

COMPANY: PACIFIC ENERGY
UNIT: ICE #1-EXHAUST (FIRED ON LANDFILL GAS ONLY)
REPORT #: T1259
DATE: APRIL 2, 1991

EPA METHOD 18 HYDROCARBON EMISSION

RUN #: 1
DSCFM: 4712 (CARBON BALANCE)
BHP : 2627

COMPOUND	ppm	lb/hr
Methane	914.1	10.8887
Ethane	3.5	0.0782
Propane	0	0.0000
Butane	0	0.0000
Pentane	0	0.0000
Hexane	2.4	0.1537
Total	920	11.1205
Total (non methane)	5.9	0.2318

Total Non-methane Hydrocarbons (gr/bhp-hr)= 0.04

*EQUATIONS: $\text{TNMHC lb/hr} = \text{TNMHC ppm} * \text{MW} * 1.58 * 10^{-7} * \text{DSCFM}$

TNMHC = Total non-methane hydrocarbons (ROG)
ppm = parts per million, concentration
MW = molecular weight
 $1.58 * 10^{-7}$ = conversion factor
DSCFM = dry standard cubic feet per minute

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EPA METHOD 18 HYDROCARBON EMISSION

RUN #: 2
DSCFM: 4712 (CARBON BALANCE)
BHP : 2627

COMPOUND	ppm	lb/hr
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Methane	892.2	10.6278
Ethane	4.2	0.0938
Propane	0	0.0000
Butane	0	0.0000
Pentane	0	0.0000
Hexane	1	0.0640
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Total	897.4	10.7857
 Total (non methane)	 5.2	 0.1578

Total Non-methane Hydrocarbons (gr/bhp-hr)= 0.03

*EQUATIONS: $TNMHC \text{ lb/hr} = TNMHC \text{ ppm} * MW * 1.58 * 10^{-7} * DSCFM$

TNMHC = Total non-methane hydrocarbons (ROG)

ppm = parts per million, concentration

MW = molecular weight

$1.58 * 10^{-7}$ = conversion factor

DSCFM = dry standard cubic feet per minute

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EPA METHOD 18 HYDROCARBON EMISSION

RUN #: 3
DSCFM: 4712 (CARBON BALANCE)
BHP : 2627

COMPOUND	ppm	lb/hr
Methane	780.8	9.3008
Ethane	3.9	0.0871
Propane	0	0.0000
Butane	0	0.0000
Pentane	0	0.0000
Hexane	0	0.0000
Total	784.7	9.3879
Total (non methane)	3.9	0.0871

Total Non-methane Hydrocarbons (gr/bhp-hr)= 0.02

*EQUATIONS: $TNMHC \text{ lb/hr} = TNMHC \text{ ppm} * MW * 1.58 * 10^{-7} * DSCFM$

TNMHC = Total non-methane hydrocarbons (ROG)

ppm = parts per million, concentration

MW = molecular weight

$1.58 * 10^{-7}$ = conversion factor

DSCFM = dry standard cubic feet per minute

PACIFIC ENERGY
LANDFILL GAS ENGINE EXHAUST EMISSION TEST REPORT

PLANT: OTAY					
TEST DATE: April 2-3, 1991		TESTING LAB: South Coast Environmental		TECHNICIAN: K. B. Shannon	
KW LOAD: 1959		RATED HP: 2650		TOTAL TEST KWHRS: 5877	
STACK TEMP: 815°F		STACK MOISTURE % VOLUME: 12.2%		FLOW SDCFM: 4791*	
TEST PARAMETER	PERMIT LIMITS	TEST AVERAGE	RUN # 1	Run #2	Run #3
FUEL FLOW (DSCFM)	NONE	588	N/A	N/A	N/A
O2 %	NONE	7.86	7.95	7.79	7.83
NO2 LBS-HR	10.9	1.55	1.42	1.57	1.67
NOx (Corrected) PPM LBS-HR g/Bhp-Hr	400 (Dry) -- -	159.95 5.59 0.97	157.79 5.55 0.96	162.52 5.66 0.98	159.53 5.56 0.96
NON-METHANE HYDROCARBONS PPM LBS-HR g/Bhp-Hr	- - 0.8 g/Bhp-Hr	5.00 0.162 0.03	5.90 0.236 0.04	5.20 0.161 0.03	3.90 0.089 0.02
CARBON MONOXIDE PPM @ 3 % O2 LBS-HR g/Bhp-Hr	750 (Dry) - -	354.95 5.49 0.95	355.01 5.49 0.95	355.60 5.50 0.95	354.23 5.48 0.95
PARTICULATES Gr/DSCF	0.1 Gr/DSCF	0.003	0.005	0.002	0.001
TEST COORDINATOR	ANDREW WASHINGTON (213) 725-1139				
SITE CONTACT	MAURICE KING 619-421-5945				

*FLOW DSCFM CALCULATED FROM COMBUSTION ANALYSIS
ENGINEERING SOURCE TEST REPORT FORMAT:

INTRODUCTION
SUMMARY

FORAMLIZED COPY OF THIS FORM
INSTRUMENT DATA
EXHAUST VOLUMETRIC FLOW DATA
COPY OF ALL CALCULATIONS
FUEL GAS ANALYSIS REPORT
INCLUDE VOLUME AND WEIGHT OF SAMPLE
LAB REPORT TO IDENTIFY PLANT AND GAS SAMPLE SOURCE
FIELD DATA
COPY OF PLANT GAS CHROMATOGRAPH PRINTOUT
ALL ENGINE OPERATING PARAMETERS DOCUMENTED

II. EXHAUST VOLUMETRIC FLOW DATA

COMPANY: PACIFIC ENERGY
 DATE: APRIL 2, 1991
 UNIT: ICE #1
 REPORT #: T1259
 RUN #: #1-NOx MODE

EXPANSION FACTOR; DSCFM CALCULATION

FUEL COMPONENT	C	H	EXPANSION FACTOR	MOLE %	EXHAUST DSCF SCF FUEL
METHANE	1	4	8.57	53.567	4.5906
ETHANE	2	6	15.25	0	0
PROPANE	3	8	21.92	0	0
ISO-BUTANE	4	10	28.6	0.004	0.0011
NORM-BUTANE	4	10	28.6	0	0.000
ISO-PENTANE	5	12	35.28	0	0.000
NORM-PENTANE	5	12	35.28	0	0.000
HEXANE +	6	14	41.95	0.07	0.029
AIR (N2 + O2)	-	-	1.00	7.931	0.0793
CO2	-	-	1.00	38.428	0.384
H2S	-	-	6.68	0	0.000
			TOTAL	100	5.0847

5.084790 DSCF EXHAUST PER SCF OF FUEL GAS @ ZERO % OXYGEN

 490.180 NET BTU/SCF OF FUEL GAS

 544.3254 GROSS BTU/SCF OF FUEL GAS

 588 FUEL USAGE DURING TEST RUN

 7.95 % O2 MEASURED DURING TEST RUN

 4825.329 CALCULATED DSCFM

COMPANY: PACIFIC ENERGY
 DATE: APRIL 2, 1991
 UNIT: ICE #1
 REPORT #: T1259
 RUN #: #2-NOx MODE

EXPANSION FACTOR; DSCFM CALCULATION

FUEL COMPONENT	C	H	EXPANSION FACTOR	MOLE %	EXHAUST DSCF SCF FUEL
METHANE	1	4	8.57	53.567	4.5906
ETHANE	2	6	15.25	0	0
PROPANE	3	8	21.92	0	0
ISO-BUTANE	4	10	28.6	0.004	0.0011
NORM-BUTANE	4	10	28.6	0	0.000
ISO-PENTANE	5	12	35.28	0	0.000
NORM-PENTANE	5	12	35.28	0	0.000
HEXANE +	6	14	41.95	0.07	0.029
AIR (N2 + O2)	-	-	1.00	7.931	0.0793
CO2	-	-	1.00	38.428	0.384
H2S	-	-	6.68	0	0.000
TOTAL				100	5.0847

5.084790 DSCF EXHAUST PER SCF OF FUEL GAS @ ZERO % OXYGEN

 490.180 NET BTU/SCF OF FUEL GAS

 544.3254 GROSS BTU/SCF OF FUEL GAS

 588 FUEL USAGE DURING TEST RUN

 7.79 % O2 MEASURED DURING TEST RUN

 4766.438 CALCULATED DSCFM

COMPANY: PACIFIC ENERGY
 DATE: APRIL 2, 1991
 UNIT: ICE #1
 REPORT #: T1259
 RUN #: #3-NOx MODE

EXPANSION FACTOR; DSCFM CALCULATION

FUEL COMPONENT	C	H	EXPANSION FACTOR	MOLE %	EXHAUST DSCF SCF FUEL
METHANE	1	4	8.57	53.567	4.5906
ETHANE	2	6	15.25	0	0
PROPANE	3	8	21.92	0	0
ISO-BUTANE	4	10	28.6	0.004	0.0011
NORM-BUTANE	4	10	28.6	0	0.000
ISO-PENTANE	5	12	35.28	0	0.000
NORM-PENTANE	5	12	35.28	0	0.000
HEXANE +	6	14	41.95	0.07	0.029
AIR (N2 + O2)	-	-	1.00	7.931	0.0793
CO2	-	-	1.00	38.428	0.384
H2S	-	-	6.68	0	0.000
			TOTAL	100	5.0847

5.084790 DSCF EXHAUST PER SCF OF FUEL GAS @ ZERO % OXYGEN

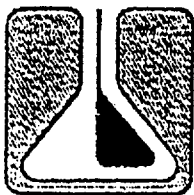
490.180 NET BTU/SCF OF FUEL GAS

544.3254 GROSS BTU/SCF OF FUEL GAS

588 FUEL USAGE DURING TEST RUN

7.83 % O2 MEASURED DURING TEST RUN

4781.026 CALCULATED DSCFM



ZALCO LABORATORIES, INC.

Analytical & Consulting Services

SOUTH COAST ENVIRONMENTAL
1915 McKinley, Suite E
Laverne, CA 91750

Lab. No.: 027378_001
Received: May 3, 1991
Reported: May 3, 1991

Attention: Russ Logan

Sample Description: PEN-OTAY LF Ice #1 Inlet

* CHROMATOGRAPHIC ANALYSIS (Z 1610) *

Components	Mole %	ppm	Wt %	G.P.M.
Carbon Dioxide	38.428	384280	60.666	
Oxygen	7.931 < 2.198		2.522	
Nitrogen	5.733		5.761	
Carbon Monoxide	0.000		0.000	
Methane	53.567	535,670	30.827	
Ethane	0.000		0.000	
Propane	0.000		0.000	0.000
IsoButane	.004	40	.008	.001
N-Butane	0.000		0.000	0.000
IsoPentane	0.000		0.000	0.000
N-Pentane	0.000		0.000	0.000
Hexanes+	.070	700	.215	.030
Totals -	100.000	920,690	100.000	.031

SPECIFIC GRAVITY (Air = 1)	.9664
* SPECIFIC VOLUME, cu.ft./lb	13.56
* GROSS CALORIFIC VALUE, BTU/cu.ft.	537.60
** GROSS CALORIFIC VALUE, BTU/cu.ft.	546.89
** GROSS CALORIFIC VALUE, BTU/lb	7414.66
* NET CALORIFIC VALUE, BTU/cu.ft.	484.14
** NET CALORIFIC VALUE, BTU/cu.ft.	492.51
COMPRESSIBILITY FACTOR 'Z' (60 F, 1 ATM)	.9975

* Water Saturated

** Dry Gas @ 60 F, 14.73 psia

Maryann W. Benoit
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Organics Supervisor

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III. NO_x, CO, AND ROG RESULTS