate and Continuous Emission Monitoring System (CEMS) tests.

At the outlet to the flare, two ports located approximately 71 inches (0.58 diameters) downstream and 370 inches (3.00 diameters) upstream of all flow disturbances was used. The gas inlet pipe size is 10 inches with a single port located several diameters upstream of the flame arrestor.

3.3 Test Procedures

The test procedures used for the inlet and flare exhaust measurements are summarized below in Tables 3-1 and 3-2, respectively. Brief discussions of each procedure are given below in Sections 3.3.1 through 3.3.3. Triplicate measurements of each parameter were performed.

3.0 TEST DESCRIPTION (Continued)

TABLE 3-1
FLARE INLET TEST PROCEDURES
CENTRAL MAUI MUNICIPAL LANDFILL
NOVEMBER 19, 2008

Parameter	Sample Medium	Analytical Technique	Reference Method	Number of Replicates
Methane and Total Gaseous Non-Methane Organics & Fixed Gases	Summa Canister	TCA/FID	EPA Method 25C	3
Fixed Gases, Btu/cf and F factor	Tedlar Bags	CG/FID	ASTM D-3588	3
Moisture	Thermocouple	Wet Bulb/Dry Bulb	EPA Methods 4	3
Flow Rate	On-site Meter	Differential Pressure	NA	Continuous

TABLE 3-2
FLARE EXHAUST TEST PROCEDURES
CENTRAL MAUI MUNICIPAL LANDFILL
NOVEMBER 19, 2008

Parameter	Sample Medium	Reference Method	Number of Replicates
Methane and Total Gaseous Non-Methane Organics	Summa Canister	EPA Method 25C	3
O_2	CEM	EPA Method 3A	3
CO_2	CEM	EPA Method 3A	3
NO_x	CEM	EPA Methods 7E and 10	3
CO	CEM	EPA Methods 7E and 10	3
Flow Rate	NA	EPA Method 19	3

3.0 TEST DESCRIPTION (Continued)

3.3.1 Methane and Total Gaseous Non-Methane Organics

Methane and total gaseous non-methane organics were measured following EPA Method 25C. The landfill gas samples were collected over an hour period in evacuated summa canisters. ATMAA, Inc., in Calabasas, California analyzed the samples following EPA Method 25C using TCA/FID.

The exhaust gas measurements were conducted using EPA Method 25C. The sample is collected using a stainless steel probe connected by Teflon tubing to an evacuated stainless steel tank. The probe and sample line are purged with flue gas continuously for 5 minutes before sampling. The exhaust sampling was conducted simultaneously with the collection of the inlet samples for the determination of destruction efficiency. The tank samples were analyzed by ATMAA, Inc. in Calabasas, CA, using TCA/FID.

3.3.2 Oxygen, Carbon Dioxide, Nitrogen, Carbon Monoxide, and Nitrogen Oxides

Measurements of NO_x, CO, O_2 and CO_2 at the exhaust were conducted using EPA Methods 3A, 7E, and 10 sampling with a CEMS.

These CEMS measurements were obtained using SCEC's continuous emissions monitoring system described in Appendix A. The system includes a stainless steel probe connected to a 25' Teflon line to extract the exhaust sample. The sample gas is then directed through a moisture knockout cooled with ice and water. A peristaltic pump continuously drains the knockout. The sample then travels to the ground using Teflon tubing to an additional conditioning and filtering system. Leak checks were conducted prior to and at the conclusion of compliance testing by operating the sample pump, plugging the probe inlet and all pressure side system exits except for one analyzer rotameter, then measuring the leakage rate on that rotameter.

A calibration error test was performed on each analyzer prior to testing. The calibration error test was conducted by spanning the instrument with zero and high span gas and then recording the as-found value when injecting zero, mid and high span gases.

EPA Protocol 1 Calibration Gases were used for all analyzer calibrations. In accordance with EPA Method procedures, a pre- and post-test system bias check was conducted for each test run. The system bias check was conducted by delivering zero and span gas to the CEM probe tip and recording the as-found concentration. No analyzer adjustments were made between these pre- and post-system bias checks. Calculations for the correction of measured system bias and instrument drift were then applied to each test run.

Triplicate emissions measurements were performed to determine the concentration of O_2, CO_2, CO, and NO_x. The average concentrations were determined during each test for a period of sixty minutes. This test average was then corrected for measured system bias and drift.

3.0 TEST DESCRIPTION (Continued)

3.3.3 Flow Rate

Landfill gas flow rate into the flare was set to specification using on-site instrumentation. The thermal capacity (MMBtu/scf) and expansion potential (EPA F factor) of the landfill gas was analyzed. Based on the on-site fuel meter and fuel quality analysis the exhaust volume flow was calculated. All results in the reported tables use EPA Method 19 calculated exhaust flow rate. The exhaust flow rate calculations are included in Appendix C.

4.0 RESULTS

The results of the source tests of the Central Maui Municipal Landfill flare show that the flare emissions are below HDOH permit limits. The flare exhaust TGNMO is well below both the 20 ppm_v @3% O_2 as hexane and the 98% DRE. Table 1-2 present the summarized test results and application permit limits. Table 4-1 present detailed test results of each parameter.

4.1 Test Critique

No sampling or analytical problems occurred during the test program. All calibration error and system bias checks were below their allowable tolerance, 2% and 5%. The on-site NO_2 converter check met the method 7e requirement.

4.0 RESULTS (Continued)

TABLE 4-1
GENERAL RESULTS
SCS Field Services
Central Maui Landfill
November 19, 2008

Parameter	INLET First Run	INLET Second Run	INLET Third Run	INLET Average	EXHAUST First Run	EXHAUST Second Run	EXHAUST Third Run	EXHAUST Average
O_2, %	0.51	0.55	0.56	0.54	14.57	14.80	14.81	14.73
CO_2, %	38.3	38.7	39.1	38.7	5.95	5.79	5.82	5.85
N_2, %	12.5	11.2	10.9	11.5	79.5	79.4	79.4	79.4
Flow Rate, wscfm	526	526	523	525	-	-	-	-
Flow Rate, dscfm	-	-	-	-	8,196	8,652	8,617	8,488
Temperature, °F	106	106	106	106	1,457	1,484	1,502	1,481
Btu/scf	469	479	482	477				
MMBtu/Hr	14.80	15.12	15.13	15.01				
NOx:								
ppm					10.17	9.55	9.98	9.90
ppm @ 3% O_2					28.7	28.1	29.3	28.7
lb/hr (as NO_2)					0.60	0.59	0.62	0.60
lb/MM Btu (as NO_2)					0.040	0.039	0.041	0.040
CO:								
ppm					39.7	45.3	35.0	40.0
ppm @ 3% O_2					112.1	133.2	102.8	116.0
lb/hr					1.418	1.711	1.314	1.481
lb/MM Btu					0.096	0.113	0.087	0.099
Hydrocarbons:								
CH_4, ppm	459,000	468,000	471,000	466,000	< 1	< 1	< 1	< 1
Ethane, ppm	< 10	< 10	< 10	< 10	< 1	< 1	< 1	< 1
TGNMO, ppm (as CH_4)	6,790	7,680	7,910	7,460	2.56	1.92	< 1	< 1.83
TGNMO, lb/hr (as CH_4)	8.90	10.06	10.31	9.76	0.05	0.04	0.02	0.04
TGNMO, ppm (as hexane)	1,132	1,280	1,318	1,243	0.43	0.32	0.17	0.30
TGNMO, ppm @ 3% O_2 (as hexane)	993	1,126	1,160	1,093	1.21	0.94	0.49	0.88
TGNMO, lb/hr (as hexane)	7.97	9.02	9.23	8.74	0.05	0.04	0.02	0.03
Destruction Eff. %					99.41	99.59	99.78	99.59

The exhaust volume flow values are based on EPA Method 19.

Appendices

Appendix A - NO_x, CO, CO_2, O_2 Data, Strip Charts and Visible Emissions Data

Appendix B - Lab Results

Appendix C - Exhaust Volume Flow Data and Field Data

Appendix D - Quality Assurance / Quality Control Data

Appendix E - Calculations

Appendix A

NO_x, CO, CO_2, O_2 Data, Strip Charts and Visible Emission Data

SCS Field Services
Central Maui Landfill
November 19, 2008
RAW DAS DATA - COMPLIANCE RUN 1
TIME: 1212-1257

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	11/19	12:12:05	14.21	6.32	10.90	12.3
2	11/19	12:13:05	13.27	7.03	14.60	2.6
3	11/19	12:14:05	13.72	6.86	12.90	1.4
4	11/19	12:15:05	14.11	6.14	12.10	5.5
5	11/19	12:16:05	14.12	6.69	11.50	9.4
6	11/19	12:17:05	13.52	6.95	13.50	3.5
7	11/19	12:18:05	13.83	5.81	12.60	13.6
8	11/19	12:19:05	13.41	6.78	14.20	0.6
9	11/19	12:20:05	14.34	6.36	11.00	10.4
10	11/19	12:21:05	15.11	5.86	9.20	10.3
11	11/19	12:22:05	15.12	6.52	11.40	3.2
12	11/19	12:23:05	13.92	6.32	12.00	6.8
13	11/19	12:24:05	14.07	6.06	11.60	11.7
14	11/19	12:25:05	14.31	6.25	11.40	11.3
15	11/19	12:26:05	15.77	5.23	7.90	19.8
16	11/19	12:27:05	14.22	5.82	10.90	40.7
17	11/19	12:28:05	14.56	5.93	9.80	63.5
18	11/19	12:29:05	14.42	5.88	10.30	57.1
19	11/19	12:30:05	15.02	5.45	9.50	54.5
20	11/19	12:31:05	14.66	5.66	10.10	54.1
21	11/19	12:32:05	14.72	5.76	9.90	46.4
22	11/19	12:33:05	14.81	5.82	9.60	72.7
23	11/19	12:34:05	14.82	5.63	9.30	87.2
24	11/19	12:35:05	15.28	4.92	9.40	58.6
25	11/19	12:36:05	14.62	5.84	10.30	75.1
26	11/19	12:37:05	15.20	5.44	9.30	77.0
27	11/19	12:38:05	14.70	5.79	9.80	68.9
28	11/19	12:39:05	14.72	5.78	9.90	65.9
29	11/19	12:40:05	14.62	5.54	10.10	69.0
30	11/19	12:41:05	14.60	5.76	10.10	54.2
31	11/19	12:42:05	14.84	5.75	9.60	81.2
32	11/19	12:43:05	14.52	5.94	10.60	68.2
33	11/19	12:44:05	14.23	5.69	11.20	31.0
34	11/19	12:45:05	14.53	5.82	10.30	36.9
35	11/19	12:46:05	13.66	6.55	13.60	6.9
36	11/19	12:47:05	14.12	6.03	13.20	6.2
37	11/19	12:48:05	14.12	5.87	10.90	34.2
38	11/19	12:49:05	14.92	5.48	9.80	81.3
39	11/19	12:50:05	14.83	5.70	10.10	86.5
40	11/19	12:51:05	14.02	6.30	12.30	33.1
41	11/19	12:52:05	14.48	5.87	10.90	52.7
42	11/19	12:53:05	14.12	6.28	11.70	46.8
43	11/19	12:54:05	13.92	6.19	12.60	27.0
44	11/19	12:55:05	14.12	6.12	11.40	42.9
45	11/19	12:56:05	14.22	6.11	10.90	47.1
AVERAGES			**14.41**	**6.00**	**10.98**	**38.87**

SCS Field Services
Central Maui Landfill
November 19, 2008
RAW DAS DATA - COMPLIANCE RUN 2
TIME: 1312-1357

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	11/19	13:12:47	14.65	6.00	10.20	20.6
2	11/19	13:13:47	14.92	5.98	9.50	33.3
3	11/19	13:14:47	14.14	6.38	10.90	43.2
4	11/19	13:15:47	14.58	5.69	10.10	40.6
5	11/19	13:16:47	14.42	6.26	10.50	71.3
6	11/19	13:17:47	14.82	5.75	9.80	58.9
7	11/19	13:18:47	14.92	5.44	9.60	47.2
8	11/19	13:19:47	14.84	5.44	9.50	57.1
9	11/19	13:20:47	15.56	5.40	8.80	44.6
10	11/19	13:21:47	14.83	5.59	9.80	82.1
11	11/19	13:22:47	14.64	5.77	9.90	83.9
12	11/19	13:23:47	14.53	5.32	10.00	81.8
13	11/19	13:24:47	14.67	5.93	11.10	25.5
14	11/19	13:25:47	13.81	6.77	15.20	3.0
15	11/19	13:26:47	14.23	6.17	13.70	2.5
16	11/19	13:27:47	14.13	5.99	11.30	24.1
17	11/19	13:28:47	14.42	5.94	10.00	50.9
18	11/19	13:29:47	14.42	6.00	9.20	62.6
19	11/19	13:30:47	14.42	5.86	9.60	45.0
20	11/19	13:31:47	14.92	5.54	9.00	73.3
21	11/19	13:32:47	14.72	5.52	9.60	79.4
22	11/19	13:33:47	14.63	5.82	10.20	65.9
23	11/19	13:34:47	14.42	5.98	10.40	63.4
24	11/19	13:35:47	15.45	4.99	9.10	73.5
25	11/19	13:36:47	15.12	5.46	9.50	60.2
26	11/19	13:37:47	14.43	6.24	11.00	41.2
27	11/19	13:38:47	14.61	5.30	11.20	18.3
28	11/19	13:39:47	14.22	5.88	11.00	19.0
29	11/19	13:40:47	13.83	7.18	15.40	2.0
30	11/19	13:41:47	14.42	5.78	10.10	16.4
31	11/19	13:42:47	14.42	6.31	10.70	14.5
32	11/19	13:43:47	14.57	5.66	11.40	20.0
33	11/19	13:44:47	15.02	5.85	9.70	42.6
34	11/19	13:45:47	14.42	5.67	10.40	53.7
35	11/19	13:46:47	14.72	5.23	9.70	42.8
36	11/19	13:47:47	14.92	5.61	9.60	54.6
37	11/19	13:48:47	15.08	5.33	10.00	42.0
38	11/19	13:49:47	14.53	5.58	9.90	40.7
39	11/19	13:50:47	14.92	5.64	8.80	48.7
40	11/19	13:51:47	14.72	5.72	9.10	58.1
41	11/19	13:52:47	14.72	5.12	9.60	53.7
42	11/19	13:53:47	14.12	6.07	11.00	32.6
43	11/19	13:54:47	14.01	6.22	12.10	17.8
44	11/19	13:55:47	14.18	6.05	11.50	44.0
45	11/19	13:56:47	14.13	6.46	13.40	33.8
AVERAGES			**14.58**	**5.82**	**10.49**	**44.23**

SCS Field Services
Central Maui Landfill
November 19, 2008
RAW DAS DATA - COMPLIANCE RUN 3
TIME: 1422-1557

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	11/19	14:22:11	14.46	6.01	9.00	10.3
2	11/19	14:23:11	14.60	6.13	10.50	69.2
3	11/19	14:24:11	14.99	5.57	11.30	54.2
4	11/19	14:25:11	14.95	5.68	10.20	65.4
5	11/19	14:26:11	14.61	6.25	10.80	62.6
6	11/19	14:27:11	14.87	5.42	10.80	51.7
7	11/19	14:28:11	14.77	5.94	10.50	56.8
8	11/19	14:29:11	14.42	5.99	11.20	50.5
9	11/19	14:30:11	14.72	5.30	11.20	48.7
10	11/19	14:31:11	14.70	5.22	11.00	41.2
11	11/19	14:32:11	15.23	5.55	9.40	49.6
12	11/19	14:33:11	14.30	6.05	11.00	53.1
13	11/19	14:34:11	14.48	6.17	11.60	55.7
14	11/19	14:35:11	14.76	5.90	11.60	42.8
15	11/19	14:36:11	14.39	5.88	10.50	50.9
16	11/19	14:37:11	14.38	6.01	11.20	49.9
17	11/19	14:38:11	15.45	5.90	9.90	29.9
18	11/19	14:39:11	15.02	4.99	8.50	45.9
19	11/19	14:40:11	14.73	5.25	10.80	35.3
20	11/19	14:41:11	14.95	4.23	7.50	38.0
21	11/19	14:42:11	15.68	4.61	10.40	39.2
22	11/19	14:43:11	14.29	5.60	11.10	30.5
23	11/19	14:44:11	15.48	5.12	9.50	36.2
24	11/19	14:45:11	15.73	5.46	8.50	28.6
25	11/19	14:46:11	15.43	5.75	7.00	30.4
26	11/19	14:47:11	14.54	5.23	10.10	40.5
27	11/19	14:50:11	13.92	6.37	13.00	23.6
28	11/19	14:51:11	14.78	6.10	10.30	20.4
29	11/19	14:52:11	14.43	6.11	11.10	44.9
30	11/19	14:53:11	14.52	6.22	11.50	26.0
31	11/19	14:54:11	13.72	6.53	11.90	11.7
32	11/19	14:55:11	15.07	5.52	12.60	8.3
33	11/19	14:56:11	14.04	6.34	10.80	9.8
34	11/19	14:57:11	13.54	6.79	14.30	1.8
35	11/19	14:58:11	13.87	6.37	13.60	3.5
36	11/19	14:59:11	14.05	5.79	12.20	2.3
37	11/19	15:00:11	13.99	6.44	11.60	6.1
38	11/19	15:01:11	14.50	6.03	11.00	40.5
39	11/19	15:02:11	14.91	5.80	10.40	26.0
40	11/19	15:03:11	13.91	6.23	13.90	33.2
41	11/19	15:04:11	14.07	6.26	11.10	41.0
42	11/19	15:05:11	14.12	6.37	11.70	16.8
43	11/19	15:06:11	14.19	6.34	6.30	12.7
44	11/19	15:07:11	14.16	6.32	9.96	11.3
AVERAGES			**14.58**	**5.84**	**10.74**	**34.25**

SUMMARY OF CONTINUOUS MONITORING DATA

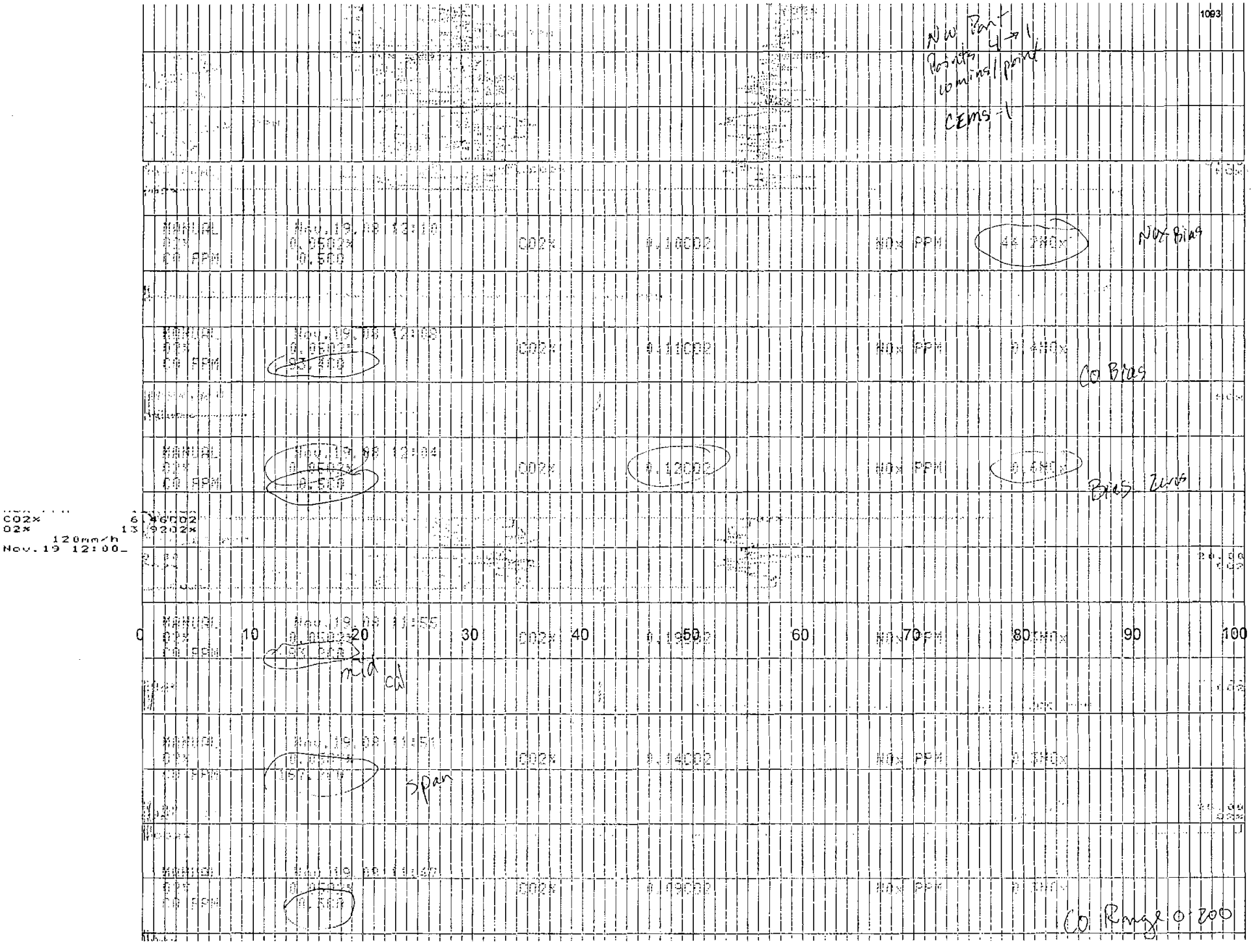
FACILITY:	SCS Field Services	DATA FOR SAMPLING RUN:		COMPLIANCE RUN 1	
SOURCE ID/CONDITION:	Central Maui Landfill	DATE:	11/19/08	TIME:	1212-1257
OPERATOR:	LAJ	PROJECT No.:	2170.1012		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.05	0.12	0.60	0.50	NA
INITIAL SPAN BIAS	11.93	10.08	44.20	83.40	NA
FINAL ZERO BIAS	0.05	0.12	1.00	0.50	NA
FINAL SPAN BIAS	11.83	9.96	44.70	82.90	NA
AVERAGE ZERO BIAS	0.05	0.12	0.80	0.50	NA
AVERAGE SPAN BIAS	11.88	10.02	44.45	83.15	NA
BIAS GAS CONCENTRATION	12.00	10.02	43.60	85.45	NA
FULL SCALE RANGE	25	20	50	200	NA
UNCORRECTED CONC.	14.41	6.00	10.98	38.87	NA
CORRECTED CONC.	**14.57**	**5.95**	**10.17**	**39.67**	NA
PPMV @ 3 % O2			28.74	112.12	NA
LB/mmBTU BASED ON HEAT INPUT (MMBTU/HR)	14.80		0.040	0.096	NA
LB/HR BASED ON VOL FLOW (DSCFM)	8,196		0.60	1.42	NA

SUMMARY OF CONTINUOUS MONITORING DATA

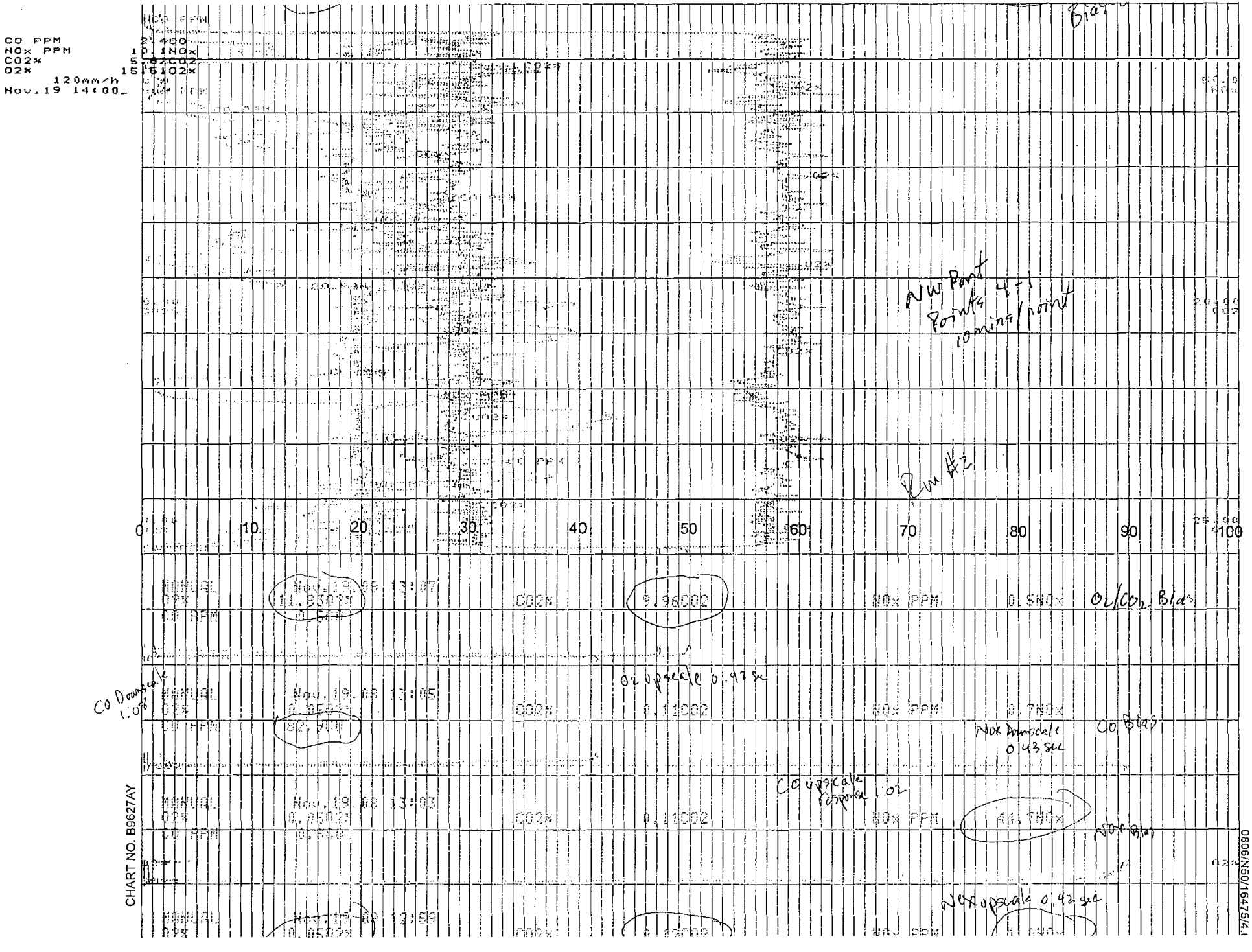
FACILITY:	SCS Field Services	DATA FOR SAMPLING RUN:		COMPLIANCE RUN 2	
SOURCE ID/CONDITION:	Central Maui Landfill	DATE:	11/19/08	TIME:	1312-1357
OPERATOR:	LAJ	PROJECT No.:	2170.1012		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.05	0.12	1.00	0.50	NA
INITIAL SPAN BIAS	11.83	9.96	44.70	82.90	NA
FINAL ZERO BIAS	0.05	0.11	0.70	0.50	NA
FINAL SPAN BIAS	11.83	10.00	45.00	82.90	NA
AVERAGE ZERO BIAS	0.05	0.12	0.85	0.50	NA
AVERAGE SPAN BIAS	11.83	9.98	44.85	82.90	NA
BIAS GAS CONCENTRATION	12.00	10.02	43.60	85.45	NA
FULL SCALE RANGE	25	20	50	200	NA
UNCORRECTED CONC.	14.58	5.82	10.49	44.23	NA
CORRECTED CONC.	**14.80**	**5.79**	**9.55**	**45.35**	NA
PPMV @ 3 % O2			28.05	133.15	NA
LB/mmBTU BASED ON HEAT INPUT (MMBTU/HR)	15.12		0.039	0.113	NA
LB/HR BASED ON VOL FLOW (DSCFM)	8,652		0.59	1.71	NA

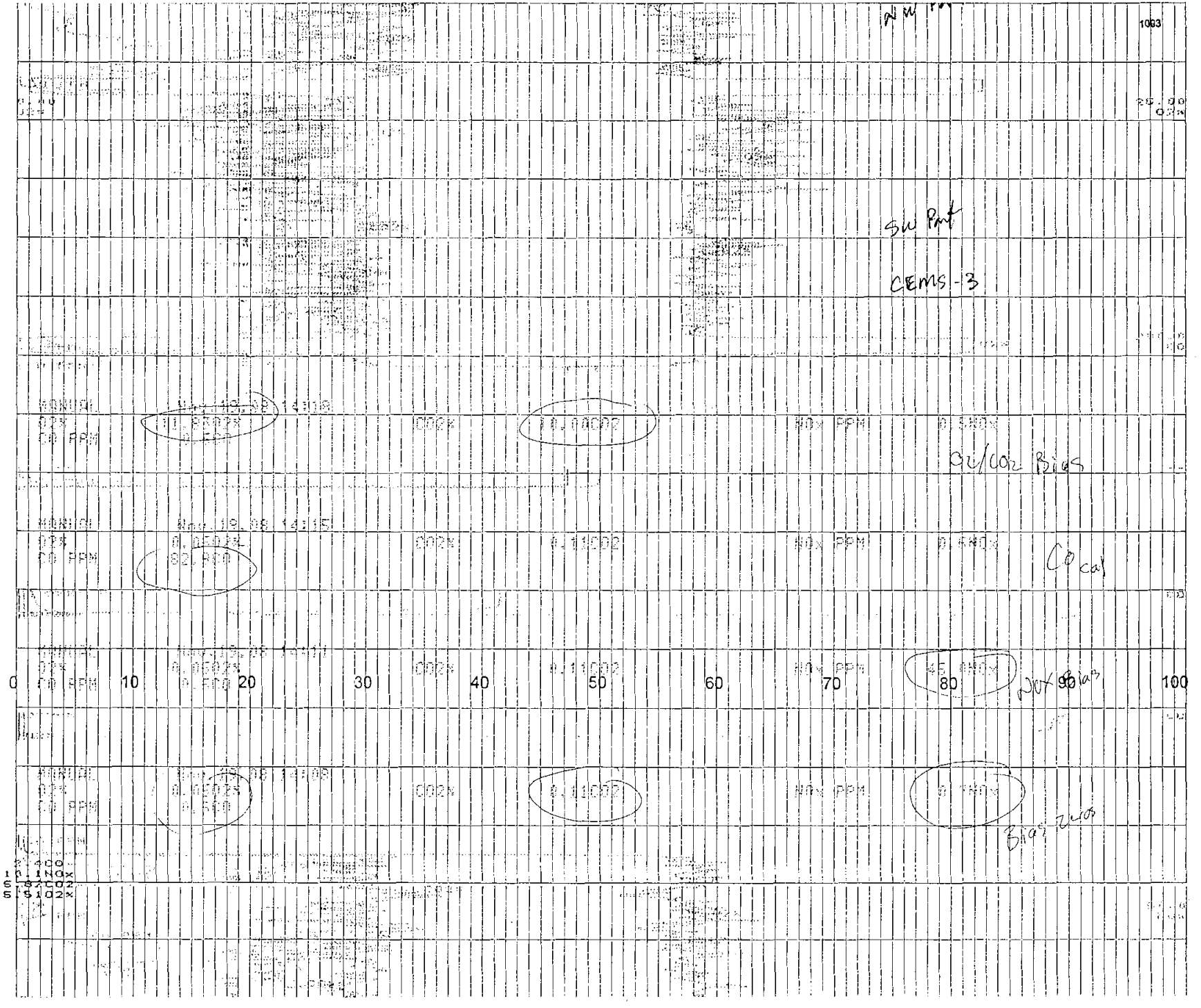
SUMMARY OF CONTINUOUS MONITORING DATA

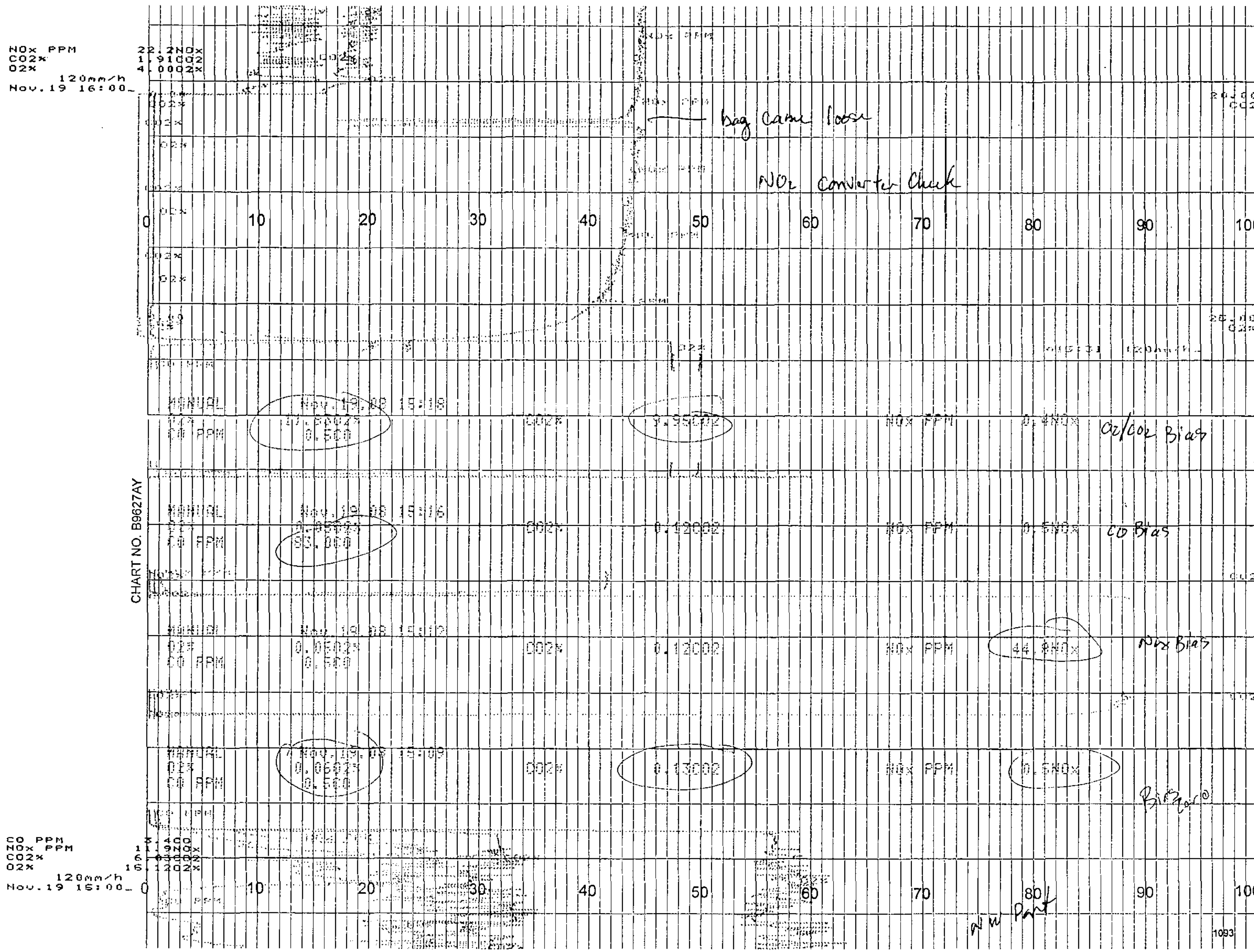
FACILITY:	SCS Field Services	DATA FOR SAMPLING RUN:		COMPLIANCE RUN 3	
SOURCE ID/CONDITION:	Central Maui Landfill	DATE:	11/19/08	TIME:	1422-1557
OPERATOR:	LAJ	PROJECT No.:	2170.1012		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.05	0.11	0.70	0.50	NA
INITIAL SPAN BIAS	11.83	10.00	45.00	82.90	NA
FINAL ZERO BIAS	0.06	0.13	0.50	0.50	NA
FINAL SPAN BIAS	11.83	9.95	44.80	83.00	NA
AVERAGE ZERO BIAS	0.06	0.12	0.60	0.50	NA
AVERAGE SPAN BIAS	11.83	9.98	44.90	82.95	NA
BIAS GAS CONCENTRATION	12.00	10.02	43.60	85.45	NA
FULL SCALE RANGE	25	20	50	200	NA
UNCORRECTED CONC.	14.58	5.84	10.74	34.25	NA
CORRECTED CONC.	**14.81**	**5.82**	**9.98**	**34.98**	NA
PPMV @ 3 % O2			29.31	102.76	NA
LB/mmBTU BASED ON HEAT INPUT (MMBTU/HR)	15.13		0.041	0.087	NA
LB/HR BASED ON VOL FLOW (DSCFM)	8,617		0.62	1.31	NA


1093
NOx Bias
CO Bias
Bias Zero
mid cal
span
CO Range 0-200
0
10
20
30
40
50
60
70
80
90
100
CO2x
O2x
120mm/h
Nov.19 12:00

16475/4.04


CO PPM
NOx PPM
CO2x
O2x
120mm/h
Nov.19 14:00
0
10
20
30
40
50
60
70
80
90
100
NW Point
Ramp 4-1
10 mins/point
Run #2
O2/CO2 Bias
O2 upscale 0.97 sec
CO Downscale
1.0 sec
NOx Downscale
0.43 sec
CO Bias
CO upscale response 102
NOx Bias
NOx upscale 0.42 sec
CHART NO. B9627AY
0806/N50/16475/4


SW Pmt
CEMS-3
O2/CO2 Bias
CO cal
NOx Bias
Bias Zero
0
10
20
30
40
50
60
70
80
100
CO PPM
NOx PPM
CO2%
O2%
120mm/h
Nov.19 14:00

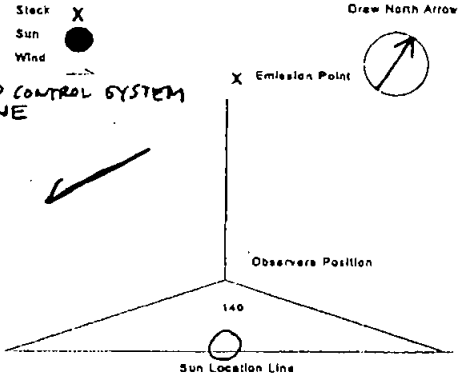

NOx PPM 22.2NOx
CO2% 1.91CO2%
O2% 4.00O2%
120mm/h
Nov.19 16:00
bag came loose
NO2 Converter Check
MANUAL
Nov.19,08 15:18
O2/CO2 Bias
Nov.19,08 15:16
83.000
0.12CO2
CO Bias
0.5NOx
Nov.19,08 15:10
44.9NOx
NOx Bias
Nov.19,08 15:09
0.13CO2
0.5NOx
Bias Zero
CO PPM 3.400
NOx PPM 11.9NOx
CO2% 6.03CO2%
O2% 16.12O2%
120mm/h
Nov.19 15:00
NW Part
CHART NO. B9627AY
0806/N50/16475/4.04
1093

VISIBLE EMISSIONS FORM
STATE OF HAWAII
COVERED SOURCE PERMIT NO. 0652-01-C

Issuance Date: March 3, 2008 **Expiration Date:** March 2, 2013

Make Copies for Future Use For Each Equipment)

Permit No.: 0652-01-C
Company Name: SCEC
Equipment and Fuel: LANDFILL GAS COLLECTION AND CONTROL SYSTEM - METHANE
Site Conditions:



Stack height above ground (ft): 45'
Stack distance from observer (ft): 70'
Emission color (black or white): CLEAR
Sky conditions (% cloud cover): 35
Wind speed (mph): 15 - 20
Temperature (°F): 78
Observer Name: AARON LORD
Certified? (Yes/No): YES
Observation Date and Start Time: 11-19-08 / 10:23 am

SECONDS / MINUTES	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
Six (6) Minute Average Opacity Reading (%):					0

Observation Date and Start Time: 11-19-08 / 10:29am

SECONDS / MINUTES	0	15	30	45	COMMENTS
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
Six (6) Minute Average Opacity Reading (%):					0

Appendix B

Lab Results

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Permanent Gases and TGNMO Analysis in SUMMA Canister Samples

Report Date: December 9, 2008
Client: SCEC
Site: SCS Field Services
Location: Central Maui Landfill
Client Project No.: 2170.3001

Date Received: November 24, 2008
Date Analyzed: December 1, - 4, 2008

ANALYSIS DESCRIPTION

Permanent gases are measured by thermal conductivity detection/gas chromatography (TCD/GC), EPA 3C. TGNMO is measured by Method 25 analysis, FID/TCA, total combustion analysis.

AtmAA Lab No.:	03298-10	03298-11	03298-12
Sample ID:	Inlet-R1	Inlet-R2	Inlet-R3
	374	171	286
	(Concentration in %v)		
Methane	45.9	46.8	47.1
Carbon Dioxide	38.3	38.7	39.1
Nitrogen	12.5	11.2	10.9
Oxygen	0.51	0.55	0.56
	(Concentration in ppmv)		
Ethane	<10	<10	<10
TGNMO	6790	7680	7910

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

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

Site: Central Maui Landfill
Date Received: November 24, 2008
Date Analyzed: December 1, - 4, 2008

Components	Sample ID	Repeat Analysis		Mean Conc.	% Diff. From Mean
		Run #1	Run #2		
		(Concentration, ppmv)			
Methane	Exh. #1	<1	<1	---	---
	Exh. #2	<1	<1	---	---
	Exh. #3	<1	<1	---	---
Ethane	Exh. #1	<1	<1	---	---
	Exh. #2	<1	<1	---	---
	Exh. #3	<1	<1	---	---
TGNMO	Exh. #1	2.61	2.50	2.56	2.2
	Exh. #2	2.09	1.75	1.92	8.9
	Exh. #3	<1	<1	---	---

Three canister samples, laboratory numbers 03298-(13 - 15), were analyzed for methane, ethane, and TGNMO. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % Difference from Mean for 2 repeat measurements from three canister samples is 5.5%

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

Methane, Ethane, and Total Gaseous Non-Methane Organics Analysis in SUMMA Canister Samples

Report Date: December 9, 2008
Client: SCEC
Site: SCS Field Services
Location: Central Maui Landfill
Client Project No.: 2170.3001

Date Received: November 24, 2008
Date Analyzed: December 1, - 4, 2008

ANALYSIS DESCRIPTION

Methane, ethane, and TGNMO were measured by Method 25, total combustion analysis, (FID/TCA).

AtmAA Lab No.:	03298-13	03298-14	03298-15
Sample ID:	Exh. #1 162	Exh. #2 147	Exh. #3 272
	(Concentration, ppmv)		
Methane	<1	<1	<1
Ethane	<1	<1	<1
TGNMO	2.56	1.92	<1

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

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

Site: Central Maui Landfill
Date Received: November 24, 2008
Date Analyzed: December 1, - 4, 2008

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in %v)			
Methane	Inlet-R1	45.9	45.9	45.9	0.0
	Inlet-R2	46.8	46.8	46.8	0.0
	Inlet-R3	47.1	47.0	47.1	0.11
Carbon Dioxide	Inlet-R1	38.3	38.3	38.3	0.0
	Inlet-R2	38.8	38.6	38.7	0.26
	Inlet-R3	39.1	39.1	39.1	0.0
Nitrogen	Inlet-R1	12.4	12.6	12.5	0.80
	Inlet-R2	11.3	11.0	11.2	1.3
	Inlet-R3	11.0	10.8	10.9	0.92
Oxygen	Inlet-R1	0.43	0.59	0.51	16
	Inlet-R2	0.56	0.54	0.55	1.8
	Inlet-R3	0.57	0.54	0.56	2.7
		(Concentration in ppmv)			
Ethane	Inlet-R1	<10	<10	---	---
	Inlet-R2	<10	<10	---	---
	Inlet-R3	<10	<10	---	---
TGNMO	Inlet-R1	6810	6770	6790	0.29
	Inlet-R2	7650	7710	7680	0.39
	Inlet-R3	7900	7920	7910	0.13

Three SUMMA canister samples, laboratory numbers 03298-(10 - 12), were analyzed for permanent gases. and TGNMO. Agreement between repeat analyses is a measure of precision and is shown in the column "% Difference from Mean". The average % Difference from Mean for 15 repeat measurements from three SUMMA canister samples is 1.6%.

Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 9, 2008
Client: SCEC
Project Location: Central Maui Landfill
Date Received: November 24, 2008
Date Analyzed: December 1, - 4, 2008
AtmAA Lab No.: 03298-10 Inlet R1

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents as is gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	45.92	26.29	Carbon	36.44
Carbon dioxide	38.27	60.26	Hydrogen	6.62
Nitrogen	12.50	12.52	Oxygen	44.38
Oxygen	0.49	0.56	Nitrogen	12.52
Argon	0.022	0.031	Argon	0.03
$(CH_2)_n$	0.679	0.340	Sulfur	0.00

Specific Volume	13.154	
BTU/ft^3	469	
BTU/ lb.	6172	
F (factor)	9915	10,068 at 68° F

"as is" gas at 60° F, 1 atm, where CH4-1010, TGNMO-804 BTU/cu.ft.

Component	Specific volume reference values *	
Methane	23.35	(ft^3/lb)
Carbon dioxide	8.59	
Nitrogen	13.54	
Oxygen	11.87	
Argon	9.52	
(CH2)n	21	

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 9, 2008
Client: SCEC
Project Location: Central Maui Landfill
Date Received: November 24, 2008
Date Analyzed: December 1, - 4, 2008
AtmAA Lab No.: 03298-11 Inlet R2

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents as is gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	46.79	26.81	Carbon	37.07
Carbon dioxide	38.70	60.99	Hydrogen	6.76
Nitrogen	11.14	11.17	Oxygen	44.96
Oxygen	0.53	0.60	Nitrogen	11.17
Argon	0.023	0.033	Argon	0.03
$(CH_2)_n$	0.768	0.385	Sulfur	0.00

Specific Volume	13.171
BTU/ft^3	479
BTU/ lb.	6306
F (factor)	9865

10,017 at 68° F

"as is" gas at 60° F, 1 atm, where CH4-1010, TGNMO-804 BTU/cu.ft.

Component	Specific volume reference values *	
Methane	23.35	(ft^3/lb)
Carbon dioxide	8.59	
Nitrogen	13.54	
Oxygen	11.87	
Argon	9.52	
(CH2)n	21	

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 9, 2008
Client: SCEC
Project Location: Central Maui Landfill
Date Received: November 24, 2008
Date Analyzed: December 1, - 4, 2008
AtmAA Lab No.: 03298-12 Inlet R3

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents as is gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	47.05	26.80	Carbon	37.15
Carbon dioxide	39.12	61.28	Hydrogen	6.76
Nitrogen	10.93	10.89	Oxygen	45.17
Oxygen	0.53	0.61	Nitrogen	10.89
Argon	0.024	0.034	Argon	0.03
$(CH_2)_n$	0.791	0.394	Sulfur	0.00

Specific Volume	13.156
BTU/ft^3	482
BTU/ lb.	6335
F (factor)	9814

9965 at 68°F

"as is" gas at 60° F, 1 atm, where CH4-1010, TGNMO-804 BTU/cu.ft.

Component	Specific volume reference values *	
Methane	23.35	(ft^3/lb)
Carbon dioxide	8.59	
Nitrogen	13.54	
Oxygen	11.87	
Argon	9.52	
(CH2)n	21	

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name	Client Project No.	ANALYSES REQUESTED	Laboratory Name
SCS Field Services	2170.3001		ATM-AA
Project Location: Central Mavi Landfill			Lab Contact: Mike Porter
Contact: Leslie Johnson	Sampler (Signature):		Lab Phone No.
			Turnaround Time: NTAT

Sample #	Description	SAMPLE Date	Time	Type	EPA 25C	ASTM D-3588					Remarks:
	Inlet #1 #374	11/19/08		Canisters	X	X					03298-10
	" #2 #171	"			X	X					-11
	" #3 #286	"			X	X					-12
	Exhaust #1 #162	"			X						-13
	" #2 #147	"			X						-14
	" #3 #272	"			X						-15

Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:
				Michael Porter	ATM AA Inc	12/4/08	10:30
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:

Appendix C

Exhaust Volume Flow Data and Field Data

SCS Field Services
Central Maui Landfill
November 19, 2008

SUMMARY OF EPA METHOD 19 SOURCE TEST DATA AND CALCULATIONS

PARAMETER	UNITS	RUN 1	RUN 2	RUN 3
DATE		11/19/2008	11/19/2008	11/19/2008
FUEL FLOW - @ 68 DEG F	SCFM	526	526	523
CALORIFIC VALUE - @ 68 DEG F	BTU/CF	469	479	482
F FACTOR (Fd) - @ 68 DEG F	DSCF/MMBTU	10,068	10,017	9,965
EXHAUST O2 CONCENTRATION	%VD	14.57	14.80	14.81
HEAT INPUT - NATURAL GAS	MMBTU/MIN	0.2467	0.2520	0.2521
EXHAUST VOLUME FLOW RATE @ 68 DEG F	DSCFM	**8,196**	**8,652**	**8,617**

SCS Field Services
Central Maui Landfill
November 19, 2008
Flare Collected Field Data

Run #	Time	Stack Temp Deg. F	Inlet Flow scfm	Field Vac	Inlet Gas Deg. F
R1	1214	1439	526	59.6	106
R1	1236	1475	525	59.8	106
R2	1316	1479	529	59.6	106
R2	1332	1500	520	59.5	106
R2	1356	1474	528	59.6	106
R3	1419	1500	519	59.3	106
R3	1503	1503	527	58.9	106
R3	1530	1504	523	59.2	106

REACTIVE ORGANIC COMPOUNDS
EPA METHOD 25C
SCEC FIELD SAMPLING DATA SHEET

Job #: 2173.3001

Facility: Central Maui Landfill

Location: Stack Exhaust

Date: 11/19/08

Operator: _____

Control Device: Flare

Sample Location: Exhaust

Ambient Temperature: 78°F

Barometric Pressure: 30.07

SAMPLE A - Run 1

Tank # : [redacted] 162

Initial Vacuum: _____

Final Vacuum: _____

TIME	VACUUM ("Hg)
9:23a	-30
12:04p	-30
12:19	-26
12:42	-8

Leak Rate Pre: _____

Leak Rate Post: _____

SAMPLE B - Run 2

Tank # : 147

Initial Vacuum: 30

Final Vacuum: _____

TIME	VACUUM ("Hg)
1314	30
13:40	-26
13:55	-20
14:08	-8

Leak Rate Pre: _____

Leak Rate Post: _____

SAMPLE C - Run 3

Tank #: 272

Initial Vacuum: _____

Final Vacuum: _____

TIME	VACUUM ("Hg)
14:15	-30
14:30	-26
14:45	-20
15:00	-14
15:15	-8

Leak Rate Pre: _____

Leak Rate Post: _____

REACTIVE ORGANIC COMPOUNDS
EPA METHOD 25C
SCEC FIELD SAMPLING DATA SHEET

Job #: 2170.3001
Facility: Central Maui Landfill
Location: Flare station
Date: 11/19/08
Operator: CAS

Control Device: Flare
Sample Location: Inlet
Ambient Temperature: 78°F
Barometric Pressure: 30.07

SAMPLE A

Tank # : 374
Initial Vacuum: 23
Final Vacuum: 6

TIME	VACUUM ("Hg)
923	23
932	19
936-1204 OFF - injuction issues	
1204	14
1220	6

Leak Rate Pre: ✓ good
Leak Rate Post: ✓

SAMPLE B

Tank # : 171
Initial Vacuum: 22
Final Vacuum: 6

TIME	VACUUM ("Hg)
1316	22
1326	17
1352	6
~~1403~~	

Leak Rate Pre: ✓ good
Leak Rate Post: ✓

SAMPLE C

Tank #: 286
Initial Vacuum: 22
Final Vacuum:

TIME	VACUUM ("Hg)
1418	22
1443	10
1505	2

Leak Rate Pre:
Leak Rate Post:

Appendix D

Quality Assurance / Quality Control Data

CALIBRATION ERROR

FACILITY:	SCS Field Services	DATA FOR SAMPLING RUNS:		COMPLIANCE RUNS 1,2,3 (INITIAL)
SOURCE ID/CONDITION:	Central Maui Landfill	DATE:		11/19/2008
OPERATOR:	LAJ	PROJECT No.:		2170.1012
PARAMETER	CYLINDER VALUE	ANALYZER CALIBRATION RESPONSE	ABSOLUTE DIFFERENCE	DIFFERENCE
UNITS	PPMV or % VOL	PPMV or % VOL	PPMV or % VOL	% OF GAS
O_2 - FULL SCALE	25			
O_2 - ZERO	0.00	0.05	-0.05	**-0.24**
O_2 - MID CAL	12.00	11.93	0.07	**0.33**
O_2 -HIGH CAL	20.99	20.81	0.18	**0.86**
CO_2 - FULL SCALE	20			
CO_2 - ZERO	0.00	0.13	-0.13	**-0.72**
CO_2 - MID CAL	10.020	10.11	-0.09	**-0.50**
CO_2 -HIGH CAL	17.95	18.08	-0.13	**-0.72**
NO_x - FULL SCALE	50			
NO_x - ZERO	0.00	0.20	-0.20	**-0.46**
NO_x - MID CAL	21.80	21.70	0.10	**0.23**
NO_x -HIGH CAL	43.70	43.70	0.00	**0.00**
CO - FULL SCALE	200			
CO - ZERO	0.00	0.30	-0.30	**-0.18**
CO - MID CAL	85.45	83.20	2.25	**1.34**
CO -HIGH CAL	167.60	167.20	0.40	**0.24**

NOTE: CO2/O2 - % VOL AND NOx/CO - PPMV; ALL ON A DRY BASIS

SYSTEM CALIBRATION BIAS AND DRIFT DATA

FACILITY:	SCS Field Services	DATA FOR SAMPLING RUN:		COMPLIANCE RUN 1		
SOURCE ID/CONDITION:	Central Maui Landfill	DATE:			11/19/08	
OPERATOR:	LAJ	PROJECT No.:			2170.1012	
		INITIAL VALUES		FINAL VALUES		
PARAMETER	ANALYZER CALIBRATION RESPONSE	SYSTEM CALIBRATION RESPONSE	SYSTEM CALIBRATION BIAS	SYSTEM CALIBRATION RESPONSE	SYSTEM CALIBRATION BIAS	CALIBRATION DRIFT
UNITS	PPMV or % VOL	PPMV or % VOL	% OF SPAN	PPMV or % VOL	% OF SPAN	% OF SPAN
O_2 - ZERO	0.05	0.05	**0.00**	0.05	**0.00**	**0.00**
O_2 - SPAN	11.93	11.93	**0.00**	11.83	**0.48**	**0.48**
CO_2 - ZERO	0.13	0.12	**0.06**	0.12	**0.06**	**0.00**
CO_2 - SPAN	10.11	10.08	**0.17**	9.96	**0.84**	**0.67**
NO_x - ZERO	0.20	0.60	**-0.92**	1.00	**-1.83**	**-0.92**
NO_x - SPAN	43.70	44.20	**-1.15**	44.70	**-2.29**	**-1.15**
CO - ZERO	0.30	0.50	**-0.12**	0.50	**-0.12**	**0.00**
CO - SPAN	83.2	83.4	**-0.12**	82.9	**0.18**	**0.30**

NOTE: CO2/O2 - % VOL AND NOx/CO - PPMV; ALL ON A DRY BASIS

SYSTEM CALIBRATION BIAS AND DRIFT DATA

FACILITY:	SCS Field Services	DATA FOR SAMPLING RUN:		COMPLIANCE RUN 2		
SOURCE ID/CONDITION:	Central Maui Landfill	DATE:			11/19/08	
OPERATOR:	LAJ	PROJECT No.:			2170.1012	
		INITIAL VALUES		FINAL VALUES		
PARAMETER	ANALYZER CALIBRATION RESPONSE	SYSTEM CALIBRATION RESPONSE	SYSTEM CALIBRATION BIAS	SYSTEM CALIBRATION RESPONSE	SYSTEM CALIBRATION BIAS	CALIBRATION DRIFT
UNITS	PPMV or % VOL	PPMV or % VOL	% OF SPAN	PPMV or % VOL	% OF SPAN	% OF SPAN
O_2 - ZERO	0.05	0.05	**0.00**	0.05	**0.00**	**0.00**
O_2 - SPAN	11.93	11.83	**0.48**	11.83	**0.48**	**0.00**
CO_2 - ZERO	0.13	0.12	**0.06**	0.11	**0.11**	**0.06**
CO_2 - SPAN	10.11	9.96	**0.84**	10.00	**0.61**	**-0.22**
NO_x - ZERO	0.20	1.00	**-1.83**	0.70	**-1.15**	**0.69**
NO_x - SPAN	43.70	44.70	**-2.29**	45.00	**-2.98**	**-0.69**
CO - ZERO	0.30	0.50	**-0.12**	0.50	**-0.12**	**0.00**
CO - SPAN	83.2	82.9	**0.18**	82.9	**0.18**	**0.00**

NOTE: CO2/O2 - % VOL AND NOx/CO - PPMV; ALL ON A DRY BASIS

SYSTEM CALIBRATION BIAS AND DRIFT DATA

FACILITY:	SCS Field Services	DATA FOR SAMPLING RUN:		COMPLIANCE RUN 3		
SOURCE ID/CONDITION:	Central Maui Landfill	DATE:			11/19/08	
OPERATOR:	LAJ	PROJECT No.:			2170.1012	
		INITIAL VALUES		FINAL VALUES		
PARAMETER	ANALYZER CALIBRATION RESPONSE	SYSTEM CALIBRATION RESPONSE	SYSTEM CALIBRATION BIAS	SYSTEM CALIBRATION RESPONSE	SYSTEM CALIBRATION BIAS	CALIBRATION DRIFT
UNITS	PPMV or % VOL	PPMV or % VOL	% OF SPAN	PPMV or % VOL	% OF SPAN	% OF SPAN
O2 - ZERO	0.05	0.05	**0.00**	0.06	**-0.05**	**-0.05**
O2 - SPAN	11.93	11.83	**0.48**	11.83	**0.48**	**0.00**
CO2 - ZERO	0.13	0.11	**0.11**	0.13	**0.00**	**-0.11**
CO2 - SPAN	10.11	10.00	**0.61**	9.95	**0.89**	**0.28**
NOx - ZERO	0.20	0.70	**-1.15**	0.50	**-0.69**	**0.46**
NOx - SPAN	43.70	45.00	**-2.98**	44.80	**-2.52**	**0.46**
CO - ZERO	0.30	0.50	**-0.12**	0.50	**-0.12**	**0.00**
CO - SPAN	83.2	82.9	**0.18**	83.0	**0.12**	**-0.06**

NOTE: CO2/O2 - % VOL AND NOx/CO - PPMV; ALL ON A DRY BASIS

SCEC
CONTINUOUS EMISSIONS MONITORING SYSTEM TEST DATA

Test Number: CEMS 1-3 | Date: 11/19/08
Client: SCS Field Services | Condition: As Found
Location: Central Maui Landfill | Operator: CAS
Unit: Flare | Barometric: 30.07

Gas Temperatures

Stack: 1475°F | Stack Knockout: <40°F
Probe: +250°F | Ambient: 79°F
Heated Line: N/A | Chiller: -

Chart recorder 8 minutes faster than CEMS time

	Analyzer Values				
	O_2 (%)	CO_2 (%)	NO_x (ppm)	CO (ppm)	SO_2 (ppm)
Analyzer Span Range	0-25	0-20	0-50	200	
Mid Span Cal Gas Value	12.00	10.02	@50% 21.8	~~@50% 72~~ 85.45	
High Span Cal Gas Value	20.99	17.95	43.6	167.6	
	As Found Analyzer Readings				
Zero	0.05	0.13	0.2	0.3	
Mid Span	11.93	10.11	21.7	83.2	
High Span	20.81	18.08	43.7	167.2	
	Pre-Test Analyzer System Bias				
System Bias Zero	0.05	0.12	0.6	0.5	
System Bias Span	11.93	10.08	44.2	83.4	

Sample Point	Time		**Raw Test Data**				
	Start	Stop	O_2 (%)	CO_2 (%)	NO_x (ppm)	CO (ppm)	SO_2 (ppm)
NW Port	1212	1257	0.05	0.12	1.0	0.5	
			11.83	9.96	44.7	82.9	
NW →	1312	1357	0.05	0.11	0.7	0.5	
			11.83	10.0	45.0	82.9	
~~SW~~							
SW NW	1422	1557	0.06	0.13	0.5	0.5	
4-1 4-1			11.83	9.95	44.8	83.0	

	Post-Test Analyzer System Bias				
System Bias Zero					
System Bias Span					
	Post-Test Analyzer Calibration				
Zero					
Mid Span					
High Span					
	Test Results Summary				
	O_2 (%)	CO_2 (%)	NO_x (ppm)	CO (ppm)	SO_2 (ppm)
Raw Average					
Corrected Average					

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (951) 653-6780 • FAX (951) 653-2430

Report Of Analysis
EPA Protocol Gas Mixtures

SCEC01
TO: SCEC - Air Quality Specialists
Attn: Harry Johnson
98-030 Hekaha Street, Suite 1
Aiea, HI 96701
(808) 488-8113

REPORT NO: 52200-01
REPORT DATE: August 10, 2007
CUSTOMER PO NO: 232

CYLINDER NUMBER: **CC67232** CYLINDER SIZE: 150A (141 std cu ft) CYLINDER PRESSURE: 2000 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
Carbon dioxide	17.95 ± 0.03 %	GMIS	Varian Model 1860	8/7/2010	8/7/2007
		CYLINDER #:	Serial # None		17.94 %
		CC51172	Thermal Conductivity		17.94 %
		@ 18.03 %	Gas Chromatography		17.98 %
			LAST CAL DATE: 7/25/2007	MEAN:	17.95 %
Oxygen	20.99 ± 0.22 %	GMIS	Varian Model 1860	8/9/2010	8/9/2007
		CYLINDER #:	Serial # None		20.98 %
		ALM031591	Thermal Conductivity		21.03 %
		@ 24.4 %	Gas Chromatography		20.97 %
			LAST CAL DATE: 8/9/2007	MEAN:	20.99 %
Nitrogen	Balance				

ppm = umole/mole **% = mole-%**

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.
The above analyses are invalid if the cylinder pressure is less than 150 psig.

ANALYST: _____ **APPROVED:** _____
M.S.Calhoun J. T. Marrin

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (951) 653-6780 • FAX (951) 653-2430

Report Of Analysis
EPA Protocol Gas Mixtures

SCEC01
TO: SCEC - Air Quality Specialists
Attn: Harry Johnson
98-030 Hekaha Street, Suite 1
Aiea, HI 96701
(808) 488-8113

REPORT NO: 52200-02
REPORT DATE: August 10, 2007
CUSTOMER PO NO: 232

CYLINDER NUMBER: CC12823 **CYLINDER SIZE:** 150A (141 std cu ft) **CYLINDER PRESSURE:** 2000 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
Carbon dioxide	10.02 ± 0.1 %	GMIS	Varian Model 1860	8/7/2010	8/7/2007
		CYLINDER #:	Serial # None		10.02 %
		CC83094	Thermal Conductivity		10.02 %
		@ 8.1 %	Gas Chromatography		10.02 %
			LAST CAL DATE: 7/25/2007	MEAN:	10.02 %
Oxygen	12.00 ± 0.11 %	GMIS	Varian Model 1860	8/9/2010	8/9/2007
		CYLINDER #:	Serial # None		11.96 %
		CC81204	Thermal Conductivity		12.00 %
		@ 9.89 %	Gas Chromatography		12.03 %
			LAST CAL DATE: 8/9/2007	MEAN:	12.00 %
Nitrogen	Balance				

ppm = umole/mole **% = mole-%**

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA-600/R97/121, dated September 1997.

The above analyses are invalid if the cylinder pressure is less than 150 psig.

ANALYST: M.S.Calhoun **APPROVED:** J. T. Marrin

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

Airgas

Airgas Specialty Gases
11711 Alameda Street
Los Angeles, CA 90059-2130
(323) 357-6891
FAX: (323) 567-3686
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0501	Reference Number:	48-124090317-2
Cylinder Number:	CC12905	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Mar 26, 2007	Valve Outlet:	350

Expiration Date: Mar 26, 2010

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	85.00 PPM	85.45 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

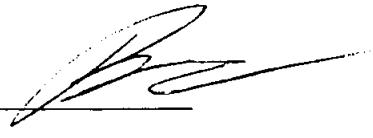
Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	980608	CC97683	98.0PPM CARBON MONOXIDE/	Feb 28, 2008

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet CO	FTIR	Mar 08, 2007

Triad Data Available Upon Request

Notes:



QA Approval

Airgas

Airgas Specialty Gases
11711 Alameda Street
Los Angeles, CA 90059-2130
(323) 357-3891
FAX: (323) 567-3686
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A1647	Reference Number:	48-124111939-9
Cylinder Number:	CC26998	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Oct 30, 2007	Valve Outlet:	660

Expiration Date: Oct 30, 2009

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
NITRIC OXIDE	42.00 PPM	42.27 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			
Total oxides of nitrogen		42.30 PPM		For Reference Only

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	60610	CC208053	49.38PPM NITRIC OXIDE/NITROGEN	Oct 02, 2008

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet NO	FTIR	Oct 18, 2007

Triad Data Available Upon Request

Notes:

QA Approval

Certificate of Analysis: EPA Protocol Gas Mixture

Airgas Specialty Gases
11711 S. Alameda Street
Los Angeles, CA 90059-2130
323.357.6891 fax: 323.567.3686
www.airgas.com

Cylinder Number: SG9135017BAL
Cylinder Pressure: 2000.6 PSIG
Certification Date: 5/9/2006
Reference Number: 48-124063854-2
Expiration Date: 5/9/2009
Laboratory: ASG - Los Angeles - CA

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
CARBON MONOXIDE	167.6 PPM	+/- 1%	FTIR	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature

Reference Standard Information

Type	Balance Gas	Component	Cyl Number	Concentration
NTRM 81639		CARBON MONOXIDE	SG9198935B	244.7 PPM

Analytical Results

1st Component **CARBON MONOXIDE**

1st Analysis Date: 04/28/2006

R 246.2	S 168.6	Z -0.027	Conc 167.6 PPM
S 169.4	Z -0.030	R 247.0	Conc 167.2 PPM
Z -0.042	R 246.4	S 169.3	Conc 168.1 PPM
			AVG: 167.6 PPM

2nd Analysis Date: 05/09/2006

R 243.3	S 166.7	Z -0.070	Conc 167.7 PPM
S 166.9	Z -0.062	R 244.2	Conc 167.3 PPM
Z -0.057	R 243.2	S 167.0	Conc 168.1 PPM
			AVG: 167.7 PPM

Appendix E

Calculations

EMISSION CALCULATIONS

1. Sample Volume and Isokinetics

a. Sample gas volume, dscf

$$V_{m\,std} = 0.03342\ V_m \left(P_{bar} + \frac{H}{13.6} \right) \left(\frac{T_{ref}}{T_m} \right) (Y)$$

b. Water vapor volume, scf

$$V_{w\,std} = 0.0472\ V_{lc} \left(\frac{T_{ref}}{528°R} \right)$$

c. Moisture content, nondimensional

$$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$$

d. Stack gas molecular weight, lb/lb mole

$$MW_{dry} = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2)$$

$$MW_{wet} = MW_{dry}(1 - B_{wo}) + 18(B_{wo})$$

e. Absolute stack pressure, in Hg

$$P_s = P_{bar} + \frac{P_{sg}}{13.6}$$

~~f. Stack velocity, ft/sec~~

N/A

~~$V_s = 2.90 C_p \sqrt{\Delta P_s} \sqrt{\left(\frac{29.92}{P_s}\right)\left(\frac{28.96}{MW_{wet}}\right)}$~~

~~g. Actual stack flow rate, wacfm~~

~~$Q = (V_s)(A_s)(60)$~~

h. Standard stack gas flow rate, dscfm

$$Q_{sd} = Q(1 - B_{wo})\left(\frac{T_{ref}}{T_s}\right)\left(\frac{P_s}{29.92}\right)$$

i. Percent isokinetic

$$I = \left(\frac{17.32(T_s)(V_{mstd})}{(1 - B_{wo})(\theta)(V_s)(P_s)(D_n^2)}\right)\left(\frac{528°R}{T_{ref}}\right)$$

~~2. Particulate Emissions~~

2. EPA Method 19

~~a. Grain loading, gr/dscf~~

~~$C = 0.01543\left(\frac{M_n}{V_{mstd}}\right)$~~

$E = \frac{\text{Inlet Gas Flow}}{\text{scfm}} \times \text{EPA F Factor} \times \frac{\text{mmbtu}}{\text{scf}}\left(\frac{20.9}{20.9 - O_{2\,exhaust}}\right)$

N/A

~~b. Grain loading at 12% CO_2, gr/dscf~~

~~$C_{12\%CO_2} = C\left(\frac{12}{\%CO_2}\right)$~~

~~c. Mass emissions, lb/hr~~

~~$M = C(Q_{sd})\left(\frac{60\,min/hr}{7000\,gr/lb}\right)$~~

3. Gaseous Emissions, lb/hr

$$M = (ppm)(10^{-6})\left(\frac{MW_i\,lb/lbmole}{SV}\right)(Q_{sd})(60\,\text{min}/hr)$$

where,

SV= specific molar volume of an ideal gas:

SV= 385.3 ft^3/lb mole for T_{ref} = 528°R

SV= 379.5ft^3/lb mole for T_{ref} = 520°R

4. Emissions Rates, lb/10^6 Btu

a. Fuel factor at 68°F, dscf/10^6 Btu at 0% O_2

$$F_{68} = \frac{10^6\left[3.64(\%H) - 1.53(\%C) - 0.14(\%N) - 0.57(\%S) - 0.46(\%O_2 fuel)\right]}{HHV, Btu/lb}$$

b. Fuel factor at 60°F

$$F_{60} = F_{68}\left(\frac{520°R}{528°R}\right)$$

c. Gaseous Emissions factor

$$\left(\frac{lb}{10^6 Btu}\right)_i = (ppm)_i\left(10^{-6}\right)\left(\frac{MW_i lb}{lbmole}\right)\left(\frac{1}{SV}\right)(F)\left(\frac{20.9}{20.9 - \%O_2}\right)$$

d. Particulate emission factor

$$\left(\frac{lb}{10^6 Btu}\right) = C\left(\frac{1lb}{7000gr}\right)(F)\left(\frac{20.9}{20.9 - \%O_2}\right)$$

Nomenclature:

A_s = stack area, ft^2

B_{wo} = flue gas moisture content

$C_{12\%CO_2}$ = particulate grain loading, gr/dscf corrected to 12% CO_2

C = particulate grain loading, gr/dscf

C_p = pitot calibration factor, dimensionless

D_n = nozzle diameter, in.

F = fuel F factor, dscf/10^6 Btu at 0% O_2

H = orifice pressure differential, iwg

I = % isokinetics

M_n = mass of collected particulate, mg

M_i = mass of emissions of species I, lb/hr

MW = molecular weight of flue gas

MW_i = molecular weight of species i:

NO_x	:	46
CO	:	28
SO_x	:	64
HC	:	16

θ = sample time, min.

ΔP = average velocity head, iwg = $\left(\overline{\sqrt{\Delta P}}\right)^2$

P_{bar} = barometric pressure, in.Hg

P_s = stack absolute pressure, in.Hg

P_{sg} = stack static pressure, iwg

Q = wet stack gas flow rate at actual conditions, wacfm

Q_{sd} = dry stack gas flow rate at standard conditions, dscfm

SV = specific molar volume of an ideal gas at standard conditions, ft^3/lb mole

T_m = meter temperature, °R

T_{ref} = reference temperature, °R

T_s = stack temperature, °R

V_s = stack velocity, ft/sec

V_{lc} = volume of liquid collected in impingers, ml

V_m = dry meter volume uncorrected, dcf

$V_{m\,std}$ = dry meter volume at standard conditions, dscf

$V_{w\,std}$ = volume of water vapor at standard conditions, scf

Y = meter calibration coefficient