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ENVIRONMENTAL ASSESSMENT OF AN ENHANCED OIL RECOVERY STEAM GENERATOR EQUIPPED WITH AN EPA HEAVY OIL LOW-NO_X BURNER

Volume II. Data Supplement

Prepared for

Office of Air Quality Planning and Standards

Prepared by

Air and Energy Engineering Research
Laboratory
Research Triangle Park NC 27711

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Volume II
Data Supplement

by

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For

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Research and Development
Washington, DC 20460

ABSTRACT

Comprehensive emission measurements and 30-day flue gas monitoring were performed on a 16-MW (55 million Btu/hr) enhanced oil recovery steam generator equipped with the EPA low-NO_x burner firing high-nitrogen crude. The 1-day comprehensive measurements included quantification of semivolatile organics and 73 trace elements; volatile organic sampling train (VOST) quantitation of volatile organic priority pollutants; EPA Method 5/8 for particulate and SO_x; controlled condensation for SO_x; Andersen impactors for particle size distribution; grab samples for N_2O; and continuous flue gas monitoring. NO_x emissions during the comprehensive tests averaged 70 ppm at 3 percent O_2, well below the target level of 85 ppm. CO emissions were below 30 ppm, and SO_2 averaged about 550 ppm. Solid particulates were emitted at about 27 ng/J (96 mg/dscm); condensible particulates were about half that level. Volatile organics (benzene, toluene, and ethylbenzene) were measured in the 0.4 to 20 ppb range. Semivolatile organics (naphthalene and phenol) were detected in the 0.3 ppb range. Subsequent continuous monitoring of flue gas criteria emissions showed NO_x below 80 ppm at 3 percent O_2 with an average of 70 ppm. CO emissions were generally less than 30 ppm.

CONTENTS

SECTION 1

INTRODUCTION

The purpose of this data supplement is to document test data in greater detail than was possible in Volume I (Technical Results) of this report. It is intended to provide sufficient detail for researchers to perform their own analysis of the data obtained. Readers are referred to the technical volume (Volume I) for objectives, description of the source tested, data interpretations, and conclusions.

The remaining sections of this data supplement contain the following information:

Section 2: Preliminary Tests and Equipment Calibration -- Stack velocity traverse and nozzle sizing and flow calculations; equipment calibration data

Section 3: Steam Generator Operating Data -- Field data sheets of steamer operating conditions from available test meters

Section 4: Sampling Data Sheets -- Emission data obtained with continuous monitoring instrumentation. Operating data tables for combined EPA Methods 5/8 (for particulate mass and SO_x emissions), source assessment sampling system (SASS) (for trace element and organic emissions), volatile organic sampling train (VOST) (for volatile organic species emissions), Andersen impactor (for particulate size

distribution), controlled condensation system (for SO_2, SO_3), and EPA Method 7 (for NO_x certification)

Section 5: Analytical Results -- Fuel proximate and ultimate analyses; laboratory reports for particulate emissions and size distribution by gravimetric analyses; sulfur oxides emissions by wet chemical analysis; trace element analyses by spark source mass spectrometry (SSMS); atomic absorption spectroscopy (AAS) and other methods; total chromatographable organic (TCO) and gravimetric organic (GRAV) results, determination of organic compounds by gas chromatography/mass spectrometry (GC/MS) and infrared (IR) spectra of GRAV residues, volatile organics analyses of VOST traps by GC/MS; N_2O analysis by GC/electron capture detector (ECD); and laboratory analyses for NO_x by EPA Method 7.

SECTION 2

PRELIMINARY TESTS AND EQUIPMENT CALIBRATION

PRELIMINARY VELOCITY TRAVERSE

PLANT [illegible]

DATE [illegible]

LOCATION [illegible]

STACK I.D. [illegible]

BAROMETRIC PRESSURE, in. Hg 29.2[illegible]

STACK GAUGE PRESSURE, in. H_2O

OPERATORS [illegible]

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.27	
2	.35	
3	.37	415
4	.37	418
5	.38	427
6	.40	433
7	.45	43[illegible]
8	.47	437
9	[illegible]	438
10	.45	437
11	.50	438
12	.48	437
AVERAGE		

SCHEMATIC OF TRAVERSE POINT LAYOUT

	TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
.22	1	.20	
.25	2	.22	
.27	3	.23	417
.28	4	.23	[illegible]
.30	5	~~.23~~	~~[illegible]~~
.32	6	~~.23~~	~~[illegible]~~ 425
.34	7	.50 ~~.23~~	~~[illegible]~~ 431
.36	8	.47 ~~[illegible]~~	~~[illegible]~~
.37	9	.50 ~~.23~~	~~[illegible]~~ 434
.38	10	.50	432
.40	11	.52	430
.40	12	.53	[illegible]
	AVERAGE		

EPA (Dur) 233
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ISOKINECTIC SAMPLING WORKSHEET

Plant _____ Peformed by _____

Date _____

Sample Location _____

Test No./Type _____

$$K = \frac{782.687\ (Cp)^2\ (1-B_{wo})^2\ P_s\ M_d}{K_o^2\ M_s\ P_m}$$

where: K = Contant of fixed and assumed parameters (dimensionless)

Pitot coefficient (dimensionless)	C_p	
Water vapor in the gas stream (proportion by volume)	B_{wo}	
Absolute stack gas pressure (in. Hg)	P_s	
Molecular weight, stack gas dry (lb/lb-mole)	M_d	
Orifice coefficient (dimensionless)	K_o	
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	
Abolute meter pressure (in. Hg)	P_m	
$\frac{782.687\ (\quad)^2\ (1-\quad)^2\ (\quad)\ (\quad)}{(\quad)^2\ (\quad)\ (\quad)}$	K	

ISOKINECTIC SAMPLING WORKSHEET

Plant CHEMON Peformed by Kaufmann

Date 2/1/84

Sample Location

Test No./Type GASS #1

$$K = \frac{782.687\ (Cp)^2\ (1-B_{wo})^2\ P_s\ M_d}{K_o^2\ M_s\ P_m}$$

where: K = Contant of fixed and assumed parameters (dimensionless)

Pitot coefficient (dimensionless)	C_p	.816
Water vapor in the gas stream (proportion by volume)	B_{wo}	0.11
Absolute stack gas pressure (in. Hg)	P_s	~~Static~~ -.5
Molecular weight, stack gas dry (lb/lb-mole)	M_d	CO_2 14 O_2 - 3 N_2 - ~~28~~
Orifice coefficient (dimensionless)	K_o	3.356 α .039
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	
Abolute meter pressure (in. Hg)	P_m	29.26
$\frac{782.687\ (\quad)^2\ (1-\quad)^2\ (\quad)\ (\quad)}{(\quad)^2\ (\quad)\ (\quad)}$	K	38.419

.69
N2 / ~~3~~

ISOKINECTIC NOZZLE CALCULATION
AND
SAMPLING RATE CALCULATION

Plant Chevron Performed by Kaufmann

Date 2/1/84

Sample Location ______

Test No./Type SASS #1

$$N_d = \left(\frac{\Delta H \ T_s}{K \ T_m \ \Delta P}\right)^{.25}$$

where: N_d = Nozzle diameter (inches)

Average pressure differential across the orifice meter (in. H_2O)	ΔH	
Temperature stack gas, average (^oF)	T_s	
Temperature of gas meter, average (^oF)	T_m	
Stack gas velocity pressure (in H_2O)	ΔP	
$\left(\frac{(\_\_\_)\ (\_\_\_ + 460)}{(\_\_\_)\ (\_\_\_ + 460)(\_\_\_)}\right)^{.25}$	N_d	

$$\Delta H = K \ (N_d)^4 \ \frac{T_m}{T_s} \ (\Delta P)$$

where: ΔH = Pressure differential across the orifice meter (in H_2O)

Nozzle diameter, actual (inches)	N_d	.674
Temperature of gas meter (^oF)	T_m	
Temperature of stack gas (^oF)	T_s	
Stack gas velocity pressure (in H_2O)	ΔP	
$\left((\_\_\_)\ (\_\_\_)^4 \ \frac{(\_\_\_ + 460)}{(\_\_\_ + 460)}\ (\_\_\_)\right)$	ΔH	
Magic number ______$(\quad)^4$	$K(N_d)^4$	7.93

ACUREX Corporation

ANDERSEN SAMPLING CALCULATIONS

Plant Chevron SVS-69

Date 2-22-84

Test Location Outlet

Pitot Coefficient (C_p) _____

Duct Dimension _____

Barometric Pressure (P_G) _____ " Hg

Static Pressure (P_{st}) _____ " H_2O

Meter Temp (T_m) _____ °F

Meter Rate (R_m) _____ cfm

Clock Time _____

1) Stack Pressure: $P_s = P_b + \frac{P_{st}}{13.6} = \frac{29.36}{} + \frac{}{13.6} = \frac{29.36}{}$ in. Hg.

2) Mole Fraction Dry Gas: $M_f \quad 1 - \frac{\%H_2O}{100} = 1 - \frac{11}{100} =$ .89

3) Mol. Wt. Dry Flue Gas:

$MW_d \quad (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28 \times \%CO) + (0.28 \times \%N_2)$

$- (0.44 \times 14.0) + (0.32 \times 2.5) + (0.28 \times \_\_\_\_) + (0.28 \times 83.5)$ 30.34

4) Mol. Wt. Flue Gas:

$MW_s \quad (MW_d) \times (M_f) + [18 \times (1 \quad M_f)]$

$= 30.34 \times .89 + [18 \times (1 \quad .11)] =$ 28.98

5) Stack Gas Velocity:

$$V_s = 85.49 \times (Cp) \times \sqrt{\Delta P \text{ avg}} \times \sqrt{\frac{T_s + 460}{P_s \times MW_s}}$$

$$85.49 \times .82 \times \sqrt{.44} \times \sqrt{\frac{530 + 460}{29.36 \times 28.98}} = 50.16 \text{ fps}$$

6) Sample Rate:

$Q_n \quad 0.327 \times (V_s) \times (D_n)^2$

$= 0.327 \times 50.16 \times (.25)^2 =$ 1,02 acfm

7) Meter Rate:

$$R_m = (Q_n) \times \frac{P_s}{P_m} \times \frac{T_m + 460}{T_{st} + 460} \times M_f \times \alpha \qquad 1.68 \left(\frac{R_m}{K_o}\right)^2 = \Delta H$$

$$= 1.025 \times \frac{29.36}{29.39} \times \frac{70 + 460}{530 + 460} \times .89 = \frac{0.488}{2\text{-}6} \text{ cfm} \qquad 1.68 \left(\frac{\quad}{.67}\right)^2 = 0.89 \text{ "}H_2O$$

Form EED-070A 12/79

CONTROL MODULE CALIBRATION

Module I.D. #105 | Barometric Pressure (in. Hg) 30.07 | Ambient Temperature (°F) 78°

Date 10-5-83 | Primary Meter I.D. 433583 | Operator S.A. Smith

Orifice Size	Orifice Reading ΔH (in H_2O)	Primary Meter Gas Volume V_p (ft^3)	Meter Box Gas Volume V_d (ft^3)	Temperature: Primary Meter Inlet T_{pi} (°F)	Primary Meter Outlet T_{po} (°F)	Primary Meter Average T_p (°F)	Meter Box Meter Inlet T_{di} (°F)	Meter Box Meter Outlet T_{do} (°F)	Meter Box Meter Average T_d (°F)	Time θ (min)	Meter Correction Factor α	Orifice Coefficient K_o
Small Orifice 0.187	.6	23.710	22.960	98 / 78	93 / 77	86.5	69 / 72	68 / 71	70	58.5	1.000	.670
	2.0	22.595	22.145	78 / 79	77 / 76	77.5	72 / 74	71 / 72	72.3	30.2	.994	.677
	4.0	26.155	25.680	79 / 84	76 / 78	79.3	74 / 74	72 / 73	73.3	25.7	1.003	.650
	5.4	21.655	21.230	84 / 86	78 / 79	81.8	74 / 75	73 / 74	74	18.2	1.008	.654
Medium Orifice 0.281	.6	70.235	68.985	86 / 86	79 / 81	83	75 / 76	74 / 76	75.3	65.3	.998	1.771
	2.0	43.130	42.265	86 / 99	81 / 85	87.8	76 / 80	76 / 77	77.3	23.0	1.004	1.688
	4.0	30.820	30.175	99 / 105	85 / 89	94.5	80 / 80	77 / 77	78.5	12.1	1.018	1.620
	5.4	33.060	32.340	105 / 109	89 / 92	98.8	80 / 83	77 / 78	79.5	11.2	1.027	1.614
Large Orifice 0.358	.6	37.865	36.910	109 / 104	92 / 90	98.8	83 / 81	78 / 79	80.3	16.9	1.010	3.672
	2.0	33.680	33.210	104 / 114	90 / 94	100.5	81 / 85	79 / 80	81.8	8.9	1.025	3.392
	4.0	73.560	73.500	114 / 121	94 / 103	108	85 / 90	80 / 82	84.3	14.4	1.053	3.231
	5.4	25.950	26.155	121 / 122	103 / 105	112.8	90 / 92	82 / 84	87	4.5	1.069	3.131

$$\alpha = \frac{V_d \left(P_B + \frac{\Delta H}{13.6}\right)(T_p + 460)}{V_p\,(P_B)\,(T_d + 460)}$$

$$K_o = \frac{V_p}{\alpha \sqrt{\frac{\Delta H\,(T_d + 460)}{P_B\,(28.96)}}}$$

Orifice	Avg. α	Avg. K_o
Small	1.001	.662
Medium	1.012	1.673
Large	1.039	3.356

SECTION 3

STEAM GENERATOR OPERATING DATA

9.30		264	3.6	2516.1	1000	535	4.70	1.84	65
9.45	33312.1	265	3.6	2548.0	1000	535	4.80	2.00	65
10.00	33314.10	265	3.6	2581.7	1000	535	4.65	3.10	65
10.15	33316.45	266	3.6	2618.5	1000	535	4.50	2.40	67
1030	33318.50	267	3.6	2654.1	1000	535	4.53	2.40	67
1045	33320.26	267	3.6	2693.5	1020	535	4.41	2.58	66
1100	33323.15	267	3.6	2729.5	1020	535	4.70	2.56	66
1115	33325.49	267	3.6	2767.0	1020	535	4.68	2.11	66
1130	33327.37	264	3.6	2800.2	1020	535	4.73	2.22	69
1145	33329.53	265	3.6	2836.4	1020	535	4.82	2.30	70
1200	33331.85	268	3.6	2874.2	1020	535	4.72	2.28	68
1215	33334.30	267	3.6	2912.8	1020	535	4.65	2.32	67
1230	33336.28	267	3.6	2946.0	1020	535	4.60	2.33	68
1245	33338.54	267	3.6	2984.6	1020	535	4.65	2.24	67
1300	33341.05	266	3.6	3024.3	1020	535	4.56	2.43	72
1315	33342.91	267	3.6	3057.4	1020	535	4.60	2.36	70
1330	33345.01	265	3.4	3095.2	1010	538	4.71	2.06	61
1345	33347.40	266	3.4	0293	1010	535	4.70	2.03	73
1400	33349.27	264	3.4	0599	1020	535	4.70	2.01	71
1415	33351.69	266	3.4	0962	1080	545	4.76	1.97	71
1430	33354.57	266	3.4	1429	1190	~560	4.65	2.19	71
1445	33356.00	266	3.4	165.2	1220	560+	4.62	2.48	73
1500	33357.80	268	3.4	201.8	1240	560+	4.65	2.40	70
1515	33360.25	267	3.4	238.6	1250	560+	4.62	2.40	73
1530	33362.53	267	3.4	268.1	1280	560+	4.63	2.33	72
1545	33364.61	269	3.4	299.3	1280	560+	4.71	2.34	70
1600	33367.07	–	3.4	3367	1280	570+	4.70	2.35	68
1615	33369.78	–	3.4	3777	1290	570+	4.70	2.35	69
1630	33371.48	–	3.4	4040	1300	570+	4.76	2.45	69
1645	33373.75	–	3.4	4390	1300	570+	4.70	2.30	55
1700	33376.26	269	3.4	475.9	1300	560+	4.70	2.30	69
1715	33378.42	269	3.4	511.7	1300	560+	4.55	2.29	70
1730	33380.28	268	3.4	540.8	1300	560+	4.70	2.32	69
1745	33382.40	269	3.4	574.6	1300	560+	4.67	2.35	69

Steamer Operating Data
Comprehensive Test - 2-1-84

Time	Oil Flow		Feedwater		Steam		Combustion Air		
	Total Gallons	Temperature (°F)	BPD X1000	Total Barrels	Pressure (Psi)	Temperature (°F)	Primary Air Flow[a] mV	Secondary Air Flow[b] mV	Temperature Air Flow (°F)
1800	33384.93	269	3.4	606.9	1300	560+	4.74	2.30	?
1815	33386.53	269	3.4	643.4	1300	560+	4.70	2.26	69
1830	33389.24	269	3.4	678.0	1300	560+	4.70	2.33	70
1845	-	269	3.4	710.4	1300	560+	4.70	2.36	69
1900	-	269	3.4	745.7	1300	560+	4.54	2.29	69
1920	-	270	3.4	794.0	1300	560+	4.68	2.43	68
1945	3340061.0	268	3.4	850.5	1320	560+	4.60	2.65	67
2000	3340291.0	268	3.4	885.4	1320	560+	4.41	2.78	66
2015	3340481.0	267	3.4	917.3	1320	560+	4.26	3.00	65
2030	3340751.1	267	3.35	953.8	1320	560+	4.40	2.80	64
2045	3340941.4	267	3.35	992.2	1320	560+	4.38	2.78	63
2100	3341202.2	267	3.35	1001.6	1330	560+	4.46	2.92	63
2115	3341438.8	266	3.3	1055.7	1330	560+	4.39	2.90	61
2145	3341880.0	267	3.3	1123.5	1320	560+	4.74	2.21	61

a Primary Air Flow (scfm) = 63777 $\left(\frac{V}{T(R)}\right)^{1/2}$

b Secondary Air Flow (scfm) = 82777 $\left(\frac{V}{T(R)}\right)^{1/2}$

SECTION 4

SAMPLING DATA SHEETS

4.1 Continuous Monitoring Data

4.2 Field Data Sheets for EPA Method 5/8, SASS, VOST, Andersen Impactor, Controlled Condensation (CCS), and EPA Method 7

4.1 CONTINUOUS MONITORING DATA

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON

Location SVS 27-29

Operator BEST

Date 1-21-84

Load Range

Ambient Temperature 54.0F

Barometric Pressure 29.44 (1101)

Static Pressure Duct

Fuel LIGHT OILS

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1090				2.9		90	573		63										
1130				2.7		70	589		66										
1230				2.6		75	595		67										
1330				4.7		35	594		63										
1430				4.7		15	595		61										
1530				4.7		20	620		61										LOST FLOW TO NOx ANALYZER 15:15 - 16:05
1630				4.7		20	619		64										
1730				2.8		55	607		70										
																			AVERAGE

4-3

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron
Location: SVS-69 ([illegible])
Operator: Best
Date: 1-22-84
Load Range:

Ambient Temperature: 51°F 55°F
Barometric Pressure: 29.51 ([illegible]) [illegible]
Static Pressure Duct:
Fuel: [illegible]

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0030				2.9		50	618		69										
0130				2.9		45	604		65										
0230				2.8		50	620		65										
0330				2.9		50	613		67										
0430				2.9		50	604		64										
0530				2.6		35	625		61										
0630				2.7		40	617		59										
0730				3.0		40	601		59										
0830				2.7		40	609		58										
1030				3.0		50	594		69										
1130				2.9		55	589		68										
1230				2.8		30	611		66										
1330				2.8		20	595		65										
1430				2.8		35	606		64										
1530				2.7		10	609		66										
1630				2.8		40	614		63										
1830				3.0		45	602		67										
1930				3.2		45	602		69										
2030				3.1		40	595		67										
2130				3.1		40	587		65										
2230				3.2		45	603		65										
2330				3.1		40	584		66										
																			AVERAGE

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FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (EER)

Location SVS 27-69

Operator BEST

Date 1-23-84

Load Range

Ambient Temperature

Barometric Pressure 29.54 (0600)

Static Pressure Duct

Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0030				3.1		40	589		66										
0130				3.0		40	605		66										
0230				3.1		40	606		66										
0330				3.0		35	598		63										
0430				3.0		35	589		64										
0630				3.0		35	587		63										
0730				3.1		45	571		69										
0830				3.1		45	585		66										
0930				3.5		45	555		66										
1030				3.2		15	559		63										
1130				3.1		35	550		64										
1230				2.8		25	553		59										
1330				2.8		30	546		63										
1430				3.0		15	574		63										
1530				3.0		15	570		60										
2030				3.6		10	577		68										
2130				3.6		20	575		69										
2230				3.5		25	574		71										
2330				3.5		20	571		68										
																			AVERAGE

4-5

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (GGR)

Location SVS 27-69

Operator BEST

Date 1-24-84

Load Range

Ambient Temperature 52°F 70°F

Barometric Pressure 29.65 (Hg) 29.54 (Hg)

Static Pressure Duct

Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0030				3.6		15	560		71										
0130				3.4		15	572		69										
0230				3.5		15	580		67										
0330				3.5		15	571		70										
0430				3.5		20	576		69										
0530				3.6		15	561		65										
0630				3.5		15	569		71										
0730				3.2		25	570		67										
0830				3.3		10	586		67										
0930				3.2		15	552		69										
1030				3.6		10	560		65										
1130				2.1		10	577		63										
1230				3.3		5	528		62										
1330				3.1		5	532		60										
1430				3.2		5	523		60										
1530				3.3		5	515		59										
1630				3.2		5	511		57										
1708				3.0		5	524		59										
1723				3.4		5	520		57										
1738				3.1		5	525		59										
1753				3.3		20	561		65										
1708				3.3		25	562		65										
1723				3.3		25	551		64										
1738				3.2		25	554		65										
1753				3.3		30	555		64										
1808				3.2		25	560		63										AVERAGE
1823				2.5		25	589		64										
1838				2.4		30	589		65										

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____ Ambient Temperature _____

Location _____ Barometric Pressure _____

Operator _____ Static Pressure Duct _____

Date 1-24-84 (CONTINUED) Fuel _____

Load Range _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1853				2.5		30	585		47										
1908				2.6		30	585		53										
1923				2.6		25	606		53										
1938				0.1		20	30		39										
																			AVERAGE

4-7

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (CLER)

Location SECTION 27 UNIT 69

Operator RBS

Date 1-25-84

Load Range

Ambient Temperature 61°F

Barometric Pressure 29.50 (1105)

Static Pressure Duct

Fuel NAT GAS

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1059				2.9		20	600		71										
1113				2.7		20	613		70										
1128				2.6		20	603		72										
1143				2.6		25	606		69										
1158				2.6		20	604		68										
1213				2.8		20	589		66										
1229				2.7		30	584		69										
1243				2.7		30	579		70										
1258				2.8		30	564		70										
1313				2.6		30	573		68										
1328				2.5		25	563		69										
1343				2.6		30	565		66										
1358				2.7		25	554		65										
1413				2.4		25	545		67										
1428				2.5		15	560		65										
1443				2.6		10	575		63										
1458				2.5		10	569		64										
1613				2.6		10	562		62										
1528				2.7		15	573		64										
1543				4.4		10	574		64										
1558				2.6		10	585		62										
																			AVERAGE

4-8

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (EER)

Location

Operator BEST

Date 1-26-84

Load Range

Ambient Temperature 58°F

Barometric Pressure 29.54 (1200)

Static Pressure Duct

Fuel LOCAL CRUDE

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1523				1.1		10	609		70										
1538				2.8		10	591		73										
1563				2.7		10	581		71										
1608				2.8		10	573		73										
1623				2.6		10	574		71										
1635				2.7		15	587		73										
1705				2.7		5	616		71										
1735				3.0		0	612		69										
1805				2.9		0	614		68										
1835				3.0		5	625		64										
1905				2.9		0	625		69										
1935				2.8		0	638		64										
2005				2.8		5	620		69										
2035				2.9		5	630		69										
2105				2.7		10	625		71										
2135				2.8		5	615		70										
2205				2.9		5	625		70										
2235				3.0		10	624		70										
2305				2.8		0	624		70										
2335				2.8		5	616		68										
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (EER)

Location

Operator BEST

Date 1-27-84

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel LOW BTU GAS

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
0005				3.0		5	626		65										
0035				2.9		5	630		62										
0105				2.9		5	637		67										
0135				3.0		5	658		65										
0205				2.8		10	638		66										
0235				2.9		0	650		66										
0305				3.1		5	634		62										
0335				3.0		5	612		65										
0405				3.0		5	621		64										
0435				3.2		10	621		68										
0505				2.9		10	623		68										
0535				2.8		5	617		67										
0605				3.1		10	623		61										
0635				3.3		10	621		69										
0705				3.2		10	622		33										
0735				2.9		10	621		61										
0805				2.9		10	611		60										
0847				2.7		15	573		70										
0847				2.6		15	612		69										
0904				2.7		10	612		71										
0917				2.7		15	603		67										
0934				2.7		10	590		69										
0949				2.8		20	622		68										
1004				2.9		20	550		66										
1019				2.8		25	547		66										
1034				2.7		25	577		64										AVERAGE
1049				2.8		25	568		63										
1104				2.7		20	575		60										

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____ Ambient Temperature _____

Location _____ Barometric Pressure _____

Operator _____ Static Pressure Duct _____

Date 1-27-84 (CONTINUED) Fuel _____

Load Range _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1119				2.9		25	569		61										
1134				2.8		25	569		57										
1149				2.7		25	524		58										
1204				2.8		25	539		56										
1219				2.7		20	539		57										
1234				2.6		25	536		58										
1249				2.7		25	546		71										
1304				4.5		25	530		65										
1319				4.4		25	533		64										
1334				4.4		20	556		62										
1349				0		25	547		27										
1404				3.0		20	551		62										
1419				3.3		20	567		63										
1434				0.6		20	547		52										
1504				3.0		20	555		62										
1519				4.4		20	521		67										
1534				4.4		20	563		67										
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (GGR)

Location SVS-67

Operator BEST

Date 1-28-84

Load Range

Ambient Temperature 60°F 56°F

Barometric Pressure 29.42 (220) 29.32 (220)

Static Pressure Duct

Fuel LEAKS (220)

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1204				2.7		25	584		75										
1219				2.7		25	574		75										
1234				2.8		25	557		78										
1249				2.9		20	553		77										
1304				2.9		20	556		77										
1319				2.9		15	557		77										
1334				2.9		10	567		76										
1349				2.9		15	566		76										
1404				2.8		15	567		77										
1419				2.8		15	569		74										
1434				2.8		20	572		74										
1449				2.7		20	581		78										
1504				2.7		10	573		74										
1519				2.9		10	581		77										
1534				3.0		15	588		73										
1549				2.9		10	579		81										
1604				2.8		10	583		79										
1619				2.8		10	585		78										
1634				2.7		10	587		78										
1649				3.0		5	595		77										
1707				2.9		15	593		82										
1719				2.8		20	575		77										
1734				2.9		20	587		80										
1749				2.9		20	588		81										
1804				2.9		20	594		83										
1819				2.9		15	594		84										AVERAGE
1834				2.6		10	600		83										
1849				3.0		10	613		76										

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____ Ambient Temperature _____

Location _____ Barometric Pressure _____

Operator _____ Static Pressure Duct _____

Date 1-28-84 (CONTINUED) Fuel _____

Load Range _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1904				2.9		10	604		78										
1919				2.9		-	598		77										
1934				3.0		-	583		75										
1949				3.0		-	589		76										
2004				2.9		-	583		74										
2019				2.8		-	581		72										
2034				2.7		-	577		72										
2049				2.8		-	573		71										
2104				2.7		-	550		70										
2119				2.8		-	556		74										
2134				2.8		-	556		74										
2149				2.7		-	558		73										
2204				2.8		25	586		80										
2304				2.8		25	580		78										
2319				2.8		30	573		80										
2334				2.9		30	571		77										
2349				2.9		30	568		77										
																		AVERAGE	

4-13

FIELD DATA SHEET

ACUREX Aerotherm

Plant: CHEVRON (EGR)
Location: SVS - 69
Operator: BEST
Date: 1-29-84
Load Range:

Ambient Temperature: 50° F
Barometric Pressure: 27.32 (1020) 27.18 (1015)
Static Pressure Duct:
Fuel: LIQUID NATURAL GAS

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0004				2.9		30	570		76										
0019				3.0		30	565		73										
0034				2.9		30	576		70										
0049				2.9		30	581		75										
0101				2.9		30	589		75										
0119				2.9		35	587		72										
0134				2.8		35	589		70										
0149				2.9		35	586		72										
0204				2.7		40	597		71										
0219				2.8		35	588		72										
0234				2.9		35	591		71										
0249				3.0		35	598		72										
0304				2.8		35	616		70										
0319				2.5		35	610		70										
0334				3.7		40	598		71										
0349				2.8		40	595		71										
0404				2.9		40	593		70										
0419				2.8		40	591		73										
0434				2.5		40	600		71										
0449				2.9		40	594		74										
0504				2.8		45	597		76										
0519				2.8		40	580		72										
0534				2.8		40	573		71										
0549				2.8		40	570		68										
0604				2.8		40	578		65										
0619				2.7		40	589		64										AVERAGE
0634				2.8		40	586		67										
0649				3.0		40	589		67										

FIELD DATA SHEET

ACUREX Aerotherm

Plant ____________________

Location ____________________

Operator ____________________

Date 1-29-84 (CONTINUED)

Load Range ____________________

Ambient Temperature ____________________

Barometric Pressure ____________________

Static Pressure Duct ____________________

Fuel ____________________

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0704				2.9		40	588		67										
0719				2.9		40	586		67										
0734				2.7		40	599		67										
0749				2.7		40	594		64										
0804				2.7		40	595		63										
0819				2.9		40	672		62										
0834				2.8		45	581		64										
0849				2.9		40	603		64										
0904				2.8		45	597		[illegible]										
0919				2.9		45	576		67										
0934				2.9		40	581		64										
																			AVERAGE

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON EGR

Location SVS - 69

Operator BEST

Date 1-30-84

Load Range

Ambient Temperature 58°F

Barometric Pressure 29.42 (0200) 29.30 (1150)

Static Pressure Duct

Fuel LOW S CRUDE

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
0000																			BURNING FROM STEAM BLOW
0015				3.0	12.5	8	550		61										
0030				2.9	12.5	8	555		61										
0045					12.5	5	560												
0100					12.5	8	535												
0115						8	520												
0130						10	575												
0145						12	580												
0200						10	560												
0215						10	565												
0230						10	565												
0245						10	575												
0300						10	585												
0315						10	590												
0330						13	590												
0345						13	575												
0400						13	580												
0415						13	585												
0430						13	590												
0445						13	555												
0500						13	550												
0515						13	550												
0530						15	555												
0545						15	550												
0600						15	555												
																			AVERAGE

NOT FLOW

LOST FLOW

NOT FLOW

4-16

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (EER)

Location SVS - 69

Operator BEST

Date 1-30-84 (CONTINUED)

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0615						15													
0630				LOST FLOW	LOST FLOW	15	LOST FLOW		LOST FLOW										
0645						15													
0700						15													
0715						12													
0730						14													
0745						16													
0800						20													
0815						23													
0830						23													
0845						24													
0900						35													
0915						25													
0930						25													
																			0930 INTERNAL CAL
				0.0	+0.2	+15	+5		0										ZERO
				6.8	18.0	175	500		90										SPAN
					17.8		533		90										SPAN GAS IN ERR
																			LEAK CHECK OK
																			UNIT LOAD VARIABLE
																			RUNNING WITH
																			AUTOMATIC CONTROLS
																			TURN OFF 1530
																			AVERAGE

4-17

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (EER)
Location SVS -69
Operator BEST
Date 1-30-84 (CONTINUED)
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1620	START			3.4	13.2	25	505		64										RECALIBRATE 1540
1630				3.5	13.2	25	505		65									400	START TEST AT 1620.
1645				3.7	13.2	25	505		65										
1700				3.7	13.2	25	500		65										CO LEAK NOISY
1715				3.7	13.2	25	500		63										
1730				3.7	13.3	25	500		62										
1745				3.7	13.4	25	500		62										
1800				3.7	13.3	25	505		62										
1815				3.6	13.3	25	510		62										
1830				3.6	13.4	25	510		63										
1845				3.7	13.5	25	515		64										
1900				3.7	13.6	25	515		66										
1915				3.7	13.5	25	520		67										
1930				3.7	13.4	25	520		67										
1945				3.7		25	520		68										
2000				3.7		25	520		67										
2015				3.6		25	520		70										
2030				3.5		25	520		70										
2045				3.6		25	520		67										
2100				3.6		25	520		62										
2115				3.5		25	520		67										
2130				3.5		25	520		68										
2145				3.7		25	523		68										
2200				3.6		25	523		68										
2215				3.6		25	524		65										
																			AVERAGE

4-18

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (EGR)

Location SVS-69

Operator BEST

Date 1-30-84 (CONTINUED)

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
2230				3.6		25	523		63										
2345				3.6	LOST	25	525		64										
2300				3.5		25	530		64										
2315				3.5		25	530		65										
2330				3.5		25	523		65										
2345				3.6		25	535		65										
2400				3.6		25	538		64										
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron (EER)
Location: SVS-64
Operator: Bert
Date: 1-31-84
Load Range:

Ambient Temperature: 66 °F
Barometric Pressure: 29.34 (1800)
Static Pressure Duct:
Fuel: [illegible]

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0015				3.5	lost flow	30	538		6.3										All values from stack inlet
0030				3.5		30	538		6.3										
0045				3.5		30	538		6.3										
0100				3.5		30	538		lost flow										
0115				lost flow		30	538												
0130						30	538												
0145						30	538												
0200						30	538												
0215						30	538												
0230						30	538												
0245						30	538												
0300						30	538												
0315						30	540												
0330						30	540												
0345						30	540												
0400						30	540												
0415						30	540												
0430						30	545												
0445						30	542												
0500						30	540												
				↓	↓				↓										Power failure ~0520 no final cal
																			AVERAGE

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron (EER)
Location: SVS-69
Operator: Best
Date: 1-31-89 (Cont)
Load Range:

Ambient Temperature:
Barometric Pressure:
Static Pressure Duct:
Fuel:

4-21

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1800	Start				14.3	15	573		72										Electrical problem w/
1815					14.0	15	573		72										unit not fixed until
1830					14.0	15	573		72										late afternoon.
1845					13.8	15	573		72										
1900					13.5	15	573		71										Calibrated at 1740
1915					13.4	15	573		71										
1930					13.4	15	573		71										CO strip chart left
1945					13.3	15	575		73										in low range
2000					13.2	15	580		74										
2015					13.2	15	580		74										CO cycling between
2030					13.2	15	580		74										0 & 30 ppm
2045					13.2	15	580		73										
2100					13.2	15	530		75										
2115					13	15	580		76										
2130					13	15	580		75										
2145					13.1	15	580		71										
2200					13.1	15	580		71										
2215					13.1	15	585		72										
2230					13.1	15	590		73										
2245					13.1	15	590		72										
2300					13.1	15	590		70										
2315					13.1	15	590		69										
2330					13.1	15	590		69										
2345					13.1	15	590		71										
2400					13.1	15	573		71										
																			AVERAGE

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Cameron (CEER)
Location: SVS-69
Operator: Boat
Date: 2-1-84
Load Range:

Ambient Temperature:
Barometric Pressure:
Static Pressure Duct:
Fuel: Coal Liquid

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0009				2.8	13.2	9	583		72										From Outside Lab IC
0024				2.7	13.3	6	587		72										
0038				2.8	13.1	14	589		69										
0053				2.8	13.3	15	587		71										
0105				2.7	13.3	16	581		72										
0121				2.7	13.3	14	571		71										
0139				2.8	13.2	14	635		74										
0202				2.7	13.2	14	589		72										
0219				2.8	13.3	13	586		74										
0242				2.8	13.2	13	588		73										
0302				2.8	13.3	14	587		72										
0322				2.8	13.2	15	586		73										
0357				2.7	13.2	7	578		69										
0350				2.7	13.3	14	578		71										
0404				2.7	13.3	15	567		70										
0413				2.6	13.4	15	574		71										
0438				2.7	13.2	15	579		71										
0443				2.8	13.2	13	574		73										
0501				2.8	13.2	14	578		72										
0508				2.8	13.2	14	575		72										
0523				2.8	13.2	15	581		71										
0538				2.8	13.2	13	567		69										
0602				2.7	13.2	11	583		72										
0617				2.8	13.2	11	576		73										
0629				2.8	13.2	14	581		73										
0644				2.7	13.2	11	576		72										AVERAGE
0659				2.8	13.2	13	574		74										
0714				2.7	14.5	15	578		76										

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (EER)
Location SVS-69
Operator Best
Date 2-1-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0728																			Calibrate @ 0720
																			intercept
				0.0	0.0	-7	0		-1.5										zero
				7.35	18.3	18.2	553		9.2										span
				7.1			553		90										span gas
0759				2.7	14.3	25	574		68										
0814				2.9	14.1	24	565		70										
0828				3.0	13.8	25	551		69										
0843				3.5	13.1	20	531		71										
0901				2.4	13.5	43	564		80										
0914				2.5	13.1	25	574		75										
0928				2.5	13.7	24	572		77										
0943					13.7	28			74										
1000				2.2	13.2	23	574		71										
1015				2.9	13.7	23	566		70										
1038				3.3	14.0	23	591		69										
1053				2.7	13.5	21	574		70										
1108				2.7	12.8	24	567		70										
1122				2.6	12.6	26	569		71										MSR 1, SVS St. 1
1136				2.7	12.2	22	554		70										
1143				2.7	12.2	23	561		70										
1157				2.7	12.6	24	563		68										
1218				2.6	13.2	25	573		68										
1233				2.7	12.7	26	561		69										
1246				2.8	12.5	22	560		67										MSR AVERAGE
1305				2.8	12.3	24	566		68										
1322				2.8	12.9	23	561		67										

4-23

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron EER

Location: SVS-69

Operator: Best

Date: 2-1-84 (cont.)

Load Range:

Ambient Temperature:

Barometric Pressure:

Static Pressure Duct:

Fuel:

4-24

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1335				2.7	13.6	24	560		72										
1354				2.7	13.4	24	553		73										
1407				2.8	13.5	24	553		75										
1423				2.7	13.1	21	560		75										
1437				2.3	13.6	21	559		71										
1455				2.8	13.4	25	569		67										
1510				2.8	13.5	27	569		68										
1525				2.7	13.7	26	559		68										
1540				2.7	13.3	27	558		68										
1555				2.5	13.4	26	573		71										
1610				2.7	12.9	26	567		75										
1625				2.7	13.1	22	579		66										SASS stop
																			1630 cal started
				0.0	0.0	+1	+1		-2										zero
				7.1	18.0	200	558		90										span
									90										span gas valved
																			recal 1650
1700	Start																		
1710				2.6	14.5	22	622		71										
1725				2.6	14.7	17	577		71									483	
1740				2.6	13.9	20	575		73										
1755				2.6	13.9	22	597		74									455	
1810				2.6	14.0	25	572		74										
1825				2.6	13.6	27	578		74									444	
1840				2.6	14.0	22	570		74									455	AVERAGE
1855				2.3	14.0	20	610		73									455	
1910				2.8	14.3	20	582		69										

FIELD DATA SHEET

ACUREX Aerotherm

Plant Cleaver (EER)
Location @ SVS-69
Operator Bent
Date 2-1-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1925				2.4	14.2	23	598		71									484	
1940				2.4	14.8	22	587		69										MSR 2 start
1955				2.7	13.9	25	551		70									483	
2010				2.8	13.6	23	539		71										
2025				3.2	13.2	22	568		72									484	
2040				2.6	14.3	26	576		74										
2055				2.9	13.5	24	584		74									492	
2110				2.6	13.3	23	585		73										
2125				2.7	13.3	24	570		76									487	
2140				2.6	13.2	22	572		82										MSR 3 start
2155				*	13.3	23	594		76									477	* O2 high due to
2210				2.6	14.4	19	594		87										boiler removal
2225				2.7	14.1	23	573		81									486	
2240				2.7	13.6	22	570		80										
2255				2.7	13.4	21	570		77									484	
2310				2.8	13.1	26	569		81										
2325				2.6	13.9	22	574		80									484	→ CO flow low
2340				2.7	13.8	21	569		78										
2355				2.6	13.7	25	567		76									483	
																			AVERAGE

1-25

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron (CEER)
Location: SVS-69 Outlet
Operator: Best
Date: 2-2-84
Load Range:

Ambient Temperature:
Barometric Pressure:
Static Pressure Duct:
Fuel: Low crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0010				2.6	12.8	23	578		75										Oil analyzer shut down automatically
0025				2.7	12.7	22	579		76									461	
0040				2.7	12.7	25	583		77										
0055				2.7	12.6	23	586		78									461	
0110				2.7	12.6	23	586		X										
0125				2.7	12.6	23	578		82									466	
0140				2.5	12.6	24	577		80										
0155				2.6	12.5	23	590		80									468	
0210				2.7	12.5	23	578												
0225				2.7	12.5	24	597											468	
0240				2.7	12.5	21	601												
0255				2.8		22	604											469	
0310				2.7		23	602												
0325				2.7		24	601											469	
0340				2.7			590												
0355				2.7		23	579											469	
0410				2.7		24	590												
0425				2.7		24	591											468	
0440						23	595												
0455						23	588											469	
0510						25	593												
0525						23	591											469	
0540						22	601												
0555						22	593											471	
0610						22	594												
0625						23	594											469	AVERAGE
0640						24	596												
0655						22	588											468	

Boiler flow

Boiler flow

Boiler flow

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FIELD DATA SHEET

ACUREX Aerotherm

Plant _____

Location _____

Operator _____

Date 2-2-84 (cont.)

Load Range _____

Ambient Temperature _____

Barometric Pressure _____

Static Pressure Duct _____

Fuel _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0710						25	588												
0725						22	598											468	
0740						21	611												
0755						21	607											466	
0810						20	594												
0825						23	598											456	
0840						21	593												
0855				2.8	12.0	20	590		66									462	
																			0900 calibrate analyzer span gas system check leak check okay
				0.0	0.0	46.5	40.5		0										
				7.25	17.9	185	545		87.5										
0940				2.5	13.9	20	612		84										
0955				2.6	13.7	24	589		25 84									467	
1010				2.5	13.6	20	587												
1025				2.4	13.8	23	571		84									464	
1040				2.6	13.4	21	579		86										
1055				2.6	13.6	21	574		85									467	
1110				2.6	13.2	23	579		84										
1125				2.4	13.4	20	586		77									471	
1140				2.7	13.4	20	585		72										
1155				2.5	13.2	23	583		69									472	AVERAGE
1210				2.8	12.1	19	573		67										
1225				2.4	12.9	21	581		69									477	

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____

Location _____

Operator _____

Date 2-2-84 (cont.)

Load Range _____

Ambient Temperature _____

Barometric Pressure _____

Static Pressure Duct _____

Fuel _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1240				2.7	12.9	21	573		68										
1255				2.7	13.5	18	576		69									496	
1310				2.7	13.3	23	577		67										
1325				2.6	13.2	23	567		66									495	
1340				2.8	12.9	18	564		68										
1355				2.6	13.4	21	578		68									498	
1910				2.6	12.9	21	568		69										
1425				2.6	13.2	20	568		67									498	
1440				2.7	13.7	22	563		65										
1455				2.6	13.4	19	567		67									495	
1510				2.6	13.1	21	568		68										
1525				2.6	13.2	21	567		70									495	
1540				2.6	13.4	21	564		69										
1555				2.6	13.2	21	562		68									496	
																			1600 entrance probe zero span span gas
				0.0	-0.1	+7	+9		0										
				7.1	17.2	180	646		86.5										
																			Water accumulating in lines; Left open on probe end to dry lines
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron EER
Location: SVS-69
Operator: Best
Date: 2-3-84
Load Range:

Ambient Temperature: 63°F
Barometric Pressure: (200) 29.32
Static Pressure Duct:
Fuel: Gaseous

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0840	calibrate																		1320 Dwyer manometer gauge reading < No. 1
	internal & external																		
0900	start																		0psi with probe blocked
0910				2.8	13.7	19	—		82									503	
0925				2.8	13.8	17	673		75										
0940				2.7	13.7	18	674		74									496	
0955				2.6	13.5	18	663		75										
1010				2.7	13.3	17	660		72									489	
1025				2.6	13.3	17	669		72										
1040				2.6	13.2	15	665		71									486	
1055				2.6	13.4	18	670		72										
1110				2.5	13.0	17	671		74									489	
1125				2.7	12.9	13	668		72										
1140				2.6	13.1	22	666		71									489	
1155				2.6	13.0	23	661		69										
1210				2.8	12.8	22	657		71									502	
1225				2.7	12.6	24	656		72										
1240				2.8	12.5	21	652		70									502	
1255				2.7	13.0	23	632		69										
1310				3.0	12.7	24	0.24		68									502	
1325				2.8	12.7	20	638		68										
1340				2.9	12.6	23	658		69										
1355				2.7	12.6	25	643		70										
1410				2.6	12.6	25	644		69										
1425				2.7	12.6	24	640		69										AVERAGE

4-29

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____

Location _____

Operator _____

Date 2-3-84

Load Range _____

Ambient Temperature _____

Barometric Pressure _____

Static Pressure Duct _____

Fuel _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1440	internal cal			0.0	0.0	+5	+14		0										gas span
				7.15	17.1	170	890		71.5										span gas
1455	recalibrate																		
1710	Start																		Starts T.C. out
1721				2.7	13.9	22	637		74										→ fired SO2 autolatch
1736				2.8	13.9	20	614		74										
1751				2.8	13.8	25	601		73										
1806				2.7	13.7	23	597		74										
1821				2.7	13.5	23	594		74										
1836				2.5	13.4	22	589		73										
1851				2.8	13.4	22	587		70										
1906				2.8	13.5	20	587		69										
1921				2.8	13.5	20	587		69										
1936				2.7	13.6	19	574		68										
1951				2.7	13.6	23	568		69										
2006				2.7	13.6	26	545		71										
2021				2.7	13.6	26	545		71										
2036				2.7	13.6	32	544		71										
2051				2.8	13.6	30	545		70										
2106				2.8	13.6	29	543		71										
2121				2.7	13.7	34	543		68										
2136				2.8	13.7	35	543		68										
2151				2.8	13.6	32	541		66										
																			AVERAGE

4-30

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____ Ambient Temperature _____

Location _____ Barometric Pressure _____

Operator _____ Static Pressure Duct _____

Date 2-3-84 Fuel _____

Load Range _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
2206				2.9	13.6	32	541		67										
2221				2.6	13.8	38	540		67										
2236				2.7	13.7	35	540		66										
2251				2.8	13.7	36	542		69										
2306				2.7	13.7	35	536		70										
2321				2.8	13.6	36	537		71										
2336				2.8	13.7	37	535		70										
2351				2.9	13.7	33	538		68										
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (CEER)
Location SVS-69
Operator Best
Date 2-4-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
0006				2.6	13.8	38	533		70										
0021				2.7	14.5	39	529		74										
0051				2.7	14.2	30	529		73										
0106				2.7	14.3	25	582		75										
0121				2.8	14.2	24	617		75										
0136				2.8	14.1	20	638		71										
0151				2.9	14.0	19	622		72										
0206				2.9	13.9	20	629		71										
0221				2.9	13.9	22	627		75										
0236				2.8	13.9	21	626		75										
0251				2.8	13.8	20	640		74										
0306				2.8	13.7	20	647		71										
0321				2.8	13.6	21	646		71										
0336				2.8	13.7	21	651		80										
0351				2.6	13.7	21	658		82										
0406				2.6	13.7	20	660		82										
0421				2.9	13.4	19	656		78										
0436				2.9	13.4	18	658		77										
0451				2.9	13.3	20	660		77										
0506				2.6	13.5	19	678		77										
0521				2.6	13.3	19	672		78										
0536				2.8	13.2	17	661		78										
0551				2.4	13.4	20	680		81										
0606				2.6	13.3	19	678		88										
0621				2.5	13.3	21	671		88										
																			AVERAGE

4-32

FIELD DATA SHEET

ACUREX Aerotherm

Plant

Location

Operator

Date 2-4-84

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0636				2.5	13.3	20	691		88										
0651				2.5	13.3	21	680		95										
0706				2.6	13.1	20	676		93										
0721				2.6	13.1	23	678		93										
0736				2.8	13.1	20	667		95										
0751				2.6	13.1	21	680		88										
0806				2.6	13.1	21	633		86										
0821				2.5	13.9	22	653		83										
0836				2.7	12.7	19	568		82										
0840	internal cal			0.0	-0.1	+7.5	+9		0										zero
					17.5		512												span
																			span gas
																			water in lines
																			left internal lines
																			on nitrogen purge
																			overnight instead
																			ambient air.
																			AVERAGE

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron (CEER)
Location: SVS-69
Operator: Best/Milburn
Date: 2-5-84
Load Range:

Ambient Temperature: 69°F 58F
Barometric Pressure: 29.36 (1435) 29.42 (2030)
Static Pressure Duct:
Fuel: lease crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1410	Interwell Eastern Coal																		water still in lines at 0700
1430	Stack																		
1432				2.7	13.9	27	640		68									532	Jake Bob Ray
1447				2.9	13.7	22	625		69										
1502				2.7	13.6	20	624		70									526	
1517				2.6	13.7	18	640		70										
1532				2.7	13.6	17	632		69									520	
1602				2.8	13.4	16	631		67									527	
1547				2.7	13.5	18	636		67										
1617				2.8	13.4	19	639		69										
1632				2.7	13.4	17	643		68									528	
1647				2.8	13.5	15	652		72										
1702				2.8	13.4	15	649		72									537	
1717				2.7	13.4	15	656		73										
1732				2.9	13.4	15	657		71									540	
1747				2.8	13.4	13	664		71										
1802				2.9	13.4	15	675		70									537	
1817				2.9	13.4	9	675		67										
1832				2.9	13.4	13	691		70									533	
1847				2.8	13.4	12	692		72										
1902				2.6	13.6	13	697		70									531	
1917				2.8	13.5	13	697		70										
1932				2.7	13.6	12	713		69									528	
1947				2.6	13.7	12	715		70										
2002				2.8	13.6	12	705		68									534	
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____

Location _____

Operator _____

Date 2-5-84 (cont.)

Load Range _____

Ambient Temperature _____

Barometric Pressure _____

Static Pressure Duct _____

Fuel _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
2017				2.8	13.5	11	702		68										
2030				2.8	14.1	8	704		67									527	
2047				2.6	14.3	10	703		73										
2102				2.9	14.1	9	705		74									531	
2117				2.8	14.1	10	716		71										
2132				2.8	14.1	9	696		68									532	
2147				2.6	14.3	10	703		72										
2202				2.9	14.1	9	705		74									531	
2217				2.8	14.2	9	708		74										
2232				2.8	14.1	12	707		73									523	
2247				2.8	14.1	11	712		68										
2302				2.7	14.3	11	712		71									520	
2317	temp stopped																		Pump failed after 2302

AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant: CHEVRON EER
Location: SUS-69
Operator: MILBURN / Best
Date: 2-6-84
Load Range:

Ambient Temperature: 67°F
Barometric Pressure: 29.52 (1115)
Static Pressure Duct:
Fuel:

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0840	span			+0.1	-0.2	0	+6		0	span									~2 190
				7.35	16.1	165	512		87	span									CO ~540 ppm
0900	internal/external cal			7.25		185	553		90.1	span gas									SO2 ~85 ppm
																			Leak check obsv
																			~~Black Smoke~~
0935	Start																		Black smoke when CO high and negative when CO ~0.1%
0947				3.4	13.3	25	656		62										
1002				2.8	13.9	14	657		60									435	
1017				2.8	13.3	14	590		61										
1032				2.5	14.5	26	666		61									424	
1047				1.0	15.6	49	734		58										Unit operating at lower fuel rate
1102				1.1	15.6	50	700		57									375	
1117				1.0	15.5	28	698		57										
1132				0.9	15.7	55	714		58									374	
1147				0.8	15.6	80	701		55										
1202				0.7	15.8	325	768		55										
1217				2.6	14.6	28	636		54										
1232				2.8	14.4	23	628		55									382	
1247				2.8	14.4	25	627		56										
1302				2.8	14.2	18	627		54									417	
1317				2.9	14.2	27	624		55										
1332				2.7	14.2	30	626		55									427	
1347				2.6	14.7	23	627		54										
1402				2.8	14.5	25	618		55									426	
1417				2.9	14.4	24	617		55										
1432				3.0	14.2	22	658		54									426	AVERAGE
1447				2.8	14.6	4	645		55										
1502				2.4	14.2	11	712		55									413	

FIELD DATA SHEET

ACUREX Aerotherm

Plant ______________________

Location ______________________

Operator ______________________

Date 2-6-84

Load Range ______________________

Ambient Temperature ______________________

Barometric Pressure ______________________

Static Pressure Duct ______________________

Fuel ______________________

				DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)					
Time	Sample Point	Load MW	Steam Flow lb/hr x1000	O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1500	span			+0.2	0.0	-10	+3		0										zero
				0.8	18.8	180	500		90										span
																			span gas
																			AVERAGE

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron EER
Location: SVS-69
Operator: Best/Milburn
Date: 2-7-84
Load Range:

Ambient Temperature: 56°F 70°F
Barometric Pressure: 29.43 (0900) 29.32 (1500)
Static Pressure Duct:
Fuel: Coke crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0800	external/extended																		1020 smoke point
	calibration																		< no. 1
																			coke boiler today
0830	start																		
0831				2.8	14.4	12	706		61									453	
0846				2.7	14.6	11	762		61										
0901				2.7	14.3	13	741		65									456	
0916				2.6	14.5	12	745		66										
0931				2.8	14.4	10	743		64									461	
0946				2.8	14.3	12	691		66										
1001				2.7	14.3	5	727		67									462	
1016				2.5	14.3	9	721		66										
1031				2.7	13.8	13	624		65									467	
1046				2.5	14.3	10	726		65										
1101				2.6	14.2	10	572		64									469	
1116				2.6	13.7	10	659		65										
1131				3.1	13.7	15	618		65									471	
1146				2.7	14.0	16	614		70										
1201				2.8	13.8	25	664		68									472	
1216				2.6	13.8	15	664		66										
1231				2.5	14.1	16	665		66									469	
1246				2.5	13.9	21	655		62										
1315				2.4	13.6	17	673		61									464	
1330				2.5	13.5	18	671		61										
1345				2.8	13.7	15	673		64									484	
1400				2.7	13.8	14	674		65										AVERAGE
1415				2.7	13.8	[illegible]	672		64									507	
1930				2.7	14.0	4	665		65										

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FIELD DATA SHEET

ACUREX Aerotherm

Plant _____ Ambient Temperature _____

Location _____ Barometric Pressure _____

Operator _____ Static Pressure Duct _____

Date 2-7-84 (cont.) Fuel _____

Load Range _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1445				2.6	14.0	5	665		64									504	
1500				2.8	14.0	6	651		65										
1502	Initial span and recal																		
				0.0	0.0	-20	0		+1										zero span
				7.1	17.3	165	620		88										span
				7.25	18.15				90										span gas value
1535	Start																		
1545				2.9	14.7	28	583		73									488	
1600				2.8	14.4	28	589		74										
1615				2.8	14.5	31	591		75									497	
1630				2.8	14.7	28	601		79										
1645				2.7	14.7	31	578		68									500	
1700				2.8	14.7	30	597		69										
1715				3.1	15.0	31	522		73									515	
1730				2.8	13.7	39	521		74										
1745				2.8	14.0	40	519		82									521	
1800				2.9	14.0	41	521		79										
1815				2.9	14.1	39	523		83									518	
1830				3.0	14.1	40	520		86										
1845				3.0	14.2	39	525		87									513	
1900				3.0	14.3	39	524		86										
1915				3.0	14.3	34	522		87									516	
1930				2.8	14.4	38	521		82										
1945				3.0	14.4	34	520		82									523	
2000				3.0	14.4	35	516		86										AVERAGE
2015				2.9	14.3	34	520		78									523	
2030				3.0	14.5	33	518		77										

FIELD DATA SHEET

ACUREX Aerotherm

Plant ______________________

Location ______________________

Operator ______________________

Date 2-7-84 (cont.)

Load Range ______________________

Ambient Temperature ______________________

Barometric Pressure ______________________

Static Pressure Duct ______________________

Fuel ______________________

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	Dry Uncorrected: O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	Corrected to 3% O2 Dry: NO ppm	NO_x ppm	NO_2 ppm	Hydrocarbons (HC): Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
2045				3.0	14.4	31	517		70									522	
2100				2.9	14.6	33	514		70										
2115				3.0	14.5	35	514		69									519	
2130				3.0	14.5	32	516		70										
2145			*	2.9	14.7	30	512		70									519	*Analyzer O2 output
2200				3.0	14.6	36	509		70										suddenly negative
2215				3.0	14.6	36	506		66									515	O2 values fine until
2230				2.9	15.8	33	--		74										2225 adjust flow
2245				2.9	15.2	31	468		70									517	
2300				3.0	14.6	36	484		68										
2315				3.0	14.3	37	457		68									517	
2330				3.0	14.2	33	456		67										
2345				3.0	14.1	35	461		70									517	
																			AVERAGE

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FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (EER)
Location SUS 69
Operator Milburn / Best
Date 2-8-84
Load Range

Ambient Temperature 66 °F
Barometric Pressure 29.33 (1430)
Static Pressure Duct
Fuel lease Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0000				3.1	13.9	34	466		67										
				~	~	~	~		~								----		flow loss
0745	span interval																		
				+0.1	+0.3	+20	+15		+0.7										zero
				7.4	18.6	195	498		90.1										span
				7.25	18.7	185	553		90.1										span gas
calibrate interval & extend																			back check day
0955	Start				14.5														
1000				2.8	14.7	21	684		67										
1015				2.8	14.7	25	673		67									503	
1030				2.7	13.8	22	670		67										
1045				2.8	14.7	22	654		66									512	
1100				2.8	14.7	22	685		65										
1115				2.8	14.8	24	681		71									517	
1130				2.8	14.7	27	682		70										
1145				2.7	14.7	24	678		71									525	
1200				2.7	14.3	19	654		69										
1215				2.6	14.5	17	688		72									524	
1230				2.9	14.5	17	674		74										
1245				2.3	14.4	16	683		71									528	
1300				2.7	14.2	11	703		70										
1315				2.8	14.2	14	706		70									521	
1330				2.8	14.2	13	717		71										
1345				2.9	14.2	17	706		73									526	AVERAGE
1400				3.0	13.9	12	700		76										
1419				3.0	13.8	14	698		76									529	

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____

Location _____

Operator _____

Date 2-8-84

Load Range _____

Ambient Temperature _____

Barometric Pressure _____

Static Pressure Duct _____

Fuel _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1430				2.4	14.3	9	722		73										
1445				2.8	14.3	11	699		73									533	
1500				2.7	14.1	12	700		70										
1515				2.8	14.0	14	673		66									526	
1530				3.2	13.8	18	637		63										
1545				3.0	13.8	18	635		62									519	* change in fuel rate
1600				3.1	13.7	15	631		63										
1615				3.2	13.5	16	622		61									518	
1630				3.2	13.6	18	630		61										
1645				3.1	14.4	23	627		61									519	
1700				3.2	13.9	21	635		63										
1715				3.2	13.4	20	635		66									524	
1730				3.2	13.7	23	642		67										
1745				3.2	13.5	22	642		77									534	
1800				3.4	13.5	18	629		77										
1815				3.2	13.6	19	643		75									537	
1830				3.3	14.0	20	630		80										
1845				3.2	13.7	21	629		80									533	
1900				2.9	13.3	18	637		70										
1915				3.1	13.8	18	638		65									535	
1930				3.2	13.8	21	629		73										
1945				3.2	13.9	21	633		65									533	
2000				3.2	13.9	22	635		63										
2015				3.2	13.9	24	631		62									523	
2030				3.2	13.9	21	633		64										
2045	Intermediation			0.0	-0.2	+10	+5		40.5										
				6.85	17.5	161	528		85										AVERAGE
																			Upon upon gas

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FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron EOR
Location SUS 69
Operator MILBURN
Date 2-9-84
Load Range

Ambient Temperature 65°F
Barometric Pressure 29.27 (est)
Static Pressure Duct
Fuel Lease Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0840	Int. Sys. Conditioned																		
	calibration																		Mobile Tech on Site
1200	Start																		
1006				3.2	13.9	17	529		73									537	
1021				3.1	13.8	17	539		70										
1036				3.1	13.8	17	549		69									538	
1051				2.9	13.7	14	554		66										
1106				3.1	13.8	23	554		66									533	
1121				3.0	13.6	17	539		64										
1136				2.9	13.8	17	549		67									521	
1151				2.8	14.1	16	544		68										
1206				2.9	14.0	16	539		68									520	
1221				3.1	13.9	15	544		68										
1236				2.9	14.1	15	549		68									525	
1251				2.9	14.0	15	544		69										
1306				3.0	13.7	19	559		64									514	
1321																			Check O2 reco
1336				2.8	13.7	21	579		71									523	
1351				2.7	13.6	22	579		69										
1406				2.8	13.7	21	559		65									531	
1421				2.8	13.5	20	584		66										
1436				3.0	13.4	16	559		65									536	
1451				2.9	13.5	16	605		74										
1506				3.1	13.4	14	619		75									539	
																			AVERAGE

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FIELD DATA SHEET

ACUREX Aerotherm

Plant _____

Location _____

Operator _____

Date 2-9-84 (cont.)

Load Range _____

Ambient Temperature _____

Barometric Pressure _____

Static Pressure Duct _____

Fuel _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1521				2.9	13.6	15	627		76										
1536				2.9	13.6	12	552		76									536	
1551				2.9	13.6	13	635		75										
1606				3.0	13.4	14	633		76									537	
1621				2.9	13.3	8	610		72										
1636				3.2	13.2	11	629		70									536	
1640	span of Calibrate																		
	internal			0.0	0.0	-5	+10		0										zero
				6.8	16.2	165	560		89										span
				7.2	18.4	183	545		90										span gas
1721				2.7	14.6	27	601		77										
1736				2.8	14.3	21	596		82									533	
1751				3.0	14.1	28	588		80										
1806				2.9	14.2	28	577		70									512	
1821				2.8	14.4	26	572		67										
1836				2.9	14.4	22	594		67									494	
1851				2.8	14.4	26	592		67										
1906				2.8	14.5	30	590		67									488	
1921				2.8	14.4	26	595		65										
1936				2.8	14.5	26	595		67									489	
1951				2.8	14.5	26	594		67										
2006				2.7	14.6	27	600		66									487	
2021				2.6	14.6	27	607		63										
2036				2.5	14.7	28	611		63									484	
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant

Location

Operator

Date 2-9-84 (Cont.)

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
2051				2.7	14.6	27	600		68										
2106				2.6	14.8	31	600		65									493	
2121				2.8	14.5	27	571		66										
2136				2.8	14.5	27	590		67									495	
2151				2.9	14.2	25	587		66										
2206																		→	drain Hankison
2221				2.7	14.3	26	602		64										bulb
2236				2.6	14.3	27	605		62									490	
2251				2.6	14.4	27	606		61										
2306				2.6	14.6	25	612		63									487	
2321				2.3	14.7	24	615		62										
2336				2.5	14.6	25	609		63									483	
2351				2.7	14.5	25	577		63										
																			AVERAGE

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON EER
Location SUS 69
Operator MILBURN
Date 2-10-84
Load Range

Ambient Temperature 60°F (1200)
Barometric Pressure 29.43 (1200)
Static Pressure Duct
Fuel LEASE CRUDE

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O_2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0006				2.6	14.5	26	601		64									483	
0021				2.7	14.5	29	604		65										
0036				2.5	14.7	25	608		64									477	
0051				2.2	16.0	26	633		65										
0106				2.4	14.8	24	629		65									475	
0121				2.8	14.5	25	606		70										
0136				2.6	14.6	25	609		70									472	
0151				2.6	14.5	27	607		70										
0206				2.7	14.6	27	608		74									475	
0221				2.7	14.6	21	601		76										
0236				2.6	14.6	26	643		80									475	
0251				2.7	14.5	24	605		77										
0306				2.8	14.5	27	578		80									471	
0321				2.7	14.5	26	619		79										
0336				2.8	14.3	23	618		76									463	
0351				2.7	14.5	28	625		76										
0406				2.6	14.6	26	626		80									464	
0421				2.7	14.4	26	628		79										
0436				3.2	10.8	28	641		87									468	
0451				2.4	14.5	29	615		81										
0506				2.7	14.4	28	629		78									466	
0521				2.3	14.7	31	625		80										
0536				2.4	14.6	27	636		78									463	
0551				2.7	14.6	26	606		79										
0606				2.4	15.0	25	620		80									468	
																			AVERAGE

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FIELD DATA SHEET

ACUREX Aerotherm

Plant ______

Location ______

Operator ______

Date 2-10-84 (cont.)

Load Range ______

Ambient Temperature ______

Barometric Pressure ______

Static Pressure Duct ______

Fuel ______

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0621				2.9	14.2	25	617		76										
0636				3.0	14.1	24	612		74									471	
0651				2.8	14.3	25	626		80										
0700 span																			
internal/external +				0.1	+0.2	+10	+10		+0.5										zero
calibration				6.1	18.3	180	441		90										span
				7.2	18.0	185			90.1										span gas
0750 start																			
0806				2.8	14.2	20	674		75									468	
0821				2.9	14.6	22	648		64										
0836				3.3	14.5	20	649		66									465	
0851				3.3	14.3	26	639		65										
0906				3.6	14.0	44	612		66									473	
0921				3.6	13.9	29	621		70										
0936				3.3	14.2	21	621		65									473	
0951				3.2	14.1	25	622		61										
1006				3.6	14.0	21	609		58									484	
1021				3.3	13.8	25	608		56										
1036				3.5	13.8	16	632		54									487	
1051				3.5	13.3	13	606		54										
1106				3.3	13.8	21	626		61									459	
1121				3.4	13.9	10	617		61										
1136				3.4	13.9	15	615		62									496	
1151				3.6	13.8	10	612		53										
																			AVERAGE

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____

Location _____

Operator _____

Date 2-10-84 (cont.)

Load Range _____

Ambient Temperature _____

Barometric Pressure _____

Static Pressure Duct _____

Fuel _____

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1206				3.3	13.7	13	624		54									498	
1221				3.4	13.9	12	617		54										
1236				3.3	14.1	9	624		57									491	
1251				3.5	13.8	21	630		56										
1306				3.3	14.1	16	631		53									485	
1321				3.3	13.9	13	623		54										
1336				3.6	13.8	14	611		53									497	
1351				3.7	13.8	9	615		53										
1406				3.5	13.9	14	615		55									498	
1430	internal span and cal																		
				0.0	0.0	-5	0		0										zero
				6.9	18.9	180	561		80										span
				7.2	18.0	185	542		90.1										span gas
1440	Start																		
1451				3.5	13.4	14	633		66										
1506				3.4	13.6	11	626		61									500	
1521				3.8	13.5	10	612		56										
1536				3.6	13.6	19	579		62									500	
1551				3.6	13.6	9	593		60										
1606				3.3	13.6	6	591		61									498	
1621				3.6	13.6	12	591		62										
1636				3.6	13.6	11	589		65									499	
1651				3.8	13.4	14	593		66										
1706				3.8	13.4	15	576		63									500	
1721				2.7	13.1	9	572		60										
1736				2.9	13.0	9	559		54									499	AVERAGE
1751				3.1	13.0	15	585		56										autodata pages ran out
1806				3.1	13.4	15	600		59										

this load

FIELD DATA SHEET

ACUREX Aerotherm

Plant _____ Ambient Temperature _____

Location _____ Barometric Pressure _____

Operator _____ Static Pressure Duct _____

Date 2-10-84 Fuel _____

Load Range _____

← ship shut 4-49

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
1821				3.1	13.6	15	600		61										
1836				3.1	13.6	15	600		62										
1851				3.0	13.6	15	600		65										
1906				2.9	13.6	15	608		67										
1921				2.9	13.6	15	610		68										
1936				2.7	13.6	15	610		68										
1951				2.6	13.6	15	605		67										
2006				2.7	13.6	15	610		65										
2021				2.7	13.6	15	613		63										
2036				2.8	14.2	10	630		65									482	
2051				3.2	14.0	12	633		66										
2106				2.8	14.4	11	639		69									487	
2121				3.0	14.3	8	634		73										
2136				2.9	14.3	12	639		74									484	
2151				2.3	14.7	14	647		77										
2206				2.9	14.6	18	634		80									473	
2221				2.4	14.6	33	640		76										
2236				2.8	14.1	5	647		75									471	
2251				2.9	14.3	21	632		72										
2306				2.7	14.2	12	637		75									483	
2321				3.3	13.8	12	632		75										
2336				2.8	14.5	13	622		81									487	
2351				3.2	13.4	19	624		74										
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron (EER)

Location: SUS 69

Operator: Milburn

Date: 7-11-84

Load Range:

Ambient Temperature: 62°F

Barometric Pressure: 29.40

Static Pressure Duct:

Fuel: Lease Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0006				2.9	14.0	11	632		74									487	Calibration Gasses
0021				2.8	14.1	7	638		75										CO_2 18.15 %
0036				3.1	13.9	8	612		72									490	O_2 7.25 %
0051				3.0	14.0	22	608		76										CO 184 ppm
0106				2.8	13.9	3	623		72									488	SO_2 546 ppm
0121				3.0	14.0	17	636		74										NO_x 90.1 ppm
0136				3.1	14.0	9	643		73									477	
0151				2.7	14.4	20	633		76										
0206				2.4	14.4	18	639		78									476	
0221				2.4	14.1	18	642		76										
0236				2.8	13.3	11	635		75									477	
0251				↓	↓	↓	↓		↓										
				Flow loss															
0830	internal span																		
	internal & external			0.0					0										zero
	cal			6.85															span
																			span gas
																			AVERAGE

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FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (EER)

Location SVS-69

Operator C. Mixon

Date 2-11-84

Load Range

Ambient Temperature 62°F

Barometric Pressure 30.42

Static Pressure Duct

Fuel Texas Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
0906				2.6	14.9	10	707		775									451	Control CHC
0921				2.9	14.5	19.6	685		651.5										
0936				2.7	14.8	21.4	668		811									495	
0951				2.5	14.7	13.6	688		766										
1006				3.7	14.7	10.3	698		694.7									502	
1021				3.0	14.5	12.9	693		650										
1036				2.8	14.7	17.0	709		654									505	
1051				2.5	14.8	15.6	714		657										
1106				2.6	14.6	9.9	711		633									507	
1121				2.7	14.5	14.9	706		633										
1136				2.5	14.7	16.4	707		627									510	
1151				2.8	14.6	13.6	697		635										
1206				2.9	14.6	13.4	704		651									514	
1221				2.8	14.4	7.2	701		655										
1236				2.9	14.4	14.6	698		667									517	
1251				2.8	14.5	8.0	700		660										
1306				2.7	14.5	15.1	707		656									516	
1321				2.8	14.6	19.7	693		667										
1336				2.7	14.5	12.8	706		674									520	
1351				2.7	14.5	15.2	686		654										
1406				2.9	14.2	14.3	666		637									514	
1421				2.7	14.3	19.0	662		656										
1436				2.9	14.5	20.4	651		653									504	
1451				2.8	14.1	13.7	635		636										
1506				3.7	14.1	22.5	624		673									507	
																			AVERAGE

4-51

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (SOCR)

Location SUS 69

Operator C. MULBURN

Date 2-11-84

Load Range

Ambient Temperature 62°F

Barometric Pressure 29.41

Static Pressure Duct

Fuel Louisiana Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1521																			Calibrate 1526 - 1531
1536				2.7	14.2	14.7	544		62.8									505	O2 zero 0% SPAN 2.0%
1551				2.6	14.4	25.3	571		65.4										CO2 " 0% " 17.9%
1606				2.6	14.3	18.4	643		61.1									502	CO " 60ppm " 2220 ppm
1621				2.7	13.8	26.9	630		62.1										SO2 " 10.1ppm " 490 ppm
1636				2.6	13.5	20.4	632		60.4									526	NOx " 0ppm " 89ppm
1651				2.6	13.5	15.7	634		65.4										
1706				2.5	13.6	24.7	635		65.2									506	RECAL
1721				2.4	13.6	19.3	639		64.9										
1736				2.3	14.0	18.4	656		41.6									500	
1751				2.5	14.0	25.2	648		→	→	---	---	---	---	---	---	---	- 2	NOx (Lost Sample Flow)
1806				2.7	13.6	17.7	642											501	
1821				2.7	13.8	18.0	660												
1836				2.4	13.7	18.6	656											492	
1851				2.4	13.9	14.0	679												
1906				2.6	13.8	19.1	651											497	
1921				2.8	13.6	16.6	653												
1936				2.5	13.8	19.6	700											491	
1951				2.5	14.6	16.8	699		67.9										
2006				2.4	14.6	20.2	692		74.2									499	
2021				2.6	14.6	9.5	707		69.4										
2036				2.7	14.5	20.7	713		68.6									504	
2051				2.4	14.8	16.8	733		73.4										
2106				2.4	15.0	17.5	731		75.3									497	
2121				2.4	15.0	17.8	731		78.3										
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (EERC)
Location SUS 6.9
Operator C. McEwen
Date 7-11-84
Load Range

Ambient Temperature 62° F
Barometric Pressure 29.40
Static Pressure Duct
Fuel Lease Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
2136				2.2	15.2	11.8	747		77.7									489	
2151				2.4	15.0	6.9	735		72.3										
2206				2.4	14.8	17.2	743		77.8									491	
2221				2.5	15.0	17.9	723		74.6										
2236				2.8	14.6	10.0	715											496	
2251				2.4	14.8	13.1	742												
2306				2.4	14.4	15.4	727											494	
2321				2.5	14.6	15.9	714												
2336				2.5	14.6	21.0	729											492	
2351				2.8	12.1	7.4	713												
																			AVERAGE

4-53

FIELD DATA SHEET

ACUREX Aerotherm

Plant: Chevron (EOR)
Location: SUS 69
Operator: C. Milburn
Date: 2-12-84
Load Range:

Ambient Temperature:
Barometric Pressure:
Static Pressure Duct:
Fuel: Lease Crude

4-54

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppm	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0006				1.7	13.5	36.6	786		~~750~~									483	lost Nox Flow
0021				2.7	13.5	15.8	713												
0036				2.6	13.2	204	718											492	
0051				2.6	13.3	34.5	722												2500 SPAN
0106				2.8	13.5	134	761											493	O2 .1% 6.85%
0121				2.6	13.3	13.6	703												Co2 .1% 18.15%
0136				2.1	13.5	20.1	735											484	CO 10ppm 180ppm
0151				2.8	12.5	15.4	712												SO2 3ppm 435ppm
0206				2.7	13.0	20.1	611											484	NOx 0ppm 88ppm
0221				2.8	12.5	31.9	672												
0236				2.4	13.0	22.2	550											491	
0251				2.7	12.7	30.2	662												
0306				2.7	12.8	29.4	611											484	
0321				2.6	12.6	33.7	634												
				LOST Flow															
																			0750: They shut
																			down the generator
AVERAGE																			

032 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (EOR)
Location SVS 69
Operator C.M.Cluff
Date 2-15-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1705				3.3	13.5		558		69.7									445	Temperature Same
1718				2.8	14.3		575		770										Back on at 1550
1733				2.9	13.7		549		75.6									447	2-15-84
1748				3.0	13.3		543		72.8										
1803				2.9	13.3		534		72.8									446	Lost Co monitor
1818				2.9	13.2		557		62.2										
1833				3.1	13.0		550		61.8									459	O2 Subject to
1848				3.1	133		555		61.2										drift
1903				3.0	13.3		557		54.9									463	
1918				3.2	13.4		560												NOx Analyzer would not
1933				3.2	13.6		559											465	
1948				3.3	13.9		556												Cal Gases
2003				3.2	14.5		565											460	
2018				3.2	14.5		565												CO_2 18.15 %
2033				3.3	14.6		560												O_2 2.25 %
2048				3.5	13.9		562		61.9									466	SO2 548 ppm
2103				3.4	13.8		560		60.4										NOx 96.1 ppm
2118				3.2	14.1		543		62.4										
1233				3.3	14.3		560		62.0									468	
2148				3.3	143		565		61.5										
2203				3.2	14.5		564		63.1									467	
2218				3.3	14.4		564		65.2										
2233				3.4	14.4		565		63.4									469	
2248				3.4	14.3		560		64.9										
2303				3.3	14.4		554		63.8									469	
																			AVERAGE

4-55

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (…)

Location SUS 69

Operator C. Dillburn

Date 2-15-84

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel

				DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)					
Time	Sample Point	Load MW	Steam Flow lb/hr x1000	O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
2318				33	14.3		555		605										
2333				3.0	14.7		635		59.7									465	
2340				3.2	14.4		554		61.3										
																			AVERAGE

4-56

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (EERT)
Location SUS 69
Operator C. Milburn
Date 2-16-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmin	CORRECTED TO 3% O_2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0003				3.0	14.6		554		595									463	Cal Gas
0018				3.2	14.4		519		595										0₂-7.20%
0033				2.9	14.5		623		595									462	CO_2=15.00%
0048				2.8	14.6		613		603										SO_2=543 PPM
0103				3.3	14.3		546		588.3									468	NOx-590.1 PPM
0118				3.1	14.3		573		602										
0133				3.1	14.3		565		597									465	[CALIBRATION CHECK]
0148				3.3	13.9		545		604										
0203				3.4	14.0		534		636									47[illegible]	
0218				3.3	14.0		542		632										SPAN Check
0233				3.3	14.1		540		629									468	
0248				3.3	14.2		554		607										ZERO SPAN
0303				3.4	14.2		557		625									471	O_2 090 4.49%
0318				3.3	14.3		556		636										CO_2
0333				3.3	14.3		557		634									467	SO_2
0348				3.2	14.3		560		629										NOx .3PPM 86PPM
0403				3.2	14.2		560		655									467	
0418				3.2	14.3		566		655										
0433				3.2	14.5		569		685									460	
0448				3.2	14.4		571		655										
0503				3.2	14.4		553		665									459	
0518				3.2	14.2		554		690										
0533				3.2	14.1		529		684									461	
0548				3.2	13.9		531		718										
0603				3.2	13.4		493		716										
																			AVERAGE

4-57

0.32 1/82

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (east)
Location SUS 69
Operator C.F. Lamm
Date 7-16-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
0618				3.2	13.7		545		67.5										
0633				3.2	13.5		551		72.0									452	
0648				3.3	13.7		519		79.1										
0703				3.5	13.8		534		80.8									449	
0718				3.2	13.8		528		83.7										
0733				3.1	13.7		534		84.8									453	
0748				3.3	13.8		534		81.7										
0803				3.3	13.9		555		83.4									450	
0818					Test	Cust													
																			AVERAGE

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron

Location SCS-69

Operator MILBURN

Date 2-22-84

Load Range

Ambient Temperature 63°F

Barometric Pressure 29.41D

Static Pressure Duct

Fuel Lease Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	DRY UNCORRECTED CO_2 %	DRY UNCORRECTED CO ppm	DRY UNCORRECTED SO_2 ppm	DRY UNCORRECTED NO ppm	DRY UNCORRECTED NO_x ppm	DRY UNCORRECTED NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	CORRECTED TO 3% O2 DRY NO_x ppm	CORRECTED TO 3% O2 DRY NO_2 ppm	HYDROCARBONS (HC) Total HC	HYDROCARBONS (HC) Methane	HYDROCARBONS (HC) Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0929				3.2	12.7		648		72.1									543	1029 to 1344 OFF -
1044				2.9	14.1		645		72.6										STRIP CHARTS - NO
1059				3.2	12.7		636		78.6									546	AUTOCLAVE PUMP
1114				3.0	100		637		80.1										
1129				3.0	15.4		629		80.4									553	CAL GASSES
1144				3.1	15.0		627		82.0										O2 7.20 %
1159				3.0	13.0		622		82.1									559	NOx 90.1 PPM
1214				3.1	10.1		621		80.0										SO2 530 PPM - I COULD
1229				2.9	8.8		619		77.2									556	NOT REACH THE
1244				3.0	16.7		631		75.7										SPAN OF 543 BECAUSE
1259				3.0	16.9		617		75.5									553	THE INSTRUMENT COULD NOT
1314				2.5	15.0		606		75.0										SPAN.
1329				2.4	15.0		651		71.7										CO_2 15.04 %
1344				2.5	14.2		660		70.0										
1359				2.6	14.3		637		68.8									532	SPAN CHECK
1414				2.5	13.8		640		68.6										220 SPAN 6.45-% O_2 00%
1429				2.6	13.3		645		71.7									529	NOx 0 PPM 86.3 PPM
1444				2.3	13.0		661		71.4										SO2 4 PPM 523 PPM
1459				END TEST															CO2 -.2% 16.2%
				RESTART 1500															
1514				2.7	14.3		654		67.3										
1529				2.5	14.4		680		74.5										
1544				2.4	13.9		683		73.1										
1559				2.7	13.5		665		70.8										
1614				2.8	13.4		670		67.0										
																			AVERAGE

4-59

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (CFER)

Location SVS 69

Operator S. Mulburn

Date 2-22-84

Load Range

Ambient Temperature

Barometric Pressure

Static Pressure Duct

Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
1629				2.7	13.4		664		70.0										
1644				2.5	13.4		654		76.9										
1659				2.8	13.1		662		74.1										
1714				2.8	13.0		671		74.0										
1729				2.8	13.0		678		76.2										
1744				2.7	13.1		681		76.7										
1759				2.1	12.8		660		70.0										
1814				2.6	13.2		685		71.2										
1829				2.7	13.2		654		68.0										
1844				2.6	13.3		675		69.1										
1859				2.4	13.3		677		64.6										
1914				2.7	13.6		686		74.9										
1929				2.8	13.6		683		72.8										
1944				2.7	13.7		688		73.8										
1959				Down for purging															
2014				2.3	13.6		724		72.5							⊖			
2029				3.8	13.6		687		72.8							⊖			
2044				2.6	13.5		692		70.3							⊖			
2059				2.6	13.2		654		67.8							⊖			
2114				2.7	13.5		610		66.0							⊖			
2129				2.5	12.9		698		68.9							⊖			
2144				3.7	12.7		692		64.5							⊖			
2159				2.6	12.6		683		66.2							⊖			
2214				2.5	12.6		688		68.7							⊖			
2229				2.7	12.2		650		71.4							⊖			
																			AVERAGE

4-60

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (Leed)
Location SVS 69
Operator C. McBurn
Date 2-22-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED							CORRECTED TO 3% O2 DRY			HYDROCARBONS (HC)			H_2O %	Stack Gas Temp °F	COMMENTS
				O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	NO ppm	NO_x ppm	NO_2 ppm	Total HC	Methane	Non-Methane HC			
2244				2.8	11.3		671		709							⊖			
2259				2.7	11.7		690		732							⊖			
2314				2.7	11.5		671		726							⊖			
2329				2.7	11.4		667		723							⊖			
2344				2.7	11.4		666		750							⊖			
2359				2.6	11.3		664		743							⊖			
																			AVERAGE

4-61

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON
Location SVS - G9
Operator MILBURN
Date 2-23-84
Load Range

Ambient Temperature 63°F
Barometric Pressure 29.40
Static Pressure Duct
Fuel Lease Crude

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0014				2.6	11.1		670		72.6							Ø			
0029				2.9	10.4		659		70.4							Ø			
0044				2.7	11.0		674		72.7							Ø			
0059				2.7	10.8		678		68.6							Ø			
0114				2.7	10.7		680		73.1							Ø			
0129				2.7	10.5		666		72.0							Ø			
0144				2.8	10.3		660		72.8							Ø			
0159				2.8	10.1		663		75.5							Ø			
0214				2.8	10.2		660		75.4							Ø			
0229				2.9	10.0		652		76.4							Ø			
0244				2.8	9.8		664		76.0							Ø			
0259				2.7	9.8		668		72.2							Ø			
0314				2.5	9.8		654		71.6							Ø			
0329				2.6	9.7		650		76.5							Ø			
0344				2.7	9.5		657		69.8							Ø			
0359				2.8	9.6		674		69.3							Ø			
0414				2.9	9.4		663		69.9							Ø			
0429				2.9	9.4		660		69.8							Ø			
0444				2.9	9.3		651		67.8							Ø			
0459				2.9	9.3		660		68.8				-			Ø			
0514				3.1	9.2		646		72.9							Ø			
0529				3.1	9.2		656		76.2							Ø			
0544				3.1	9.2		660		70.5							Ø			
0559				3.0	9.2		648	612	680	676						Ø			
0614				3.0	9.1		634		67.5							Ø			
																			AVERAGE

4-62

FIELD DATA SHEET

ACUREX Aerotherm

Plant Chevron (EOR)
Location SUS C9
Operator C. Nusbaum
Date 2-23-84
Load Range

Ambient Temperature
Barometric Pressure
Static Pressure Duct
Fuel

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
0624				3.1	8.4		617		70.6										O_2 Subject to Drift
0644				3.0	8.9		560		67.9										Zero SPAN
0659				Test Over															O_2 10% 7.0%
				restart															CO_2 10.5% 18.15
0859				2.6	15.6		608		74.4										SO_2 5ppm 495
0914				2.7	15.8		602		76.7										NO_x 0 ppm 82 ppm
0929				2.8	16.9		601		75.9										
0944				2.9	16.3		602		70.6										
0959				2.9	17.6		598		70.1										
1014				2.8	18.5		628		68.7										
1029				3.3	14.5		649		72.9										
1044				3.3	14.7		648		72.6										
1059				3.3	12.5		641		72.3										
1114				3.2	12.2		657		68.3										
1129				→	16.6		477		→									548	Check O_2 Cal
1144				3.5	14.6		597		69.1										
1159				3.5	16.4		614		69.5									549	
1214				3.6	17.4		621		66.4										
1229				3.7	17.2		631		68.8									537	
1244				3.7	14.0		655		69.2										
1259				4.0	14.5		645		65.9									545	Zero SPAN
1314				4.4	14.5		649		67.9										O_2 0% 6.95%
1329				4.8	14.0		626		70.4									553	CO_2 0% 19.3%
1344				4.9	13.5		634		72.4										SO_2 ~16 ppm 548 ppm
1359																			NOx 0 ppm 86.5 ppm
																			AVERAGE

4-63

FIELD DATA SHEET

ACUREX Aerotherm

Plant CHEVRON (EER)
Location SUNSET
Operator MILBURN
Date 2-24-84
Load Range

Ambient Temperature 66°F
Barometric Pressure 29.4C
Static Pressure Duct
Fuel LEASE CRUDE

Time	Sample Point	Load MW	Steam Flow lb/hr x1000	DRY UNCORRECTED O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	NO_2 ppmn	CORRECTED TO 3% O2 DRY NO ppm	NO_x ppm	NO_2 ppm	HYDROCARBONS (HC) Total HC	Methane	Non-Methane HC	H_2O %	Stack Gas Temp °F	COMMENTS
804				2.2					75										O2 meter suspect to
0950				2.2	12.8		689		707									544	DRIFT CHK 1-1244
1005				2.2	13.6		688		71.3									535	
1020				2.3	12.7		641		713									527	
1035				2.6	13.2		630		701									536	
1040				3.0	12.93		627		683									530	
1105				3.1	12.50		630		700									531	
1120				3.2	13.05		632		6871									527	
1135				3.3	12.39		622		6992									527	
1150				3.3	12.3		622		69.9										
1205				3.3	12.7		637		65.4									544	
1220					11.9		637		64.9										
1235					12.6		636		69.1									547	
1250				2.7	11.2		635		726										
1305				2.7	11.8		632		741.2									547	O2 OFF strip chart
1320				2.7	11.8		636		71.8										
1335				2.6	12.2		642		704									549	ZERO SPAN
1350				2.7	11.7		625		740										O2 0% 7.25%
1405				2.7	12.2		631		714									548	CO2 -1% 17.05%
1420				2.8	12.0		635		727										SO2 -10ppm 490ppm
1435				2.7	11.7		637		665									543	NOx 0ppm 876ppm
1450				2.7	11.9		668		828										
1505				2.7	12.2		629		734									553	
1620				Test over															
																			AVERAGE

4.2 FIELD DATA SHEETS FOR EPA METHOD 5/8, SASS, VOST, ANDERSEN IMPACTOR, CONTROLLED CONDENSATION (CCS), AND EPA METHOD 7

Plant Chevron
Date 2-1-84
Sample Location SVS-690 add
Sample Type M5/8
Run Number 1
Operator Bart
Ambient Temperature
Barometric Pressure 29.28
Static Pressure, (H_2O)
Filter Number(s) 84-753-010

Impinger Volumes

Initial	Final	Net Gain
471.5	534.0	
554.3	604.7	
528.6		
Silica Gel		
691.6	733.0	
SASS Condensate		
Total Volume		

Probe Length and Type 5' glass
Nozzle Size & I.D. .309 A-100 Clarex
Pitot Coefficient & I.D.
Assumed Moisture 11
Molecular Weight, Dry, (M_d)
Meter Box Number D555
Meter Coefficient .679
α Factor 0.975
K = 935.06
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Leak Check: Initial at 15 " Hg, .015 CFM from filter
Final at 15 " Hg, .007 CFM from filter
Pitot Leak Check: O.K.

Traverse Point Number	Clock Time (24-hr) Clock / Sampling Time, min	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	1124	Init. 720.987												
12	0.0	720.187	.37	1.81	1.8	457	227	37		204	65	65	7	
11	3.0	723.21	.45	2.18	2.2	466	232	36		214	66	68	10	
10	6.0	725.55	.49	2.27	2.3	465	237	36		256	69	67	10	
9	9.0	727.98	.45	2.18	2.2	464	236	38		255	69	67	10	
8	12.0	730.44	.45	2.21	2.2	485	227	38		256	69	67	10	
7	15.0	732.83	.45	2.21	2.2	456	229	42		256	69	66	10	
6	18.0	735.24	.45	2.21	2.2	454	230	45		255	68	65	11	
5	21.0	736.44	.40	1.97	2.0	455	232	46		255	67	65	11	
4	24.0	739.90	.35	1.72	1.7	456	234	46		257	68	65	11	

7602/5/E Rev 1

Comments:

Traverse Point Number	Clock Time (24-hr) Clock / Sampling Time, min	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F					Gas Meter		Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
		Init.												
3	27.0	742.13	.35	1.72	1.7	456	232	45		256	68	65	10	
2	30.0	744.25	.35	1.72	1.7	454	233	46		255	68	65	10	
1	33.0	746.39	.25	1.23	1.2	450	231	48		254	67	65	8	
	36.0-End	748.276												
		—												
12	36.0 12:16	748.276	.50	2.46	2.4	453	227	52		266	68	67	15	
11	39.0	750.77	.50	2.46	2.4	454	232	47		261	72	69	15	
10	42.0	753.45	.50	2.49	2.5	454	231	48		259	74	71	11	
9	45.0	756.15	.48	2.39	2.4	453	235	52		261	78	71	11	
8	48.0	758.66	.47	2.34	2.3	453	238	52		268	76	72	11	
7	51.0	761.12	.45	2.24	2.2	454	238	55		269	74	72	10	
6	54.0	763.54	.45	2.25	2.2	453	242	54		270	76	73	10	
5	57.0	765.93	.43	2.10	2.10	453	239	55		271	75	72	10	
4	60.0	768.34	.45	2.25	2.2	454	237	54		272	76	73	10	
3	63.0	770.71	.45	2.25	2.2	452	235	54		268	76	73	10	
2	66.0	773.11	.45	2.25	2.2	450	237	54		266	76	72	11	
1	69.0	775.64	.25	1.25	1.3	450	235	54		264	76	72	8	
	72.0 End	777.625	.649		2.075	456.2					69.9			

Gage Again for 15 minutes at 4.0 ΔH

Run No. 1 — 56.638 — Date 2-1-84 — Sampling Location Outlet

Comments: ($\sqrt{\Delta p}$)

4-67

M5/8

FIELD DATA

Plant Chevron
Date 2-1-84
Sample Location S/S-69 Outlet
Sample Type 5/8
Run Number 2
Operator Test
Ambient Temperature
Barometric Pressure
Static Pressure, (H_2O) +00.2
Filter Number(s)

Leak Check: Initial at 15 " Hg, .011 CFM from filter
Final at 10 " Hg, .008 CFM from filter
Pitot Leak Check: O.K.

Impinger Volumes

Initial	Final	Net Gain
500.0	534.3	34.3
558.1	601.2	43.1
530.0	559.0	29.0
Silica Gel		
560.9	584.0	23.1

SASS Condensate N/A
Total Volume 129.5

Probe Length and Type 5' glass
Nozzle Size & I.D. .309 P-100 Acurex
Pitot Coefficient & I.D.
Assumed Moisture 11
Molecular Weight, Dry, (M_d)
Meter Box Number D555
Meter Coefficient .699
α Factor .975
K =
$K(Nd)^4$ = ___ x (___)^4 = ___
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)$ (P)

Traverse Point Number	Clock Time (24-hr) Clock / Sampling Time, min	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
West	1940	Init. 787.417												
12	0.0	787.417	.43	2.07	2.1	472	252	58		243	67	66	7	
11	3.0	789.78	.43	2.07	2.1	472	248	48		256	68	66	7	
10	6.0	792.31	.50	2.40	2.4	472	231	58		272	72	71	8	
9	9.0	794.43	.48	2.31	2.3	473	235	52		271	73	69	9	
8	12.0	796.86	.50	2.44	2.4	473	242	56		279	74	72	9	
7	15.0	799.46	.45	2.19	2.2	472	244	62		245	76	72	8	
6	18.0	801.90	.43	2.11	2.1	473	235	67		235	78	74	8	
5	21.0	804.33	.45	2.20	2.2	475	238	65		224	79	75	8	
4	24.0	806.79	.45	2.21	2.2	474	234	60		235	80	77	8	

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Comments:

Traverse Point Number	Clock Time (24-hr) Clock / Sampling Time, min	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F					Gas Meter		Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
		Init.		Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
3	27.0	809.17	.45	2.21	2.2	476	242	56		258	81	77	8	
2	30.0	811.60	.45	2.22	2.2	475	242	56		265	81	78	8	
1	33.0	814.04	.45	2.22	2.2	474	248	48		273	81	78	8	
	36.0 Stop	816.496												
12	South 2160	816.496	.47	2.29	2.3	488	298	49		280	80	82	8	
11	39.0	818.96	.45	2.19	2.2	487	263	51		243	84	83	8	
10	42.0	821.34	.50	2.44	2.4	490	258	55		238	85	83	8	
9	45.0	823.80	.50	2.45	2.4	485	253	55		233	84	82	9	
8	48.0	826.34	.50	2.45	2.4	486	248	54		271	84	81	9	
7	51.0	828.87	.50	2.44	2.4	485	243	53		267	83	81	9	
6	54.0	831.39	.45	2.20	2.2	483	231	53		267	83	81	9	
5	57.0	833.85	.42	2.05	2.1	483	235	52		269	82	80	9	
4	60.0	836.26	.43	2.05	2.1	482	241	51		269	80	78	9	
3	63.0	838.63	.40	1.95	1.9	483	238	50		262	80	78	8	
2	66.0	840.96	.40	1.95	1.9	483	240	50		263	80	78	8	
1	69.0	843.30	.30	1.46	1.5	482	241	49		267	79	77	7	
	72.0 End	845.360												
		57.943	.16696 ($\sqrt{\Delta P}$)		2.18	479.1					(77.8)		÷48	

Run No. 2 Date 2-1-84 Sampling Location Outlet

Comments: Orsat for 15 minutes at 1.0 AH

FIELD DATA

Plant Chevron
Date 2/1/84
Sample Location
Sample Type SASS
Run Number 1
Operator Kaufmann
Ambient Temperature ~65
Barometric Pressure 29.26
Static Pressure, (H_2O) ±0.5
Filter Number(s) 31, 32, 33, 34,

Leak Check: Initial at 19 " Hg, .016 CFM
Final at 20 " Hg, ____ CFM
Pitot Leak Check: O.K.

Impinger Volumes		
Initial	Final	Net Gain
500	547	
500	840	
500		
Silica Gel		
1081.8	1322.6	
973.7		
SASS Condensate		1920
Total Volume		

Probe Length and Type 3 ft.
Nozzle Size & I.D. 0.674 P-205
Pitot Coefficient & I.D. 0.816 P-02
Assumed Moisture 11%
Molecular Weight, Dry, (M_d)
Meter Box Number 105
Meter Coefficient 1.039 @
α Factor 3.356
K = 38.419
$K(Nd)^4$ = ___ x (___)^4 = 7.93
$\Delta H = K(N_d)^4 \left(\frac{Tm}{Ts}\right)^2 (P)$

Traverse Point Number	Clock Time (24-hr) Clock / Sampling Time, min	Gas Meter Reading (V_m), ft^3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F							Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter In	Gas Meter Out		
	0 1129	Init. 73.411												
	10	111.5	.45	2.10	2.1	454	319		48	395	78	78	18	.671
	20	148.1	.40	1.87	1.9	450	396		50	402	78	77	17	.632
	30	183.9	.46	1.86	1.9	451	407		49	405	84	78	17	.632
	40	219.3	.40	1.90	1.9	450	411		50	407	87	81	19	.632
	50	254.4	.40	1.91	1.7	451	409		62	408	92	84	20	.632
	60 1233	290.9	.40	1.91	1.9	451	409		54	325	90	89	12.	.632
	70	326.3	.40	1.92	1.9	450	409		51	342	92	89	16	.632
	80	362.4	.40	1.93	1.9	460	409		51	864	97	91	17	.632
	90	400.6	.40	1.93	1.9	464	409		51	375	99	94	18	.632

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Comments: min 31 - drain condensate from Org. Mod. min 61 - Drain condensate
min 50 - stop to change filters restart 1233

Traverse Point Number	Clock Time (24-hr) Clock / Sampling Time, min	Gas Meter Reading (V_m), ft 3	Velocity Head (ΔP_s), in. H_2O	Orifice Pressure Differential (ΔH), in. H_2O		Temperature °F					Gas Meter		Pump Vacuum in. Hg	Avg. $\sqrt{\Delta P}$
				Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out		
	90	Init. 400.6												
	100	435.2	.40	1.94	1.9	457	409		51	383	104	96	20	.632
	110	470.7	.40	1.94	1.7	454	408		50	377	98	98	20	.632
	1400 120	506.0	.40	1.94	1.7	460	409		52	370	99	97	20	.632
	130	542.0	.40	1.94	1.9	449	404		75	385	95	95	14	.632
	1442 140	580.7	.40	1.94	1.9	448	404		72	406	95	94	15	.632
	150	616.0	.40	1.94	1.9	449	412		54	409	97	95	17	.632
	160	651.8	.40	1.95	1.9	448	413		54	407	101	96	18	.632
	170	687.1	.40	1.92	1.8	467	406		51	410	103	97	20	.632
	1521 180	721.6	.40	1.91	1.6	470	406		52	409	104	98	20	.632
	190	758.1	.40	1.90	1.9	466	406		57	362	94	98	14	.632
	200	795.1	.40	1.91	1.9	466	412		53	343	96	97	16	.632
	210	832.7	.40	1.91	1.9	466	414		54	333	101	97	19	.632
	220	868.6	.40	1.93	1.9	463	415		56	369	103	99	20	.632
	230	904.6	.40	1.93	1.8	463	414		56	371	104	99	20	.632
	240	939.830	.40	1.93	1.7	463	406		56	369	103	99		.632
		866.42	0.40	1.93	1.9	456								0.632

Run No. SASS 1 Date 2/1/84 Sampling Location Boiler outlet

Comments: Min ~~120~~ 100 - Stop to change filter Restart 1400
Min 121 - Drain condensate
Min 140 - Stop to change S.6. Restart 1422
Min 152 - Drain Condensate
Min 180 - Stop to change filter Restart 1521
Min 185 - Drain Condensate
Min 240 - Stop ~~to change filter~~ ~~Restart~~
Stop test - filter holder connection galled, cannot remove filter holder

Volatile Organic Sampling Sampling Train (VOST) Data Sheet

Plant Chevron (EER) / CMEA
Date 2-1-84
Sample Location Sec. 27 Unit 39 STACK
Run No. 1 (TRAPS packed in culture tubes)

Project No. 307735.81
Operator M. M. Murray
Barometric Pressure (in. Hg) 29.28 (2pm)
Ambient Temperature (°F) 60

Trap Set	Trap I.D.	Clock Time 24 Hour	Elapsed Time (minutes)	Dry Gas Meter (L)	Volume Sampled (L)	Temperature (°F) DGM	Probe	Heated Line	Tenax Inlet	Rotometer Setting	Pump Vacuum (in. Hg)	Leak Rate LPM at Vacuum	Comments
A	45	Start: 1530	42	0.00	21.188	70	370	N/A	57	40	<1	0.05@	68°F before 2nd trap
	19A	Stop: 1612		21.188		78	354	N/A	62	40	<1	15" Hg	84°F before 2nd trap
B	23	Start: 1814	40.5	0.00	20.140	64	331	N/A	52	40	<1	0.07Lpm@	61°F before 2nd trap
	24A	Stop: 80		20.14		68	316	N/A	64	38	<1	15" Hg	68°F " " "
C	9	Start: 1730	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Trip Blank
	35A	Stop: —		N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
D	11	Start: N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Field Blank
	32A	Stop: N/A		N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
E	21	Start: 1825	41.1	0.00	20.151	62	365	N/A	52	40	0.5	0.04@	75°F before 2nd trap
	13A	Stop: 1906		20.151		70	345	N/A	57	37	5	10" Hg	69°F before 2nd trap
F		Start:											
		Stop:											
Summary													

Notes: a) 2nd knockout impinger added after test set A (wouldn't seal properly for set A & was wrapped ~ TFE tape for test B)
b) After set A, noticed charcoal fines in 1st condenser (probably from charcoal purge trap). Condenser was changed out ~ clean one.
c) culture tube broke & lost ¼" cap for trap #45; ¼" cap lost from 19A
d) sudden increase in stack moisture during set B
e) SET E - 1st trap has significant moisture - not noted with other sets (After 15 mins of test)

Volatile Organic Sampling Sampling Train (VOST) Data Sheet

Plant Chevron/EER (AMEA) — Project No. 307135.80

Date 2/1/84 — Operator Murray

Sample Location Sec 27 Unit 39 STACK — Barometric Pressure (in. Hg) 29.28

Run No. 2 (traps in cigar boxes) — Ambient Temperature (°F) 60

Trap Set	Trap I.D.	Clock Time 24 Hour	Elapsed Time (minutes)	Dry Gas Meter (L)	Volume Sampled (L)	Temperature (°F) DGM	Probe	Heated Line	Tenax Inlet	Rotometer Setting	Pump Vacuum (in. Hg)	Leak Rate LPM at Vacuum	Comments
A	42	Start: 1901	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	TRIP BLANK
	15A	Stop: N/A		N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N
B	40	Start: 1945	39.7	0.00	20.01	62	310	N/A	67	@ 40	<1	0.06 @ 11" Hg	61° before 2nd trap
	33A	Stop: 2025		20.01		70	316	N/A	60	2/0	-1		66°F before 2nd trap
C	40	Start: 1940	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FIELD BLANK
	1A	Stop: N/A		N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
D		Start:											
		Stop:											
E		Start:											
		Stop:											
F		Start:											
		Stop:											
Summary													

Notes:

ACUREX Corporation

ANDERSEN FIELD TEST DATA

Plant Chevron (EERD) | Date 2-22-84 | Ambient Temperature ____ °F

Test Location SVS-69 Out | Operator Bart | Barometric Pressure 27.36 " Hg

Run No. 1 | Nozzle Size & No. .250 | Static Pressure (P_s) -0.25 "H_2O ~~" Hg~~

Molecular Weight ____ | Pitot Coefficient .82 | Filter Set No. UOP-23

% H_2O ____ | Pitot No. ____ | Meter Box No. # 105

Orifice Coefficient .67 ∝ 1.001

(.99 corr)

SAMPLE POINT NUMBER	CLOCK TIME / SAMPLE TIME	VELOCITY HEAD ΔP in. wg.	ORIFICE METER ΔH in. wg.	GAS METER VOLUME FT³	TEMPERATURES °F STACK	PROBE	IMPINGER	GAS METER IN	GAS METER OUT	PUMP VACUUM in. Hg	√ΔP	COMMENTS
6	~~1104~~ 0.0	.44	0.9	945.646	549			67	67	5	.663	initial leak rate
	5.0		0.9	948.23				65	66	5		.008 cfm at 10" Hg
	10.0		0.9	950.70				65	67	5.5		preheat impactor
	15.0		0.9					64	65	6		20 min in stack
	20.0		0.9	955.58				64	64	6.5		
	25.0		0.9	957.08	556			64	64	7		
	~~30.0~~ End			960.628								
	30.15											Final leak rate
												0.009 at 10" Hg
AVERAGE / TOTAL	30.15		0.9	14.982	552.5			64.8	65.5			

902229

902227

(65.2)

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Form EED-070 B 6 79

ACUREX Corporation

ANDERSEN FIELD TEST DATA

Plant Chevron (CEER) | Date 2-22-84 | Ambient Temperature ____ °F

Test Location SVS-69 Outlet | Operator Bart | Barometric Pressure 29.32 " Hg

Run No. 2 | Nozzle Size & No. .250 | Static Pressure (P_s) -0.25 " H_2O ~~" Hg~~

Molecular Weight ____ | Pitot Coefficient .82 | Filter Set No. 40P20

% H_2O ____ | Pitot No. ____ | Meter Box No. 105

Orifice Coefficient .67

SAMPLE POINT NUMBER	CLOCK TIME / SAMPLE TIME	VELOCITY HEAT ΔP in. wg.	ORIFICE METER ΔH in. wg.	GAS METER VOLUME FT³	TEMPERATURES °F STACK	PROBE	IMPINGER	GAS METER IN	GAS METER OUT	PUMP VACUUM in. Hg	$\sqrt{\Delta P}$	COMMENTS
6	~~1352~~ 0.0	.94	0.9	960.875	532			61	59	5	.663	initial leak rate
	6.0		0.9	963.36				60	59	6		.005 cfm at 10" Hg
	10.0		0.9	965.79				61	69	6		preheat impactor
	15.0		0.9	968.22				60	59	6.5		20 min. in stack
	20.0		0.9	970.67				61	58	7		
	25.0		0.9	973.11				63	58	7		
	30.0	End		975.551	531							
												Final leak rate
												.007 cfm at 10" Hg
				900592				902230				
								902294				
								902226				
AVERAGE / TOTAL	30.0		0.9	14.676	531.5			60.8	58.7		.663	

(57.8)

4-75

Form EED-070 B 6 79

CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD DATA SHEET

Plant Chevron EFR
Date 2-23-84
Sample Location SVS-69 Outlet
Run No. 1
Operator Best

Ambient Temperature
Barometric Pressure 29.34
Meter Box Number 105
Meter Orifice Coefficient .67
Meter α Factor 1.000

initial leak rate .003 cfm at 10" Hg (nozzle)

Sampling Time, min / Clock Time (24-hr clock)	Gas Meter Reading (V_m), ft^3 Init. 975.729	Temperature (°F) Stack	Probe (4)	Filter Skin (3)	Filter Out (5)	Recirc Water (2)	Exit Coil (1)	Dry Gas Meter In	Dry Gas Meter Out	ΔH	Hg
0.0 1243	975.729	537	575	1053	565	144	143	71	69	0.4	6
5.0			564	1140	700	148	147	69	67	0.4	6
10.0	779.18		559	796	581	150	148	68	67	0.4	6
15.0	980.88		579	867	514	149	147	68	67	0.4	6.5
20.0	~~984.40~~		586	1226	706	149	147	67	67	0.4	7
25.0	984.40		595	1296	783	149	147	67	66	0.4	7
30.0	986.12		591	865	583	149	147	67	67	0.4	7
35.0	987.90		592	863	516	149	147	67	68	0.4	7
40.0	989.51		597	1200	685	149	147	67	65	0.4	8
45.0	991.27		586	787	534	150	148	67	66	0.4	8
50.0	993.1		587	736	501	149	147	66	66	0.4	9
55.0	994.71		589	1151	694	149	147	66	66	0.4	9
60.0 End	996.444							67.8	66.5		
Average	20.715							67.5			

Final leak rate (nozzle) .007 at 10" Hg

902292 902296

902291 902295

CONTROLLED CONDENSATION SYSTEM (CCS)
FIELD DATA SHEET

Plant Chevron CEER) — Ambient Temperature ____
Date 2-23-84 — Barometric Pressure 29.32
Sample Location SVS-69 Outlet — Meter Box Number 105
Run No. 2 — Meter Orifice Coefficient .47
Operator Best — Meter α Factor 1.000

Clock Time (24-hr) clock / Sampling Time, min	Gas Meter Reading (V_m), ft³	Temperature (°F)								Δ H	Δ Hg
				Filter		①	②	Dry Gas Meter			
	Init. 996.577	Stack	④ Probe	③ Skin	⑤ Out	Recirc Water	Exit Coil	In	Out		
initial leak rate .005 at 10" Hg (average) 1737											
0.0	996.577	449	527	1232	479	153	145	64	64	0.4	8
5.0	998.42		576	1271	532	159	143	63	65	0.4	7
10.0	018.90		577	1224	577	153	145	64	65	0.4	7
15.0	018.90		577	1220	562	153	145	64	64	0.4	7
20.0	003.43		582	1212	563	154	146	64	64	0.4	8
25.0	005.36		576	1183	530	154	146	62	62	0.4	8
30.0	007.10		585	1320	535	154	146	62	62	0.4	9
35.0	010.67		580	1331	523	154	146	62	62	0.4	9.5
40.0	010.67		580	1252	511	154	146	60 62	59 62	0.4	10
45.0	012.44		582	1231	544	153	145	58	59	0.4	10
50.0	014.16		577	1298	497	153	145	58	59	0.4	10
55.0	015.85		574	1222	486	153	145	57	58	0.4	10
60.0 End	017.561										
Average	20.924							61.5 (61.7)	61.9	0.4	

final leak rate .005 at 10" Hg

902301 902297 902300
902302 4-77 902293 902298

Run Number 1
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =	Lining Material	Pre-Filter	Heated	Pitot Tube
N/A	3 ft	☐ S. Steel ☒ Pyrex	☒ Glass Wool ☐ _____	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	2	25	18	
Volume of Flask Less Absorb. Soln.	2032	2087	2079	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.65	29.65	29.65	
Flask Temperature (°F)	70	70	72	
Flask Vacuum (in. Hg):				
Top	13.2	16.2	15.9	
Bottom	16.2	13.1	13.2	
Difference	29.4	29.3	29.1	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	Directly above cm port		—	
Point or Distance from Inside of Port	~1.5'	1.5'	1.5'	
Clock Time	1101	1116	1132	
Performed by	mmm	mmm	mmm	

Comments:
Probe Temp = 406°F

Run Number 1

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	2	25	18	
Final Conditions:				
Barometric Pressure (in. Hg)	29.50	29.50	29.50	
Flask Temperature (°F)	64	71	72	
Flask Vacuum (in. Hg):				
Top	0.2	0.2	0.5	
Bottom	0.8	0.2	0.7	
Difference	1.0	0.4	1.2	
Sample Number	901398	901399	901400	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1048	1455	1128	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901398	901399	901400	
Absorbance of Sample	0.170	0.209	0.161	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	250.0	307.3	236.7	
Analysis Date	3-15-84	3-15-84	3-15-84	
Analyzed by	mmm	mmm	mmm	

Comments:

ACUREX CORPORATION

307235.81

Run Number 2
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =	Lining Material	Pre-Filter	Heated	Pitot Tube
	3 ft	☐ S. Steel ☒ Pyrex	☒ Glass Wool ☐	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	7	8	6	
Volume of Flask Less Absorb. Soln.	2046	1995	2062	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.65	29.65	29.65	
Flask Temperature (°F)	68	70	80	
Flask Vacuum (in. Hg):				
Top	16.2	13.2	16.2	
Bottom	13.2	16.2	13.2	
Difference	29.4	29.4	29.4	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above cm port			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1201 -	1216	1232	
Performed by	mmm	mmm	mmm	

Comments:

Probe temp = 406°F

Run Number 2

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	7	8	6	
Final Conditions:				
Barometric Pressure (in. Hg)	29.44	29.44	29.44	
Flask Temperature (°F)	72	74	74	
Flask Vacuum (in. Hg):				
Top	0.2	0.3	0.3	
Bottom	0.2	0.3	0.5	
Difference	0.4	0.6	0.8	
Sample Number	901401	901402	901403	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1500	1430	1452	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901401	901402	901403	
Absorbance of Sample	0.211	0.359	0.275	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	620.5	1055.7	808.7	
Analysis Date	3-15-84	3-15-84	3-15-84	
Analyzed by	mmm	mmm	mmm	

Comments:

ACUREX CORPORATION

Run Number 3
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =		Lining Material	Pre-Filter	Heated	Pitot Tube
N/A	3	ft	☐ S. Steel ☒ Pyrex	☒ Glass Wool ☐ _____	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	5	4	13	
Volume of Flask Less Absorb. Soln.	1989	2023	2075	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.58	29.58	29.58	
Flask Temperature (°F)	80	75	78	
Flask Vacuum (in. Hg):				
Top	15.9	16.1	13.1	
Bottom	13.2	13.1	16.0	
Difference	29.1	29.2	29.1	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above CM PORT			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1301	1316	1331	
Performed by	mmm	mmm	mmm	

Comments:

Probe temp = 390°F

Run Number 3

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	5	4	13	
Final Conditions:				
Barometric Pressure (in. Hg)	29.50	29.5	29.5	
Flask Temperature (°F)	62	73	64	
Flask Vacuum (in. Hg):				
Top	0.6	0.8	0.2	
Bottom	0.3	0.1	0.3	
Difference	0.9	0.2	0.5	
Sample Number	901404	901405	901406	
Date	8-25-84	1-25-84	1-25-84	
Clock Time	1111	1446	1050	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901404	901405	901406	901406
Absorbance of Sample	0.169	0.150	0.282	0.248
Absorbance of Blank	0	0	0	0
Calibration Curve No.	1	1	1	1
Mass of NO_x as NO_2 (µg)	248.5	220.5	829.3	729.3
Analysis Date	3-15-84	3-15-84	3-15-84	3-15-84
Analyzed by	mmm	mmm	mmm	mmm

Comments:

Sample recovery - slight sample loss during recovery of #13 & #4

ACUREX CORPORATION

Run Number 4
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =	Lining Material	Pre-Filter	Heated	Pitot Tube
N/A	3 ft	☐ S. Steel ☒ Pyrex	☑ Glass Wool ☐ _____	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	46	9	14	
Volume of Flask Less Absorb. Soln.	2082	2077	2049	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.54	29.54	29.54	
Flask Temperature (°F)	74	75	76	
Flask Vacuum (in. Hg):				
Top	16.2	16.1	16.1	
Bottom	13.2	13.2	13.0	
Difference	29.4	29.3	29.1	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above am port			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1401	1416	1431	
Performed by	mmm	mmm	mmm	

Comments:
probe temp = 428°F

Run Number 4

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	46	9	14	
Final Conditions:				
Barometric Pressure (in. Hg)	29.50	29.5	29.5	
Flask Temperature (°F)	70	72	64	
Flask Vacuum (in. Hg):				
Top	1.2	0.6	0.8	
Bottom	1.0	0.7	0.4	
Difference	2.2	1.3	1.2	
Sample Number	901407	901408	901409	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1155	1450	1109	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure	Spectrophotometric			
Sample Number	901407	901408	901409	
Absorbance of Sample	0.188	0.109	0.138	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	276.4	160.3	202.9	
Analysis Date	3-15-84	3-15-84	3-15-84	
Analyzed by	mmm	mmm	mmm	

Comments:

~~Per~~ slight loss of sample in recovery of #46

ACUREX CORPORATION

Run Number 5
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =		Lining Material		Pre-Filter		Heated		Pitot Tube	
N/A	3	ft	☐ S. Steel ☒ Pyrex		☒ Glass Wool ☐ _____		☒ Yes ☐ No		No. N/A Coefficient: ☐ .85 ☒ N/A	

SAMPLING DATA

Flask No.	45	10	30	
Volume of Flask Less Absorb. Soln.	2075	2060	2006	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.54	29.54	29.54	
Flask Temperature (°F)	76	72	72	
Flask Vacuum (in. Hg):				
Top	16.0	15.9	16.1	
Bottom	13.1	13.0	13.1	
Difference	29.1	28.9	29.2	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above cm port			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1501 -	1516	1531	
Performed by	mmm	mmm	mmm	

Comments:

Run Number 5

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	45	10	30	
Final Conditions:				
Barometric Pressure (in. Hg)	29.5	29.5	29.5	
Flask Temperature (°F)	66	73	65	
Flask Vacuum (in. Hg):				
Top	0.9	0.2	0.8	
Bottom	0.6	0.8	1.0	
Difference	1.5	1.0	1.8	
Sample Number	901410	901411	901412	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1213	1446	1156	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901410	901411	901412	
Absorbance of Sample	0.112	0.200	0.082	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	164.71	294.1	120.6	
Analysis Date	3-15-84	3-15-84	3-15-84	
Analyzed by	mmm	mmm	mmm	

Comments:

ACUREX CORPORATION

Run Number 6
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =	Lining Material	Pre-Filter	Heated	Pitot Tube
N/A	3 ft	☐ S. Steel ☒ Pyrex	☒ Glass Wool ☐ _____	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	17	F52	21	
Volume of Flask Less Absorb. Soln.	2012	2043	2081	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.54	29.54	29.54	
Flask Temperature (°F)	72	72	74	
Flask Vacuum (in. Hg):				
Top	13.1	16.2	16.2	
Bottom	16.0	13.0	13.1	
Difference	29.1	29.2	29.3	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above cm port			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1601	1616	1631	
Performed by	mmm	mmm	mmm	

Comments:

probe temp = 484°F

Run Number 6

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	17	F52	21	
Final Conditions:				
Barometric Pressure (in. Hg)	29.46	29.46	29.46	
Flask Temperature (°F)	72	72	74	
Flask Vacuum (in. Hg):				
Top	0.2	0.3	0.3	
Bottom	0.1	0.1	0.2	
Difference	0.3	0.4	0.5	
Sample Number	901413	901414	901415	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1315	1310	1430	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901413	901414	901415	
Absorbance of Sample	0.141	0.235	0.122	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	207.3	345.5	179.4	
Analysis Date	3-15-84	3-15-84	3-15-84	
Analyzed by	mmm	mmm	mmm	

Comments:

ACUREX CORPORATION

Run Number 7
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =	Lining Material	Pre-Filter	Heated	Pitot Tube
N/A	3 ft	☐ S. Steel ☒ Pyrex	☒ Glass Wool ☐ _____	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	1	22	2A	
Volume of Flask Less Absorb. Soln.	1996	2045	2011	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.54	29.54	29.54	
Flask Temperature (°F)	66	65	65	
Flask Vacuum (in. Hg):				
Top	16.1	16.2	16.2	
Bottom	12.9	13.0	13.1	
Difference	29.0	29.2	29.3	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above CM port			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1701	1716	1731	
Performed by	mmm	mmm	mmm	

Comments:

probe = 426°F

Run Number 7

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	1	22	2A	
Final Conditions:				
Barometric Pressure (in. Hg)	29.46	29.46	29.46	
Flask Temperature (°F)	71	70	71	
Flask Vacuum (in. Hg):				
Top	0.0	0.1	0.6	
Bottom	0.3	0.1	0.6	
Difference	0.3	0.2	1.2	
Sample Number	901416	901417	901418	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1235	1515	1530	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901416	901417	901418	
Absorbance of Sample	0.131	0.315	0.151	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	192.6	926.3	222.0	
Analysis Date	3-15-84	3-15-84	3-15-84	
Analyzed by	mmm	mmm	mmm	

Comments:

Flask #22 had styrofoam peanut in flask

ACUREX CORPORATION

Run Number 8
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =	Lining Material	Pre-Filter	Heated	Pitot Tube
N/A	3 ft	☐ S. Steel ☒ Pyrex	☒ Glass Wool ☐ _____	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	6A	20	43	
Volume of Flask Less Absorb. Soln.		2041	2053	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.54	29.54	29.54	
Flask Temperature (°F)	67	68	68	
Flask Vacuum (in. Hg):				
Top	16.2	16.2	16.2	
Bottom	13.1	13.1	13.0	
Difference	29.3	29.3	29.2	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above CM port			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1801	1820	1835	
Performed by	mmm	mmm	mmm	

Comments:

CM Filter change @ 1815
probe temp = 419°F

Run Number 8

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	6A	20	43	
Final Conditions:				
Barometric Pressure (in. Hg)	29.5	29.5	29.5	
Flask Temperature (°F)	68	72	71	
Flask Vacuum (in. Hg):				
Top	0.1	0.2	0.3	
Bottom	0.3	0.3	0.2	
Difference	0.4	0.5	0.5	
Sample Number	901419	901420	901422	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1235	1455	1330	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901419	901420	901422	
Absorbance of Sample	0.078	0.161	0.135	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	114.7	236.7	198.5	
Analysis Date	3-15-84	3-15-84	3-15-84	
Analyzed by	mmm	mmm	mmm	

Comments:

ACUREX CORPORATION

Run Number 9
Date 1-24-84

NO_x SAMPLING

PROBE

Unit No.	Length =	Lining Material	Pre-Filter	Heated	Pitot Tube
N/A	3 ft	☐ S. Steel ☒ Pyrex	☒ Glass Wool ☐ _____	☒ Yes ☐ No	No. N/A Coefficient: ☐ .85 ☐ N/A

SAMPLING DATA

Flask No.	19	23	F51	
Volume of Flask Less Absorb. Soln.	2064	2037	2053	
Initial Conditions:				
Barometric Pressure (in. Hg)	29.54	29.54	29.54	
Flask Temperature (°F)	62	62	63	
Flask Vacuum (in. Hg):				
Top	16.3	16.2	16.3	
Bottom	13.0	13.1	13.0	
Difference	29.3	29.3	29.3	
Leak Check	OK	OK	OK	
Sampling Location:				
Port	directly above SM port			
Point or Distance from Inside of Port	1.5'	1.5'	1.5'	
Clock Time	1905	1920	1936	
Performed by	mmm	mmm	mmm	

Comments:

Probe temp = 487°F

Run Number 9

NO_x SAMPLE RECOVERY AND ANALYSIS

SAMPLE RECOVERY

Flask No.	19	23	F51	
Final Conditions:				
Barometric Pressure (in. Hg)	29.46	29.46	29.46	
Flask Temperature (°F)	66	66	71	
Flask Vacuum (in. Hg):				
Top	16.3	16.2	16.3	
Bottom	13.0	13.1	13.0	
Difference	29.3	29.3	29.3	
Sample Number	901422	901423	901424	
Date	1-25-84	1-25-84	1-25-84	
Clock Time	1139	1215	1137	
Performed by	mmm	mmm	mmm	

ANALYSIS

Analysis Procedure: Spectrophotometric

Sample Number	901422	901423	901424	
Absorbance of Sample	0.121	0.072	0.102	
Absorbance of Blank	0	0	0	
Calibration Curve No.	1	1	1	
Mass of NO_x as NO_2 (µg)	177.9	105.9	150.0	
Analysis Date				
Analyzed by				

Comments:

PLANT Charron (ECR) OPERATOR Bart

LOCATION SIS 69 outlet

DATE 7-2-84

TIME

AMBIENT PRESSURE (IN. HG.) INIT 29.37 FINAL 29.35
AMBIENT TEMPERATURE (°F)
SAMPLING POINT 30 radius CM

TEST NUMBER Run 1

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1055	30	2006	29.0	55	0.9	58
1110	46	2082	28.7	63	1.2	58
1130	17	2012	29.0	60	1.4	59

PLANT Clinton (EER2) OPERATOR Best

LOCATION SVS 69 outlet

DATE 2-8-84

TIME

	INIT	FIN
AMBIENT PRESSURE (IN. HG.)	29.37	29.35
AMBIENT TEMPERATURE (°F)		
SAMPLING POINT 30" Modified CM		

TEST NUMBER Run 2

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1155	13	2075	25.5	79	2.1	59
1210	14	2049	25.7	69	1.2	55
1225	11	2055	25.9	58	0.9	59

PLANT Chevron (EPTA)   OPERATOR Best

LOCATION SUS 59 outlet

DATE 2-8-84

TIME

INIT   FINAL

AMBIENT PRESSURE (IN. HG.) 29.37   29.35
AMBIENT TEMPERATURE (°F)
SAMPLING POINT 30" above CH

TEST NUMBER Run 3

NO$_x$ SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1235	10	2060	25.9	51	0.4	59
1310	F52	2043	25.7	70	+0.2	60
1320	25	2087	25.7	73	2.2	60

PLANT Chevron (EETR) OPERATOR Bob

LOCATION SCR 67 outlet

DATE 2-3-84

TIME

	INIT	FINAL
AMBIENT PRESSURE (IN. HG.)	29.35	29.30
AMBIENT TEMPERATURE (°F)		
SAMPLING POINT 30 vacuum		

TEST NUMBER Run 4

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1355	1	1996	28.7	73	2.1	61
1420	6	2062	28.7	75	1.5	62
1435	93	2053	28.6	73	0.0	61

PLANT Chevron (EDR) OPERATOR

LOCATION SO3 GF outlet

DATE 2-8-84

TIME MT MN

AMBIENT PRESSURE (IN. HG.) 29.35 29.30
AMBIENT TEMPERATURE (°F)
SAMPLING POINT 30" above GM

TEST NUMBER Run 5

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1610	23	2-37	28.6	70	0.0	61
1635	20	2041	27.2	61	1.1	63
1650	21	2031	25.5	69	2.0	65

PLANT Cairo (EDS) OPERATOR Bost

LOCATION SO2-S9 outlet

DATE 2-5-84

TIME

	INIT	FIN
AMBIENT PRESSURE (IN. HG.)	29.30	29.32
AMBIENT TEMPERATURE (°F)		
SAMPLING POINT 30' above GM		

TEST NUMBER Run 6

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1710	8	1995	25.5	69	1.7	64
1725	7	2046	28.5	65	0.4	64
174	FS1	2053	28.2	69	1.1	66

PLANT Chevron (EOR) OPERATOR Best

LOCATION SPS-69 outlet

DATE 2-5-84

TIME

	INIT	FIN
AMBIENT PRESSURE (IN. HG.)	29.30	29.32
AMBIENT TEMPERATURE (°F)		
SAMPLING POINT	30" above (?)	

TEST NUMBER Run 7

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1810	5	1994	28.5	68	1.2	65
1825	1	1996	28.6	72	1.6	65
1845	7A		27.3	72	+0.3	65

PLANT Chilean (EDS) OPERATOR Scott

LOCATION SWS 09 outlet

DATE 2-5-54

TIME

	IMT	FINAL
AMBIENT PRESSURE (IN. HG.)	29.30	29.32
AMBIENT TEMPERATURE (°F)		
SAMPLING POINT 30" radius CM		

TEST NUMBER Run 6

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1910	22	2045	28.2	72	1.1	67
1930	24	2011	28.3	64	0.9	67
1950	19	2064	28.6	67	1.5	67

PLANT Chevron (EDR) OPERATOR Lent

LOCATION SW 69 outlet

DATE 2-5-84

TIME

AMBIENT PRESSURE (IN. HG.) INIT 29.30 FIN 29.32
AMBIENT TEMPERATURE (°F)
SAMPLING POINT 36" above CM

TEST NUMBER Run 9

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
2010	18	2079	28.0	65	0.0	67
2025	16	2017	28.6	79	0.0	68
2040	9	2077	28.6	74		

PLANT Chevron (EER) OPERATOR Bost

LOCATION Outlet

DATE 2-24-84

TIME

	INITIAL	FINAL
AMBIENT PRESSURE (IN. HG.)	29.32	29.30
AMBIENT TEMPERATURE (°F)	65	
SAMPLING POINT	10	

TEST NUMBER Run 1

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1214	23	2037	29.2	65	0.2	43
1233	10	2000	28.9	69	0.0	43
1249	8	1995	28.9	73	2.9	43

PLANT Charron (GEER) OPERATOR Dist

LOCATION Outlet

DATE 2-24-84

TIME

	INITIAL	FINAL
AMBIENT PRESSURE (IN. HG.)	29.32	29.50
AMBIENT TEMPERATURE (°F)	65	
SAMPLING POINT 10		

TEST NUMBER Run 2

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1314	10	2060	29.0	64	3.0	43
1329	43	2053	28.1	73	0.0	93
1346	FS2	2043	29.0	74	1.7	43

PLANT Chevron (Ozark) OPERATOR Bert

LOCATION Outlet

DATE 2-24-84

TIME

	INITIAL	FINAL
AMBIENT PRESSURE (IN. HG.)	29.32	29.10
AMBIENT TEMPERATURE (°F)	65	
SAMPLING POINT		

TEST NUMBER Run 3

NO_x SAMPLING DATA

Time	Flask Number	Flask Volume (ml.)	Initial Conditions		Final Conditions	
			Flask Vacuum (in. Hg.)	Flask Temp (°F)	Flask Vacuum (in. Hg.)	Flask Temp (°F)
1414	2A	2011	25.7	69	3.3	44
1429	7	2046	25.5	71	3.1	45
1445	19	2004	25.9	70	0.4	47

SECTION 5

ANALYTICAL RESULTS

5.1 Fuel Proximate and Ultimate Analyses

5.2 Particulate and Sulfur Oxides Emissions from Method 5/8 Samples

5.3 Particulate Emissions from SASS Samples

5.4 Particulate Emissions and Size Distributions from Andersen Samples

5.5 Sulfur Oxides Emissions from Controlled Condensation System Samples

5.6 Trace Element Analyses of Fuel and SASS Samples

5.7 Organic Analyses of SASS Samples: Total Chromatographable Organics (TCO), Gravimetric Organics (GRAV), Gas Chromatography Mass Spectrometry (GC/MS), and Infrared (IR) Spectra of Total Sample Extracts

5.8 Volatile Organics Analyses of VOST Traps

5.9 N_2O Emissions by GC/ECD

5.10 NO_x Emissions by EPA Method 7

5.1 FUEL PROXIMATE AND ULTIMATE ANALYSES

LABORATORY CERTIFICATE

CURTIS & TOMPKINS, LTD.

ESTABLISHED 1878

Bulk Oil & Chemical Surveyors, Samplers & Weighers
Analytical & Consulting Chemists

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FOOD TECHNOLOGISTS

ENVIRONMENTAL ANALYSTS

MEMBERS, OFFICIAL CHEMISTS AND/OR SAMPLERS FOR GOVERNMENT AGENCIES AND TRADE ORGANIZATIONS

Laboratory No. 84e34
Preliminary No. 7758

Reported 5/3/84
Sampled --------
Received 3/23/84

For ACUREX CORPORATION

Report on 1 sample of Fuel

Mark Sample No. 901440
Subcontract No. RB59186A
Release No. 13
Prime Contract 62-02-3176
Acurex Project No. 7951

ULTIMATE ANALYSIS

Carbon	86.2
Hydrogen	11.3
Oxygen	0.4
Sulfur (1st test)	1.00
Sulfur (2nd test)	1.10
Sulfur (3rd test)	1.08
Nitrogen (1st test)	1.04
Nitrogen (2nd test)	1.09
Nitrogen (3rd test)	1.00

PROXIMATE ANALYSIS

Gross Heating Value, BTU per lb.	18,430
Moisture	0.57
Ash	0.03

Specific Gravity (API)@ +60°F ---------- 12.6

Curtis & Tompkins Ltd.

5.2 PARTICULATE AND SULFUR OXIDES EMISSIONS FROM METHOD 5/8 SAMPLES

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant CHEV/FEER Performed by DaRos

Date 2-6-84

Sample Location

Test No./Type 1 / M-5/8

Barometric Pressure (in. Hg)	P_b	29.28
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(56.65)}{(.995)}\right)\left(\frac{(29.28) + \frac{(2.075)}{13.6}}{(69.9) + 460}\right)$	$V_{m\ std}$	55.772
Volume of liquid collected (grams)	Vl_c	NO DATA
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	6.047 ✓
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{(\quad)}{(\quad) + (\quad)}$	B_{wo}	0.0978 From Run 2
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(14.9 \times 0.44) + (2.9 \times 0.32) + (82.2 + \quad \times 0.28)$ $6.556 + .928 + 23.016$	M_d	30.5 PRELIMINARY DATA
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, $(30.5)(1-.0978) + 18(.0978)$	M_s	29.28 BASED ON PRELIM. DATA
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}$, $(29.28) + \frac{(+.2)}{13.6}$	P_s	29.29

✓ BACK CALCULATED BASED ON RUN 2 DATA

7602/5/81/Rev 1

RUN 1 / M-5/8 CHEU/EER

Temperature stack gas, average (°F)	T_s	456.2
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P}_{s\ avg})\ \sqrt{\frac{T_s avg + 460}{P_s \quad M_s}}$ $85.49\ (.79)(\sqrt{.649})^2 \sqrt{\frac{(456.2) + 460}{(29.29)(29.28)}}$	$V_{s(avg)}$	45.30
Total sample time (minutes)	θ	72
Nozzle diameter, actual (inches)	N_d	.309
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta \quad V_s \quad 916.2 P_s \quad N_d^2 \quad 61.819}$ $\frac{17.33\ (456.2 + 460)((6.047) + (55.772))}{(72)(45.30)(29.29)(.309)^2}$	%I	107.6
Area of stack (ft^2) $\pi = 3.1416$ 36" diam $\pi r^2 \div 144$, $\pi(18)^2 \div 144$	A_s	7.069
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo}) Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - .0778)(45.30)(7.069)\left(\frac{528}{456.2 + 460}\right) \left(\frac{(29.29)}{(29.92)}\right)$	Q_s	9,779
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $15.432\ \frac{(\quad)}{(\quad)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\quad)(\quad)$	E_p	

2) ASSUMED

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant CHEM/ECR Performed by DaRos

Date 2-6-84

Sample Location OUTLET STACK

Test No./Type 2 / M-5I8

Barometric Pressure (in. Hg)	P_b	29.28
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(57.943)}{(.995)}\right)\left(\frac{(29.28) + \frac{(2.18)}{13.6}}{(77.8) + 460}\right)$	$V_{m\ std}$	56.223
Volume of liquid collected (grams)	Vl_c	129.5
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	6.096
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{(6.096)}{(6.096) + (56.223}$	B_{wo}	0.0978
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (____ x 0.44) + (___ x 0.32) + (___ + ____ x 0.28)	M_d	30.5 PRELIMINARY DATA (SEE RUN 1)
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (____)(1-____) + 18(____)	M_s	29.28 BASED ON PRELIM. DATA (SEE RUN 1)
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (\text{in. } H_2O)}{13.6}$, $(29.28) + \frac{(0.2)}{13.6}$	P_s	29.29

7602/5/81/Rev 1

Run 2 / M-5I8 CHEVLEER

Temperature stack gas, average (^{o}F)	T_s	479.1
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P_{s\ avg}})\ \sqrt{\frac{T_s avg + 460}{P_s \quad M_s}}$ $85.49\ (\underline{.79}^{1})(\sqrt{.6096})^2 \sqrt{\frac{(479.1) + 460}{(29.29)(29.29)}}$	$V_{s(avg)}$	47.32
Total sample time (minutes)	θ	72
Nozzle diameter, actual (inches)	N_d	.309
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta \quad V_s \quad P_s \quad N_d^2}$ $\frac{17.33\ (479.1 + 460)((6.096) + (56.223))}{(72)(47.32)(29.29)(.309)^2}$ (939.1; 62.319)	%I	106.44
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(\underline{18})^2 \div 144$	A_s	7.069
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - .0978)(47.32)(7.069)\left(\frac{528}{479.1 + 460}\right) \left(\frac{29.29}{29.92}\right)$	Q_s	9966
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $15.432\ \frac{(\quad)}{(\quad)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\quad)(\quad)$	E_p	

1/ ASSUMED

ACUREX
ANALYTICAL REPORT

Sample of: CMEA

Sample Date: 2-1-84

Requested By: LARRY WATERLAND, PhD

I.D. Number: 307735.81

Analytical Method: GRAVIMETRIC Analyses of EPA 5/8 Front Filters & Probe WASHES

Date of Analysis: 2-9-84

Lab I.D. Number	Component (Filter # or Total Vol. Acetone)	Analytical Result (Final − Tare = Net Wt)	Unit
901479 (Filter Blank)	84-95.3-001	0.47822 − 0.47824 = −0.00002 g	grams of Particulate
901467 (Filter, Run#1)	84-953-010	0.57543 − 0.48021 = 0.09522 g	
901471 (Filter, Run#2)	84-95.3-008	0.59386 − 0.47772 = 0.11614 g	
901478 (ACETONE BLANK)	450 mLs	1.46443 − 1.46365 = 0.00078 g/450 mLs = 1.73333×10^{-6} g/mL ACE.	
901446 (Probe WASH, Run#1)	126 mLs	1.47268 − 1.46736 = 0.00532	
901468 (Probe WASH, Run#2)	176 mLs	1.55760 − 1.47117 = 0.08743 g	

NB.: ALL REPORTED VALUES HAVE NOT Been corrected for Blanks.

Analysis By Martha M. Murray

Date 3-12-84

ACUREX
ANALYTICAL REPORT

Sample of: CMEA/EER

Sample Date: 2-1-84

Requested By: L. Waterland

I.D. Number: 307735.81

Analytical Method: Gravimetric Analysis of Method 5/8 Condensibles

Date of Analysis: 3/13 - 3/16/84

Lab I.D. Number	Component (Total Volume/Aliquot)	Analytical Result	Unit
901447 Run #1	224/50	0.13700	grams
	224/50	0.13422	
901469 Run #2	257/50	0.02631	
	257/50	0.02092	
901466 IPA Blank	50 mls	0.00041	

N.B. All samples were analyzed in duplicate and the results reported have been blank corrected

Analysis By Martha M. Murray

5-10 **Date** 3-16-84

Form EED—082 5/81

ACUREX
ANALYTICAL REPORT

Sample of: CMSA

Sample Date: 2-1-84

Requested By: LARRY WATERLAND

I.D. Number: 307735.81

Analytical Method: SULFATE TITRATIONS OF EPA 5/8 IMPINGER CATCHES

Date of Analysis: 2-6-84

Lab I.D. Number	Component (TOTAL VOL/ALIQ.)	Analytical Result	Unit
901447 (Imp. #1 + Filter, TEST #1)	174 mls / 25 mls	82.72	TOTAL mg Sulfate per sample
901450 + 901452 (Imp. 2+3, TEST #1)	338 mls / 5/100 x 10 mls	3968.4	
901469 (Imp. #1 + FILTER, TEST #2)	207 mls / 25 mls	28.33	
901472 (Imp. #2 + 3, Test #2)	362 mls / 5/100 x 10 mls	3,833 (100.1% recovery on spike)	
901466 (80% IPA + Filter BLANK)	328 mls / 25 mls	0.00 (INSTANT ENDPOINT)	
901465 (6% H_2O_2 BLANK)	196 mls / 10 mls	0.00 (INSTANT ENDPOINT)	
* EPA STANDARDS (SUBMITTED BY B. DAROS) #2A (Lot 0881 #733)*	100 mls / 10 mls	1294.9	mg/Dscm
#3A (Lot 0881 #5333)**	100 mls / 10 mls	200.7	

STANDARDIZATION OF $BaCl_2 \cdot 2H_2O$:

2-6-84: V_2 = 10 mls; N_2 = 0.01; V_1 = 9.98, 10.03 (10.01 mls AVERAGE);

N_1 = 0.0100 N

* True value = 1296.4 mg/dscm

** " = 190.7 mg/dscm

Analysis By Marsha M. Mussey

Date 3-13-84

5.3 PARTICULATE EMISSIONS FROM SASS SAMPLES

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant CHEVRON USA [illegible] Performed by Roberts

Date 12-5-84

Sample Location Steamer Outlet

Test No./Type SASS

Barometric Pressure (in. Hg)	P_b	
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{(866.4)}{(1039)}\right)\left(\frac{(29.9) + \frac{(1.9)}{13.6}}{(95) + 460}\right)$	$V_{m\ std}$	796
Volume of liquid collected (grams)	Vl_c	1920
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	90.37
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{(90.37)}{(796) + (90.37)}$	B_{wo}	0.103
Molecular weight, stack gas dry (lb/lb-mole) $(\%\ CO_2 \times 0.44) + (\%\ O_2 \times 0.32) + (\%\ N_2 + \%\ CO \times 0.28)$ $(13.1 \times 0.44) + (2.7 \times 0.32) + (84.2 + \_\_\_\_ \times 0.28)$	M_d	30.2
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, $(30.2)(1-0.103) + 18(0.103)$	M_s	29.9
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (in.\ H_2O)}{13.6}$, $(29.3) + \frac{(\_\_\_\_)}{13.6}$	P_s	29.3

Form 440 3/84

Temperature stack gas, average (^{o}F)	T_s	456
Stack velocity (fps) $85.49\ (C_p)\ (\sqrt{\Delta P_{s\ avg}})\ \sqrt{\frac{T_s avg + 460}{P_s\ M_s}}$ $85.49\ (0.816)(\sqrt{0.632})\ \sqrt{\frac{(456) + 460}{(29.3)(29.7)}}$	$V_{s(avg)}$	45.3
Total sample time (minutes)	θ	240
Nozzle diameter, actual (inches)	N_d	0.674
Percent isokinetic (%) $\frac{17.33\ (T_s + 460)(V_w\ std + V_m\ std)}{\theta\ \ V_s\ \ P_s\ \ N_d^2}$ $\frac{17.33\ (456 + 460)((29.4) + (7.6))}{(240)(45.3)(29.3)(0.674^2)}$	%I	96.2
Area of stack (ft^2) $\pi = 3.1416$ $\pi r^2 \div 144$, $\pi(\quad)^2 \div 144$	A_s	7.069
Stack gas volume at standard conditions (dscfm) $60\ (1 - B_{wo})Vs_{avg}\ A_s \left(\frac{528}{T_s\ avg + 460}\right) \left(\frac{Ps}{29.92}\right)$ $60\ (1 - 0.103)(45.8)(7.069)\left(\frac{528}{456 + 460}\right) \left(\frac{(29.3)}{(29.92)}\right)$	Q_s	9836
Particulate matter concentration, dry (gr/dscf) $15.432\ \frac{M_p(grams)}{Vm_{std}}$, $15.432\ \frac{(\quad)}{(\quad)}$	$C_{s(std)}$	
Emission rate of particulate matter (lb/hr) $0.00857\ (Q_s)\ C_{s(std)}$, $0.00857\ (\quad)(\quad)$	E_p	

SASS ANALYTICAL DATA

Plant EPA Sample No. —

Sampling Location Chevron EER Run No. 1

Recovered By C. Beeman Recovery Date 2-1-84 Run Date 2-1-84

Comments

Analyst Responsible

Calculations and Report Reviewed By Report Date

FILTERS USED		CYCLONES		
No.			Used (yes/no)	Pretared Container (No.)
		10μ		
		3μ		
		1μ		

IMPINGER VOLUMES

	Initial	Final	
First (H_2O_2)	500 ml	547 ml	53 ml rinse
Second (APS + $AgNO_3$)	500 ml	840 ml	100 ml rinse
Third (APS + $AgNO_3$)	500 ml	ml	
TOTALS	1500 ml	ml	Gain ml

SILICA GEL WEIGHTS

Initial	Final	
1089.8 g	1322.6 g	silica gel totally spent
973.7 g	1115.2 g	
g	g	
TOTALS g	g	Gain g

CONDENSATE

TOTAL VOLUME COLLECTED		1420 ml
Volume Neat	ml	pH - 13
Volume Extracted	ml	
Volume CH_2Cl_2 Extract (3 x ml)	ml	
Extracted Condensate: pH Neat		
Amount 96% HNO_3 added		
pH Final		

TOTAL GAIN ml

Note: Imp. solutions and condensate were bubbled

ACUREX
ANALYTICAL REPORT

Sample of: CMEA/EER

Sample Date: 2-1-84

Requested By: L Waterland

I.D. Number: 307735.81

Analytical Method: Gravimetric Analyses of SASS filters and probe wash

Date of Analysis: 2/9 - 3/13/84

Lab I.D. Number	Component (Filter # or Volume)	Analytical Result	Unit
901460 (probe/nozzle rinse)	117 mls	0.05014	grams
901481 ($meCl_2$ blank)	50 mls	−0.00008	
901458	84-142-034	0.12175	
901459 (Filter Blank)	84-142-035	0.00005	
901457	84-142-033	0.12797	
901456	84-142-032	0.15379	
901455	84-142-031	0.11046	

NB: ALL RESULTS HAVE BEEN BLANK CORRECTED

Analysis By Martha M Murray

5-16 **Date** 3-16-84

Form EED—082 5/81

5.4 PARTICULATE EMISSIONS AND SIZE DISTRIBUTIONS FROM ANDERSEN SAMPLES

ACUREX Corporation

PARTICULATE CALCULATIONS

EER
Anderson #1
2-22-84

1. Volume of dry gas sampled at standard conditions, 68° F, 29.92 inch Hg (scf)

$$Vm_{std} \quad 17.64 \frac{Vm}{\alpha}\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_{m,avg} + 460}\right) = 17.64 \quad \frac{14.982}{1.001}\left(\frac{29.36 + \frac{0.9}{13.6}}{65.2 + 460}\right) = 14.793$$

or $Vm_{stack} - \left(\frac{Vm}{\alpha(1 - B_{wo})}\right)\left(\frac{T_{s,avg} + 460}{T_{m,avg} + 460}\right)\left(\frac{P_m}{P_s}\right)$ (acf at stack conditions)

2. Stack gas moisture condensed at standard conditions (scf)

$$Vw_{std} \quad 0.04707\ Vl_c = \frac{Vm_{std}(B_{wo})}{1 - B_{wo}} \qquad = 1.941$$

3. Stack gas proportion of water vapor, by volume

$$B_{wo} = \frac{Vw_{std}}{Vw_{std} + Vm_{std}}$$

$$= \qquad 11.60\%$$

4. Stack gas dry molecular weight (lb/lb-mole)

$$MW_d \quad 0.44\ (\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

13.0 3.0 84.0

30.20

5. Stack gas molecular weight (lb/lb-mole)

$$MW_s = MW_d\ (1 - B_{wo}) + 18\ (B_{wo})$$

28.78

6. Pressure stack, in. Hg

$$P_s = P_b + \frac{P_{st}}{13.6}$$

$$= \quad 29.36 + \frac{-.25}{13.6} = 29.34$$

7. Stack gas velocity at stack conditions (ft/sec)

$$V_s = 85.49\ (C_p)\ (\sqrt{\Delta P})_{avg} \sqrt{\frac{T_{s,avg} + 460}{P_s\ MW_s}}$$

$$= 85.49\,(.84)\,(.663)\,\sqrt{\frac{531.5 + 460}{(29.30)(.893)}} = 50.267$$

8. Stack gas volume at standard conditions (scfm)

$$Q_s = 60\ (1 - B_{wo})\ Vs_{avg}\ A_s \left(\frac{528}{T_{s,avg} + 460}\right)\left(\frac{P_s}{29.92}\right)$$

or Q_a $60\ Vs_{avg}\ A_s$ (acfm) =

9. Test percent isokinetic

$$\%I \quad \frac{17.33(T_{s,avg} + 460)\ [Vw_{std} + Vm_{std}]}{\theta V_s P_s D_n^{\,2}} = \frac{17.33(T_s + 460)(Vm_{std})}{\theta V_s P_s D_n^{\,2}(1 - B_{wo})}$$

$$\frac{17.33(99.5)\,(16.540)}{(30.0)(.796)\,(29.30)(.250)^2} = 102.91\%$$

10. Particulate matter concentration, gr/scf

$$C_s = 15.432\ \frac{M_p}{Vm_{std}} = \quad 0.016\,7$$

or C_a $15.432\ \dfrac{M_p}{Vm_{stack}}$ (gr/acf) =

11. Emission rate of particulate matter, lb/hr

$$ER = 0.00857\ (Q_s)\ C_s$$

=

12. Percent excess air at sampling point

$$\%\ EA = \frac{100\ [\%O_2 - 0.5\ (\%CO)]}{0.264\ \ \%N_2 - (\%O_2 - 0.5 \times \%CO)} =$$

13. Emission rate of particulate matter, lb/10^6 Btu

$$E \quad 2.679 \times 10^6 \left(\frac{M_p}{Vm_{std}}\right) F \left(\frac{20.9}{20.9 - \%O_2}\right)$$

=

ACUREX Corporation

EER
Anderson #2
2-22-84

PARTICULATE CALCULATIONS

1. Volume of dry gas sampled at standard conditions, 68° F, 29.92 inch Hg (scf)

$$Vm_{std} \quad 17.64 \frac{Vm}{\alpha}\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_{m,avg} + 460}\right) \quad 17.64 \frac{14.676}{1.001}\left(\frac{29.32 + \frac{0.7}{13.6}}{59.8 + 460}\right) = 14.621$$

$$\text{or} \quad Vm_{stack} = \left(\frac{Vm}{\alpha(1 - B_{wo})}\right)\left(\frac{T_{s,avg} + 460}{T_{m,avg} + 460}\right)\left(\frac{P_m}{P_s}\right) \quad \text{(acf at stack conditions)}$$

2. Stack gas moisture condensed at standard conditions (scf)

$$Vw_{std} = 0.04707\ Vl_c = \frac{Vm_{std}(B_{wo})}{1 - B_{wo}}$$

$$= \qquad = 1.919$$

3. Stack gas proportion of water vapor, by volume

$$B_{wo} = \frac{Vw_{std}}{Vw_{std} + Vm_{std}}$$

$$= \qquad 11.60\%$$

4. Stack gas dry molecular weight (lb/lb-mole)

$$MW_d = 0.44\ (\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$$

14.1 ~~2.56~~ 83.3

$$= \quad 30.36$$

5. Stack gas molecular weight (lb/lb-mole)

$$MW_s = MW_d\ (1 - B_{wo}) + 18\ (B_{wo})$$

$$28.93$$

6. Pressure stack, in. Hg

$$P_s = P_b + \frac{P_{st}}{13.6}$$

$$= \qquad 29.32 + \frac{-0.25}{13.6} = 29.30$$

7. Stack gas velocity at stack conditions (ft/sec)

$$V_s = 85.49\ (C_p)\ (\sqrt{\Delta P})_{avg} \sqrt{\frac{T_{s,avg} + 460}{P_s\ MW_s}}$$

$$85.49\ (.84)(.663)\sqrt{\frac{652.5+460}{(27.34)(28.78)}} = 50.894.$$

8. Stack gas volume at standard conditions (scfm)

$$Q_s = 60\ (1 - B_{wo})\ Vs_{avg}\ A_s \left(\frac{528}{T_{s,avg} + 460}\right)\left(\frac{P_s}{29.92}\right)$$

or Q_a $60\ Vs_{avg}\ A_s$ (acfm) =

9. Test percent isokinetic

$$\%I \quad \frac{17.33(T_{s,avg} + 460)\ [Vw_{std} + Vm_{std}]}{\theta V_s P_s D_n^{\,2}} = \frac{17.33(T_s + 460)(Vm_{std})}{\theta V_s P_s D_n^{\,2}(1 - B_{wo})}$$

$$= \frac{17.33(1012.5)\ (16.734)}{(30.15)(50.894)(27.34)(.250)^2} = 104.35\ \%$$

10. Particulate matter concentration, gr/scf

$$C_s = 15.432\ \frac{M_p}{Vm_{std}} = \quad 0.0134$$

or $C_a = 15.432\ \frac{M_p}{Vm_{stack}}$ (gr/acf) =

11. Emission rate of particulate matter, lb/hr

$$ER = 0.00857\ (Q_s)\ C_s$$

12. Percent excess air at sampling point

$$\%\ EA = \frac{100\ [\%O_2 - 0.5\ (\%CO)]}{0.264\ \ \%N_2 - (\%O_2 - 0.5 \times \%CO)} =$$

13. Emission rate of particulate matter, lb/10^6 Btu

$$E = 2.679 \times 10^{-6} \left(\frac{M_p}{Vm_{std}}\right) F \left(\frac{20.9}{20.9 - \%O_2}\right)$$

ACUREX Corporation

ANDERSEN PARTICLE SIZE ANALYSIS

Plant CHEVRON SYS-69
Test Location SYS-69 Outlet
Run No. 1
Flow Rate 1.08 ACFM

Tare Weights:
Date 2/13/84
By K. BREWSTER
Location MT VIEW

Final Weights:
Date 2/15/84
By K. BREWSTER
Location MT VIEW

STAGE NO.	FILTER NO.	FINAL WT (g)	TARE WT (g)	SAMPLE WT (g)[a]	% OF TOTAL WT[b]	CUMULATIVE % OF TOTAL WT[b]	Dp μ
0	UOP-23-1	1.23277	1.23293	~~0~~		100.00	7.52
1	UOP-23-2	1.23529	1.21493	0.00020	1.55	98.45	7.11
2	UOP-23-3	1.21700	1.21627	0.00057	4.42	94.03	4.35
3	UOP-23-4	1.21362	1.21319	0.00027	2.09	91.94	3.03
4	UOP-23-5	1.21782	1.21744	0.00022	1.71	90.23	1.57
5	UOP-23-6	1.20114	1.20039	0.00059	4.58	85.65	.78
6	UOP-23-7	1.22987	1.22893	0.00078	6.05	79.60	.48
7	UOP-23-8	1.20792	1.20685	0.00071	7.06	72.54	.27
F	UOP-23-F	1.28680	1.27712	0.00935	72.54		
			TOTAL WITH FILTER	12.89 mg			
			TOTAL WITHOUT FILTER	3.54 mg			

Blank correction value = -0.00016 Stages 0 through 7

Blank correction value -0.00033 Stage F (final filter)

[a] Includes appropriate blank corection factor.
[b] Calculations based on total sample weight with filter are entered on first line; calculations based on total sample weight without filter are entered on second line for each stage.

Comments: Cyclone rinse = 0 mg 13.04 μm Dp50

ACUREX Corporation

ANDERSEN PARTICLE SIZE ANALYSIS

Plant CHEVRON SVS-69

Test Location SVS-69 Outlet

Run No. 2

Flow Rate 1.05 ACFM

Tare Weights:
Date 2/13/84
By K. BRENSTOR
Location MT VIEW

Final Weights:
Date 3/5/84
By K. BRENSTOR
Location MT VIEW

STAGE NO.	FILTER NO.	FINAL WT (g)	TARE WT (g)	SAMPLE WT (g)[a]	% OF TOTAL WT[b]	CUMULATIVE % OF TOTAL WT[b]	Dp μ
0	UOP-20-1	1.24019	1.23960	0.00043	2.72	89.63	7.55
1	UOP-20-2	1.21855	1.21781	0.00058	3.67	85.96	7.15
2	UOP-20-3	1.23509	1.23447	0.00046	2.91	83.05	4.37
3	UOP-20-4	1.21236	1.21164	0.00056	3.54	79.51	3.04
4	UOP-20-5	1.23021	1.22926	0.00079	5.00	74.51	1.58
5	UOP-20-6	1.21475	1.21369	0.00090	5.69	68.82	.79
6	UOP-20-7	1.23182	1.23090	0.00076	4.81	64.01	.49
7	UOP-20-8	1.21294	1.21169	0.00107	6.89	57.12	.22
F	UOP-20F	1.29128	1.28192	0.00903	57.12		
				TOTAL WITH FILTER	15.81mg		
				TOTAL WITHOUT FILTER	6.78mg		

Blank correction value -0.00016 Stages 0 through 7

Blank correction value -0.00033 Stage F (final filter)

[a] Includes appropriate blank corection factor.
[b] Calculations based on total sample weight with filter are entered on first line; calculations based on total sample weight without filter are entered on second line for each stage.

Comments: Cyclone rinse = 1.21 mg 7.65% (92.35 cum %)

12.52 Dp50

ACUREX Corporation

ANDERSEN PARTICLE SIZE ANALYSIS

Plant CHEVRON SUS-69
Test Location BLANK
Run No.
Flow Rate

Tare Weights:
Date 2/13/84
By K. BREWSTER
Location MT VIEW

Final Weights:
Date 3/5/84
By K. BREWSTER
Location MT VIEW

STAGE NO.	FILTER NO.	FINAL WT (g)	TARE WT (g)	SAMPLE WT (g)[a]	% OF TOTAL WT[b]	CUMULATIVE % OF TOTAL WT[b]	Dp μ
0	UCP-24-1	1.22138	1.22080	.00058			
1	UCP-24-2	1.21042	1.21021	.00021			
2	UCP-24-3	1.22256	1.22249	.00007			
3	UCP-24-4	1.20185	1.20186	-.00001			
4	UCP-24-5	1.22539	1.22535	.00004			
5	UCP-24-6	1.20843	1.20817	.00026			
6	UCP-24-7	1.23253	1.23248	.00005			
7	UCP-248	1.21429	1.21420	.00009			
F	UCP-24-F	1.27939	1.27906	.00033			
			TOTAL WITH FILTER				
			TOTAL WITHOUT FILTER				

Blank correction value = _____ Stages 0 through 7

Blank correction value = 0 Stage F (final filter)

[a] Includes appropriate blank corection factor.
[b] Calculations based on total sample weight with filter are entered on first line; calculations based on total sample weight without filter are entered on second line for each stage.

Comments:

ACUREX
ANALYTICAL REPORT

Sample of: Chevron SVS-69 (EPA)

Sample Date: 2-22-84

Requested By: Regan Best

I.D. Number: _____

Analytical Method: Gravimetric analysis of Anderson cyclone rinses

Date of Analysis: 3-7-84

Lab I.D. Number		Component	Analytical Result	Unit
902226 Blank	tin # 186	particulate	+0.12	mg
* 902229 Test 1	tin # 189		0.00	
* 902230 Test 2	tin # 185		+1.21	

* these weights are blank-corrected.

Analysis By: [signature]

Date: 3-8-84

5-25

Form EED—082 5/81

5.5 SULFUR OXIDES EMISSIONS FROM CONTROLLED CONDENSATION SYSTEM SAMPLES

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Chevron CCER I Performed by Best

Date 2-23-84

Sample Location S/S-69 Outlet

Test No./Type CCS-1

Barometric Pressure (in. Hg)	P_b	29.34
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{20.715}{1.00}\right)\left(\frac{29.31 + \frac{(0.4)}{13.6}}{62.2 + 460}\right)$	$V_{m\ std}$	20.357
Volume of liquid collected (grams)	Vl_c	61
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	2.87
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{(2.87)}{(2.87) + 20.357}$	B_{wo}	12.4
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (____ x 0.44) + (___ x 0.32) + (___ + ____ x 0.28)	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (____)(1-____) + 18(____)	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (in.\ H_2O)}{13.6}$, (____) + $\frac{(\quad)}{13.6}$	P_s	

Form 440 3/84

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant Kerr (EZR) Performed by Bart

Date 2-23-84

Sample Location SVS-65 (outlet)

Test No./Type CCS-2

Barometric Pressure (in. Hg)	P_b	25.32
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha}\right)\left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460}\right)$ $17.64 \left(\frac{20.924}{(100)}\right)\left(\frac{25.32 + \frac{(0.4)}{13.6}}{(61.7) + 460}\right)$	$V_{m\ std}$	20.765
Volume of liquid collected (grams)	Vl_c	60.
Volume of liquid at standard condition (scf) $Vl_c \times 0.04707$	$V_{w\ std}$	2.82
Stack gas proportion of water vapor $\frac{V_{w\ std}}{V_{w\ std} + V_{m\ std}}$, $\frac{2.82}{2.82 + 20.7}$	B_{wo}	12.0
Molecular weight, stack gas dry (lb/lb-mole) (% CO_2 x 0.44) + (% O_2 x 0.32) + (% N_2 + % CO x 0.28) (____ x 0.44) + (___ x 0.32) + (___ + ____ x 0.28)	M_d	
Molecular weight, stack gas wet (lb/lb-mole) $Md(1-B_{wo}) + 18(B_{wo})$, (____)(1-____) + 18(____)	M_s	
Absolute stack pressure (in. Hg) $P_b + \frac{P_{stack}\ (in.\ H_2O)}{13.6}$, (____) + $\frac{(\_\_\_\_)}{13.6}$	P_s	

Form 440 3/84

ACUREX
ANALYTICAL REPORT

Sample of: CMEA/EER

Sample Date: 2-23-84

Requested By: Watersland

I.D. Number: 307735.81

Analytical Method: Sulfate Titrations of CCS Samples

Date of Analysis: 3-29-84

Lab I.D. Number	Component	Analytical Result	Unit
902296, 902292, 902295	Run 1 probe, filter, coil rinse	109.1	mg SO_4 per sample
902291	H_2O_2 impinger Run 1	1382.4	
902302, 902297, 902293	Run 2 probe, filter, coil rinse	119.2	
902300	Run 2 H_2O_2 impinger	1434.7	
902301	D.I. blank	0.0	
902298	H_2O_2 blank	0.0	

Analysis By Bert

5-29 Date 3-29-84

Form EED—082 5/81

5.6 TRACE ELEMENT ANALYSES OF FUEL AND SASS SAMPLES

In the following, samples labeled fuel, test 1 and fuel, test 2 are blind duplicate samples of the same material.

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

ROBERT L. TAYLOR, Ph.D.
MANAGER
INSTRUMENTAL ANALYSIS DIVISION

SINCE 1908

PLEASE ADDRESS ALL CORRESPONDENCE TO:
490 ORCHARD ST., GOLDEN, CO 80401
OFFICE TEL. (303) 278-9521

May 16, 1984

Mr. Christopher Mann
Acurex Corporation
P.O. Box 7555
Mountain View, CA 94042

RE: IAD #97-P137-116-10
Subcontract #SW59159A
Release #15

Analytical Report

Ten samples were received for analysis on April 2, 1984. These samples were assigned our IAD identification #97-P137-116-10.

Trace element determinations using Spark Source Mass Spectrometry per EPA level 1 protocol are reported in separate attached reports.

Arsenic and Antimony were determined on two of the samples using hydride generation atomic absorption spectrophotometry. Mercury was determined on all ten samples using flameless cold vapor atomic absorption spectrophotometry. The results of these determinations are presented in Table No. I and are reported in parts per million (ppm) by weight on an "as received" basis.

Carbon and Hydrogen were determined on four samples by an external laboratory. The results of these determinations are presented in Table No. II and are reported in weight percent (Wt.%) on an "as received" basis.

Table No. I
(ppm by Wt.)

Sample ID	Arsenic (As)	Antimony (Sb)	Mercury (Hg)
901458 EOR Filter	--	--	0.04 *
901459 EOR Filter Blank	--	--	≤0.02 *
901454 EOR XAD-2	--	--	0.52
901475 EOR XAD-2 Blank	--	--	≤0.4
901463 EOR Impinger 1	--	--	0.0031
901461 EOR Impinger 1 Blank	--	--	0.0089
901440 EOR Fuel, Test 1	--	--	≤0.4
901441 EOR Fuel, Test 2	--	--	≤0.4
901464 EOR Impinger 2 and 3	0.012	≤0.004	0.004
901462 EOR Impinger 2 & 3 Blank	0.005	≤0.004	≤0.002

* Reported in ppm by weight of the filter.

Table No. II
(Wt.%-As Received)

Sample ID	Carbon	Hydrogen
901458 EOR Filter	0.14 **	0.17 **
901459 EOR Filter Blank	0.05 **	0.02 **
901440 EOR Fuel, Test 1	85.67	11.22
901441 EOR Fuel, Test 2	85.91	11.36

** Reported in weight per cent of the filter.

If you have any questions concerning these results, please call.

Harold A. Connell
Assistant Laboratory Manager

Robert L. Taylor, Ph.D., Manager
Instrumental Analysis Division
16 May 84

HAC/gh

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A, Release # 15, Project #EE7734.82

Sample No.: 901440
EOR Fuel
Test 1

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

IAD No.: 97-P137-116-70

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	6
Thorium		Gadolinium		Molybdenum	*2	Titanium	3
Bismuth		Europium		Niobium	0.09	Scandium	≤0.09
Lead	0.6	Samarium		Zirconium	0.2	Calcium	13
Thallium		Neodymium		Yttrium	0.06	Potassium	5
Mercury	NR	Praseodymium		Strontium	0.2	Chlorine	*MC
Gold		Cerium		Rubidium	0.02	Sulfur	MC
Platinum	**1	Lanthanum		Bromine	0.2	Phosphorus	4
Iridium		Barium	0.8	Selenium	0.5	Silicon	19
Osmium		Cesium		Arsenic	0.06	Aluminum	9
Rhenium		Iodine	0.5	Germanium		Magnesium	8
Tungsten		Tellurium		Gallium	0.2	Sodium	10
Tantalum		Antimony		Zinc	2	Fluorine	≈27
Hafnium		Tin		Copper	0.7	Oxygen	NR
Lutetium		Indium	STD	Nickel	6	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.6	Carbon	NR
Thulium		Silver		Iron	10	Boron	0.2
Erbium		Palladium		Manganese	0.4	Beryllium	
Holmium		Rhodium		Chromium	0.4	Lithium	0.5
Dysprosium						Hydrogen	NR

*Heterogeneous
**Probable Contamination From Sample Preparation

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.7 ppm
MC — Major Component > 100 ppm
INT — Interference

Approved: Robert L. Taylor
16 May 84

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5-33

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300

Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A, Release #15, Project #EE7734.82

Sample No.: 901441
EOR Fuel
Test 2

IAD No.: 97-P137-116-10

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	2
Thorium		Gadolinium		Molybdenum	0.3	Titanium	4
Bismuth		Europium		Niobium	0.03	Scandium	$\leq$0.03
Lead	0.5	Samarium		Zirconium	0.06	Calcium	5
Thallium		Neodymium		Yttrium	0.04	Potassium	3
Mercury	NR	Praseodymium		Strontium	0.2	Chlorine	19
Gold		Cerium		Rubidium		Sulfur	MC
Platinum		Lanthanum		Bromine	0.06	Phosphorus	2
Iridium		Barium	0.3	Selenium	0.4	Silicon	9
Osmium		Cesium		Arsenic	0.05	Aluminum	1
Rhenium		Iodine	0.5	Germanium	$\leq$0.02	Magnesium	5
Tungsten		Tellurium		Gallium	0.2	Sodium	MC
Tantalum		Antimony		Zinc	2	Fluorine	$\simeq$4
Hafnium		Tin		Copper	0.7	Oxygen	NR
Lutetium		Indium	STD	Nickel	20	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.2	Carbon	NR
Thulium		Silver		Iron	5	Boron	0.08
Erbium		Palladium		Manganese	0.3	Beryllium	<0.01
Holmium		Rhodium		Chromium	0.4	Lithium	0.2
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.02 ppm
MC — Major Component > 100 ppm
INT — Interference

Approved: Robert L. Taylor
16 May 84

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COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: may 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A Release 15 Project 7601

Sample No.: 901458
EOR Filter

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-P137-116-10

CONCENTRATION IN PPM WEIGHT of the Filter

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	1	Terbium	0.8	Ruthenium		Vanadium	MC
Thorium	8	Gadolinium	4	Molybdenum	12	Titanium	44
Bismuth	0.2	Europium	0.4	Niobium	0.8	Scandium	4
Lead	3	Samarium	4	Zirconium	3	Calcium	MC
Thallium	0.4	Neodymium	12	Yttrium	24	Potassium	MC
Mercury	NR	Praseodymium	4	Strontium	16	Chlorine	MC
Gold		Cerium	12	Rubidium	0.8	Sulfur	MC
Platinum		Lanthanum	16	Bromine	8	Phosphorus	MC
Iridium		Barium	36	Selenium	4	Silicon	MC
Osmium		Cesium	0.4	Arsenic	16	Aluminum	MC
Rhenium		Iodine	0.8	Germanium	2	Magnesium	MC
Tungsten	0.4	Tellurium	3	Gallium	12	Sodium	MC
Tantalum	2	Antimony	8	Zinc	64	Fluorine	≅170
Hafnium		Tin	4	Copper	8	Oxygen	NR
Lutetium	0.4	Indium	STD	Nickel	MC	Nitrogen	NR
Ytterbium	1	Cadmium	0.2	Cobalt	56	Carbon	NR
Thulium	0.4	Silver	1	Iron	MC	Boron	1
Erbium	2	Palladium		Manganese	20	Beryllium	0.4
Holmium	2	Rhodium		Chromium	36	Lithium	17
Dysprosium	4					Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.1 ppm
MC — Major Component >1000 ppm
INT — Interference

Approved: Robert L. Daylor
16 May 84

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300

Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A Release 15 Project 7601

Sample No.: 901459 SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS IAD No.: 97-P137-116-10
EOR Filter Blank CONCENTRATION IN PPM WEIGHT of the Filter

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	3
Thorium		Gadolinium		Molybdenum	2	Titanium	24
Bismuth		Europium		Niobium	≤0.2	Scandium	0.3
Lead		Samarium		Zirconium	3	Calcium	MC
Thallium		Neodymium		Yttrium	0.8	Potassium	56
Mercury	NR	Praseodymium	0.2	Strontium	4	Chlorine	64
Gold		Cerium	0.1	Rubidium	<0.1	Sulfur	24
Platinum		Lanthanum	0.2	Bromine	2	Phosphorus	12
Iridium		Barium	28	Selenium	0.2	Silicon	84
Osmium		Cesium		Arsenic	0.2	Aluminum	MC
Rhenium		Iodine	0.2	Germanium	0.1	Magnesium	340
Tungsten		Tellurium		Gallium	0.3	Sodium	240
Tantalum		Antimony		Zinc	4	Fluorine	≅64
Hafnium		Tin		Copper	2	Oxygen	NR
Lutetium		Indium	STD	Nickel	12	Nitrogen	NR
Ytterbium		Cadmium	≤0.3	Cobalt	≤0.3	Carbon	NR
Thulium		Silver		Iron	80	Boron	4
Erbium	8.	Palladium		Manganese	2	Beryllium	
Holmium		Rhodium		Chromium	8	Lithium	0.8
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected <0.2 ppm
MC — Major Component >1000 ppm
INT — Interference

Approved: Robert L. Douglas 16 May 84

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A, Release # 15, Project #EE7734.82

Sample No.: 901454
EOR XAD-2

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

IAD No.: 97-P137-116-10

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.09
Thorium		Gadolinium		Molybdenum	0.8	Titanium	4
Bismuth		Europium		Niobium		Scandium	0.2
Lead	0.4	Samarium		Zirconium	0.1	Calcium	17
Thallium		Neodymium		Yttrium		Potassium	12
Mercury	NR	Praseodymium		Strontium	0.2	Chlorine	4
Gold		Cerium		Rubidium		Sulfur	6
Platinum	*0.6	Lanthanum		Bromine		Phosphorus	2
Iridium		Barium	0.9	Selenium		Silicon	13
Osmium		Cesium		Arsenic	0.07	Aluminum	1
Rhenium		Iodine	0.1	Germanium	0.05	Magnesium	9
Tungsten		Tellurium		Gallium	0.08	Sodium	3
Tantalum		Antimony		Zinc	3	Fluorine	≈8
Hafnium		Tin		Copper	0.4	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.6	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.04	Carbon	NR
Thulium		Silver		Iron	5	Boron	0.7
Erbium		Palladium		Manganese	0.4	Beryllium	
Holmium		Rhodium		Chromium	0.4	Lithium	0.3
Dysprosium						Hydrogen	NR

*Probable Contamination From Sample Preparation

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.08 ppm
MC — Major Component > 100 ppm
INT — Interference

Approved: Robert L. Taylor 16 May 84

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300

Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A, Release # 15, Project #EE7734.82

Sample No.: 901475
EOR XAD-2 Blank

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

IAD No.: 97-P137-116-10

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.07
Thorium		Gadolinium		Molybdenum	0.7	Titanium	5
Bismuth		Europium		Niobium		Scandium	0.3
Lead		Samarium		Zirconium	0.1	Calcium	*13
Thallium		Neodymium		Yttrium		Potassium	4
Mercury	NR	Praseodymium		Strontium	0.09	Chlorine	17
Gold		Cerium		Rubidium		Sulfur	1
Platinum	**0.3	Lanthanum		Bromine		Phosphorus	3
Iridium		Barium	0.5	Selenium		Silicon	15
Osmium		Cesium		Arsenic	0.04	Aluminum	1
Rhenium		Iodine	0.09	Germanium	≤0.04	Magnesium	8
Tungsten		Tellurium		Gallium	0.08	Sodium	8
Tantalum		Antimony		Zinc	0.7	Fluorine	≃44
Hafnium		Tin		Copper	0.6	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.5	Nitrogen	NR
Ytterbium		Cadmium	0.1	Cobalt	≤0.07	Carbon	NR
Thulium		Silver		Iron	6	Boron	0.2
Erbium		Palladium		Manganese	0.3	Beryllium	
Holmium		Rhodium		Chromium	0.5	Lithium	0.3
Dysprosium						Hydrogen	NR

*Heterogeneous
**Probable Contamination From Sample Preparation

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.04 ppm
MC — Major Component > 100 ppm
INT — Interference

Approved: Robert L. Daylor
16 May 84

gh

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300
Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A, Release # 15, Project #EE7734.82

Sample No.: XAD-2
Preparation Reagent Blank

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

IAD No.: 97-P137-116-10

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	≤0.4	Terbium		Ruthenium		Vanadium	0.04
Thorium	0.8	Gadolinium		Molybdenum	≤0.2	Titanium	0.6
Bismuth		Europium		Niobium		Scandium	0.2
Lead	1	Samarium		Zirconium	0.4	Calcium	11
Thallium		Neodymium	0.6	Yttrium	0.2	Potassium	7
Mercury	NR	Praseodymium	0.4	Strontium	0.2	Chlorine	8
Gold	**2	Cerium	1	Rubidium		Sulfur	1
Platinum		Lanthanum	1-	Bromine		Phosphorus	10
Iridium		Barium	0.6	Selenium		Silicon	*20
Osmium		Cesium		Arsenic	0.1	Aluminum	2
Rhenium		Iodine	0.06	Germanium	0.02	Magnesium	52
Tungsten		Tellurium		Gallium	0.2	Sodium	5
Tantalum		Antimony		Zinc	4	Fluorine	≈40
Hafnium		Tin		Copper	1	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.6	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.06	Carbon	NR
Thulium		Silver	0.2	Iron	18	Boron	0.2
Erbium		Palladium		Manganese	0.2	Beryllium	
Holmium		Rhodium		Chromium	0.2	Lithium	0.6
Dysprosium						Hydrogen	

*Heterogeneous
**Probable Contamination

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.04 ppm
MC — Major Component > 100 ppm
INT — Interference

Approved: Robert L. Taylor
16 May 84
gh

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300

Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A, Release #15, Project #EE7734.82

Sample No.: 901463
EOR
Impinger 1

IAD No.: 97-P137-116-10

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN µg/mL

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.05
Thorium		Gadolinium		Molybdenum	1	Titanium	1
Bismuth		Europium		Niobium	≤0.04	Scandium	0.5
Lead	6	Samarium		Zirconium	0.06	Calcium	2
Thallium		Neodymium		Yttrium	0.01	Potassium	2
Mercury	NR	Praseodymium	0.01	Strontium	0.1	Chlorine	5
Gold		Cerium		Rubidium	0.01	Sulfur	MC
Platinum		Lanthanum		Bromine	0.2	Phosphorus	2
Iridium		Barium	0.2	Selenium	0.5	Silicon	4
Osmium		Cesium	0.004	Arsenic	0.05	Aluminum	0.9
Rhenium		Iodine	0.1	Germanium	0.09	Magnesium	MC
Tungsten		Tellurium	0.09	Gallium	0.04	Sodium	MC
Tantalum		Antimony	0.03	Zinc	MC	Fluorine	MC
Hafnium		Tin	0.2	Copper	MC	Oxygen	NR
Lutetium		Indium	STD	Nickel	3	Nitrogen	NR
Ytterbium		Cadmium	≤0.02	Cobalt	≤0.01	Carbon	NR
Thulium		Silver	0.09	Iron	6	Boron	0.02
Erbium		Palladium		Manganese	0.2	Beryllium	
Holmium	≤0.2	Rhodium		Chromium	3	Lithium	0.08
Dysprosium						Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.008 µg/mL
MC — Major Component > 10 µg/mL
INT — Interference

Approved: Robert L. Taylor
16 May 84

gh
5-40

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 AREA CODE 312 953-9300

Reply to INSTRUMENTAL ANALYSIS DIVISION, 490 ORCHARD STREET, GOLDEN, COLORADO 80401, PHONE: 303 278-9521

To: Acurex Corporation
555 Clyde Avenue
P.O. Box 7555
Mountain View, CA 94039

Date: May 16, 1984

Analyst: G. Meagher

P. O. No.: Subcontract SW59159A, Release #15, Project #EE7734.82

Sample No.: 901461
EOR Impinger
1 Blank

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN µg/mL

IAD No.: 97-P137-116-10

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.003
Thorium		Gadolinium		Molybdenum	0.03	Titanium	0.04
Bismuth		Europium		Niobium	≤0.004	Scandium	0.005
Lead		Samarium		Zirconium	0.01	Calcium	0.4
Thallium		Neodymium		Yttrium		Potassium	0.2
Mercury	NR	Praseodymium		Strontium	0.003	Chlorine	*6
Gold		Cerium		Rubidium		Sulfur	MC
Platinum		Lanthanum		Bromine	0.008	Phosphorus	1
Iridium		Barium	0.02	Selenium	0.006	Silicon	0.6
Osmium		Cesium		Arsenic	≤0.002	Aluminum	0.05
Rhenium		Iodine	0.03	Germanium	≤0.002	Magnesium	0.7
Tungsten		Tellurium	0.006	Gallium	0.003	Sodium	MC
Tantalum		Antimony	≤0.009	Zinc	0.02	Fluorine	≈0.3
Hafnium		Tin	0.2	Copper	0.002	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.01	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.004	Carbon	NR
Thulium		Silver		Iron	0.06	Boron	0.002
Erbium		Palladium		Manganese	0.01	Beryllium	
Holmium		Rhodium		Chromium	0.01	Lithium	0.01
Dysprosium		*Heterogeneous				Hydrogen	NR

STD — Internal Standard
NR — Not Reported
All elements not detected < 0.003 µg/mL
MC — Major Component > 10 µg/mL
INT — Interference

Approved: gh

16 May 84

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • (312) 953-9300

GERALD T. SKAR
MANAGER
INSTRUMENTAL ANALYSIS DIVISION

SINCE 1908

PLEASE ADDRESS ALL CORRESPONDENCE TO:
490 ORCHARD ST., GOLDEN, CO. 80401
OFFICE TEL. (303) 278-9521

August 2, 1984

Mr. Larry Waterland
Acurex Corporation
P.O. Box 7555
Mountain View, CA 94039

RE: IAD #97-P897-116-06
Subcontract #SW 59159A
Release #16

Analytical Report

Six samples, previously analyzed for trace elements by spark source mass spectrometry, under our IAD identification #97-P137-116-10, were logged in under our IAD identification #97-P897-116-06 on July 16, 1984, for additional analysis.

Chlorine and fluorine were determined using specific ion electrode methodology. Phosphorus was determined colorimetrically.

Depending on sample type and the amount of sample available, sulfur was determined turbidimetrically or by X-ray fluorescence spectrometry.

The remaining elemental analysis was performed using flame atomic absorption/emission spectrophotometry.

The results of these determinations are presented in the following tables. Samples #1 and 2 are reported in total micrograms (µg) on the filter. Samples #3 and 4 are reported in micrograms per millilitre (µg/mL). Samples #5 and 6 are reported in micrograms per gram (µg/g). All values are reported on an "as received" basis.

If you have any questions concerning these results, please call.

Harold A. Connell
Project Coordinator

HAC/as

Charter Member

Table No. I
(Total µg on the Filter)

Parameter	#1 - 901458 EOR Filter	#2 - 901459 EOR Filter Blank
Aluminum, (Al)	7,000	3,740
Calcium, (Ca)	16,000	--
Chlorine, (Cl)	44,300	--
Iron, (Fe)	10,150	--
Potassium, (K)	80	--
Magnesium, (Mg)	2,640	--
Sodium, (Na)	1,930	--
Nickel, (Ni)	33,100	--
Phosphorus, (P)	590	--
Sulfur, (S)	125	--
Silicon, (Si)	780	--
Vanadium, (V)	1,320	--

Table No. II
(µg/mL)

Parameter	#3 - 901463 EOR Impinger 1	#4 - 901461 EOR Impinger 1 Blank
Copper, (Cu)	71.9	--
Fluorine, (F)	0.89	--
Magnesium, (Mg)	0.14	--
Sodium, (Na)	4,960	0.39
Sulfur, (S)	6,920	<50
Zinc, (Zn)	30	--

Table No. III
(µg/g)

Parameter	#5 - 901440 EOR Fuel, Test 1	#6 - 901441 EOR Fuel, Test 2
Chlorine, (Cl)	25	21
Sodium, (Na)	132	104
Sulfur, (S)	11,700	11,600

5.7 ORGANIC ANALYSES OF SASS SAMPLES: TOTAL CHROMATOGRAPHABLE ORGANICS (TCO), GRAVIMETRIC ORGANICS (GRAV), GAS CHROMATOGRAPHY MASS SPECTROMETRY (GC/MS), and INFRARED (IR) SPECTRA OF TOTAL SAMPLE EXTRACTS

ACUREX Corporation

Energy & Environmental Division

Acurex/ES
MS 2-2260

April 18, 1984
Acurex ID#: 8402-006
Client PO#: 307736.82

Attention: Larry Waterland

Sample: Bakersfield, 1 SASS Train;
Received 2/3/84

The above samples were analyzed by Level 1 protocol. The XAD and OMC extracts were combined per your instruction. Organic extracts were also analyzed for the semivolatile priority pollutants by gas chromatography/mass spectrometry employing a J&W SE-54 30 meter capillary column. The column was held at 30°C for 2 minutes, then ramped at 10°C per minute to 270°C . In addition to the priority pollutants, benzo(c)phenanthrene, dibenzo(c,g)carbazole, 7,12-dimethylbenzo(a)anthracene, 3-methylcholanthrene, and perylene were sought employing the computerized library search and manual interpretation. The assignment and quantitation of these organics is tentative since analytical standards of these compounds were not available for analysis. Benzo(c)phenanthrene, dibenzo(c,g)carbazole, 7-12-dimethylbenzo(a)anthracene, 3-methylcholanthrene and perylene were not detected in any of the samples at levels above 100 ug per train.

After extraction of the XAD field blank, the same resin was spiked with 400 ug each of dodecane and hexadecane for TCO analysis, 400 ug each of naphthalene, phenanthrene, and pyrene for PAH analysis, and 10 mg of bis(2-ethylhexyl)phthalate which combined with the phenanthrene and pyrene for the GRAV analysis. Results are presented in Tables 1 through 3. Chromatograms and spectra are attached.

Submitted by:

Greg Nicoll
Manager, Inorganic Chemistry

Viorica Lopez-Avila, Ph.D.
Technical Director

GN/VLA/ats

Attachments

Table 1. TCO and GRAV Results

Sample ID	TCO	GRAV
Filters	--	<3 mg/train
XAD*	4.1 mg/train	6 mg/train
XAD blank	0.34 mg/train	3 mg/train
XAD spike	784 ug	11 mg
XAD spike level	800 ug**	10.8 mg***
XAD spike recovery	98%	102%

* Blank corrected

** 400 ug each of C(12) and C(16)-alkanes

*** 10 mg of bis(2-ethylhexyl)phthalate, 400 ug of phenanthrene, and 400 ug of pyrene

Table 2. GC/MS Results, ug/train

Analyte	XAD	XAD*	Spiked XAD	% Recovery of spiked XAD
Dibutylphthalate	<50	<50	NS***	--
Dimethylphthalate	100	60	NS	--
Naphthalene	40	20	420	105
Phenanthrene	<10	<10	400	100
Phenol	20	10	NS	--
Pyrene	<10	<10	510	128
Other Priority Pollutants	ND**	ND	NS	--

* Duplicate injection
** ND - Not detected
*** NS - Not spiked

Table 3. Sample Disposition

Sample ID	Type	Initial	Subcontract	Organic	Remainder
901455 #31	Filter	--	32%	68%	
901456 #32	Filter	--	33%	67%	62%*
901457 #33	Filter	--	28%	72%	
901458 #34	Filter	--	30%	70%	
901459 #35	Filter blank	--	100%	0	0
901453	OMR	395 ml	--	--	--
901454	XAD	130 g	5 g	125 g	87%*
901475	XAD blank	130 g	5 g	125 g	87%*
------	XAD spike	125 g	0	125 g	90%*
901442 901443 901444	OMC	1910 ml	--	--	--
901463	Imp 1	595 mL**	100 mL	0	2550 mL
901461	Imp 1 blank	1 L	100 mL	0	1 L
901464	Imp 2&3	920 mL	100 mL	0	820 mL
901462	Imp 2&3 blank	1 L	100 mL	0	1 L
901440	Grab fuel 1A	500 mL	100; 100; 100 mL	0	200 mL

* as extract

** Imp 1 & OMC (aqueous) volume is 2650 mL

IR REPORT

SAMPLE: 8402-006-1 Filters

Wave Number (cm^{-1})	Intensity	Assignment	Comments
		No Peaks	

IR REPORT

SAMPLE: 8402-006-7 XAD

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2930	M	C-H Aliphatic	
1732	S	C=O	
1438	W	CH	
1255	W	C-O	
1165	W	C-O	
1115	W	C-O	

IR REPORT

SAMPLE: 8402-006-8 XAD Blank

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2928	S	C-H Aliphatic	
			Very weak spectrum

IR REPORT

SAMPLE: 8402-006-9 XAD Spike

Wave Number (cm^{-1})	Intensity	Assignment	Comments
2931	S	C-H Aliphatic	
1728	S	C=O	
1600	W	C=C Aromatic	
1759	W	C=C Aromatic	
1463	M	C-H Aliphatic	
1381	W	C-H ATiphatic	
1275	S	C-O	
1123	M	C-O	
1073	M	C-O	
1040	W	Unassigned	
744	W	CH	

5.8 VOLATILE ORGANICS ANALYSES OF VOST TRAPS

Inhouse experiments regarding the level of precautions needed to prevent blank trap contamination during storage and shipping were being performed during the time period of these tests. As a consequence, six pairs of trap blanks were available for use in this test: two pairs of trip blanks, two pairs of field blanks, and two pairs of laboratory blanks, differing only in the manner in which they were stored. As suggested by the VOST protocol, the pair t-test was used to assess the "sameness" of each blank trap pair. Use of this test showed all six blank pairs to be the same, with a confidence level of 70 percent or greater. Therefore, a mean blank trap level for each of the volatile compounds determined, with an associated standard deviation, was used to blank-correct each sample trap analyzed. The concentration of a compound had to be present in a sample trap at a level greater than three standard deviations above the mean blank level to be considered actually present in the flue gas sampled (as suggested by the VOST protocol). Based on this criterion, only benzene, toluene, and ethylbenzene were found to be present in sample traps at levels statistically different from blank traps. Thus, only emissions of these three components are reported in Volume 1 of this report.

The analytical data report follows. Traps denoted by the suffix "A" are the Tenax/charcoal trap of a run pair.

ACUREX Corporation

Energy & Environmental Division

Acurex/ES (CMEA)

Attention: Larry Waterland/2-2260

March 9, 1984
Acurex ID#: 8402-004
Client PO#: 307736.82
302865.65

Subject: Analysis of 10 Pairs of Tenax Traps,
Received 2/2/84

The above referenced samples were individually analyzed by GC/MS according to EPA VOST Protocol for volatile organics (EPA Method 624 Priority Pollutants).

Sample Analysis results are listed in Table 1. Blank data and recovery data from spiked Tenax traps are given in Tables 2 and 3, respectively.

If you have any questions, please call.

Prepared by: William G. Hellier
William G. Hellier
Staff Chemist

Approved by: Viorica Lopez-Avila
Viorica Lopez-Avila, Ph.D.
Technical Director

WGH/VLA/ats

Table 1. Results of Volatile Organic Analyses

Sample ID	Concentration (ng/trap)									
	Run #4	Run #4	Field Blank	Field Blank	Trip Blank	Trip Blank	Run #2	Run #2	Lab Blank	Lab Blank
Trap #	7[a]	33A[a]	40[a]	7A[a]	42[a]	15A[a]	23	24A[b]	8	10A
Priority Pollutants										
Chloromethane	302	4900	2260	27	523	58	960	87	290	53
Dichloromethane	137	2670	550	3050	396	4160	103	933	115	225
1,1-Dichloroethylene	ND	ND	ND	ND	ND	8	ND	6	ND	ND
Trans-1,2-Dichloroethylene	2	ND	ND	ND	ND	ND	ND	ND	ND	3
Chloroform	28	ND	ND	ND	ND	12	24	ND	35	ND
1,2-Dichloroethane	3	ND	ND	ND	ND	24	ND	ND	ND	ND
1,1,1-Trichloroethane	9	19	10	7	9	ND	8	ND	7	3
Carbon tetrachloride	77	ND	ND	ND	12	8	ND	5	ND	5
1,2-Dichloropropane	4	ND	ND	ND	ND	22	4	ND	ND	ND
Trichloroethylene	8	3	ND	12	11	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	29	ND	ND	ND	30	29	ND	ND	ND	ND
Benzene	63	35	10	38	38	51	850	34	14	ND
Tetrachloroethylene	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	47	ND	ND	ND	ND	10	ND	6	ND	11
Toluene	67	42	7	35	29	16	33	52	13	52
Chlorobenzene	10	ND	ND	ND	ND	12	ND	4	ND	ND
Ethylbenzene	8	6	2	29	ND	ND	1	ND	1	ND
Nonpriority Pollutants										
Xylenes	11	9	4	30	8	15	7	10	5	15
Detection Limit	2	2	2	2	2	2	1	1	1	1
Percent Surrogate Recovery										
Toluene-d_8	65	86	13[c]	146	219	100	79	136	80	107

a - Shipped in wooden boxes
b - Transport tube received broken
c - Low recovery of internal standards

ND - Not detected

Table 1. Results of Volatile Organic Analyses (Cont.)

Sample ID	Concentration (ng/trap)									
	Glass Sealed	Glass Sealed	Run #1	Run #1	Run #3	Run #3	Field Blank	Field Blank	Trip Blank	Trip Blank
Trap #	44	20A	45	19A	21[a,b]	13[b]	11	32A	9	35A
Priority Pollutants										
Chloromethane	830	37	519	146	2240	66	721	28	1340	71
Vinyl Chloride	ND	ND	ND	9	ND	ND	ND	ND	ND	ND
Dichloromethane	120	121	109	25200	63	889	115	1550	118	204
1,1-Dichloroethylene	ND	10	ND	3	ND	ND	ND	ND	22	ND
Trans-1,2-Dichloroethylene	ND	ND	ND	3	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	24	ND	ND	ND	3	ND	ND	3
1,2-Dichloroethane	ND	12	8	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	15	30	ND	8	10	ND	3	20	10
Carbon Tetrachloride	ND	8	ND	ND	46	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	27	17	ND	ND	ND	ND	ND	ND
Trichloroethylene	ND	ND	8	6	ND	ND	5	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	54	ND	ND	ND	ND	ND	ND
Benzene	19	5	2640	ND	205	46	26	1	20	41
Tetrachloroethylene	ND	17	11	32	ND	21	ND	4	ND	ND
1,1,2,2-Tetrachloroethane	ND	8	ND	ND	ND	ND	ND	3	ND	8
Toluene	10	42	144	2	57	34	2	2	9	44
Ethylbenzene	3	9	9	72	4	5	ND	2	4	7
Nonpriority Pollutants										
Styrene	1	ND	2	6	ND	ND	ND	ND	3	6
Xylenes	2	ND	8	ND	6	10	4	7	3	9
Detection Limit	1	1	2	2	2	2	2	2	2	2
Percent Surrogate Recovery										
Toluene-d_8	108	134	91	213[c]	95	142	111	103	106	142

a - Transport tube received broken
b - Transported with activated charcoal
c - Low recovery of internal standards
ND - Not Detected

Table 2. Analysis Blanks

Sample ID	Concentration (ng/Trap)							
	Purge Blank	Trap Blank	Purge Blank	Trap Blank	Purge Blank	Trap Blank	Purge Blank	Trap Blank
Date	2/2/84	2/2/84	2/3/84	2/3/84	2/5/84	2/5/84	2/6/84	2/6/84
Priority Pollutants								
Chloromethane	70	286	4	315	17	2130	63	64
Dichloromethane	78	60	81	68	49	62	115	59
1,1-Dichloroethylene	ND	14	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	7	ND	ND	ND	ND	ND	11
1,1,1-Trichloroethane	ND	59	ND	ND	ND	ND	ND	ND
Trichloroethylene	4	23	ND	2	ND	ND	ND	ND
Chlorodibromomethane	ND	ND	ND	ND	ND	15	ND	ND
1,1,2-Trichloroethane	ND	10	ND	6	ND	24	ND	ND
Benzene	18	41	14	18	12	26	2	19
Tetrachloroethylene	2	3	ND	21	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	6	13	ND	23	ND	41	ND	ND
Toluene	4	12	3	10	5	12	ND	12
Chlorobenzene	ND	ND	ND	7	ND	ND	ND	ND
Ethylbenzene	3	3	3	8	1	9	ND	7
Nonpriority Pollutants								
Styrene	3	2	ND	7	ND	3	5	10
Xylenes	4	5	5	9	ND	ND	52	10
Detection Limit	2	2	2	2	2	2	2	2
Percent Surrogate Recovery								
Toluene-d_8	100	95	93	91	96	102	104	109

ND - Not detected

Table 3. Tenax Trap Spike Recovery

Sample ID Date	% Recovery 200 ng Trap 2/2/84	 200 ng Trap 2/3/84	 200 ng Trap 2/5/84	 200 ng Trap 2/6/84
Chloromethane	404	615	338	49
Bromomethane	116	160	114	90
Vinyl chloride	112	163	117	74
Chloroethane	116	170	100	70
Dichloromethane	116	136	109	106
1,1-Dichloroethylene	131	171	112	73
1,1-Dichloroethane	128	161	114	84
Trans-1,2-Dichloroethylene	130	170	114	78
Chloroform	130	154	110	88
1,2-Dichloroethane	94	87	82	70
1,1,1-Trichloroethane	118	158	108	78
Carbon tetrachloride	118	161	110	60
Dichlorobromomethane	100	95	91	68
1,2-Dichloropropane	93	65	96	139
Trichloroethylene	90	66	101	111
1,1,2-Trichloroethane	39	54	113	58
Benzene	118	96	138	152
Tetrachloroethylene	100	78	102	84
Toluene	106	67	110	91
Chlorobenzene	66	31	68	43
Ethylbenzene	85	38	81	44
<u>Nonpriority Pollutants</u>				
Xylenes	66	42	54	54
<u>Percent Surrogate Recovery</u>				
Toluene-d_8	104	72	105	95

5.9 N_2O EMISSIONS BY GC/ECD

ACUREX Corporation

Energy & Environmental Division

Acurex/ES

May 21, 1984
Acurex ID#: 8404-025
Client PO#: 307736.82

Attention: Larry Waterland

Subject: Analysis of 3 Gas Bombs for Nitrous Oxide by GC/ECD

The above referenced samples were analyzed by GC/ECD according to previously reported method.

Results are listed in the table below:

Sample ID	N_2O (ppm)
901428	<0.5*
901448	2
901470	11

* Sample cylinder was not pressurized - sample may have leaked.

If you have any questions, please call.

Prepared by: _____
William G. Hellier
Staff Chemist

Approved by: Richard B. Scott for
Viorica Lopez-Avila, Ph.D.
Technical Director

WGH/VLA/ats

5.10 NO_X EMISSIONS BY EPA METHOD 7

Laboratory analysis data for the Method 7 test performed on January 24, 1984, was included on the forms reporting the sampling and recovery data included in Section 4.2. Analysis data for the tests performed on February 8 and 24, 1984, appear on the following pages.

ACUREX
ANALYTICAL REPORT

Sample of: CMEA/EER Bakersfield

Sample Date: 2-8-84

Requested By: Larry Waterland

I.D. Number: 307735.82

Analytical Method: EPA METHOD 7 NOx ANALYSIS

Date of Analysis: 3-27-84 ; Test date = 2-8-84.

Lab I.D. Number	TEST #	Analytical Result		Unit
900573	1	185.6	92.8	$\mu g\ NO_2$ / mg/dscm N.D.
900572	2	123.8	61.9	
900559	3	88.4	44.2	
900563	4	293.2	146.6	
900548	5	366.6	183.3	
900568	6	235.4	117.7	
900564	7	244.4	122.2	
900561	8	283.0	141.5	
900562	9	229.0	114.5	
900560	10	267.6	133.8	
900570	11	360.2	180.1	
900575	12	373.0	186.5	
900571	13	326.8	163.4	

Analysis By: K. W. Brenton

Date: 3-29-84

ACUREX
ANALYTICAL REPORT

Sample of: CMEA/EER Bakersfield

Sample Date: 2-8-84

Requested By: Larry Waterland

I.D. Number: 307735.82

Analytical Method: EPA METHOD 7 NOx ANALYSIS

Date of Analysis: 3-27-84

Lab I.D. Number	TEST #	Analytical Result		Unit
900555	14	57.8	28.9	$\mu g NO_2$/mg/dscm NO_2
900547	15	292.0	146.0	
900537	16	283.0	141.5	
900574	17	48.8	24.4	
900565	18	328.0	164.0	
900566	19	315.2	157.6	
900549	20	224.6	112.3	
900567	21	191.6	95.8	
900534	22	218.6	109.3	
900558	23	220.0	110.0	
900569	24	196.8	98.4	
900551	25	159.6	79.8	
900550	26	236.8	118.3	
EAA QA sample #0481		594.68	297.34*	

*actual value = 298.5 mg/dscm NO_2

Analysis By: [signature]

Date: 3-29-84

ACUREX
ANALYTICAL REPORT

Sample of: CMEA/EER Bakersfield

Sample Date: 2-24-84

Requested By: Larry Waterland

I.D. Number: 307735.82

Analytical Method: EPA METHOD 7 NOx ANALYSIS

Date of Analysis: 3-28-84

Lab I.D. Number	TEST #	Analytical Result		Unit
903474	1	262.7	131.35	$\mu g NO_2$ / mg/dscm NL
903475	2	223.8	111.9	
903476	3	189.99	94.99	
903477	4	257.62	128.81	
903478	5	295.45	147.72	
903479	6	378.37	189.18	
903480	7	265.66	132.83	
903481	8	118.38	59.19	
903482	9	251.18	125.59	
903483	10	547.43	≥73.72	

Analysis By [signature]

Date 3-29-84

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-600/7-86-013b		

4. TITLE AND SUBTITLE	5. REPORT DATE
Environmental Assessment of an Enhanced Oil Recovery Steam Generator Equipped with an EPA Heavy-oil Low-NOx Burner; Volume II*	April 1986
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
C. Castaldini, L. R. Waterland, and R. De Rosier	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
Acurex Corporation Energy and Environmental Division P.O. Box 7044 Mountain View, California 94039	11. CONTRACT/GRANT NO. 68-02-3188
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
EPA, Office of Research and Development Air and Energy Engineering Research Laboratory Research Triangle Park, NC 27711	Final; 1/84 - 1/85 14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES AEERL project officer is Joseph A. McSorley, Mail Drop 65, 919/541-2920. Volume I contains technical results. (*) Volume II is Data Supplement.

16. ABSTRACT The report gives results of comprehensive emission measurements and 30-day flue gas monitoring on a 16-MW (55 million Btu/hr) enhanced oil recovery steam generator equipped with the EPA low-NOx burner firing high-nitrogen crude. The 1-day comprehensive measurements included quantification of semivolatile organics and 73 trace elements; volatile organic sampling train quantitation of volatile organic priority pollutants; EPA Method 5/8 for particulate and SOx; controlled condensation for SOx; Andersen impactors for particle size distribution; grab samples for N2O; and continuous flue gas monitoring. NOx emissions averaged 70 ppm at 3% O2, well below the target of 85 ppm. CO emissions were below 30 ppm, and SO2 averaged about 550 ppm. Solid particulates were emitted at about 27 ng/J (96 mg/dscm); condensible particulates were about half that. Volatile organics (benzene, toluene, and ethylbenzene) were measured in the 0.4 to 20 ppb range. Semivolatile organics (naphthalene and phenol) were detected at about 0.3 ppb. Subsequent continuous monitoring of flue gas criteria emissions showed NOx below 80 ppm at 3% O2 with an average of 70 ppm. CO emissions were generally less than 30 ppm.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution	Pollution Control	13B
Assessments	Stationary Sources	14B
Boilers	Environmental Assessment	13A
Oil Recovery		08I, 11H
Crude Oil	Low-NOx Burners	
Combustion		21B

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
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EPA Form 2220-1 (9-73)