KERN COUNTY AIR POLLUTION CONTROL DISTRICT

AUTHORITY TO CONSTRUCT

1601 "H" Street, Suite 150
Bakersfield, California 93301-5199
Telephone: (805) 861-3682

LEON M. HEBERTSON, M.D.
Director of Public Health
Air Pollution Control Officer

ISSUE DATE: November 2, 1987	APPLICATION NO. 0083002
EXPIRATION DATE: November 2, 1989	DATE: June 5, 1987

AUTHORITY TO CONSTRUCT IS HEREBY GRANTED TO:

PACIFIC ENERGY RESOURCES, INC.

In the event an AUTHORITY TO CONSTRUCT is reissued to a new owner, any emissions increase assigned to this equipment during the initial New Source Review Process remains with the initial bearer of this document.

AUTHORITY TO CONSTRUCT IS HEREBY GRANTED FOR:

Modification to Existing I.C. Engine Permit:
Nonidentical Replacement of I.C. Engine

L-XP
NOT TESTED

(See attached sheets for equipment description and conditions)

S	T	R	Location:	Start-up Inspection Date:
10	29S	28E	Bakersfield Landfill	

Upon completion of construction and/or installation, please telephone the Manager of Engineering Evaluation. This document serves as a TEMPORARY Permit to Operate only as provided by Rule 201 of the District's Rules and Regulations. For the issuance of a Permit to Operate, Rule 208 requires that the equipment authorized by this AUTHORITY TO CONSTRUCT be installed and operated in accordance with the conditions of approval. Changes to these conditions must be made by application and must be approved before such changes are made. This document does not authorize the emission of air contaminants in excess of New Source Review limits (Rule 210.1) or Regulation IV emission limits. Emission testing requirements set forth in this document must be satisfied before a Permit to Operate can be granted.

Validation Signature:

Manager of Engineering Evaluation

0083002
Continued

EQUIPMENT DESCRIPTION: Modification to Existing I.C. Engine Permit: Nonidentical Replacement of I.C. Engine, including the following equipment and design specifications:

Superior, model 12-SGTA, twelve cylinder, turbo charged, clean burn, gas-fired internal combustion engine driving electrical generator (1.415 MW). (new)

CONDITIONAL APPROVAL:

Pursuant to Rule 209, "conditional approval" is hereby granted. Please be aware that all conditions of approval remain in effect for life of project unless modified by District.

DESIGN CONDITIONS:

1. Engine shall be equipped with fuel gas flowmeter. (Rule 209)
2. Engine shall be equipped with automatic air/fuel controller. (Rule 209)
3. Engine shall be of lean burn design with precombustion chamber for each cylinder. (Rule 209)

OPERATIONAL CONDITIONS:

a. Only landfill gas and natural gas shall be used as fuel, and use shall not exceed 600 scfm. (Rule 210.1)
b. Natural gas fuel use shall not exceed 120 scfm, and total fuel use shall not exceed 800 scfm. (Rule 210.1)
c. Sulfur compound concentration of fuel gas shall not exceed 20 ppmv. (Rule 210.1)
d. Engine shall operate in lean-burn mode at approximately 200-300% theoretical combustion air. (Rule 210.1)
e. Air to fuel ratio shall be determined by manual exhaust gas sample on at least weekly basis. (Rule 209)
f. Engine shall operate without visible emissions or source test shall be required to document particulate matter emission rate. (Rule 210.1)
g. Oxides of nitrogen emissions shall not exceed 1.5 gm/bhp-hr. (Rule 210.1-BACT requirement)
h. Flare shall not be operated when this engine is operated. (Rule 210.1)

EMISSION SAMPLING LIMITS:

Particulates:	0.18 lbm/hr (Rule 210.1)
Sulfur Dioxide:	0.16 lbm/hr (Rule 210.1)
Sulfates:	0.00 lbm/hr (Rule 210.1)
Oxides of Nitrogen:	8.25 lbm/hr (Rule 210.1)

0083002
Continued

Hydrocarbons: 4.90 lbm/hr (Rule 210.1)

Carbon Monoxide: 24.75 lbm/hr (Rule 210.1)

COMPLIANCE TESTING REQUIREMENTS:

Compliance with oxides of nitrogen, hydrocarbons and carbon monoxide emission sampling limits shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days after startup of this equipment and annually 60 days prior to permit anniversary date and official test results and field data submitted within 30 days thereafter. (Rule 108.1)

Compliance with SO2 emission sampling limit shall be demonstrated by fuel gas sulfur content analysis performed by independent testing laboratory at time of stack gas sampling. (Rule 108.1)

SPECIAL CONDITIONS:

aa. Pacific Energy Resources, Inc. shall maintain records of air to fuel ratio measurement (Operational Condition e) and shall make such records readily available for District inspection upon request. (Rule 210.1)

bb. Permit to Operate #0083001 is hereby cancelled. (Rule 210.1)

RULE 210.1 (NSR) ANALYSIS VALIDATION:

Maximum daily emission rate of each air contaminant from entire stationary source shall not exceed daily amount shown as "proposed" on attached emission profiles.

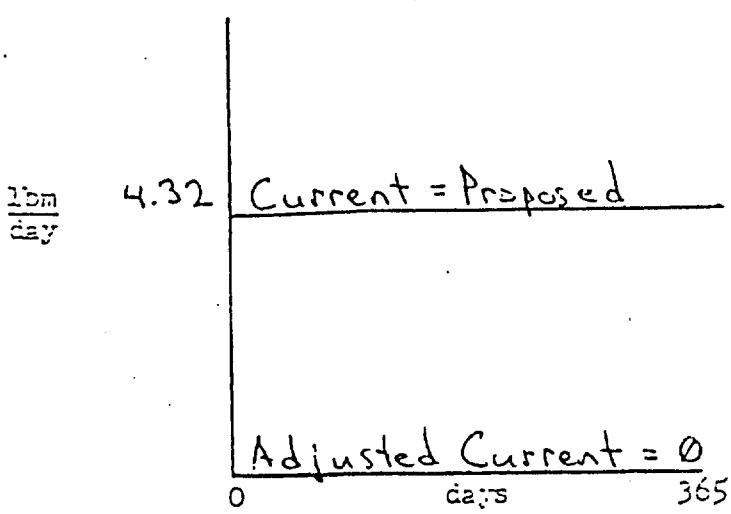
Maximum average monthly emission rate of each air contaminant from entire stationary source shall not exceed number of days in month times daily amount shown as "proposed" on attached emission profiles. Average monthly emission rate shall be determined at end of each month by averaging previous 12 months of operation (fewer than 12 if new or seasonal source).

Compliance with these emission limits shall be verified by source operator (with fuel consumption data, operational data, etc.) on daily basis (maximum daily emission rate) and on monthly basis (maximum average monthly emission rate) and written documentation made readily available to District for period of one year.

RULE 210.1 (NSR) SPECIFIC LIMITING CONDITIONS:
(See attached emission profiles)

EMISSION PROFILES

P.M.



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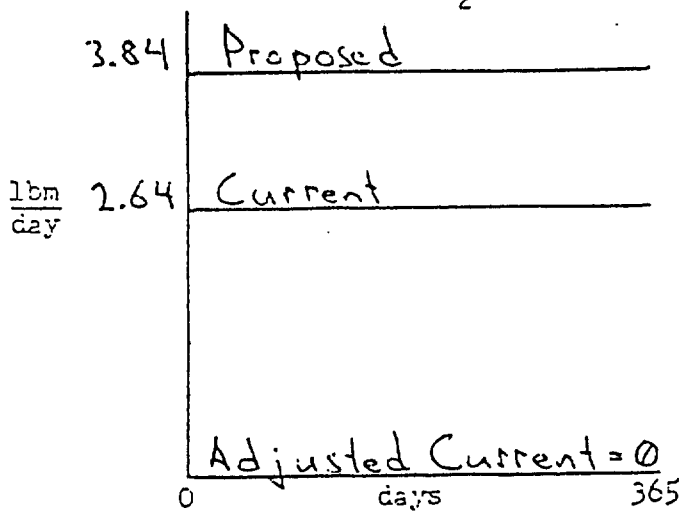

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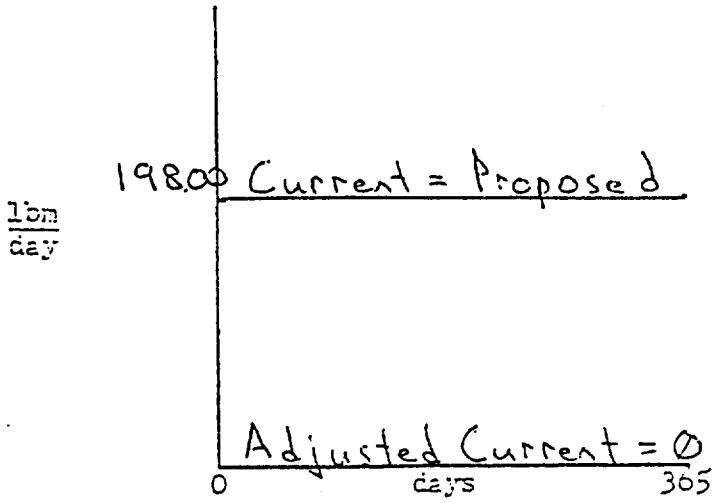

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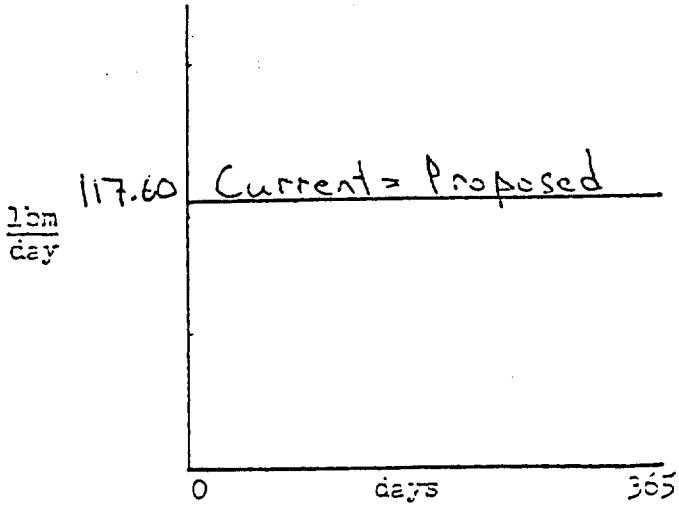

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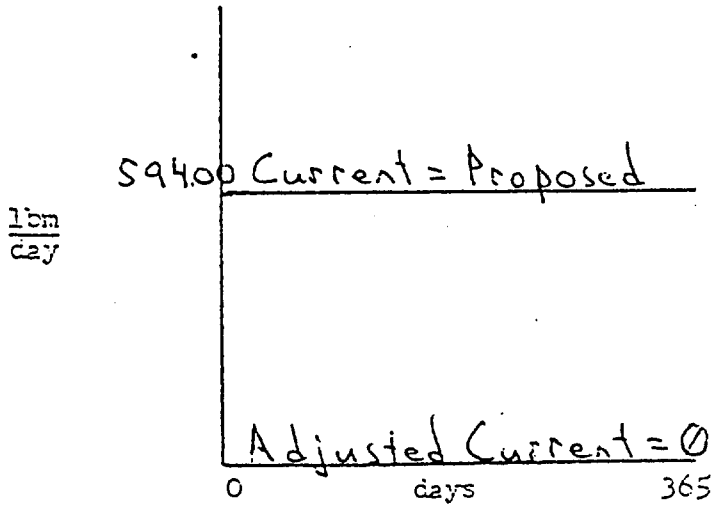
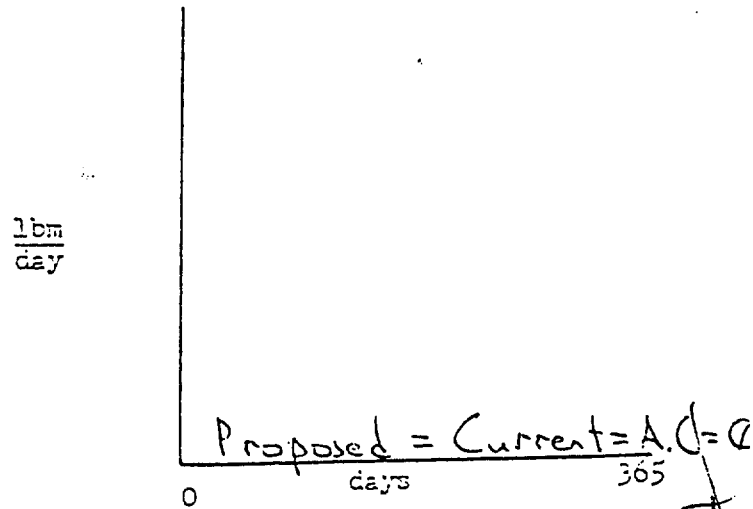


SO_4



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PACIFIC ENERGY

Landfill Gas Engine Exhaust Emission Test Report

PLANT: BAKERSFIELD LANDFILL UNIT #1			APCD#: A to C 0083001		
TEST DATE: DEC. 4, 1990	TESTING LAB: Petro-Chem Environmental		TECHNICIAN: Mr. James Taplin		
KW LOAD(GKW): 1750	RATED HP: 2500		TOTAL TEST KWHRS: 5250		
STACK TEMP: 906	STACK MOISTURE % VOLUME: 14.03		FLOW DSCFM: 5586		
TEST PARAMETER	**PERMIT LIMITS**	**Test Run #1**	**Test Run #2**	**Test Run #3**	**AVG. RESULT**
FUEL FLOW (SCFM)	800	781	785	785	784
Excess Air	200-300%				
O2 %		8.24	8.00	8.03	8.09
PARTICULATE					
gr/SCF		0.008831	0.032105		0.020468
gr/SCF @ 12%O2		0.011201	0.040026		0.0256135
lbs/hr	0.18 lb/hr	0.50	1.78		1.14
SULFATE					
gr/SCF		0.002590	0.004183		0.0033865
gr/SCF @ 12%O2		0.003285	0.005215		0.00425
lbs/hr	0.00 lbs/hr	0.14	0.23		0.185
SO2 (wet) *					
ppm		2.40	1.30		1.85
ppm @ 3%O2		3.90	2.10		3.00
lbs/hr	0.11 lb/hr	0.16	0.08		0.120
NOx					
ppm		140.8	138.6	144.3	141.2
ppm @ 3%O2		199.1	192.3	200.6	197.3
ppm @ 15%O2		65.6	63.4	66.1	65.0
lbs/hr	8.25 lbs/hr	5.77	5.60	5.84	5.74
g/Bhp-Hr	1.5 g/BHP-hr	0.9885	0.9594	1.0005	0.9828
Non-Methane Hydrocarbons					
ppm		56.9	53.3	59.8	56.7
ppm @ 3%O2		80.5	74.0	83.2	79.2
lbs/hr	4.9 lbs/hr	0.81	0.759	0.85	0.806
Carbon Monoxide					
ppm		347	354	343	348
ppm @ 3% O2		491	491	477	487
lbs/hr	24.75 lbs/hr	8.7	8.71	8.47	8.61
TEST COORDINATOR	Terence Hee 213-725-1139				
SITE CONTACT	Almo Pladson 805-872-5341				

* Particulate, sulfate, SO2, calculated by wet chemistry techniques, not required by KCAPCD.

SUMMARY OF ENGINEERING TEST RESULTS

COMPANY: PACIFIC ENERGY APCD #: A to C #0083001

TEST DATE: DECEMBER 4, 1990 UNIT #: BAKERSFIELD LANDFILL UNIT #1

EMISSIONS

	gr/scf	@12%CO2	ppm	3% O2	lb/hr	g/BHP-hr	Permit Limits
PARTICULATE	0.008831	0.011201			0.50		
	0.032105	0.040026			1.78		
							0.18 lb/hr
Mean:	0.020468	0.025614			1.14		
SULFATE	0.002590	0.003285			0.14		
	0.004183	0.005215			0.23		0.00 lb/hr
Mean:	0.003387	0.004250			0.19		
SO2 (wet) *			2.40	3.90	0.16		
			1.30	2.10	0.08		0.11 lb/hr
Mean:			1.85	3.00	0.12		
NOx (dry)			140.82	199.10	5.77	0.9885	
			138.60	192.30	5.60	0.9594	8.25 lb/hr
			144.26	200.60	5.84	1.0005	
							1.5 g/BHP-hr
Mean:			141.23	197.33	5.74	0.9828	
NMHC			56.90	80.45	0.81		
			53.30	73.96	0.76		
			59.80	83.17	0.85		4.9 lb/hr
Mean:			56.67	79.19	0.81		
CO			347.29	491.00	8.66		
			354.09	491.30	8.71		
			343.32	477.40	8.47		
							24.75 lb/hr
Mean:			348.23	486.57	8.61		

Comments: * Particulate, sulfate, and SO2 calculated by wet chemistry techniques, not required by KCAPCD.

For Kern County Use Only: ANNUAL 210.1 - 16 Cyl Waste Gas F Drive For 1.975 M.W Elect Gen.

APN. 2/13/91

COMPANY : PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

DESTRUCTION REMOVAL EFFICIENCY OF HYDROCARBONS

OUTLET C1-C6+ TOTAL HYDROCARBON ANALYSIS

RUN #		INLET LB/HR	C1-C6+ OUTLET LB/HR	DRE % REDUCTION
#1		880.43	19.30	97.8
#2		880.43	19.25	97.8
#3		880.43	19.34	97.8

INTRODUCTION

On December 4th, 1990, Petro-Chem Environmental Services (PCES) performed an engineering test for PACIFIC ENERGY. The unit tested was at the Bakersfield Landfill, Engine #1. Testing was to determine the emissions of Particulate, NOx, CO, and hydrocarbons. The following parameters were tested using the following procedures:

Parameter	Methods	# of Tests
Particulate	EPA Method 5 Gravimetric	2
SO_2, SO_4	EPA Method 5/8; Gravimetric & Titrametric	2
%O2, N2, CO2	EPA Method 3 ORSAT Analysis	2
NOx	CARB 1-100; TECO Analyzer Chemiluminescent	3 - 40 min
CO	CARB 1-100; CO Analyzer	3 - 40 min
Hydrocarbons	Method 18 Gas Chromatograph	3
Fuel Gas	ASTM; Elemental Analysis	1
Removal Efficiency (%)	Mathmatical Calculation	

All testing was performed by Mr. James Taplin, Mr. Bob Martin, and Mr. Ric Williams of Petro-Chem Environmental Services. The fuel analysis was performed by Pacific Gas Technology and Zalco Laboratories of Bakersfield, CA. Mr. Almo Pladson of Pacific Energy supervised the operation of the test unit.

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

FIELD DATA @ 60° F

	RUN #:	1	2	
	TIME:	1115	1315	average
Vm (dry gas sampled)		50.43	47.99	
Y (meter calib. factor)		1.004138	1.004138	
P bar (Barometric pressure)		29.8	29.8	
P static (stack pressure, " H2O)		14	14	
Delta H (differential meter press, " H2O)		1.09	1.19	
Tm (meter temperature, R')		521	522	
Vol H2O mls		176.7	168.9	
Vm(std),dscf		50.47	47.95	
Bws-H2O vapor		0.1399	0.1406	0.14025
MF-moisture factor		0.8601	0.8594	0.85975
% CO2		11	11.2	
% O2		8	8	
% N2		81	80.8	
Md-MW stk gas,dry		30.08	30.11	
Ms-MW stk gas,wet		28.39	28.41	
Cp-pitot tube		0.84	0.84	
Avg sq rt ^p		1.918	1.977	
T stack, R'		1364	1367	
Stack area,ft2		1.67	1.67	
Vs-fps		171.94	177.36	174.65
Qstd-dscfm *		5821	5986	5904
Area noz.ft2		2.14E-04	2.14E-04	
Sample time		60	60	
% Isokinetic		112.9	104.3	

*All emissions are based on DSCFM calculated from fuel usage.

COMPANY : PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

RUN #1

EPA METHOD 5/8

@ 60°F

PARTICULATE RESULTS:	net mg	gr/dscf	gr/scf	gr/dscf @ 12% CO2	lbs/hr
Probe & Nozzle:	2.4	0.000732	0.000629	0.000798	0.04
Filter:	8.05	0.002456	0.002112	0.002679	0.12
Condensables:	23.2	0.007079	0.006088	0.007722	0.34
Total:	33.65	0.010267	0.008831	0.011201	0.50

SULFATE RESULTS:	Vol aliq	Vt	gr/dscf	gr/scf	gr/dscf @ 12% CO2	lbs/hr
Probe & Nozzle:	5	0	0	0	0	0
Filter:	10	0.64	0.000909	0.000782	0.000991	0.04
Condensables:	20	0.74	0.002102	0.001808	0.002293	0.1
		Total:	0.003011	0.002590	0.003285	0.14

SULFUR DIOXIDE RESULTS:

N BaCL	Vs/Va	dilution	Vt	ppm,dry	ppm,wet	ppm,dry @ 3% O2	lbs/hr
0.0096	20	1	1.77	2.8	2.4	3.9	0.16

ADDITIONAL DATA:

TIME

start	finish	%O2	%CO2	%H2O	Vm(std)	SDCFM
1115	1220	8	11	13.99	50.47	5630

COMPANY : PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

RUN #2

EPA METHOD 5/8

@ 60°F

PARTICULATE RESULTS:	net mg	gr/dscf	gr/scf	gr/dscf @ 12% CO2	lbs/hr
Probe & Nozzle:	6.9	0.002216	0.001904	0.002374	0.11
Filter:	33.42	0.010733	0.009224	0.011500	0.51
Condensables:	76	0.024408	0.020976	0.026152	1.16
Total:	116.32	0.037358	0.032105	0.040026	1.78

SULFATE RESULTS:	Vol aliq	Vol samp Vt	gr/dscf	gr/scf	gr/dscf @ 12% CO2	lbs/hr
Probe & Nozzle:	5	0.33	0.000246	0.000212	0.000264	0.01
Filter:	10	0.63	0.000942	0.000809	0.001009	0.04
Condensables:	20	1.23	0.003678	0.003161	0.003941	0.18
Total:			0.004867	0.004183	0.005215	0.23

SULFUR DIOXIDE RESULTS:

N BaCL	Vs/Va	dilution	Vt	ppm,dry	ppm,wet	ppm,dry @ 3% O2	lbs/hr
0.0096	20	1	0.92	1.5	1.3	2.1	0.08

ADDITIONAL DATA:

TIME

start	finish	%O2	%CO2	%H2O	Vm(std)	SDCFM
115	215	8	11.2	14.06	47.95	5557

SAMPLING AND ANALYTIC PROCEDURES

REF: EPA Code of Federal Regulations, Title 40, Part 60, Appendix A.
Method 1, 2, 3, 4, 5, and 8

Method 5: Sampling Apparatus

The sampling apparatus consisted of a nozzle, heater wrapped probe, and heated filter holder (see data sheets for type of nozzle, probe, and filter holder). The filter was connected to a heated teflon filter-to-impinger line. A series of impingers (see data sheet for type and contents) were connected in tandem and immersed in an ice bath. The absorption train was followed by a gas pump, dry test meter, and a calibrated restriction orifice fitted with a magnehelic differential pressure gauge. A type 'S' pitot tube and temperature probe was positioned along side the probe terminating at the sample nozzle for monitoring duct conditions throughout the test.

EPA Method 1: Sampling and Velocity Traverses for Stationary Sources

Prior to the source test a site accessment was performed in order to locate sample points for obtaining the best representative measurements of pollution concentrations and volumetric flow rates. EPA Method 1 takes into account duct area, straight run and cyclonic or stratified flow patterns.

EPA Method 2: Velocity and Volumetric Flow Rates

A computer was used in selection of suitable sample/traverse points. The calibrated pitot tube was connected to a magnehelic gauge and leak checked. A temperature and delta-P was recorded at each traverse point and a duct static pressure was measured and recorded. A volume flow rate was calculated from the measured required traverse points.

EPA Method 3: % CO2, % O2, Dry Molecular Weight

Concurrent with each particulate sampling, an integrated gas sample was withdrawn from the summation of the traverse points through the train and collected at the outlet of the meter into a sample bag. The contents of the sample bladder were analyzed by Orsat for fixed gas composition.

EPA Method 4: Percent Water

Tare weights of the charged individual impingers were recorded. After sampling, the final weights were recorded. Percent water was calculated from the weight of water collected and the dry gas volume sampled.

EPA Method 5: Particulate Emissions

A series of preliminary measurements was made prior to conducting the particulate test. EPA Methods 1, 2, and 3 were performed to determine location and number of traverse points, average gas velocity, and pressure and gas molecular weight. Percent water was determined by a psychrometric chart and from combustion analysis of the fixed gases. The results of these measurements were entered into the field computer and an appropriate nozzle size for isokinetic sampling was determined.

The Method 5 apparatus was prepared on-site in the mobile laboratory. The absorption train was charged with freshly prepared chemicals, weighed on a calibrated digital balance to the nearest 0.1 grams, and assembled. The probe was brushed out and rinsed with distilled water and acetone and the filter holder was charged. The sampling apparatus was sealed and transported to the sampling site where it was assembled and leak tested at 15 inches mercury vacuum.

Probe, filter, and impinger line heaters were set at 250 degrees F and the probe was positioned into the duct at the first traverse point with the nozzle out of the flow.

The nozzle was positioned into the gas flow and the vacuum pump was started immediately and adjusted to obtain an isokinetic sample rate. A complete traverse was performed while sampling at a minimum of two minutes per sample point. Upon completion of the traverse the vacuum pump was turned off and the probe was transferred into the next sample port where an identical sample-traverse was performed. Duct conditions (temperature, delta-P) and sampling conditions (meter temperature, volume and pressure, probe, filter, sample line and impinger temperatures, and absorption train vacuum) were monitored and recorded regularly for each sample point.

Upon completion of sampling, the apparatus was leak tested at a vacuum greater than the highest observed vacuum. The leak was recorded and the apparatus was sealed and transported to the mobile laboratory. The heated filter-to-impinger line was rinsed with a known amount of distilled water into the first impinger.

The filter and any loose particulate was carefully removed from the filter holder with tweezers. It was then placed in a labeled petri dish and transported to the P.C.E.S. laboratory. The nozzle, probe, and filter top housing was rinsed and brushed three times with distilled water and acetone. The sample

fractions were combined, bottled, labeled, and fluid level marked for transportation to the P.C.E.S. laboratory. Aliquots of acetone and distilled water were similarly treated for blank analysis.

The absorption train was inspected for abnormalities and disassembled. The impingers were weighed on a digital balance for a percent moisture determination. The contents of the impingers were quantitatively transferred into separate bottles, sealed, labeled, and fluid level marked for transportation to the P.C.E.S. laboratory of analysis, if required. Aliquots of the reagent grade impinger contents were saved for blank analysis.

The filter was transferred to an oven and heated at 105 degrees C for 2-3 hours and then placed in a desiccator for 24 hours. The filter was then weighed on a Mettler digital balance to the nearest 0.01 mg. Additional six hour desiccations and weighings were performed until the difference between consecutive weighings was less than 0.5 mg or one percent of the total filtrate weight (weighed to a constant weight).

The nozzle/probe/filter top wash was examined for any leakage during transportation and transferred to a tared evaporation dish. The wash was then evaporated at an elevated temperature, below the boiling point of the wash, with occasional swirling. The dish and wash residue were then desiccated and weighed to a constant weight.

If required by the regulatory agency, the contents of the first impinger were recovered and diluted volumetrically to a known volume. An aliquot of this sample was then evaporated, desiccated, and then weighed to a constant weight.

The net weight of particulate was calculated from the two fractions (three fractions including the impinger contents, if required). Concentrations (gr/DSCF) and emissions (lb/hr) or other applicable units were then calculated and reported.

EPA Method #8: Sulfuric Acid Mist and Sulfur Dioxide Emissions

The sampling equipment was prepared and sampling was performed as described in EPA Method 5. The absorption train contained 80 % isopropyl alcohol in the first impinger, 3 % hydrogen peroxide in the second and third impingers, a dry empty knock-out, and an impinger containing 8-16 mesh indicating silica gel. In addition to a heated filter upstream of the first impinger, a dry glass fiber filter de-mister was positioned between the first and second impingers to avoid any sulfuric acid mist carryover.

Upon completion of sampling, the sample train was purged with clean filtered ambient air in the mobile laboratory for fifteen minutes at the average sampling rate.

ANALYSIS

The probe/nozzle/filter housing was washed as per Method 5 and quantitatively transferred to a clean labeled bottle.

The impingers contents were inspected for any abnormalities and weighed for purposed of percent water determination. the IPA sample was quantitatively transferred into a clean labeled bottle and the fluid level was marked. The de-mister was removed from its holder and transferred to a petri dish. The front half of the de-mister holder was rinsed with distilled water and the rinsings combined with the IPA sample. In the P.C.E.S. laboratory, the IPA sample was transferred to a volumetric flask. The de-mister was washed with distilled water through Whatman #40 filter paper into the volumetric flask to extract any sulfuric mist carryover. The contents were then diluted to volume and saved for analysis.

The contents of two peroxide impingers and dry knockout were quantitatively transferred into a clean labeled bottle and the fluid level marked for transportation to the P.C.E.S. laboratory.

SULFURIC ACID MIST (H_2SO_4):

Sulfuric acid mist was analyzed from three fractions of the Method 8 sampling apparatus: 1. The nozzle/probe/filter housing rinse, 2. The filter extract, and 3. The IPA impinger contents.

At the P.C.E.S. laboratory the fraction #1 was evaporated for gravimetric analysis of particulate. The residue was then extracted with distilled water and diluted to a known volume. An aliquot was passed through an ion exchange column to remove any interfering species and titrated for sulfuric acid with freshly standardized barium chloride to a thorin end point. Fraction #2 was heated and desiccated and weighed for gravimetric analysis of particulate. The filter was then extracted with 100 mls of 80 % IPA and an aliquot passed through an ion exchange column and titrated with barium chloride to a thorin end point. An aliquot of fraction #3 was titrated with barium chloride to a thorin end point. All titrations were performed and replicated to an accuracy of .05 mls or one percent.

The gravimetric equivalent of sulfuric acid mist was calculated from the sum of the three fractions. Concentrations(gr/DSCF) and emissions (lb/hr) or other applicable units were then calculated and reported. An aliquot blank IPA was similarly treated and reported.

SULFUR DIOXIDE (SO2):

Sulfur dioxide was analyzed by a sulfuric acid analysis of the peroxide fraction of the Method 8 sampling apparatus.

At the P.C.E.S. laboratory the peroxide fraction was diluted volumetrically to a known volume. Any serial dilutions were performed, if necessary. An aliquot of the final dilution was then titrated against freshly standardized barium chloride to a thorin end point. The titration was performed in replicate to an accuracy of 0.02 mls or one percent.

The concentrations (ppm) and emissions (lb/hr) of sulfur dioxide were calculated from the titrametric equivalent of SO2. An aliquot of blank peroxide was similarly treated and reported.

METHOD 2 STACK GAS VELOCITY AND VOLUMETRIC FLOWRATE

Average Stack Gas Velocity

$$Pg = \frac{\text{Static Pressure, "}H_2O\text{"}}{13.6}$$

$$Ps = P_{bar} + Pg$$

$$Vs = K_p C_p \left(\sqrt{\Delta p}\right)_{avg} \sqrt{\frac{T_{s(avg)}}{P_s M_s}} \qquad \text{Eq. 2-9}$$

Average Stack Gas Dry Volumetric Flow Rate

$$Q_{std} = 60 (1-B_{ws}) v_s A \left(\frac{T\ std}{Ts\ (avg)}\right) \left(\frac{Ps}{Pstd}\right) \qquad \text{Eq. 2-10}$$

$$\frac{Q_{std}}{MF} = scfm$$

METHOD 3 DRY MOLECULAR WEIGHT OF STACK GAS

$$Md = 0.440\ (\%CO_2) + 0.320\ (\%O_2) + 0.280\ (\%N_2 + \%CO) \qquad \text{Eq. 3-2}$$

Wet Molecular Weight of Stack Gas

$$M_s = Md\ (1-B_{ws}) + 18\ (B_{ws})$$

METHOD 4. DETERMINATION OF MOISTURE CONTENT IN STACK GASES (Use when a moisture train is run separately from other pollutant measurements.)

Volume of Water Vapor Condensed

$$V_{wc(std)} = \frac{(V_f - V_i)\rho_w RT_{(std)}}{P_{std} M_w} = K_1 (V_f - V_i) \qquad \text{Eq. 4-1}$$

Where $K_1 = 0.04646\ ft^3/ml$ @ 520°R

Volume of Water Vapor Collected in Silica Gel

$$V_{wsg(std)} = \frac{(V_f - W_i) R\ T_{std}}{P_{std} M_w (453.6\ g/lb)} = K_2(W_f - W_i) \qquad \text{Eq. 4-2}$$

Where $K_2 = 0.04651\ ft^3/g$ @ 520°R

Sample Gas Volume

$$V_{m(std)} = V_m Y \frac{(P_m)(T_{std})}{(P_{std})(T_m)} = K_3 Y \frac{V_m P_m}{T_m} \qquad \text{Eq. 4-3}$$

Where $K_3 = 17.38$ °R/in Hg @ 520°R

Moisture Content

$$B_{ws} = \frac{V_{wc(std)} + V_{wsg(stg)}}{V_{wc(std)} + V_{wsg(stg)} + V_{m(stg)}} \qquad \text{Eq. 4-4}$$

$B_{ws} \times 100 = \%H_2O$ in gas stream

$MF = 1 - B_{ws}$

METHOD 5 DETERMINATION OF PARTICULATE EMISSIONS FROM STATIONARY SOURCES (Use in Method 5 and 8 combination runs.)

Dry Gas Volume

$$V_{m(std)} = V_m Y \left(\frac{T\ std}{Tm}\right) \left[\frac{P\ bar + \frac{\Delta H}{13.6}}{P\ std}\right] = K_1 V_m Y \left[\frac{P\ bar + \left(\frac{\Delta H}{13.6}\right)}{Tm}\right] \quad \text{Eq. 5-1}$$

$$= K_1 = 17.38\ ^\circ R/in\text{-}Hg\ @\ 520^\circ R$$

*In case of leak rate beyond allowable limits, correct Eq. 5-1 as follows:

case 1. No component changes made during run.

$$V_m = V_m - (Lp - La)\,\Theta$$

case 2. One or more component changes made during run.

$$V_m = \left[V_m - (L_1 - L_a)\,\Theta - \sum_{i=2}^{n} (L_i - L_a)\,\Theta_i - (L_p - L_a)\,\Theta_p\right]$$

Volume of Water Vapor

$$V_{wc(std)} = V_{lc}\left(\frac{\rho_w}{M_w}\right)\left(\frac{RTstd}{Pstd}\right) = K_2\, V_{lc} \quad \text{Eq. 5-2}$$

Where $K_2 = 0.04646\ ft^3/ml\ @\ 60^\circ F$

Moisture Content

$$B_{ws} = \frac{V_{wc(std)}}{V_{m(std)} + V_{wc(std)}} \quad \text{Eq. 5-3}$$

METHOD 5 Continued:

Acetone Blank Concentration

$$C_a = \frac{m_a}{V_{ab}\rho_a} \qquad \text{Eq. 5-4}$$

Acetone Wash Blank

$$W_a = C_a V_{aw}\rho_a \qquad \text{Eq. 5-5}$$

Particulate Concentration

$$C_s = (0.001 \text{ g/mg}) \left(m_n / V_{m(std)}\right) (15.432) = \text{gr/dscf} \qquad \text{Eq. 5-6}$$

gr/dscf (MF) = gr/scf

Corrected to 12% CO_2

$$\frac{\text{gr/dscf} \times 12}{\%\ CO_2 \text{ (dry)}} = \text{gr/dscf @ 12\% } CO_2 = \text{gr/scf @ 12\% } CO_2$$

Isokinetic Variation

$$\%\ I = 100 \times \frac{T_s \left[V_{lc} K_3 + V_{m/T_m} \left(P_b + \frac{H}{13.6}\right)\right]}{60\ \Theta\ A_n\ V_s\ P_s}$$

Where $K_3 = 0.002669$

Mass Emission Rate

gr/dscf x dscfm x 60m/hr x 1 lb/7000 gr = lb/hr.

EPA METHOD 8 DETERMINATION OF SULFURIC ACID MIST AND SULFUR DIOXIDE EMISSIONS FROM STATIONARY SOURCES.

Sulfate Calculations

$$C_{H_2SO_4} = K_1 \frac{N\left(V_t - V_{tb}\right)\left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} = \text{lb/dscf} \qquad \text{Eq. 8-2}$$

Where $K_1 = 1.081 \times 10^{-4}$ lb/meq

OR: $K_1 N \left(V_t - V_{tb}\right)\left(\frac{V_{soln}}{V_a}\right)(7000) = \text{grains}$

$$\text{grains}_{(nozzle)} + \text{grains}_{(filters)} + \text{grains}_{(cond)} = \text{grains}_{(total)}$$

$$\frac{\text{grains}_{(total)}}{V_{m(std)}} = \text{gr/dscf}$$

$$(\text{gr/dscf})\ (Qstd)\ (60)\ (1/7000) = \text{lb}_{H_2SO_4}/\text{hr}$$

$$(\text{gr/dscf})\ (MF) = \text{gr/scf}$$

Corrected to 12% CO_2

$$\frac{\text{gr/dscf} \times 12}{\%CO_2\ (\text{dry})} = \text{gr/dscf @ 12\% } CO_2 = \text{gr/scf @ 12\% } CO_2$$

T_s = Absolute stack temperature, (460° + t_s)

V_a = Volume of sample aliquot titrated, (ml)

V_{ab} = Volume of acetone blank, ml

V_m = Dry gas volume measured by dry gas meter, (dcf)

$V_{m(std)}$ = Dry gas volume measured by dry gas meter, corrected to standard conditions, (dscf)

$V_{wc(std)}$ = Volume of water vapor condensed corrected to standard conditions, (scf)

$V_{wsg(std)}$ = Volume of water vapor collected in silica gel corrected to standard conditions (scf)

V_{lc} = Volume of water vapor condensed in impingers and silica gel, (ml)

V_f = Final volume of condensed water, ml

V_i = Initial volume of condensed water, ml

v_s = Average stack gas velocity, (ft/sec)

V_{soln} = Total volume of solution in which the sulfur dioxide sample is contained (ml)

V_t = Volume of barium perchlorate titrant used for the sample, (ml)

V_{tb} = Volume of barium perchlorate titrant used for the blank, (ml)

W_f = Final weight of silica gel or silica gel plus impinger, (g)

W_i = Initial weight of silica gel or silica gel plus impinger, (g)

Y = Dry gas meter calibration factor

ρ_w = Density of water, (0.002202 lb/ml @ 60°F)

ρ_a = Density of acetone, (g/ml)(see bottle label)

MF = Moisture factor

$\%CO_2$ = Percent CO_2 by volume (dry basis)

$\%O_2$ = Percent O_2 by volume (dry basis)

%CO = Percent CO by volume (dry basis)

$\%N_2$ = Percent N_2 by volume (dry basis)

0.264	=	Ratio of O_2 to N_2 in air v/v
0.280	=	Molecular weight of N_2 or CO, divided by 100
0.320	=	Molecular weight of O_2, divided by 100
0.440	=	Molecular weight of CO_2, divided by 100
60	=	Conversion factor, (sec/min)
18.0	=	Molecular weight of water, (lb/lb-mole)
32.03	=	Equivalent weight of sulfur dioxide
0	=	Total sampling time (min)
O_i	=	Sampling time interval, between two successive component changes, beginning with the interval between the first and second changes, (min)
O_1	=	Sampling time interval, from the run beginning until first component change, (min)
O_p	=	Sampling time interval, from the final (n^{th}) component change until the end of the sampling run, (min)

NOMECLATURE

A	=	Cross-sectional area of stack (ft^2)
A_n	=	Cross-sectional area of nozzle, (ft^2)
B_{ws}	=	Proportion of water vapor, by volume, in the gas stream
C_a	=	Acetone blank residue concentration, (mg/g)
C_p	=	Pitot tube coefficient, dimensionless
C_s	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, (gr/dscf).
C_{SO_2}	=	Concentration of sulfur dioxide, dry basis corrected to standard conditions, (lb/dscf)
$C_{H_2SO_4}$	=	Sulfuric acid (including SO_3) concentration, corrected to standard conditions, (lb/dscf)
ΔH	=	Average pressure differential across the orifice meter, (in H_2O)
K_p	=	Pitot tube constant, 85.49 $\frac{ft\ [(lb/lb\text{-}mole)(in\ Hg)]\ \frac{1}{2}}{Sec[\quad (°R)\ (in\ H_2O)\ ]}$
L_p	=	Leakage rate observed during the post-test leak check, (cfm)
L_a	=	Maximum aceptable leakage rate, (0.02 cfm or 4% of average sampling rate, whichever is less)
L_i	=	Individual leakage rate observed during the leak check conducted prior to the "i^{th}" component change, (cfm)
m_a	=	Mass of residue of acetone after evaporation, mg.
M_d	=	Molecular weight of stack gas, dry basis, (lb/lb-mole)
m_n	=	Total weight of particulate matter collected, mg.
M_s	=	Molecular weight of stack gas, wet basis, (lb/lb-mole)
M_w	=	Molecular weight of water, 18 lb/lb-mole
N	=	Normality of barium perchlorate titrant, (milliequivalents/ml)
Δp	=	Velocity head of stack gas, (in H_2O)
P_{bar}	=	Barometric pressure at measurement site (in Hg)
P_g	=	Stack static pressure, (in Hg)
P_m	=	Absolute pressure at the dry gas meter
P_s	=	Absolute stack gas pressure, (in Hg)
$P_{std)}$	=	Standard absolute pressure, 29.92 in Hg
Q_{std}	=	Dry volumetric stack gas flow rate, standard conditions, (dscfm)
R	=	Ideal gas constant, 21.85 (in Hg) (ft^3)/(lb-mole)(°R)
t_s	=	Stack temperature, (°F)
T_m	=	Absolute temperature at meter, (°R)
T_{std}	=	Standard absolute temperature, (520°R)

COMPANY : PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL - UNIT #1
DATE : DECEMBER 4, 1990
REPORT : 62-354 A

GM/BHP-HR

RUN	#1	#2	#3	AVERAGE
NOx lbs/hr	5.77	5.60	5.84	5.74
BHP @ 900 rpm	2650	2650	2650	2650
NOx gm/BHP-hr	0.9885	0.9594	1.0005	0.9828

EQUATION:

$$\frac{\text{LB/HR} * 454}{\text{BHP}}$$

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

NOx/CO/O2 DATA

RUN #1

TIME INTERVAL			CONCENTRATIONS			% Full Scale		
BEGIN	-	END	O2;%	NOx;ppm	CO;ppm	O2%fs	NOx%fs	CO%fs
11:23 AM	-	11:33 AM	8.11	145.97	346.53	42.5	39	44
11:33 AM	-	11:43 AM	8.25	140.61	348.06	42.9	38	44.1
11:43 AM	-	11:53 AM	8.27	139.27	347.55	42.8	37.8	44
11:53 AM	-	12:03 PM	8.32	137.43	347.04	42.8	37.5	43.9
Averages:			8.24	140.82	347.29	42.75	38.08	44.00

	O2	NOx	CO
INITAL zero	10	9.9	9.9
INITAL span	94	51.2	90
FINAL zero	9.9	9.9	9.9
FINAL span	95	50.8	90.3
ZERO DRIFT %/ppm:	-0.02488	0	0
CALIB. DRIFT %/ppm:	0.248809	-2.01	3.05
ZERO DRIFT %fs:	-0.1	0	0
CALIB.DRIFT %fs:	1	-0.4	0.3
CAL GAS value	20.9	207.4	813.4
FULL SCALE RANGE	25	250	1000

DSCFM (Calculated DSCFM from fuel rate) = 5630

	%O2	ppm	@ 3%O2	@15%O2	lb/hr
NOx values:	8.24	140.82	199.10	65.63	5.77

	%O2	ppm	@ 3%O2	@15%O2	lb/hr
CO values:	8.24	347.29	491.00	161.85	8.66

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

NOx/CO/O2 DATA

RUN #2

TIME INTERVAL	CONCENTRATIONS			% Full Scale		
BEGIN - END	O2;%	NOx;ppm	CO;ppm	O2%fs	NOx%fs	CO%fs
12:25 PM - 12:35 PM	8.00	139.62	351.06	42.1	37.5	44.5
12:35 PM - 12:45 PM	7.99	138.94	354.09	42.1	37.5	44.6
12:45 PM - 12:55 PM	8.01	138.27	354.09	42.2	37.5	44.4
12:55 PM - 01:05 PM	8.00	137.59	357.13	42.2	37.5	44.5
Averages:	8.00	138.60	354.09	42.15	37.50	44.50

	O2	NOx	CO
INITAL zero	9.9	9.9	9.9
INITAL span	94	50.8	90.3
FINAL zero	9.9	9.9	9.9
FINAL span	93.8	50	91.5
ZERO DRIFT %/ppm:	0	0	0
CALIB. DRIFT %/ppm:	-0.04970	-4.06	12.14
ZERO DRIFT %fs:	0	0	0
CALIB.DRIFT %fs:	-0.2	-0.8	1.2
CAL GAS value	20.9	207.4	813.4
FULL SCALE RANGE	25	250	1000

DSCFM (Calculated DSCFM from fuel rate) = 5557

	%O2	ppm	@ 3%O2	@15%O2	lb/hr
NOx values:	8.00	138.60	192.30	63.38	5.60

	%O2	ppm	@ 3%O2	@15%O2	lb/hr
CO values:	8.00	354.09	491.30	161.92	8.71

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

NOx/CO/O2 DATA

RUN #3

TIME INTERVAL		CONCENTRATIONS			% Full Scale		
BEGIN	END	O2;%	NOx;ppm	CO;ppm	O2%fs	NOx%fs	CO%fs
01:20 AM	01:30 AM	8.03	142.96	344.07	42.2	37.5	44.5
01:30 AM	01:40 AM	8.03	143.40	342.41	42.2	37.5	44.5
01:40 AM	01:50 AM	8.05	143.83	343.73	42.3	37.5	44.8
01:50 AM	02:00 AM	8.00	146.84	343.07	42.1	38	44.9
Averages:		8.03	144.26	343.32	42.20	37.63	44.68

	O2	NOx	CO
INITAL zero	9.9	9.9	9.9
INITAL span	94	50	91.5
FINAL zero	9.9	9.9	9.9
FINAL span	94	50.5	90.5
ZERO DRIFT %/ppm:	0	0	0
CALIB. DRIFT %/ppm:	0	2.59	-9.97
ZERO DRIFT %fs:	0	0	0
CALIB.DRIFT %fs:	0	0.5	-1
CAL GAS value	20.9	207.4	813.4
FULL SCALE RANGE	25	250	1000

DSCFM (Calculated DSCFM from fuel rate) = 5570

	%O2	ppm	@ 3%O2	@15%O2	lb/hr
NOx values:	8.03	144.26	200.60	66.12	5.84

	%O2	ppm	@ 3%O2	@15%O2	lb/hr
CO values:	8.03	343.32	477.40	157.35	8.47

CONTINUOUS EMISSION MONITORING SYSTEM (CEMS)

Reference: BAAQMD, Manual of Procedures; ST-13A, ST-19A, Jan 1982
State of California, Air Resources Board, Test Methods 1-100, June 1979.
EPA CFR Title 40, Pt. 60, Appendix A, Method 20.

INSTRUMENT SUMMARY

A constant sample of flue gas was extracted, dried, filtered and delivered to an instrument manifold system for distribution to one or more analyzers. Instrument results are recorded on an analog strip chart recorder. System calibration checks are performed as well as calibration checks at the beginning and end of each test run. Final data reduction includes zero and calibration drift corrections.

SAMPLE CONDITIONING SYSTEM

Consists of a borosilicate glass tube or 316 grade stainless steel probe fitted with a cindered stainless steel or pyrex glass wool particulate filter. The probe is fitted with a teflon (TFE) sample line which connects to a water condensation system located at the sources. The condensation system consists of three (3) 500-ml short stem glass impingers connected in a series, immersed in an ice bath. The gas is delivered to the instrument trailer with a teflon line (3/8" O.D.) through an in-line Balstron particulate filter drawn by a teflon-coated diaphragm pump. The sample system is leak checked prior to sampling by plugging the end of the sample probe and adjusting the sample pump to its maximum rate (approximately 22" Hg). The manifold is by-passed and the leak rate monitored through a gas meter or low range flow meter.

MANIFOLD SYSTEM

Sample gas is delivered to each analyzer through a five-(5) way valve and regulated with a needle valve flow meter. Manifold pressure is controlled by a back pressure regulator which is typically set at three (3) psi. Zero gas (N_2) and calibrated gases are delivered to the analyzers using the same five-way valve and flow meter. All manifold parts are glass, stainless steel, or teflon materials.

ANALOG STRIP CHART DATA REDUCTION

Analog recordings consists of averaged time increments as shown on the data pages (typically 5,10, or 20 minute increments). Data for each increment was recorded at an average percent of full scale. The readings were then compared with the zero and calibration readings for calculation of the average concentration for each time increment. Any deviation of the zero and calibration readings from the start to the end of a test period was corrected by calculating apparent zero and calibration readings for the mid-point of each time increment. The average concentrations were then calculated from the sample readings and the apparent zero and span readings.

ROCARBON DATA

COMPANY : PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

DESTRUCTION REMOVAL EFFICIENCY OF HYDROCARBONS

OUTLET C1-C6+ TOTAL HYDROCARBON ANALYSIS

RUN #	INLET LB/HR	C1-C6+ OUTLET LB/HR	DRE % REDUCTION
#1	880.43	19.30	97.8
#2	880.43	19.25	97.8
#3	880.43	19.34	97.8

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL - UNIT #1
DATE : 12-4-90
REPORT : 62-354A LAB # 2034

INLET - HYDROCARBONS

SCFM = 783.5

		ppm	lb/hr	ppm as CH4	lb/hr (as Methane)
Methane	(C1)	431200.0	854.613	431200.0	854.613
Ethane	(C2)	5200.0	19.324	10400.00	0.00
Propane	(C3)	700.0	3.815	2100.00	0.00
Butane	(C4)	100.0	0.718	400.00	0.00
Pentane	(C5)	100.0 *	0.892	500.00	0.00
Hexane	(C6)	100.0 *	1.065	600.00	0.00
	Total	437400.0	880.428	445200.0	854.613

* Less than detection limit

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

HYDROCARBON RESULTS

RUN No: 1
GC RUN: 1 & 2 AVG
DSCFM : 5630.0
% O2 : 8.24

Compound	Response Factor	Peak Area	Atten.	ppm	pm @3%O2
C1	5531.95	7206550.0	1	1302.70	1841.890
C2	11642.14	139125.0	1	12.00	16.97
C3	17463.5	164410	1	9.40	13.29
C4	23605.34	20022	1	0.80	1.13
C5	29149	7510.0	1	0.30	0.42
C6+	37435.92	0.0	1	0.00	0

		ppm	lb/hr	ppm as CH4	lb/hr (as CH4)	ppm @3%O2 as CH4
Methane	(C1)	1302.7	18.553	1302.7	18.553	1841.89
Ethane	(C2)	12.0	0.320	24.00	0.342	33.93
Propane	(C3)	9.4	0.368	28	0.402	39.87
Butane	(C4)	0.8	0.041	3	0.046	4.52
Pentane	(C5)	0.3	0.019	2	0.021	2.12
Hexane	(C6)	0.0	0.000	0	0.000	0.00
	Total	1325.2	19.30	1359.6	19.36	1922.34
Total (non methane)		22.50	0.75	56.9	0.81	80.45

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

HYDROCARBON RESULTS

RUN No: 2
GC RUN: 1 & 2 AVG
DSCFM : 5557.0
% O2 : 8.00

Compound	Response Factor	Peak Area	Atten.	ppm	pm @3%O2
C1	5531.95	6944000.0	1	1255.3	1741.85
C2	11642.14	131310.0	1	11.3	15.68
C3	17463.50	154325.0	1	8.8	12.21
C4	23605.34	17004.5	1	0.7	0.97
C5	29149.00	7962.5	1	0.3	0.42
C6+	37435.92	0.0	1	0	0.00

		ppm	lb/hr	ppm as CH4	lb/hr (as CH4)	ppm @3%O2 as CH4
Methane	(C1)	1255.3	18.553	1255.3	17.878	1741.85
Ethane	(C2)	11.3	0.302	22.6	0.322	31.36
Propane	(C3)	8.8	0.345	26.4	0.376	36.63
Butane	(C4)	0.7	0.036	2.8	0.040	3.89
Pentane	(C5)	0.3	0.019	1.5	0.021	2.08
Hexane	(C6)	0	0.000	0.0	0.000	0.00
	Total	1276.40	19.25	1308.60	18.64	1815.81
Total (non methane)		21.10	0.702	53.30	0.7591	73.96

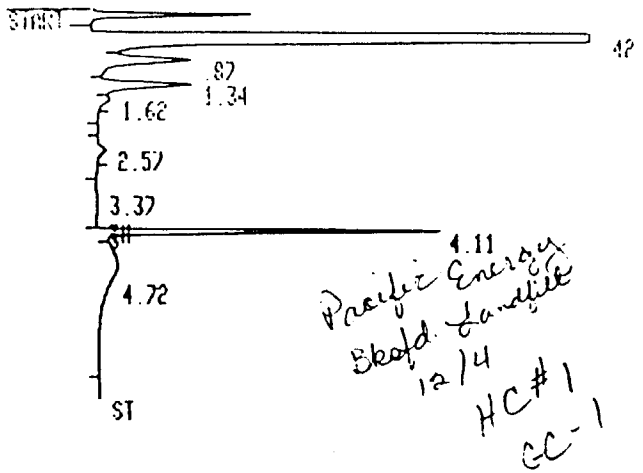
COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

HYDROCARBON RESULTS

RUN No: 3
GC RUN: 1 & 2 AVG
DSCFM : 5570.0
% O2 : 8.03

Compound	Response Factor	Peak Area	Atten.	ppm	pm @3%O2
C1	5531.95	7937800.0	1	1434.90	1995.70
C2	11642.14	153185.0	1	13.20	18.36
C3	17463.5	173360.0	1	9.90	13.77
C4	23605.34	18247.5	1	0.80	1.11
C5	29149	3811.0	1	0.10	0.14
C6+	37435.92	0.0	1	0.00	0.00

		ppm	lb/hr	ppm as CH4	lb/hr (as CH4)	ppm @3%O2 as CH4
Methane	(C1)	1434.9	18.553	1434.9	20.44	1995.70
Ethane	(C2)	13.2	0.352	26.4	0.38	36.72
Propane	(C3)	9.9	0.388	29.7	0.42	41.31
Butane	(C4)	0.8	0.041	3.2	0.05	4.45
Pentane	(C5)	0.1	0.006	0.5	0.01	0.70
Hexane	(C6)	0.0	0.000	0.0	0.00	0.00
	Total	1458.90	19.34	1494.7	21.29	2078.88
Total (non methane)		24.00	0.79	59.8	0.85	83.17

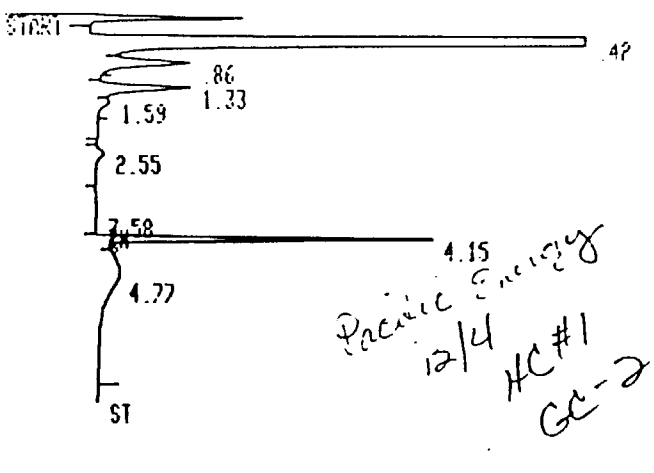


RUN # 748 DEC/06/90 12:42:00

AREA%

	RT	AREA	TYPE	AR/HT	AREA%
	0.42	7269200	SPB	0.113	88.199
	0.87	138450	TBP	0.126	1.680
	1.34	165690	TPV	0.130	2.010
	1.62	24369	DTVV	0.165	0.296
	2.57	21640	TPV	0.184	0.263
	3.37	7849	TPB	0.479	0.095
	4.11	346400	D BV	0.070	4.203
	4.72	268260	VV	0.905	3.255

TOTAL AREA= 8241900
MUL FACTOR= 1.0000E+00

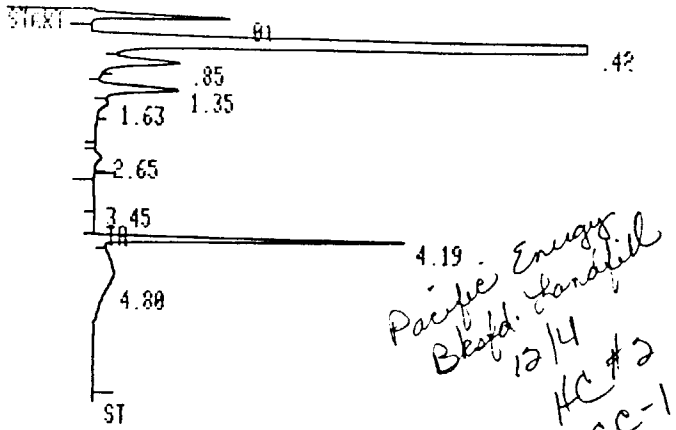


RUN # 749 DEC/06/90 13:19:30

AREA%

	RT	AREA	TYPE	AR/HT	AREA%
	0.42	7269600	SPB	0.112	87.766
	0.86	139800	TBP	0.126	1.638
	1.33	163130	TPV	0.127	1.970
	1.59	23171	DTVB	0.158	0.280
	2.55	18404	TVP	0.173	0.222
	3.58	7171	TPB	0.421	0.087
	4.15	342200	D BV	0.071	4.131
	4.77	319440	VB	0.938	3.857

TOTAL AREA= 8282900
MUL FACTOR= 1.0000E+00

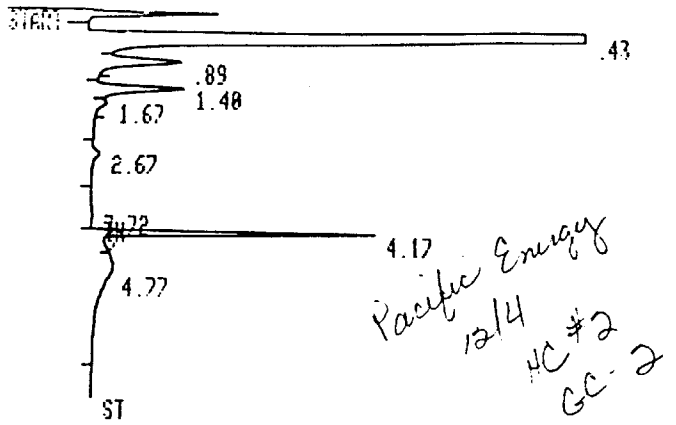


RUN # 750 DEC/06/90 13:37:46

AREA%

	RT	AREA	TYPE	AR/HT	AREA%
	0.01	36909	D BB	0.041	0.475
C1	0.42	6824500	SBB	0.111	87.776
C2	0.85	127420	TBP	0.129	1.639
C3	1.35	150390	TPV	0.133	1.934
	1.63	23332	DTVB	0.170	0.300
C4	2.65	15038	TVB	0.173	0.193
C5	3.45	7667	BV	0.393	0.099
	4.19	321150	D VV	0.071	4.131
	4.80	268480	VB	0.911	3.453

TOTAL AREA= 7774900
MUL FACTOR= 1.0000E+00

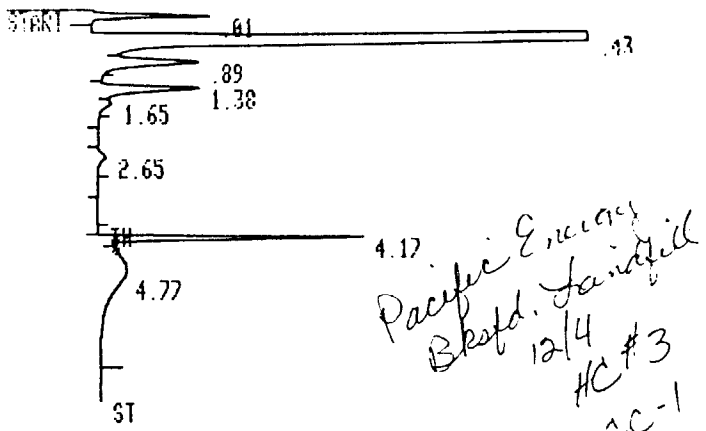


RUN # 751 DEC/06/90 13:59:46

AREA%

	RT	AREA	TYPE	AR/HT	AREA%
C1	0.43	7189200	SBB	0.116	88.651
C2	0.89	135200	TBP	0.130	1.667
C3	1.40	158260	TPV	0.130	1.952
	1.67	23700	DTVB	0.166	0.292
C4	2.67	18971	TBP	0.186	0.234
C5	3.72	8258	TPB	0.405	0.102
	4.17	283860	D BV	0.071	3.500
	4.77	292090	VV	0.941	3.602

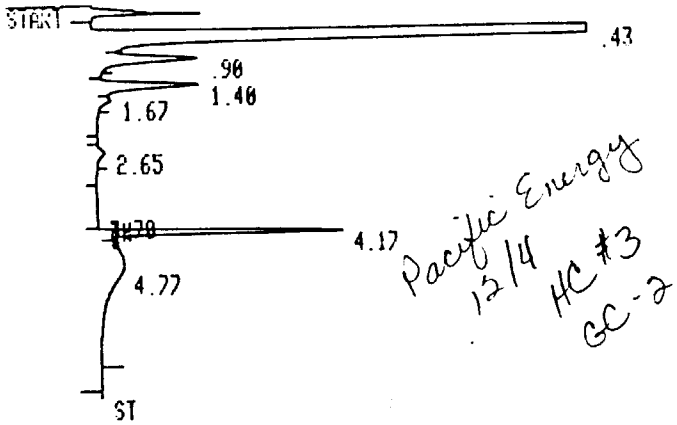
TOTAL AREA= 8109500
MUL FACTOR= 1.0000E+00



RUN # 752 DEC/06/90 14:54:55

	RT	AREA	TYPE	AR/HT	AREA%
	0.01	33126	D BB	0.039	0.367
C_1	0.43	8004900	SBB	0.115	88.691
C_2	0.89	153940	TBP	0.128	1.706
C_3	1.38	173240	TPV	0.126	1.919
	1.65	25216	DTVV	0.164	0.279
C_4	2.65	18371	TPV	0.172	0.204
	4.17	266670	D BV	0.071	2.955
C_5	4.77	350150	VB	0.878	3.880

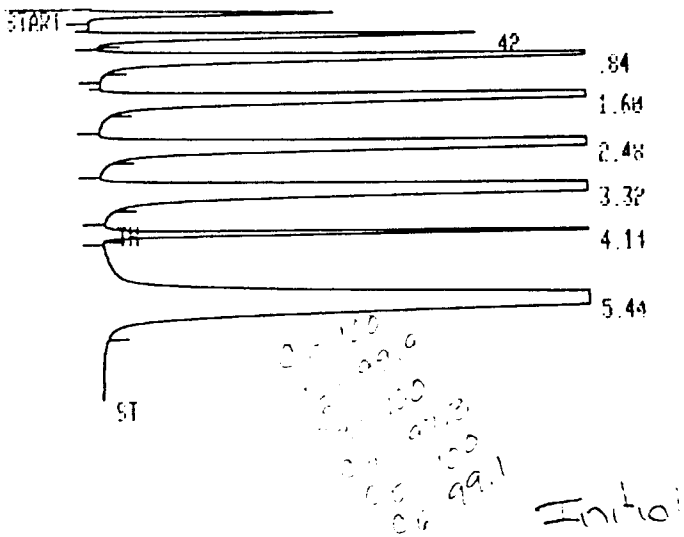
TOTAL AREA= 9025600
MUL FACTOR= 1.0000E+00



RUN # 753 DEC/06/90 15:19:42

	RT	AREA	TYPE	AR/HT	AREA%
C_1	0.43	7996400	SPB	0.115	89.283
C_2	0.90	152430	TBP	0.129	1.702
C_3	1.40	173480	TPV	0.127	1.937
	1.67	24766	DTVV	0.157	0.277
C_4	2.65	18124	TPV	0.179	0.202
C_5	3.70	7622	TPB	0.479	0.085
	4.17	247460	D BV	0.071	2.763
	4.77	335960	VB	0.917	3.751

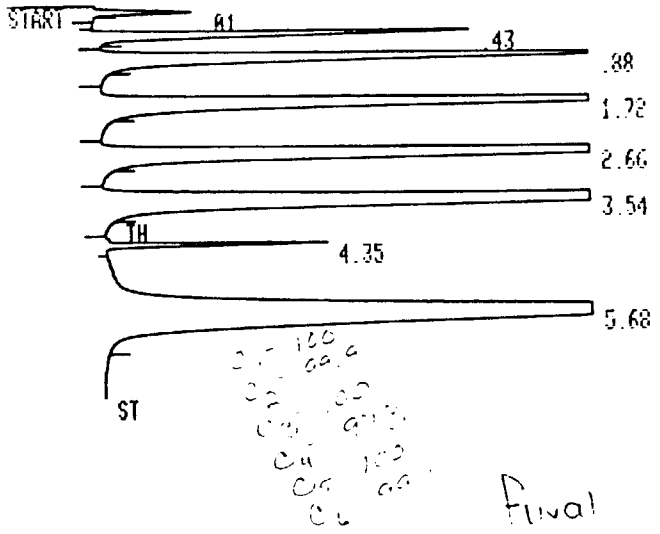
TOTAL AREA= 8956200
MUL FACTOR= 1.0000E+00



RUN # 746 DEC/06/90 10:55:30

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.42	554520	PB	0.102	4.232
0.84	1175000	PB	0.141	8.967
1.60	1766100	PB	0.150	13.477
2.48	2318000	PB	0.155	17.689
3.32	2950500	PB	0.188	22.515
4.14	573520	D BB	0.072	4.377
5.44	3767000	BB	0.364	28.745

TOTAL AREA= 1.3105E+07
MUL FACTOR= 1.0000E+00

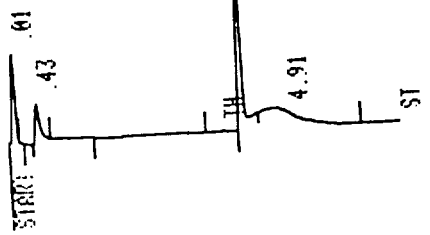


RUN # 757 DEC/06/90 17:47:52

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.01	25264	D BB	0.034	0.202
0.43	551870	PB	0.103	4.422
0.88	1151100	PB	0.148	9.223
1.72	1726600	PB	0.158	13.835
2.66	2275600	PB	0.159	18.234
3.54	2879300	PB	0.197	23.071
4.35	217580	D BV	0.069	1.743
5.68	3652800	VB	0.392	29.269

TOTAL AREA= 1.2480E+07
MUL FACTOR= 1.0000E+00

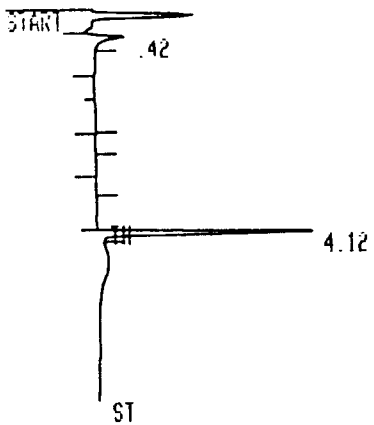
SAMPLE BLANK



RUN # 754 DEC/06/90 16:36:52

AREA% RT	AREA	TYPE	AR/HT	AREA%
0.01	24976	B BB	0.038	4.346
0.43	61632	PB	0.108	10.699
4.31	229730	P PV	0.071	39.706
4.91	260720	VB	0.882	45.259

TOTAL AREA= 576060
MUL FACTOR= 1.0000E+00



He Blank

RUN # 756 DEC/06/90 17:26:11

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.42	62850	PB	0.122	23.455
~~4.12~~	~~205110~~	~~D PB~~	~~0.067~~	~~76.545~~

TOTAL AREA= 267960
MUL FACTOR= 1.0000E+00

HYDROCARBON EMISSIONS TESTING
METHODS AND EQUATIONS

REF: EPA METHOD 18; FID ANALYSIS

SAMPLING PROCEDURES:

The sample was drawn via evacuated cannister through a stainless steel/teflon probe into a tedlar bag. Each sample bag was evacuated three (3) times, and then filled.

ANALYTICAL PROCEDURES:

The contents of the tedlar bag are analyzed by gas chromatography. The gas chromatograph is calibrated with an appropriate standard for each carbon #, before and after each set of samples are analyzed. The sample is speciated by carbon #-C1, C2, C3, C4, C5, and C6+ backflush.

SYMBOL IDENTIFICATION:

i = carbon #; i = 1 to 6+
s = refers to standard for that carbon #
Rx_i = response factor for C_i
MW = molecular weight - g/mole
DSCFM = Average volume flow rate of unit tested

EQUATIONS

$$Rx_i = \frac{ppm\,std}{Area_s} \qquad Rx_i = \frac{Area\,std}{ppm\,std}$$

$$Sample\ ppm_i = \frac{1}{Rx_i} \times Area_i$$

$$Sample\ ppm\ (as\ C_1) = Sample\ ppm \times \#\ of\ Carbons$$

$$\frac{lbs}{hr_i} = ppm_i \times MW_i \times DSCFM \times 1.581 \times 10^{-7}$$

$$Total\ non\text{-}methane\ \frac{lbs}{hr} = \sum_{2}^{6+} \frac{lbs}{hr_i}$$

Note 1: If $\frac{lbs}{hr}$ *as methane is required, MW will equal* 16.0 *(MW of methane)*

Note 2: # of carbons: ethane = 2; propane = 3; etc...

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL PACIFIC GAS No. : 2034
DATE : 12-4-90
REPORT : 62-354 A

EPA "F" FACTOR FOR NATURAL GAS

FUEL COMPONENT	C	H	EXPANSION FACTOR	COMPONENT MOLE %	EXHAUST DSCF (0)/ SCF FUEL
METHANE	1	4	8.57	43.12	3.695384
ETHANE	2	6	15.25	0.52	0.0793
PROPANE	3	8	21.92	0.07	0.015344
(ISO-BUTANE)	4	10	28.6	0.01	0.00286
NORM-BUTANE	4	10	28.6	0.01	0.00286
(ISO-PENTANE)	5	12	35.28 *	0.01	0.003528
NORM-PENTANE	5	12	35.28 *	0.01	0.003528
HEXANE +	6	14	41.95 *	0.01	0.004195
AIR (N2+02)	--	--	1	24.76	0.2476
CO2	--	--	1	31.5	0.315
H2S	--	--	6.68	0	0
			TOTAL	100.02	4.369599

* Less than detection limit

4.369599	DSCF EXHAUST PER SCF OF FUEL GAS AT ZERO % OXYGEN
403.8198	NET BTU/SCF OF FUEL GAS
448.2710	GROSS BTU/SCF OF FUEL GAS
9747.672	DSCF/MMBTU (EPA "F" FACTOR @ 60'F & ZERO % OXYGEN)
9896.114	DSCF/MMBTU (EPA "F" FACTOR @ 68'F & ZERO % OXYGEN)

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

DSCFM CALCULATIONS

RUN #1

SCFM = 780.5

FOLLOWING VALUES FOR GROSS MMBTU/CF TAKEN FROM LAB ANALYSIS,
F-FACTOR FROM FUEL GAS DATA SHEET, AND %O2 FROM INSTRUMENTS

0.000448 = MMBtu/CF % O2 = 8.240
9747.67 = DSCF/MMBTU

DSCF/MIN= 780.5 SCF/MIN *0.000448 MMBTU/CF*9747.6 DSCF/MMBTU

= 3410 DSCF/MIN @ 0 % O2

DSCFM @ 8.24 % O2 = 3410.5 DSCF/MIN* (20.9/ (20.9 - 8.24

= 5630.00 DSCFM @ 8.24 % O2

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

DSCFM CALCULATIONS

RUN #2

SCFM = 785.0

FOLLOWING VALUES FOR GROSS MMBTU/CF TAKEN FROM LAB ANALYSIS,
F-FACTOR FROM FUEL GAS DATA SHEET, AND %O2 FROM INSTRUMENTS

0.000448 = MMBtu/CF % O2 = 8.000
9747.67 = DSCF/MMBTU

DSCF/MIN= 785.0 SCF/MIN *0.000448 MMBTU/CF*9747.6 DSCF/MMBTU

= 3430 DSCF/MIN @ 0 % O2

DSCFM @ 8 % O2 = 3430.1 DSCF/MIN* (20.9/ (20.9 - 8.00

= 5557.00 DSCFM @ 8.00 % O2

COMPANY: PACIFIC ENERGY
UNIT : BAKERSFIELD LANDFILL
DATE : 12-4-90
REPORT : 62-354 A

DSCFM CALCULATIONS

RUN #3

SCFM = 785.0

FOLLOWING VALUES FOR GROSS MMBTU/CF TAKEN FROM LAB ANALYSIS,
F-FACTOR FROM FUEL GAS DATA SHEET, AND %O2 FROM INSTRUMENTS

0.000448 = MMBtu/CF % O2 = 8.03
9747.67 = DSCF/MMBTU

DSCF/MIN= 785.0 SCF/MIN *0.000448 MMBTU/CF*9747.6 DSCF/MMBTU

= 3430 DSCF/MIN @ 0 % O2

DSCFM @ 8.03 % O2 = 3430.1 DSCF/MIN* (20.9/ (20.9 - 8.03

= 5570.00 DSCFM @ 8.00 % O2

PACIFIC GAS TECHNOLOGY

4200 Easton Drive - Suite 5
Bakersfield, California 93309
805/324-1317
Fax: 805/324-2746

GAS ANALYSIS BY CHROMATOGRAPH

PETROCHEM ENVIRONMENTAL SERVICES, INC
3207 Antonio Avenue
Bakersfield, CA 93388

SAMPLED: DECEMBER 4, 1990
SUBMITTED: DECEMBER 5, 1990
REPORTED: DECEMBER 10, 1990

Attention: Faith Blythe

LAB # 2034

Sample ID : PACIFIC ENERGY
BAKERSFIELD LANDFILL
FUEL GAS

CUSTOMER NUMBER : 01118

CUSTOMER
JOB NUMBER: 62-354

ANALYZED GAS

	MOLE %	WT %	CHONS	WT %
OXYGEN	1.71	1.96	CARBON	32.60
NITROGEN	23.05	23.07	HYDROGEN	6.35
CARBON DIOXIDE	31.50	49.54	OXYGEN	37.98
HYDROGEN	ND	0.00	NITROGEN	23.07
CARBON MONOXIDE	ND	0.00	SULFUR	0.00
METHANE	43.12	24.72		
ETHANE	0.52	0.56		
PROPANE	0.07	0.11		
iso-BUTANE	0.01	0.02		
n-BUTANE	0.01	0.02		
iso-PENTANE	TR<0.01	0.00		
n-PENTANE	TR<0.01	0.00		
HEXANE +	TR<0.01	0.00		

SPECIFIC GRAVITY * : 0.966

HYDROGEN SULFIDE : ppm * CALCULATED ACCORDING TO :
(Draeger)

ASTM D-3588

TOTAL * DRY : 448
BTU/cu ft
WET : 440

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

Petro-Chem Environmental Service
3207 Antonino Avenue
Bakersfield, CA 93308

Attention: Faythe Blythe

Laboratory No: 25866
Date Received: 12-5-90
Date Reported: 12-7-90
Job #: 62-354
P O #: 1119

Sample: Gas

Sample Description: Pacific Energy Landfill
25866-1 Bag #1
25866-2 Bag #2
Sampled by James Taplin on 12-4-90

Total Sulfur
(ASTM D 3246)

	25866-1	25866-2
As H_2S, ppm (vol.)	44.8	47.9
As S, Grains/100 SCF*	2.72	2.91

* Standard cubic feet (60 °F, 14.7 psia)

Richard L. Penner
Laboratory Director

RLP/mlm

4309 Armour Avenue Bakersfield, California 93308
(805) 395-0539 FAX (805) 395-3069

F-FACTOR FOR GASEOUS FUELS

Ref: 1) Code of Federal Regulations 40 CFR 60.45
2) Handbook of Chemistry and Physics; CRC Press

The F-Factor is the ratio of the total exhaust volume (DSCF°) produced by the stoichiometric combustion of 1 SCF of the gaseous fuel and the Btu content of the same 1 SCF of gaseous fuel.

$$EPA\ F\ Factor = F\ \frac{DSCF^{\circ}}{MMBtu} = 10^{6} \times \frac{\frac{DSCF^{\circ}}{SCF\ fuel}}{\frac{Btu}{SCF\ fuel}}$$

STOICHIOMETRIC COMBUSTION OF HYDROCARBONS:

The exhaust volume concentration of each fuel gas component is determined by the general equation for the stoichiometric combustion of a gaseous hydrocarbon.

C_xH_y in air:

$$C_xH_y + air \rightarrow x\ CO_2 + \frac{y}{2}\ H_2O + 3.785\ (x + \frac{y}{4})\ N_2$$

$$C_{xH_y} + (x + \frac{y}{4})\ (O_2 + 3.785\ N_2) \rightarrow x\ CO_2 + \frac{y}{2}\ H_2O + 3.785\ (x + \frac{y}{4})\ N_2$$

Therefore, for each mole (or standard cubic foot) of each fuel gas component C_xH_y, there will be:

1) $x + \frac{y}{2} + 3.785\ (x + \frac{y}{4})$ *moles (or SCF) of "wet" exhaust flow*

2) $x + 3.785\ (x + \frac{y}{4})$ *moles (or DSCF) of "dry" exhaust flow*

OR

1 SCF of C_xH_y produces 4.785x + 0.946y DSCF° flue gas

where: x = # of carbon atoms in component C_xH_y
y = # of hydrogen atoms in component C_xH_y

If non-combustible components such as N_2, O_2, or CO_2 are present in the gaseous fuel, these will not participate in the combustion process.

1 SCF Non-combustible component produces 1 SCF° flue gas.

STOICHIOMETRIC COMBUSTION OF HYDROCARBONS (con't)...

Hydrogen (H_2) combustion proceeds according to the reaction:

$$1\ H_2 + \frac{1}{2}\ (O_2 = 3.785\ N_2) \rightarrow 1\ H_2O + 1.893\ N_2$$

Carbon Monoxide (CO) combustion in air proceeds according to the reaction:

$$CO + air \rightarrow CO_2 + N_2\ (stoichiometric\ combustion)$$

$$1\ CO + \frac{1}{2}\ (O_2 + 3.785\ N_2) \rightarrow 1\ CO_2 + 1.893\ N_2$$

1 SCF CO produces 2.893 DSCF° flue gas

The total exhaust gas volume at stoichiometric combustion (zero % excess O_2) is the summation of the individual component's contribution. The actual total exhaust gas volume is greater and depends on the % O_2 in the exhaust gas.

$$Actual\ DSCF = DSCF°\ (@\ stoichiometric\ combustion) \times \frac{20.9}{20.9 - \%\ O_2\ in\ exhaust\ gas}$$

BTU HEATING CONTENT OF GASEOUS FUELS:

The Btu/SCF of the gaseous fuel is determined either by actual measurement of a sample combustion in a calorimeter or from a summation of the known heating value of the components multiplied by the mole fraction of the components.

OD 5/8 RAW DATA

COMPANY: Pacific Energy
REPORT #: 62-354
UNIT ID: Bakersfield Landfill
DATE: 12-4-90

ON-SITE DATA

SITE:

RUN #:	#1	#2	#3
TIME:	1115 > 1220	1115 > 215	

		#1	#2	#3
Vm	Dry sampled gas volume, dcf	50.43	47.99	
Y	Meter calibration factor (met# 1001 1001)	1.004138	1.004138	
P bar	Barometric pressure, in Hg	29.8	29.8	
P static	Stack static pressure, in H_2	14.0	14.0	
Delta H	Differential meter pressure, in H_2O	1.09	1.19	
Tm	Meter temperature, deg F	61	62	

Contents	Run 1 final	Run 1 tare	Run 1 net	Run 2 final	Run 2 tare	Run 2 net	Run 3 final	Run 3 tare	Run 3 net
IPA	738.9	586.5	152.4	661.3	570.5	90.8			
H_2O_2	600.6	577.4	23.2	623.3	573.4	49.9			
H_2O_2	599.1	582.5	16.6	609.6	575.6	34.0			
KO	487.1	480.6	6.5	493.7	485.9	7.8			
Silica Gel	797.1	748.7	48.4	809.0	770.9	38.1			
LiCl			~~-704~~			-51.7			
V lc, volume of H_2O, grams			176.7			168.9			

		#1	#2	#3
CO_2	% Dry Volume	11.0	11.2	
O_2	% Dry Volume	8.0	8.0	
N_2	% Dry Volume	84.7	84.7	
Cp	Pitot tube coefficient (Pit# ___ ___ ___)	.84	.84	
Delta P	Avg Delta-P, in H_2O	3.678	3.907	
Ts	Stack temperature, in deg F	904	907	
As	Stack area, sq. ft	1.67	1.67	
Ds	Stack Diameter, inches	17.5	17.5	
Dn	Nozzle diameter, inches	.198	.198	
Dur	Sampling time, min	60	60	
% Iso	Mini Iso			

****

Filter #		256	250
Filter tare weights, grams		0.82045	0.83294

INITIALS**

CONTROL BOX#: _____
Hi Δ P _____ Lo Δ P _____ Ave Δ P _____ Duct Temp. _____
Diameters before disturb _____ After _____
# of Points, total _____
Overall (inches) _____ Coupling _____

METH 5/3 Run # 1 FIELD DATA

Client: PACIFIC ENERGY Report #: _____
Location: BAKERSFIELD LANDFILL
Operator: RAW, BDMJ
Date: 12-4-90
Run No: 1
Pump No.: EAST
Meter Box No.: 1601 Factor: .984
Meter ΔH @: 0.95
Pitot Tube No.: _____

Pre Post Test Leak Chk.
Leak Rate: 0.00 cfm
Vacuum: 8 (in Hg)

Ambient Temp: 65
Barometric Pressure: 29.8
Static Pressure, (in Hg): +19.0
Assumed Moisture %: 7.0, MWET 28.0
Nozzle Ident. No.: [illegible]
Aver. Calib. Nozzle Diam.(in): .198
Probe Liner Material: QUARTZ.
Filter Number: _____
Duct Diam. (in): 17½

Traverse Point number	Time: (e) min	Vacuum in Hg	Stack Temper. (Ts) °F	Velocity Head (ΔPs) (in)H_2O	Pressure Differencial across Orifice Meter ΔH (in H_2O)		Gas Sample Volume (ft^3)	Gas Sample Temp. at dry Gas Meter inlet (°F)	Gas Sample Temp. at dry Gas Meter outlet (°F)	Filter Holder Temperature: (°F) P	Filter Holder Temperature: (°F) Box	Temperature of Gas Leaving Condenser or La Impinger (°F)
12	11:15	5.0	912	4.4	0.843	1.31	604.40	58	60			
11	17.5	8.0	912	4.6	0.861	1.37	606.5	59	58	400	325	
10	20	10.0	896	4.7	0.872	1.41	608.6	58	55			
9	22.5	10	903	4.7	0.871	1.40	610.8	59	56			
8	25	10	912	4.3	0.830	1.28	612.9	59	56			
7	27.5	10	914	4.0	0.801	1.20	615.1	60	56	450	326	
6	30	10	915	3.6	0.761	1.09	617.1	60	57			
5	32.5	10	913	3.6	0.762	1.09	618.9	60	58			
4	35	10	913	3.5	0.751	1.07	620.8	60	58			
3	37.5	10	910	3.4	0.741	1.04	622.7	61	57	695	328	
2	40	10	912	3.2	0.719	0.98	624.6	62	57			
1	42.5	10	901	3.2	0.721	0.99	626.4	62	56			
EOT	11:45						628.19					
Total								avg.	avg.			
Average								avg.				

METH 5/8 RUN #1 CONT FIELD DATA

Client: PACIFIC ENERGY Report #: _____
Location: BAKERSFIELD LANDFILL
Operator: RAW, BOM
Date: 12-4-90
Run No: #1 CONT
Pump No.: CAST
Meter Box No.: 1001 Factor: .84
Meter ΔH @: 0.95
Pitot Tube No.: _____

Post Test Leak Chk.

Leak Rate: 0.00 cfm
Vacuum: 11 (in Hg)

Ambient Temp: 65
Barometric Pressure: 29.8
Static Pressure, (in Hg): 14.0
Assumed Moisture %: 7.0 MWET 28.0
Nozzle Ident. No.: _____
Aver. Calib. Nozzle Diam.(in): .198
Probe Liner Material: QUARTZ
Filter Number: _____
Duct Diam. (in): 17.5

averse Point number	Time: (e) min	Vacuum in Hg	Stack Temper. (Ts) °F	Velocity Head (ΔPs) (in)H_2O	Pressure Differencial across Orifice Meter ΔH (in H_2O)		Gas Sample Volume (ft^3)	Gas Sample Temp. at dry Gas Meter inlet (°F)	Gas Sample Temp. at dry Gas Meter outlet (°F)	Filter Holder Temperature: (°F)	Temperature of Gas Leaving Condenser or Last Impinger (°F)
							604.40				
12	1150	10	914	4.6	0.867	1.38	628.19	63	62	700, 311	
11		10	910	4.6	0.868	1.38	630.4	63	62		
10	55	10	914	4.5	0.856	1.35	633.2	63	60		
9		10	916	4.4	0.846	1.32	635.5	64	60	782, 320	
8	1200	10	918	4.5	0.855	1.34	637.8	64	60		
7		10	918	3.8	0.788	1.15	640.1	65	62		
6	1205	10	919	3.4	0.746	1.04	642.4	66	62	770, 353	
5		10	919	3.6	0.767	1.10	644.7	66	62		
4	1210	10	914	3.5	0.758	1.07	646.8	66	62		
3		10	867	3.0	0.714	0.96	648.8	66	61	722, 362	
2	1215	10	847	1.5	0.506	0.53	650.9	66	60		
		10	836	1.3	0.475	0.47	652.9	66	60		
EOT	1220						654.83				
X			904	3.678		1.09	50.43 cf		61	VEL (FPS) =	173.14
tal					150 = 108.74			avg.	avg.		
								avg.			

Method 5/6 #2 FIELD DATA

Client: Pacific Energy Report #: _____
Location: Bakersfield Landfill
Operator: RAW, BDM
Date: 12/4/90
Run No: 2
Pump No.: GAST
Meter Box No.: 1001 Factor: .984
Meter ΔH @: 0.95
Pitot Tube No.: _____

Pre ~~Post~~ Test Leak Chk.
Leak Rate: 0.00 cfm
Vacuum: 11.0 (in Hg)

Ambient Temp: 69.8 °F
Barometric Pressure: 29.8
Static Pressure, (in Hg): +14.0
Assumed Moisture %: 7.0 MW_{wet} 28.0
Nozzle Ident. No.: _____
Aver. Calib. Nozzle Diam.(in): .198
Probe Liner Material: Quartz
Filter Number: _____
Duct Diam. (in): 17½

Traverse Point number	Time: (e) min	Vacuum in Hg	Stack Temper. (Ts) °F	Velocity Head (ΔPs) (in)H_2O	Pressure Differencial across Orifice Meter ΔH (in H_2O)		Gas Sample Volume (ft^3)	Gas Sample Temp. at dry Gas Meter inlet (°F)	Gas Sample Temp. at dry Gas Meter outlet (°F)	Filter Holder Temperature: (°F) Probe, Box	Temperature o Gas Leaving Condenser or I Impinger (°F)
12	1:15	6	906	4.3	0.842	1.30	665.00	63	64	525, 351	
11		6	917	4.8	0.866	1.43	667.1	63	64		
10	1:20	6	917	4.6	0.867	1.37	669.32	63	63		
9		6	919	4.4	0.845	1.31	671.49	63	61		
8	:25	6	917	4.4	0.846	1.32	673.60	63	61		
7		6	917	4.5	0.855	1.34	675.72	64	60		
6	:30	6	920	3.7	0.774	1.12	677.86	64	55		
5		6	920	3.6	0.764	1.09	679.80	64	59		
4	:35	6	910	3.5	0.755	1.07	681.71	63	59		
3		6	873	3.41	0.756	1.07	683.60	64	60		
2	:40	6	869	3.0	0.711	0.96	685.49	64	60		
1		6	860	3.0	0.713	0.97	687.27	64	60		
P/C	:45	6					689.05				
								avg.	avg.		
otal								avg.			

Method 5/8 #2 CONT FIELD DATA

Client: Pacific Energy Report #: _____
Location: Bakersfield LanFill
Operator: RAW, BDM
Date: 12/4/90
Run No: #2 Cont
Pump No.: GAST
Meter Box No.: 1001 Factor: .44
Meter ΔH @: 0.95
Pitot Tube No.: _____

Post Test Leak Chk.

Leak Rate: 0.001 cfm
Vacuum: 10 (in Hg)

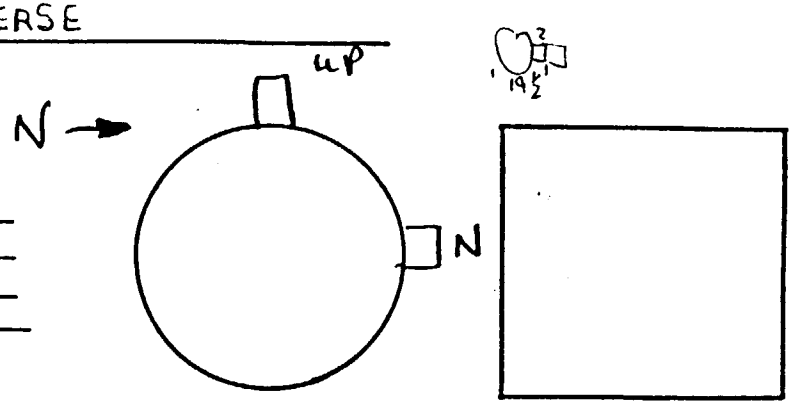
Ambient Temp: 69.8
Barometric Pressure: 29.8
Static Pressure, (in Hg): +14.0
Assumed Moisture %: 7.0 MW28.0
Nozzle Ident. No.: _____
Aver. Calib. Nozzle Diam.(in): .198
Probe Liner Material: Quartz
Filter Number: _____
Duct Diam. (in): 17.5

Traverse Point number	Time: (e) min	Vacuum in Hg	Stack Temper. (Ts) °F	Velocity Head (ΔPs) (in)H_2O	Pressure Differencial across Orifice Meter ΔH (in H_2O)		Gas Sample Volume (ft^3) 665.0	Gas Sample Temp. at dry Gas Meter inlet (°F)	Gas Sample Temp. at dry Gas Meter outlet (°F)	Filter Holder Temperature: (°F) Probe, Box	Temperature of Gas Leaving Condenser or Impinger (°F
12	1:45	6	915	4.6	0.869	1.38	689.05	65	63		
11		6	916	4.5	0.857	1.35	691.22	64	62		
10	:50	6	919	4.4	0.845	1.31	693.36	64	60		
9		6	918	4.3	0.836	1.29	695.47	64	60		
8	:55	6	919	4.2	0.825	1.26	697.56	64	59		
7		6	915	3.8	0.785	1.15	699.62	64	58		
6	2:00	6	920	3.8	0.783	1.14	701.58	64	57		
5		6	917	3.7	0.773	1.12	703.54	64	57		
4	:05	6	917	3.6	0.764	1.09	705.47	65	58		
3		6	915	3.3	0.732	1.01	707.38	64	58		
2	:10	6	873	3.4	0.754	1.07	709.21	64	58		
1		6	871	3.4	0.756	1.07	711.10	65	59		
EOT	:15						712.99				
X			907	3.907		1.19			62	UEL 174.59	
							47.99 Cu.ft.				
Total							550 100.28	avg.	avg.		
								avg.			

VELOCITY TRAVERSE

Client: PACIFIC ENERGY Report #: _____
Location: BAK, LANDFILL
Operator: RAW, BDM.
Date: 12-4-90
Run No: _____
Pump No.: _____
Meter Box No.: _____
Meter ΔH @: _____
Pitot Tube No.: _____ Cp: _____

TOTAL 24.5
COUPLING 7"
DIAMETER 17½
AREA 1.67



TRAVERSE POINTS w/o	w/coup	no.	Ts (°F)	ΔP	Ts (°F)	ΔP
0.4	7.4	1	895	2.5	896	2.5
1.2	8.2	2	899	2.4	899	2.8
2.1	9.1	3	901	2.3	900	2.7
3.1	10.1	4	903	2.3	894	2.6
4.4	11.4	5	905	2.2	893	2.7
6.2	13.2	6	903	2.0	899	2.5
11.3	18.3	7	904	2.0	901	2.6
13.1	20.1	8	890	1.8	900	2.6
14.4	21.4	9	853	1.7	888	2.7
15.4	22.4	10	843	1.5	869	2.3
16.3	23.3	11	820	1.2	855	2.1
17.1	24.1	12	813	1.1	845	2.0
			877.4		886.6	

VELOCITY DATA

Rated Total MMBTU/hr _____

ΔP 2.184
Ts 882.0
Static +14.0
Pbar 29.82
MW(wet) (28)
%H2O (7.0) 7.4
%O2 7.4
F60 _____

Vel= 134.5
DSCFM= 4,842.8
MMBTU/hr= _____
%Thr= _____

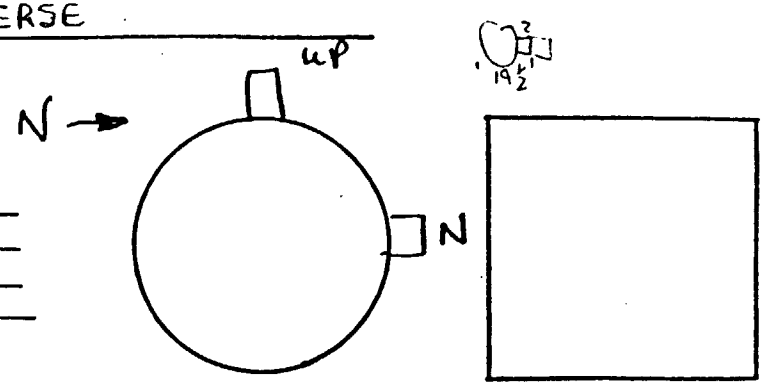
ACFM = 13,484.0
SCFM = 5,207.3

Additional Data:

VELOCITY TRAVERSE

Client: PACIFIC ENERGY Report #: _____
Location: BAK, LANDFILL
Operator: RAW, BDM.
Date: 12-4-90
Run No: _____
Pump No.: _____
Meter Box No.: _____
Meter ΔH @: _____
Pitot Tube No.: _____ Cp: _____

TOTAL 24.5
COUPLING 7"
DIAMETER 17½
AREA 1.67



TRAVERSE POINTS w/o	w/coup	no.	Ts (°F)	ΔP	Ts (°F)	ΔP
0.4	7.4	1	895	2.5	896	2.5
1.2	8.2	2	899	2.4	899	2.8
2.1	9.1	3	901	2.3	900	2.7
3.1	10.1	4	903	2.3	894	2.6
4.4	11.4	5	905	2.2	893	2.7
6.2	13.2	6	903	2.0	899	2.5
11.3	18.3	7	904	2.0	901	2.6
13.1	20.1	8	890	1.8	900	2.6
14.4	21.4	9	853	1.7	888	2.7
15.4	22.4	10	843	1.5	869	2.3
16.3	23.3	11	920	1.2	855	2.1
17.1	24.1	12	813	1.1	845	2.0
			877.4		886.6	

VELOCITY DATA

Rated Total MMBTU/hr _____

ΔP 2.184
Ts 882.0
Static +14.0
Pbar 29.82
MW(wet) (28)
%H2O (7.0)
%O2 7.4
F_{60} _____

Vel= 134.5
DSCFM= 4,842.8
MMBTU/hr= _____
%Thr= _____

ACFM = 13,484.0
SCFM = 5,207.3

Additional Data:

LABORATORY ANALYSIS

Client: Pacific Energy
Report: 62-354

Location: Bakersfield Landfill
Date: 12-4-90
Analysist: JB

GRAVIMETRIC ANALYSIS:

Run-1

Probe/Nozzle/Filter Top

	#1	#2	#3	Average
Desiccator in				
Desiccator out				
#21 final (gr)	79.7822	79.7818		79.7820
tare (gr)	79.7797	79.7795		79.7796
NET (mg)				0.0024

Filter GT #256

	#1	#2	#3	Average
Desiccator in				
Desiccator out				
final (gr)	0.82854	0.82852		0.82853
tare (gr)	0.82042			0.82048
NET (mg)				0.00805

Condensable (aliquot 250 / 250)

	#1	#2	#3	Average
Desiccator in				
Desiccator out				
#134 final (gr)	82.3023	82.3016		82.3021
tare (gr)	82.2905	82.2905		82.2905
NET (mg)				0.0116

LABORATORY ANALYSIS

Client: Pacific Energy
Report: 62-354

Location Bakersfield Landfill
Date: 12-4-96
Analysist: JB

Titrametric Analysis:

Run-1

Probe/Nozzle/Filter Top $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	10/50	none	0.00
2)	1	1	0.00
3)			

Average 0.00

Filter $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	10/100	none	0.63
2)	1	1	0.65
3)			

Average 0.64

Condensable $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	25/500	none	0.73
2)	1	1	0.75
3)			

Average 0.74

SO_2 $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	25/500	none	1.75
2)	1	1	1.79
3)			

Average 1.77

LABORATORY ANALYSIS

Client: Pacific Energy
Report: 62-354

Location: Bakersfield Landfill
Date: 12-4-90
Analysist: ~~HB~~

GRAVIMETRIC ANALYSIS:

Run-2

Probe/Nozzle/Filter Top

	#1	#2	#3	
Desiccator in				
Desiccator out				Average
# 39				
final (gr)	78.8985	78.8980		78.8983
tare (gr)	78.8913	78.8915		78.8914
NET (mg)				0.0069

Filter C.T #350

	#1	#2	#3	
Desiccator in				
Desiccator out				Average
final (gr)	0.86638	0.86633		0.86636
tare (gr)	0.83294			0.83294
NET (mg)				0.03342

Condensable (aliquot 250 / 500)

	#1	#2	#3	
Desiccator in				
Desiccator out				Average
# 3				
final (gr)	77.7378	77.7375		77.7376
tare (gr)	77.6993	77.6998		77.6996
NET (mg)				0.038

LABORATORY ANALYSIS

Client: Pacific Energy
Report: 62-354

Location Bkfd. Landfill
Date: 12-4-90
Analysist: ~~YB~~

Titrametric Analysis:

Run - 2

Probe/Nozzle/Filter Top $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	10/50	none	0.30
2)	1	1	0.35
3)			

Average 0.33

Filter $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	10/100	none	0.63
2)	1	1	0.62
3)			

Average 0.63

Condensable $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	25/500	none	1.20
2)	1	1	1.25
3)			

Average 1.23

SO_2 $NBaCl_2$ 0.0096

	Aliquot	Dilution	mls Titrant
1)	25/500	none	0.91
2)	1	1	0.95
3)			

Average 0.93

F_{60} mixed gas = 9186 DSCF/mmBtu

Cal Value Mix = 616 Btu/cf

	Fuel Rate Nat Gas	Fuel Rate Land fill	Total Fuel (SCFM)	$\%O_2$	DSCFM
	120	650	770	8.0	7059
					NO_x lbs = 161
					CO lbs = 792
11:30	117	662	779	8.0	7142
					RUN #1 NO_x = 159. ppm CO = 782 ppm
12:00	120	662	782	8.0	7169 NO_x = 158 CO = 780
12:30	120	666	786	8.0	7206 NO_x = 157 CO = 776
					RUN #2
1:00	120	664	784	8.0	7188 NO_x = 158 CO = 778
1:30	120	667	787	8.0	7215 NO_x = 157 CO = 775
					RUN #3
2:00	120	663	783	8.0	7178 NO_x = 158 CO = 779

$$DSEFM = SCFM \times F \times CV \times \left(\frac{20.9}{20.9 - \%O_2}\right)$$

ERATIONAL DATA

COMPANY : PACIFIC ENERGY SYSTEMS
UNIT : BAKERSFIELD LANDFILL UNIT #1
DATE : 12-4-90
REPORT : 62-354 A

OPERATIONAL DATA

TIME	1130	1200	1230	1300	1330	1400
LUBE OIL						
TEMP IN	150	150	150	150	150	150
TEMP OUT	185	185	185	185	185	185
JACKET WATER						
TEMP IN	1901	190	190	190	190	190
TEMP OUT	205	208	204	201	200	200
AFTER COOLER						
WATER TEMP IN	130	130	130	130	130	130
WATER TEMP OUT	130	131	130	131	131	131
AFTER COOLER						
AIR TEMP	125	125	125	125	125	125
AIR MANIFOLD						
PRESSURE	15.5	16	15.5	15.5	15.5	15.5
LUBE OIL						
PRESSURE IN	56	56	56	56	56	56
PRESSURE OUT	38	35	35	38	42.5	42.5
JACKET WATER						
PRESSURE	335	335	335	335	335	335
STARTING AIR						
PRESSURE	140	135	130	128	121	120
AFTER COOLER						
WATER PRESSURE	225	225	225	225	225	225
GAS MANIFOLD						
PRESSURE	69	70	70	69	69	70
INSTRUMENT AIR						
PRESSURE	85.5	85.5	85.5	85.5	85.5	85.5
FUEL GAS						
PRESSURE	90	90	90	90	90	90
TACH(RPM)	900	900	900	900	900	900
GROSS KW	1750	1750	1750	1750	1750	1750
NET KW	1562	1655	1588	1614	1546	1560

SCOTT - MARRIN, INC. 2001 THIRD ST., UNIT H RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: 1027/Reanalysis

CYLINDER NUMBER CC51218

COMPONENT	CONCENTRATION (v/v)
Nitric Oxide	207.4 ± 2.1 ppm
Carbon Monoxide	412 ± 4 ppm
Nitrogen*	Balance

Cylinder Pressure: 1000 psig

*Oxygen-free.

Replicate	10/26/90	206.9 ppm
Analysis		206.6 ppm
Data On		206.3 ppm
NO:	Mean	206.6 ppm

Expiration Date NO: 4/26/91

Replicate	10/24/90	411 ppm
Analysis		408 ppm
Data On		410 ppm
CO:	Mean	410 ppm

Expiration Date CO: 4/24/91

(The Nitric Oxide analysis was performed in accordance with Section 3.0.4 of the revised EPA)
(traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National)
(Institute of Standards & Technology by direct intercomparison with GMIS, cylinder number)
(CC49697 at 254.5 ppm Nitric Oxide in Oxygen-free Nitrogen. The analysis was performed)
(using a Monitor Labs Model 8440, S/N 136 analyzer with continuous chemiluminescence)
(detection. The last multipoint calibration was performed 7/30/90.)

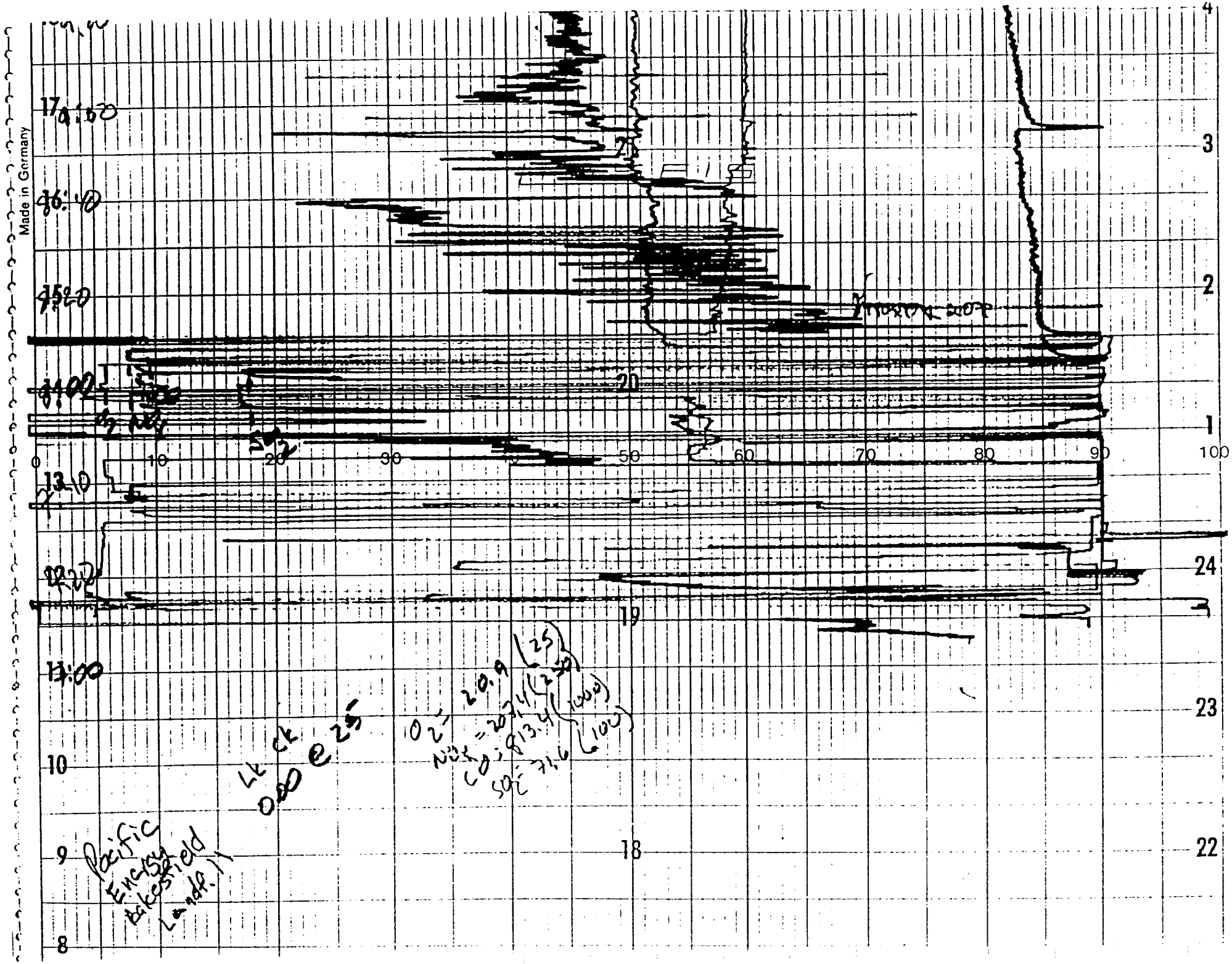
(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised)
(EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the)
(National Institute of Standards & Technology by direct intercomparison with GMIS, cylinder)
(number CC28362 at 495 ppm Carbon Monoxide in Ultrapure Air. The analysis was performed)
(using a Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization)
(detection. The last multipoint calibration was performed 9/11/90.)

SMF - 03

PETRO-CHEM ENVIRONMENTAL
DRY GAS METER CALIBRATION

DATE:11-14-90
OPERATOR:BDDM
METER ID 1001

AMBIENT TEMP.		67			
BAROMETRIC Pbar		29.47			
TEST METER ID#:		S5M104564			
TEST METER Mcf:		1.031			
APROXIMATE CFM		1	.75	.5	.3
STD TEST METER VOLUME CF	INT.	0.00	0.00	0.00	0.00
	FINAL	10.17	7.41	10.01	10.01
	TOTAL	10.17	7.41	10.01	10.01
FIELD GAS METER VOLUME CF	INT.	425.20	441.60	451.00	464.80
	FINAL	435.24	449.05	461.37	475.36
	TOTAL	10.04	7.45	10.37	10.56
STD TEST METER TEMP F'		65	63	69.5	71
FIELD GAS METER TEMP F'					
IN		63	61.5	68.5	72.5
OUT		61.5	62.5	64	68
AVERAGE		62.25	62	66.25	70.25
STD TEST METER PRES.(in H2O)		-1.30	-0.60	-0.30	-0.15
FIELD GAS METER PRES.(in H2O)		2.28	1.27	.51	.2
FIELD GAS METER Mcf		1.033003	1.020271	.9878428	.9754350
FIELD AVERAGE Mcf:		1.004138			


Made in Germany
Pacific Energy Bakersfield Landfill
O2: 20.9
NO: 25
CO: 813.4 (1000)
SO2: 71.6 (100)
0
10
20
30
40
50
60
70
80
90
100
1
2
3
4
8
9
10
11
12
13
14
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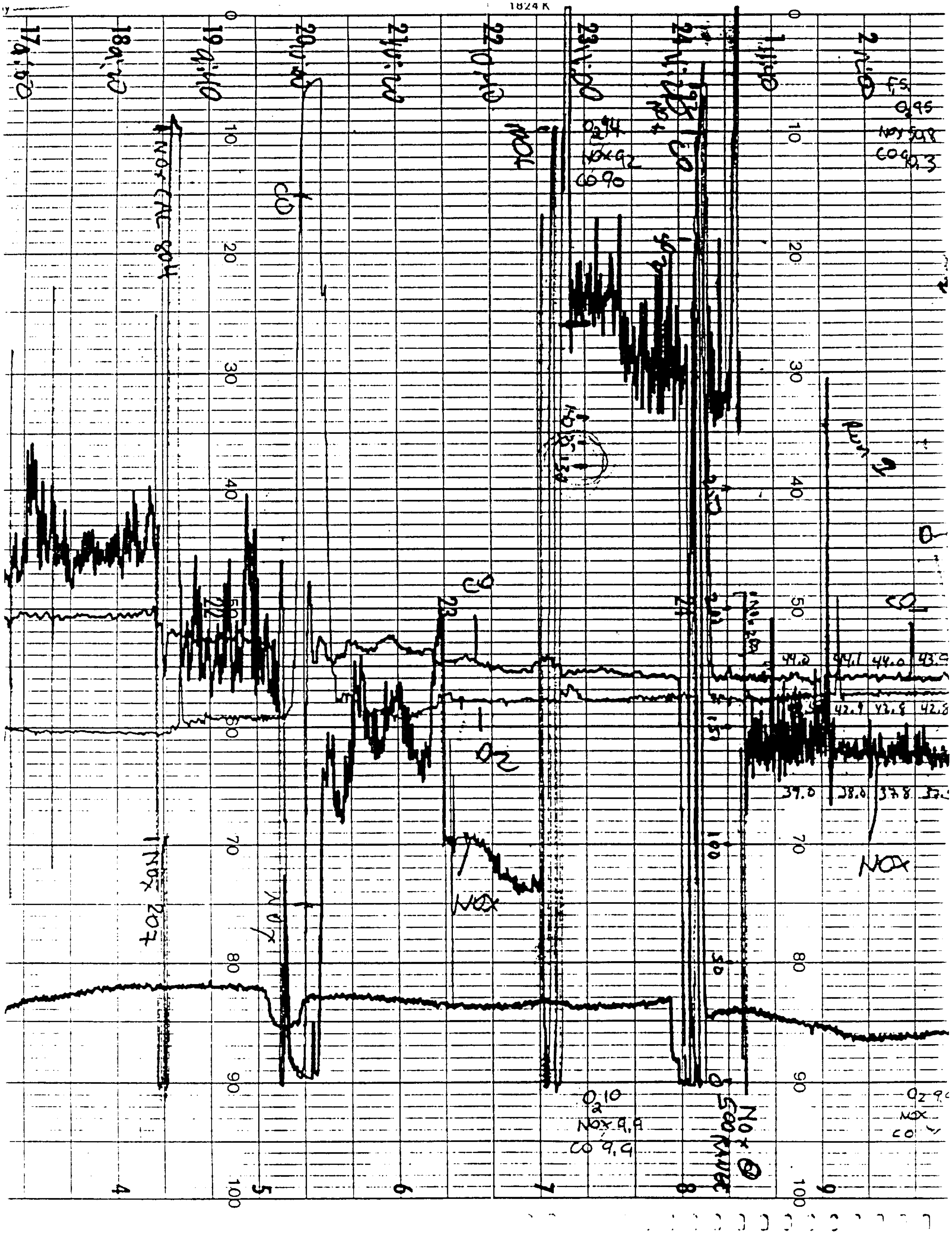
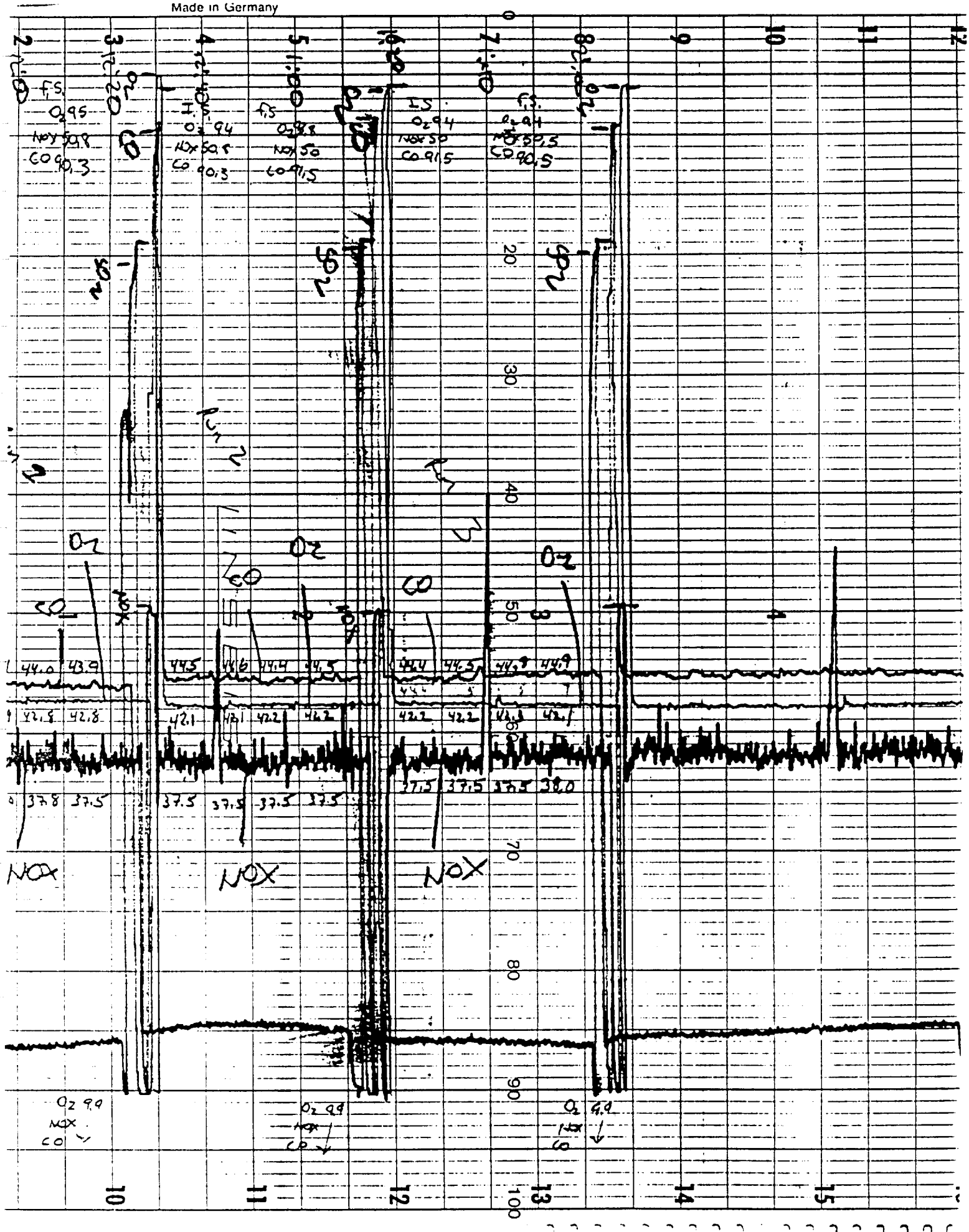
24




Made in Germany
Run 1
Run 2
Run 3
O2
NOX
CO
NOX
NOX
NOX