



Research and Development

ENVIRONMENTAL ASSESSMENT OF
A WATERTUBE BOILER
FIRING A COAL/WATER SLURRY
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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ENVIRONMENTAL ASSESSMENT OF A WATERTUBE BOILER FIRING A COAL-WATER SLURRY

Volume II Data Supplement

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SECTION 1

INTRODUCTION

The purpose of this data supplement is to document 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 for objectives, description of source emission results, data interpretation, and conclusions.

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

Section 2 -- Preliminary Tests: stack velocity traverse and gas composition tests

Section 3 -- Boiler Operating Data: continuous monitors, pressures, temperatures, and flowrates

Section 4 -- Sampling Data Sheets: operating data tables for EPA Method 5/8 (for particulate mass emissions, SO₂ and SO₃ sampling), and SASS (for trace element and organic sampling)

Section 5 -- Analytical Laboratory Results: fuel analysis, SASS particulate emissions; Method 5 particulate emissions; Method 8 sulfur oxides emissions; trace element emissions by spark source mass spectrometry (SSMS) and atomic absorption spectroscopy (AAS); C₁ to C₆ hydrocarbons by gas chromatography; N₂O by gas chromatography; total chromatographable organic (TCO) and

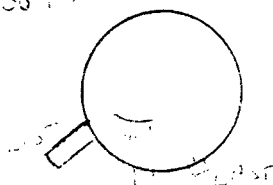
gravimetric (GRAV) results; infrared (IR) spectra; determination of organic compounds by gas chromatography/mass spectrometry (GC/MS); liquid chromatography (LC) separation results; low resolution mass spectrometry (LRMS) analyses; and biological assay reports.

SECTION 2
PRELIMINARY RESULTS

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TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT PETE / DOE
DATE 6-11-82
SAMPLING LOCATION INLET TO BAGHOUSE
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) 35"
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) 11"
STACK I.D., (DISTANCE A - DISTANCE B) 24"
NEAREST UPSTREAM DISTURBANCE _____
NEAREST DOWNSTREAM DISTURBANCE _____
CALCULATOR JOHN T. CO



SCHEMATIC OF SAMPLING LOCATION

[illegible]

PRELIMINARY VELOCITY TRAVERSE

PLANT _____
DATE _____
LOCATION _____ 200 H.P. Boiler
STACK I.D. _____
BAROMETRIC PRESSURE, in. Hg _____
STACK GAUGE PRESSURE, in. H₂O _____
OPERATORS _____
SCHEMATIC _____

SCHEMATIC OF TRAVERSE POINT LAYOUT

[illegible]

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s) , in.H ₂ O	STACK TEMPERATURE (T_g) , °F
AVERAGE		

ISOKINETIC SAMPLING WORKSHEET

Plant 1117 / 100

Performed by 1. 2. 3. 4. 5.

Date 7/11/68

Sample Location 1000 ft. / 1000 ft. / 1000 ft. / 1000 ft. / 1000 ft.

Test No./Type 10/5/2

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

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

Pitot coefficient (dimensionless)	C_p	0.787
Water vapor in the gas stream (proportion by volume)	B_{wo}	0.09
Absolute stack gas pressure (in. Hg)	P_s	29.75
Molecular weight, stack gas dry (lb/lb-mole)	M_d	28.36
Orifice coefficient (dimensionless)	K_o	0.711
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	29.05
Absolute meter pressure (in. Hg)	P_m	29.73
$\frac{782.687 (\frac{0.787}{0.711})^2 (1-0.09)^2 (29.75) (28.36)}{(\frac{0.711}{0.711})^2 (29.05) (29.73)}$	K	823.30

ISOKINETIC NOZZLE CALCULATION AND SAMPLING RATE CALCULATION

Plant 101 Performed by 101
Date 10/1/80
Sample Location 101, 200 H₂O 205 L₂
Test No./Type 101 5/8

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

where: N_d = Nozzle diameter (inches)

Average pressure differential across the orifice meter (in. H ₂ O)	ΔH	1.6
Temperature stack gas, average (°F)	T _s	734
Temperature of gas meter, average (°F)	T _m	80
Stack gas velocity pressure (in H ₂ O)	ΔP	0.62
$\left(\frac{(\underline{1.6}) (\underline{734} + 460)}{(\underline{0.075}) (\underline{70} + 460)(\underline{0.62})} \right)^{.25}$	N _D	0.284

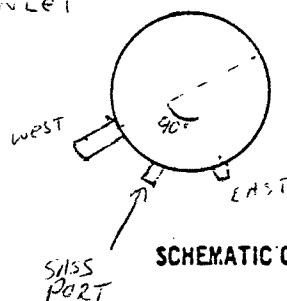
$$\Delta H = K (N_d)^4 \frac{T_m}{T_s} (\Delta P)$$

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

Nozzle diameter, actual (inches)	N_d	0.252
Temperature of gas meter ($^{\circ}\text{F}$)	T_m	$\frac{20}{530}$
Temperature of stack gas ($^{\circ}\text{F}$)	T_s	$\frac{530}{530}$
Stack gas velocity pressure (in H_2O)	ΔP	0.002
$\left(\frac{(0.002)}{(0.002)} \right)^4 \left(\frac{(20 + 460)}{(530 + 460)} \right) (0.252)$	ΔH	1.12
Magic number $\frac{0.002}{(0.002)} (0.252)^4$	$K(N_d)^4$	332

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT PETC / DOE
DATE 6/17/82
SAMPLING LOCATION 700 HP Boiler, Emergency Inlet
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE (DISTANCE A) 35"
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE (DISTANCE B) 11"
STACK I.D., (DISTANCE A - DISTANCE B) 24"
NEAREST UPSTREAM DISTURBANCE _____
NEAREST DOWNSTREAM DISTURBANCE _____
CALCULATOR MUSTARD

[illegible]

PRELIMINARY VELOCITY TRAVERSE

PLANT PETC / DOE
DATE 6/17/82
LOCATION 200 HP Boiler, Baghouse Inlet
STACK I.D. 24"
BAROMETRIC PRESSURE, in. Hg 28.92
STACK GAUGE PRESSURE, in. H₂O -3.0" H₂O
OPERATORS Murphy from Joe Jobe
PETC Personnel J. Thomas.

SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s) , in. H ₂ O	STACK TEMPERATURE (T _s), °F
1	0.37	525°F
2	0.43	
3	0.55	
4	0.67	
6	0.70	
7	0.70	
8	0.70	
9	0.53	
AVERAGE	0.58	525°F

[illegible]

ISOKINETIC SAMPLING WORKSHEET

Plant PETC / DOE Performed by M. J. T. F.
 Date 5/12/82
 Sample Location 700 H.P. Boiler, Baghouse Inlet
 Test No./Type 2 m 5/8

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

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

Pitot coefficient (dimensionless)	C_p	0.789
Water vapor in the gas stream (proportion by volume)	B_{wo}	0.09 Assumed
Absolute stack gas pressure (in. Hg)	- 3.0 H ₂ O P_s	28.70
Molecular weight, stack gas dry (lb/lb-mole)	- Assume M_d 14.7.002 3.7.002 83.70.22	30.30
Orifice coefficient (dimensionless)	K_o	0.711
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$	M_s	29.25
Absolute meter pressure (in. Hg)	P_m	28.92
$\frac{782.687 (0.789)^2 (1-0.09)^2 (28.70) (30.30)}{(0.711)^2 (29.25) (28.92)}$	K	822.14

ISOKINETIC NOZZLE CALCULATION
AND
SAMPLING RATE CALCULATION

Plant PETC / DOE Performed by Murti, G
 Date 6/17/82
 Sample Location 700 HP Boiler, Baghouse Inlet
 Test No./Type 2 / m 5/8

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

where: N_d = Nozzle diameter (inches)

Average pressure differential across the orifice meter (in. H ₂ O)	ΔH	1.7
Temperature stack gas, average (°F)	T_s	530
Temperature of gas meter, average (°F)	T_m	80
Stack gas velocity pressure (in H ₂ O)	ΔP	0.58
$\left(\frac{(1.7) (530 + 460)}{(80 + 460)(0.58)} \right)^{.25}$	N_d	0.254

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

where: ΔH = Pressure differential across the orifice meter (in H₂O)

Nozzle diameter, actual (inches)	N_d	0.252
Temperature of gas meter (°F)	T_m	80 530
Temperature of stack gas (°F)	T_s	530 80
Stack gas velocity pressure (in H ₂ O)	ΔP	0.58
$\left(\frac{(0.252)^4 (80 + 460)}{(530 + 460) (0.58)} \right)$	ΔH	1.05
Magic number _____ () ⁴	$K(N_d)^4$	3.315

SECTION 3
BOILER OPERATING DATA

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Key to Operating Data Tables

<u>Column No.</u>	<u>Parameter measured</u>
6	CO ₂ volume fraction in dry flue gas after furnace (percent)
7	O ₂ volume fraction in dry flue gas after furnace (percent)
8	Taylor O ₂ analyzer after furnace (percent)
9	CO volume fraction in dry flue gas after furnace (ppm)
10	CH _x volume fraction in dry flue gas after furnace (ppm)
11	NO _x volume fraction in dry flue gas after furnace (ppm)
12	SO _x volume fraction in dry flue gas after furnace (ppm)
13	CO ₂ volume fraction in dry flue gas after baghouse (percent)
14	O ₂ volume fraction in dry flue gas after baghouse (percent)
15	CO volume fraction in dry flue gas after baghouse (ppm)
16	CH _x volume fraction in dry flue gas after baghouse (ppm)
17	NO _x volume fraction in dry flue gas after baghouse (ppm)
19	Mass flowrate of fuel from micromotion meter (lb/min)
22	Barometric pressure (psia)
23	Furnace pressure (in. H ₂ O)
24	Pressure of steam in boiler (psia)
25	Pressure of fuel before preheater (psia)
29	Pressure of atomizing steam to burner (psia)
30	Pressure of CWS loop at pipe bend (psia)
31	Pressure drop of CWS loop across bend (in. H ₂ O)
32	Pressure of CWS loop after straight section (psia)
33	Pressure of CWS loop at end of test section (psia)
34	Combustion air pressure at brandt meter (in. H ₂ O)
35	Coal/water pressure at nozzle (psia)
36	Coal/water pressure at pump (psia)
37	Atomizing air pressure at orifice (psia)
38	Atomizing air pressure at nozzle (psia)
39	Natural gas pressure (psia)
40	Center tube pressure (in. H ₂ O)
41	Scani zero reference (approximately 3 psig) (psig)
42	Scani span reference (approximately 9 psig) (psig)
43	Pressure drop of atomizing steam (in. H ₂ O)
44	Pressure drop of steam from boiler (in. H ₂ O)
45	Pressure drop of makeup water at orifice (in. H ₂ O)
46	Pressure drop of combustion air (annubar) (in. H ₂ O)
47	Pressure drop of CWS across straight section (in. H ₂ O)
48	Pressure drop of CWS across the test section (in. H ₂ O)
49	Atomizing air flow (in. H ₂ O)
50	Natural gas flowrate (in. H ₂ O)
51	Center tube delta P (in. H ₂ O)
52	Combustion air flow (brandt total air) (in. H ₂ O)
53	Temperature of flue gas after cooler (°F)
54	Temperature at flue gas cooler (°F)
55	Temperature at fuel after preheater (°F)
56	Temperature at bottom of coal supply hopper (°F)
57	Temperature of dust collector (°F)
58	Temperature at bottom of proportioning feeder tank (°F)

Key to Operating Data Tables (concluded)

<u>Column No.</u>	<u>Parameter measured</u>
59	Temperature at bottom of coal slurry hold tank (°F)
60	Temperature of fuel oil at storage tank (1 ft from bottom) (°F)
61	Temperature of fuel oil at storage tank (6 ft from bottom) (°F)
62	Temperature of fuel oil at storage tank (12 ft from bottom) (°F)
63	Temperature of fuel oil at storage tank (18 ft from bottom) (°F)
64	Temperature of fuel oil at storage tank outlet (°F)
65	Temperature of fuel before preheater (°F)
66	Temperature of fuel to burner (°F)
67	Temperature at baghouse no. 1 (°F)
68	Temperature at stack blower inlet (°F)
69	Temperature at stack blower outlet (°F)
70	Temperature of combustion air to furnace (°F)
71	Temperature of flue gas after cooler (°F)
72	Temperature of atomizing steam (°F)
74	Temperature of steam from boiler (°F)
75	Coal/water temperature at nozzle (°F)
76	Boiler skin temperature (front west) (°F)
77	Boiler skin temperature (top center east) (°F)
78	Boiler skin temperature (top center west) (°F)
79	Atomizing air temperature at orifice (°F)
80	Entrance of convection bank temperature (°F)
81	Boiler skin temperature (right side east rear) (°F)
82	Natural gas temperature (°F)
83	Water outlet temperature (°F)
84	Boiler skin temperature (left side west front) (°F)
85	Combustion air temperature at brandt meter (°F)
86	North wall temperature (°F)
87	Temperature of flue gas after furnace (°F)
88	Temperature at makeup water orifice (°F)
89	Temperature of duct exit of boiler (°F)
90	Temperature of condensate return line at D A (°F)
91	Temperature of CWS loop after pump (°F)
92	Temperature of CWS loop at pipe bend (°F)
93	Temperature of CWS loop at test section inlet (°F)
94	Temperature of CWS loop at end of test section (°F)
95	Center tube air temperature (°F)
96	Refractory temperature taper block (°F)
97	Refractory temperature top of convulsion (°F)
98	Refractory temperature bottom of convulsion (°F)
99	Thermocouple reference junction temperature (°F)

TIME													
9.30-10.45	14.7	2.34	14.18	2.32	14.18	2.32	14.18	2.32	14.18	2.32	14.18	2.32	14.18
9.45-10.00	14.7	2.34	14.18	2.32	14.18	2.32	14.18	2.32	14.18	2.32	14.18	2.32	14.18
10.00-10.15	14.7	2.72	14.15	2.30	14.15	2.30	14.15	2.30	14.15	2.30	14.15	2.30	14.15
10.15-10.30	14.6	2.30	14.12	2.28	14.12	2.28	14.12	2.28	14.12	2.28	14.12	2.28	14.12
10.30-10.45	14.6	2.28	14.10	2.26	14.10	2.26	14.10	2.26	14.10	2.26	14.10	2.26	14.10
10.45-11.00	14.6	2.26	14.08	2.24	14.08	2.24	14.08	2.24	14.08	2.24	14.08	2.24	14.08
11.00-11.15	14.6	2.24	14.06	2.22	14.06	2.22	14.06	2.22	14.06	2.22	14.06	2.22	14.06
11.15-11.30	14.6	2.22	14.04	2.20	14.04	2.20	14.04	2.20	14.04	2.20	14.04	2.20	14.04
11.30-11.45	14.6	2.20	14.02	2.18	14.02	2.18	14.02	2.18	14.02	2.18	14.02	2.18	14.02
11.45-12.00	14.6	*2.18	*14.02	*2.16	*14.02	*2.16	*14.02	*2.16	*14.02	*2.16	*14.02	*2.16	*14.02
	*0.000	*0.000	*9.77	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71
12.15-12.30	*0.000	*2.18	*9.77	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71	*36.71
12.30-12.45	14.6	2.80	9.24	13.8	2.06	2.21	1.87	2.00	2.14	1.80	2.00	2.22	2.22
12.45-13.00	14.6	2.82	9.24	13.8	2.06	2.21	1.87	2.00	2.14	1.80	2.00	2.22	2.22
13.00-13.15	14.7	2.81	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
13.15-13.30	14.6	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
13.30-13.45	14.6	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
13.45-14.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
14.00-14.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
14.15-14.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
14.30-14.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
14.45-15.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
15.00-15.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
15.15-15.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
15.30-15.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
15.45-16.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
16.00-16.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
16.15-16.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
16.30-16.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
16.45-17.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
17.00-17.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
17.15-17.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
17.30-17.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
17.45-18.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
18.00-18.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
18.15-18.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
18.30-18.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
18.45-19.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
19.00-19.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
19.15-19.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
19.30-19.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
19.45-20.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
20.00-20.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
20.15-20.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
20.30-20.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
20.45-21.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
21.00-21.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
21.15-21.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
21.30-21.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
21.45-22.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
22.00-22.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
22.15-22.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
22.30-22.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
22.45-23.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
23.00-23.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
23.15-23.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
23.30-23.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
23.45-24.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
24.00-24.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
24.15-24.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
24.30-24.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
24.45-25.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
25.00-25.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
25.15-25.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
25.30-25.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
25.45-26.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
26.00-26.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
26.15-26.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
26.30-26.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
26.45-27.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
27.00-27.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
27.15-27.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
27.30-27.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
27.45-28.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
28.00-28.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
28.15-28.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
28.30-28.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
28.45-29.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
29.00-29.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
29.15-29.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
29.30-29.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
29.45-30.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
30.00-30.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
30.15-30.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
30.30-30.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
30.45-31.00	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
31.00-31.15	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
31.15-31.30	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1.80	1.80
31.30-31.45	14.7	2.83	8.87	14.0	1.70	2.74	1.66	14.17	2.83	1.40	1.80	1	

Time												
10:00-10:05	52.3	14.3	01432	190	217	190	52.3	4.06	110	110		
10:10-10:15	52.0	14.3	01437	190	218	190	52.3	4.06	110	110		
10:20-10:25	52.2	14.3	01438	190	219	190	52.2	4.06	-110	-111	8.74	
10:30-10:35	52.1	14.3	01439	190	220	190	52.1	4.06				
10:40-10:45	52.0	14.3	01440	191	221	191	52.0	4.06	110	110		
10:50-10:55	52.1	14.3	01441	190	222	190	52.1	4.06				
11:00-11:05	52.1	14.3	01442	190	223	190	52.1	4.06				
11:10-11:15	52.1	14.3	01443	190	224	190	52.1	4.06	110	110	8.74	
11:20-11:25	52.0	14.3	01444	188	225	188	52.0	4.06	110	110	8.74	
11:30-11:35	52.0	14.3	01445	188	226	188	52.0	4.06	110	110	8.74	
11:40-11:45	51.9	14.3	01446	188	227	188	51.9	4.06	-111	-111	8.74	
11:50-11:55	51.5	14.3	01447	188	228	188	51.5	4.06	-111	-111	8.74	
12:00-12:05	51.3	14.3	01448	188	229	188	51.3	4.06	-111	-111	8.74	
12:10-12:15	51.4	14.3	01449	188	230	188	51.4	4.06	-111	-111	8.74	
12:20-12:25	51.2	14.3	01450	188	231	188	51.2	4.06	-111	-111	8.74	
12:30-12:35	51.3	14.3	01451	188	232	188	51.3	4.06	-111	-111	8.74	
12:40-12:45	51.6	14.3	01452	188	233	188	51.6	4.06	-111	-111	8.74	
12:50-12:55	51.6	14.3	01453	188	234	188	51.6	4.06	-111	-111	8.74	
13:00-13:05	51.6	14.3	01454	188	235	188	51.6	4.06	-111	-111	8.74	
13:10-13:15	51.6	14.3	01455	188	236	188	51.6	4.06	-111	-111	8.74	
13:20-13:25	51.6	14.3	01456	188	237	188	51.6	4.06	-111	-111	8.74	
13:30-13:35	51.6	14.3	01457	188	238	188	51.6	4.06	-111	-111	8.74	
13:40-13:45	51.6	14.3	01458	188	239	188	51.6	4.06	-111	-111	8.74	
13:50-13:55	51.6	14.3	01459	188	240	188	51.6	4.06	-111	-111	8.74	
14:00-14:05	51.6	14.3	01460	188	241	188	51.6	4.06	-111	-111	8.74	
14:10-14:15	51.6	14.3	01461	188	242	188	51.6	4.06	-111	-111	8.74	
14:20-14:25	51.6	14.3	01462	188	243	188	51.6	4.06	-111	-111	8.74	
14:30-14:35	51.6	14.3	01463	188	244	188	51.6	4.06	-111	-111	8.74	
14:40-14:45	51.6	14.3	01464	188	245	188	51.6	4.06	-111	-111	8.74	
14:50-14:55	51.6	14.3	01465	188	246	188	51.6	4.06	-111	-111	8.74	
15:00-15:05	51.6	14.3	01466	188	247	188	51.6	4.06	-111	-111	8.74	
15:10-15:15	51.6	14.3	01467	188	248	188	51.6	4.06	-111	-111	8.74	
15:20-15:25	51.6	14.3	01468	188	249	188	51.6	4.06	-111	-111	8.74	
15:30-15:35	51.6	14.3	01469	188	250	188	51.6	4.06	-111	-111	8.74	
15:40-15:45	51.6	14.3	01470	188	251	188	51.6	4.06	-111	-111	8.74	
15:50-15:55	51.6	14.3	01471	188	252	188	51.6	4.06	-111	-111	8.74	
16:00-16:05	51.6	14.3	01472	188	253	188	51.6	4.06	-111	-111	8.74	
16:10-16:15	51.6	14.3	01473	188	254	188	51.6	4.06	-111	-111	8.74	
16:20-16:25	51.6	14.3	01474	188	255	188	51.6	4.06	-111	-111	8.74	
16:30-16:35	51.6	14.3	01475	188	256	188	51.6	4.06	-111	-111	8.74	
16:40-16:45	51.6	14.3	01476	188	257	188	51.6	4.06	-111	-111	8.74	
16:50-16:55	51.6	14.3	01477	188	258	188	51.6	4.06	-111	-111	8.74	
17:00-17:05	51.6	14.3	01478	188	259	188	51.6	4.06	-111	-111	8.74	
17:10-17:15	51.6	14.3	01479	188	260	188	51.6	4.06	-111	-111	8.74	
17:20-17:25	51.6	14.3	01480	188	261	188	51.6	4.06	-111	-111	8.74	
17:30-17:35	51.6	14.3	01481	188	262	188	51.6	4.06	-111	-111	8.74	
17:40-17:45	51.6	14.3	01482	188	263	188	51.6	4.06	-111	-111	8.74	
17:50-17:55	51.6	14.3	01483	188	264	188	51.6	4.06	-111	-111	8.74	
18:00-18:05	51.6	14.3	01484	188	265	188	51.6	4.06	-111	-111	8.74	
18:10-18:15	51.6	14.3	01485	188	266	188	51.6	4.06	-111	-111	8.74	
18:20-18:25	51.6	14.3	01486	188	267	188	51.6	4.06	-111	-111	8.74	
18:30-18:35	51.6	14.3	01487	188	268	188	51.6	4.06	-111	-111	8.74	
18:40-18:45	51.6	14.3	01488	188	269	188	51.6	4.06	-111	-111	8.74	
18:50-18:55	51.6	14.3	01489	188	270	188	51.6	4.06	-111	-111	8.74	
19:00-19:05	51.6	14.3	01490	188	271	188	51.6	4.06	-111	-111	8.74	
19:10-19:15	51.6	14.3	01491	188	272	188	51.6	4.06	-111	-111	8.74	
19:20-19:25	51.6	14.3	01492	188	273	188	51.6	4.06	-111	-111	8.74	
19:30-19:35	51.6	14.3	01493	188	274	188	51.6	4.06	-111	-111	8.74	
19:40-19:45	51.6	14.3	01494	188	275	188	51.6	4.06	-111	-111	8.74	
19:50-19:55	51.6	14.3	01495	188	276	188	51.6	4.06	-111	-111	8.74	
20:00-20:05	51.6	14.3	01496	188	277	188	51.6	4.06	-111	-111	8.74	
20:10-20:15	51.6	14.3	01497	188	278	188	51.6	4.06	-111	-111	8.74	
20:20-20:25	51.6	14.3	01498	188	279	188	51.6	4.06	-111	-111	8.74	
20:30-20:35	51.6	14.3	01499	188	280	188	51.6	4.06	-111	-111	8.74	
20:40-20:45	51.6	14.3	01500	188	281	188	51.6	4.06	-111	-111	8.74	
20:50-20:55	51.6	14.3	01501	188	282	188	51.6	4.06	-111	-111	8.74	
21:00-21:05	51.6	14.3	01502	188	283	188	51.6	4.06	-111	-111	8.74	
21:10-21:15	51.6	14.3	01503	188	284	188	51.6	4.06	-111	-111	8.74	
21:20-21:25	51.6	14.3	01504	188	285	188	51.6	4.06	-111	-111	8.74	
21:30-21:35	51.6	14.3	01505	188	286	188	51.6	4.06	-111	-111	8.74	
21:40-21:45	51.6	14.3	01506	188	287	188	51.6	4.06	-111	-111	8.74	
21:50-21:55	51.6	14.3	01507	188	288	188	51.6	4.06	-111	-111	8.74	
22:00-22:05	51.6	14.3	01508	188	289	188	51.6	4.06	-111	-111	8.74	
22:10-22:15	51.6	14.3	01509	188	290	188	51.6	4.06	-111	-111	8.74	
22:20-22:25	51.6	14.3	01510	188	291	188	51.6	4.06	-111	-111	8.74	
22:30-22:35	51.6	14.3	01511	188	292	188	51.6	4.06	-111	-111	8.74	
22:40-22:45	51.6	14.3	01512	188	293	188	51.6	4.06	-111	-111	8.74	
22:50-22:55	51.6	14.3	01513	188	294	188	51.6	4.06	-111	-111	8.74	
23:00-23:05	51.6	14.3	01514	188	295	188	51.6	4.06	-111	-111	8.74	
23:10-23:15	51.6	14.3	01515	188	296	188	51.6	4.06	-111	-111	8.74	
23:20-23:25	51.6	14.3	01516	188	297	188	51.6	4.06	-111	-111	8.74	
23:30-23:35	51.6	14.3	01517	188	298	188	51.6	4.06	-111	-111	8.74	
23:40-23:45	51.6	14.3	01518	188	299	188	51.6	4.06	-111	-111	8.74	
23:50-23:55	51.6	14.3	01519	188	300	188	51.6	4.06	-111	-111	8.74	

Time												
10:00 - 10:15	137	116	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
10:15 - 10:30	138	117	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
10:30 - 10:45	138	117	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
10:45 - 11:00	137	117	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
11:00 - 11:15	137	116	100	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
11:15 - 11:30	138	117	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
11:30 - 11:45	139	116	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
11:45 - 12:00	138	116	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
12:00 - 12:15	138	116	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
12:15 - 12:30	138	116	101	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
12:30 - 12:45	139	116	100	24.6	8.69	3.01	7.04	0.011	96.1	61.4	0.425	137
12:45 - 13:00	138	115	100	24.6	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
13:00 - 13:15	138	115	100	24.6	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
13:15 - 13:30	144	116	100	24.6	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
13:30 - 13:45	144	115	100	24.6	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
13:45 - 14:00	142	116	100	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
14:00 - 14:15	140	115	100	24.6	8.69	3.02	7.04	0.011	96.1	61.4	0.425	137
TOTAL	2639	2406	1911	469.7	107.41	8.128	190.1	0.011	1107	1182	0.425	2406
AVERAGE	139	116	100	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	139
STANDARD	139	116	100	24.7	8.69	3.02	7.04	0.011	96.1	61.4	0.425	139

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TIME												
9:30-9:45	165	371	114	192	402	12						
9:45-10:00	165	372	115	192	402	12						
10:00-10:15	164	372	116	196	402	12	125					
10:15-10:30	164	372	115	196	402	12						
10:30-10:45	164	372	115	196	402	12						
10:45-11:00	165	372	115	196	402	12						
11:00-11:15	165	372	115	200	402	129						
11:15-11:30	165	372	115	200	402	129						
11:30-11:45	165	372	115	200	402	129						
11:45-12:00	165	372	115	200	402	129						
12:00-12:15	165	372	115	200	402	129						
12:15-12:30	162	372	118	204	402	129						
12:30-12:45	155	371	116	202	424	109	132	1580	123	77.7	80.7	122
12:45-13:00	150	371	116	203	418	102	131	1561	122	77.2	80.2	122
13:00-13:15	147	371	116	200	413	106	130	1547	121	76.7	79.7	122
13:15-13:30	140	370	116	202	407	98.2	128	1535	121	76.2	79.2	122
13:30-13:45	137	371	117	205	407	98.2	128	1535	121	76.2	79.2	122
13:45-14:00	130	371	118	205	407	98.2	128	1535	121	76.2	79.2	122
14:00-14:15	130	371	118	205	407	98.2	128	1535	121	76.2	79.2	122
TOTAL	1960	4000	1100	2000	4000	1000		30129	2400	76.0	79.0	122
PERCENT	16.5	37.2	11.5	19.6	40.2	12.9		1586	123	77.7	80.7	122
ADJUST	16.5	37.2	11.5	19.6	40.2	12.9		1586	123	77.7	80.7	122

Time												
9:30 - 9:45	791	792										
9:45 - 10:00	792	793	794									
10:00 - 10:15	795	797	797									
10:15 - 10:30	798	799	798									
10:30 - 10:45	799	799	799									
10:45 - 11:00	800	800	800									
11:00 - 11:15	800	800	800									
11:15 - 11:30	800	800	800									
11:30 - 11:45	800	800	800									
11:45 - 12:00	805	807	807									
12:00 - 12:15	812	811	811									
12:15 - 12:30	812	812	812									
12:30 - 12:45	814	811	811									
12:45 - 13:00	814	813	813									
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46:00 - 46:15	814	813	813									
46:15 - 46:30	814	813	813									

TIME												
11:30-11:45	15.8	2.04	11.0	82			101	15.8			2.04	11.0
11:45-12:00	15.9	1.92	10.5	171	2.57	507	914	15.9	1.92	1.1	2.0	10.5
12:00-12:15	15.7	1.97	10.1	157	2.05							
12:15-12:30	15.1	2.01	10.4	151	3							
12:30-12:45	15.9	1.94	10.5	151	2.71	224	717	15.9	1.94	1.1	2.0	10.5
12:45-13:00	15.3	1.99	10.7	152	2.22	366	727	15.3	1.97	1.2	2.0	10.7
13:00-13:15	15.7	2.20	10.4	152	3.51	427	725	15.7	2.2	1.2	2.51	10.4
13:15-13:30	15.5	2.25	10.4	242	3.50	251	725	15.5	2.25		3.86	10.4
13:30-13:45	* 15.6	* 1.86	* 8.50	* 3545	* 2.82	* 301		* 15.6	* 1.86	* 7.01	* 2.02	* 8.21
13:45-14:00	15.6	2.12	8.86	201	2.29	327	910	15.6	2.12	2.01	2.29	8.87
14:00-14:15	15.8	1.99	9.30	213	2.31	322	908	15.8	1.97	2.03	2.31	9.32
14:15-14:30	15.7	1.94	9.62	204	3.21	255	923	15.7	1.94	2.04	3.21	9.65
14:30-14:45	15.6	2.12	9.75	174	4.20	266	914	15.6	2.12			
14:45-15:00	15.1	2.25	1.12	258	5.03	437	621	15.1	2.68	2.58	1.12	2.1
15:00-15:15	BUILT IN	2.04										
15:15-15:30	15.1	1.93	9.34	21	1.11	215	711	15.1	1.93			
15:30-15:45	15.8	2.07	8.60	241	2.29	293	728	15.8	2.07	2.41	2.29	8.73
15:45-16:00	15.7	2.07	7.79	194	2.21	301	924	15.7	2.07	1.94	2.21	8.07
16:00-16:15	251	33.24	158.37	3294	46.70	5237	14886	244.18	34.16	3391	56.22	5203
16:15-16:30	15.7	2.08	9.90	2059	2.92	327	930	15.26	2.14	212	3.51	325
16:30-16:45	%	%	%	PPM	PPM	PPM	PPM	%	%	PPM	PPM	PPM

TIME													
11:30 - 11:45	54.3	14.2	0.470	189	209	189	54.3	4.52	-111	-111	8.17		
11:45 - 12:00	54.4	14.2	0.467										
12:00 - 12:15	54.6	14.2	0.485	189	209	189							
12:15 - 12:30	54.5	14.1	0.473	189	209	189	54.6	4.52	-111	-111			
12:30 - 12:45	54.7	14.1	0.471	189	209	189	54.7	4.52	-111	-111			
12:45 - 13:00	54.4	14.1	0.476	190	209	190	54.4	4.52	-111	-111	8.17		
13:00 - 13:15	54.3	14.2	0.464	189	209	189	54.3	4.55	-111	-111	8.17		
13:15 - 13:30	54.3	14.2	0.480	189	209	189	54.3	4.55	-111	-111	8.20	110	
13:30 - 13:45	54.2	14.2	0.481	190	209	190	54.2	4.54	-111	-111	8.23	109	
13:45 - 14:00	54.3	14.2	0.513	189	209	189	54.3	4.51	-111	-111	8.41		
14:00 - 14:15	54.2	14.1	0.468	189	209	189	54.2	4.52	-111	-111	8.40	107	
14:15 - 14:30	54.2	14.1	0.480	189	208	189	54.2	4.58	-111	-111	8.11	107	
14:30 - 14:45	54.7	14.1	0.471	189	209	189	53.9	4.51	-111	-111	8.21	110	
14:45 - 15:00	52.1	14.1	0.487	189	208	189	52.1	4.51	-111	-111	7.50		
15:00 - 15:15	52.1	14.1	0.487			190	55.0	4.56	-111	-111	8.20	102	
15:15 - 15:30	52.1	14.1	0.487			190	55.0	4.56	-111	-111	8.20	102	
15:30 - 15:45	54.3	14.2	0.461	189	209	189	54.3	4.38	-111	-111	8.38	105	
15:45 - 16:00	53.9	14.2	0.500	190	208	190	53.9	4.30	-111	-111	8.42	104	
TOTAL	121.7	240.6	8.0	3219	3551	3219	921.70	76.97	-1887	-1887	140.76	1422	
AVERAGE	54.2	14.1	0.470	189	209	189	54.2	4.53	-111	-111	8.28	107	
UNIT :	LB/MIN	PSIA	IN H ₂ O	PSIA	PSIA	PSIA	PSIA	IN H ₂ O	PSIA	PSIA	IN H ₂ O	PSIA	

3-14

	Time												
3-15	11:30 - 11:45	116	116	96.8	24.7	8.21	3.04	9.03	0.843	94.6	60.7	0.410	14.5
	11:45 - 12:00	117	115	96.7	24.7	8.28	3.02	9.03	0.843	94.6	60.7	0.407	14.5
	12:00 - 12:15	118	115	96.7	24.7	8.28	3.02	9.03	0.843	94.6	60.7	0.407	14.5
	12:15 - 12:30	118	115	96.7	24.7	8.28	3.02	9.03	0.843	94.6	60.7	0.407	14.5
	12:30 - 12:45	118	115	96.7	24.7	8.28	3.02	9.03	0.843	94.6	60.7	0.407	14.5
	12:45 - 13:00	119	115	96.8	24.7	8.29	3.04	9.03	0.843	94.6	60.7	0.410	14.5
	13:00 - 13:15	122	111	93.0	24.7	8.50	3.02	9.04	0.841	94.6	60.8	0.407	14.5
	13:15 - 13:30	121	109	91.6	24.7	8.28	3.04	9.03	0.843	94.6	60.7	0.381	43.8
	13:30 - 13:45	120	109	91.5	24.8	8.23	3.02	9.02	0.846	94.6	61.0	0.406	45.6
	13:45 - 14:00	120	109	91.4	24.7	8.21	3.02	9.03	1.01	94.6	61.0	0.406	14.5
	14:00 - 14:15	120	109	91.4	24.7	8.10	3.03	9.03	0.846	94.6	60.9	0.394	14.5
	14:15 - 14:30	120	109	91.6	24.7	8.11	3.02	9.04	1.20	94.6	61.0	0.399	14.8
	14:30 - 14:45	121	109	90.9	24.7	8.21	3.04	9.03	0.745	93.8	60.8	0.409	14.5
	14:45 - 15:00	116	106	88.3	24.6	7.30	3.02	9.02	1.02	90.7	60.7	0.406	14.5
	15:00 - 15:15	BOILER DOWN	DOWN										
	15:15 - 15:30	112	126	92.1	24.5	8.13	3.04	9.03	1.12	93.8	62.4	0.410	14.5
	15:30 - 15:45	116	117	97.0	24.7	8.58	3.03	9.01	1.05	94.2	61.6	0.403	14.5
15:45 - 16:00	114	116	96.5	24.7	8.42	3.04	9.03	0.704	93.2	60.7	0.407	14.5	
	TOTAL	2008	1921	1548.5	420.1	140.76	51.46	153.15	14.67	1548.9	1040.6	6.83	2241.9
	AVERAGE	118	113	94.0	24.7	8.28	3.03	9.03	0.860	94.6	61.2	0.400	14.5
	UNIT	PSIA	PSIA	PSIA	PSIA	IN H2O	PSIA	PSIA	IN H2O	PSIA	PSIA	PSIA	IN H2O

TIME													
11:30 - 11:45	- 37.5	17.2	0.0147	1.10	0.615	371	409	-97.4	2765	15214	747	112	
11:45 - 12:00	- 37.5	17.2	0.0029	1.21	0.618	373	411	-97.4	2765	15214	747	112	
12:00 - 12:15	- 37.5	17.2	0.0024	1.22	0.622	374	412	-97.4	2765	15214	747	112	
12:15 - 12:30	- 37.5	19.4	0.0032	1.23	0.625	382	418	-97.4	2765	15214	747	112	
12:30 - 12:45	- 37.5	17.2	0.0024	1.10	0.615	371	409	-97.4	2765	15214	747	112	
12:45 - 13:00	- 37.5	19.3	0.0047	1.24	0.626	374	415	-97.4	2765	15214	747	112	
13:00 - 13:15	- 37.5	18.7	-0.0032	1.24	0.634	378	415	-97.4	2765	15214	747	112	
13:15 - 13:30	- 37.5	18.2	0.0024	1.20	0.608	373	409	-97.4	2765	15214	747	112	
13:30 - 13:45	- 37.5	18.1	-	1.20	0.605	372	408	-97.4	2765	15214	747	112	
13:45 - 14:00	- 37.5	18.2	0.0073	1.23	0.625	376	412	-97.4	2765	15214	747	112	
14:00 - 14:15	- 37.5	18.2	-0.0049	1.21	0.616	371	411	-97.4	2765	15214	747	112	
14:15 - 14:30	- 37.5	18.2	-0.0073	1.21	0.616	371	411	-97.4	2765	15214	747	112	
14:30 - 14:45	- 37.5	18.3	-0.0013	1.22	0.621	377	414	-97.4	2765	15214	747	112	
14:45 - 15:00	- 37.5	18.2	0.0077	1.14	0.618	371	411	-97.4	2765	15214	747	112	
15:00 - 15:15	- 37.5	17.5	0.0122	1.06	0.657	383	421	-97.4	2765	15214	747	112	
15:15 - 15:30	- 37.5	17.2	0.0024	1.03	0.653	384	421	-97.4	2765	15214	747	112	
15:30 - 15:45	- 37.5	17.2	0.0024	1.03	0.640	343	421	-97.4	2765	15214	747	112	
15:45 - 16:00	- 37.5	19.4	-0.0147	1.03	0.640	343	421	-97.4	2765	15214	747	112	
TOTAL	-637.5	318.5	0.050	20.12	10.577	5226	7038	-1656.8	31164.2	17311.2	1873.3	111	
AVERAGE	-37.5	18.7	0.0029	1.12	0.622	378	414	-97.4	1833	10231	75.9	111	
IN H2O	IN H2O	IN H2O	IN H2O	IN H2O	IN H2O	F	F	F	F	F	F	F	

TIME													
12-12-12-25	131	99.5	112					222	94	348			
12-25	134	99.5											
12-15 12-30	135	102	113	113	206								
12-30 12-45	134	101	112	113	205	224	230						
12-45 13-00	135	100	110	111	205								
13-00-13-15	134	101	110	110	205	1061	67.5	324	347	354	78.4	367	
13-15 13-30	134	101	110	109	208	861	67.2	328	349	350	78.1	367	
13-30-13-45	131	98.6	108	107	210	-10.5	67.0	328		346	78.4	361	
13-45 14-00	130	96.5	106	107	207	209.1	68.1	328	345	347	78.2	364	
14-00-14-15	130	99.4	108	108	207	218.1	67.5	320	344	347	78.5	365	
14-15-14-30	130	98.5	108	107	207	1648	67.5	332	344	351	78.2	367	
14-30-14-45	129	98.9	107	106	210	568	68.2	323	347	352	78.5	367	
14-45 15-00	129	98.0	106	106	210	-186	68.1	331	347	351	78.2	364	
15-00 15-15													
15-15 15-30													
16-05-16-30	131	99.0	109	110	210	-178	68.2	335	351	352	78.2	367	
16-30 16-45	134	101	110	110	214	36.9	71.1	336	352	354	78.3	372	
16-45 17-00	129	97.7	108		207	-12.0	68.2	337	354	355	78.5	372	
TOTAL	2239	1690.4	1852	1857	3516	*	1164.9	5640	5704	5961	1284.5	1287	
AVERAGE	132	99.4	109	109	207	*	68.5	332	347	351	78.1	367	
10.1	1	1	1	1	1	1	1	1	1	1	1	1	

TIME													
11:30 - 11:45	159	365	105	175	411	98.6		127	1572	109	67.7	1959	1254
	159	365	106	185	405	98.6		127	1572	109	67.7	1959	1254
12:00 - 12:15	159	365	107	183	403	98.6	127	1572	109	67.7	1959	1254	
12:15 - 12:30	171	367	111	183	415	99.7	127	1572	111	68.2	1962	1257	
12:30 - 12:45	170	367	111	185	415	99.7	127	1572	111	68.2	1962	1257	
12:45 - 13:00	170	367	110	187	414	99.7	127	1572	111	68.2	1962	1257	
13:00 - 13:15	170	368	110	183	414	98.6	124	1571	108	66.7	1955	1247	
13:15 - 13:30	171	368	104	189	424	99.7	120	1566	110	68.2	1962	1257	
13:30 - 13:45	172	368	101	190	424	99.7	119	1566	109	68.2	1962	1257	
13:45 - 14:00	170	366	110	189	413	98.6	116	1562	106	68.1	1962	1257	
14:00 - 14:15	171	367	110	188	415	99.7	117	1562	106	68.1	1962	1257	
14:15 - 14:30	170	369	110	188	417	99.7	117	1562	106	68.1	1962	1257	
14:30 - 14:45	170	369	109	188	417	99.7	117	1562	106	68.1	1962	1257	
14:45 - 15:00	170	369	109	188	420	100	118	1562	107	68.2	1964	1257	
15:00 - 15:15	154	367	104	187	415	101	127	1545	107	68.5	1965	1260	
16:30 - 16:45	155	370	104	187	412	102	129	1545	111	68.5	1965	1260	375
16:45 - 17:00	152	365	104	190	400	101	129	1545	111	68.5	1965	1260	375
Σ 3-18	2841	6243	1811.4	3168	7041	1692.7	2092	36724	1849	1150.7	3330.5	21216	
17:00 - 17:15	167	367	106	186	414	99.6	123	1572	109	67.7	1959	1254	
17:15 - 17:30	1	1	1	1	1	1	1	1	1	1	1	1	

[illegible]

[illegible]

SECTION 4
SAMPLING DATA SHEETS

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FIELD DATA

Page 1 of 1

Plant TECO / DCL
Date 5/10/88
Sample Location Pointe aux Indes
Sample Type 10 3/8
Run Number 1
Operator W. J. M. M. M.
Ambient Temperature 15.5
Barometric Pressure 29.13
Static Pressure, (H₂O) — 0.5" H₂O
Filter Number(s) PLV-140-058

Leak Check: Initial at 14 " Hg, 0.005 CFM
Final at 20 " Hg, 0.012 CFM
Pitot Leak Check: 0.05

Impinger Volumes

Initial	Final	Net Gain
1/20/0	6/20/0	17/0
1/25/8	6/24/9	7/6
4/24/7	4/25/7	1/7
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
Silica Gel		
7/24/1	2/26/5	4/8
_____	_____	_____

SASS Condensate

Total Volume

Probe Length and Type

Nozzel Size & I.D. _____

Pitot Coefficient & I.D. 0.98 1.1

Assumed Moisture 7.4

Molecular Weight, Dry. (M_d) 20 5-

Meter Box Number 22

Meter Coefficient 0 10 100 200

α Factor 11 / 01 8 / 1 34

K - 52-42

$$K(\text{Nd})^4 = \quad \times (\quad)^4 = 1.2 \times 10^{-10}$$
$$\Delta H = K(N_d)^4 \left(\frac{T_m}{T_s} \right) (P)$$

Traverse Point Number	Clock Time (24-hr) Clock		Gas Meter Reading (V _m), ft ³	Velocity Head (ΔP _v), in. H ₂ O	Orifice Pressure Differential (ΔH), in. H ₂ O		Temperature of							Pump Vacuum in. Hg	Avg. √ΔP
	Sampling Time, min	Init.			Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	Gas Meter			
												In	Out		
5-23"	6	11-10	190-543												
5-23"	8	11-15	197-420	0.8	1.75	1.75	520	287			210	76	77	1	1.00
5-23"	10	11-20	203-439	0.9	1.64	1.65	515	280			200	76	76		0.979
5-23"	24	11-34	210-550	0.80	1.55	1.55	506	260			200	80	79	1	0.962
5-21"	31	11-42	204-550	0.60	1.10	1.10	503	260			200	82	81	2	0.90
5-23"	40	11-50	212-420	0.70	1.41	1.40	500	260			220	82	84	1	0.952
1-10"	42	11-58	222-462	0.50	1.02	1.02	500	270			200	84	86	3	0.907
15-23"	8		200-042	0.55	1.55	1.52	534	284			205	80	76	1	0.91
15-23"	11		233-642	0.90	1.73	1.72	531	261			200	82	80	1	0.90

7602/5/81/Rev 1

Comments:

Probe Length and Type 5 ft
 Nozzel Size & I.D. 0.252
 Pitot Coefficient & I.D. 0.754 P102
 Assumed Moisture 0.09
 Molecular Weight, Dry, (M_d) 30.30
 Meter Box Number 82
 Meter Coefficient 0.711 / 3933
 α Factor 7.003 / 1.034
 $K =$ 822.14
 $K(N_d)^4 = \underline{\hspace{1cm}} \times (\underline{\hspace{1cm}})^4 = \underline{\hspace{1cm}} 3315$
 $\Delta H = K(N_d)^4 \left(\frac{T_m}{T_s} \right) \quad (P)$

SASS Condensate _____
Total Volume 153.5

[illegible]

7602/5/81/Rev 1

Comments:

Traverse Point Number	Sampling Time, min	Clock Time (24-hr) Clock	Gas Meter Reading (V _m), ft ³	Velocity Head (ΔP _s), in. H ₂ O	Orifice Pressure Differential (ΔH), in. H ₂ O		Temperature of					Gas Meter		Pump Vacuum in. Hg	Avg. √ΔP	
					Desired	Actual	Stack	Probe	Impinger	Organic Module	Oven	In	Out			
			Init.													
6	23"	6	1431	—	0.80	1.45	1.45	500	256			250	77	77	8.5	0.90
5	20"	12	1437	275.75	0.85	1.50	1.50	506	255			252	78	77	8.5	0.92
4	16"	18	1443	279.77	0.90	1.54	1.54	503	251			258	78	77	9.0	0.94
3	7.1"	24	1449	—	0.55	0.97	0.97	505	246			249	79	79	6.0	0.74
2	35"	30	1455	287.28	0.48	0.85	0.85	503	240			250	79	78	6.0	0.69
1	1.0"	36		240.39												
				291.238												
				31.63 minutes	Boiler	OFF,				SPRAY						
										N O Z Z I E						
										P L U G G E D						

Run No. 2 M 5/8

Date 6/17/82

Sampling Location 700 HP Boiler
INLET TO BAG HOUSE

Comments:

22-11-83 0.029 AIRFLOW
 11-1-80 0.022 CFM

7602/5/81/Rev 1

Comments: 1240 sparse, most of them small
1242 dense filter about collection box + capsule
1245 dense filter - but small capsule

SECTION 5
ANALYTICAL RESULTS

- 5.1 FUEL ANALYSIS
- 5.2 SASS PARTICULATE EMISSIONS
- 5.3 EPA METHOD 5 PARTICULATE EMISSIONS
- 5.4 EPA METHOD 8 ANALYSES (SULFUR OXIDES)
- 5.5 TRACE ELEMENT ANALYSES
- 5.6 C₁ TO C₆ HYDROCARBONS BY GAS CHROMATOGRAPHY
 - 5.6.1 FROM JUNE 11, 1982
 - 5.6.2 FROM JUNE 17, 1982
- 5.7 N₂O BY GAS CHROMATOGRAPHY
- 5.8 TOTAL CHROMATOGRAPHABLE ORGANICS (TCO), GRAVIMETRIC ORGANICS (GRAV), IR SPECTRA, GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS), LIQUID CHROMATOGRAPHY (LC), AND LOW RESOLUTION MASS SPECTROMETRY (LRMS)
- 5.9 BIOASSAY REPORTS

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5.1 FUEL ANALYSIS

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September 10, 1982

Mr. Robert DeRosier
Project Engineer
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

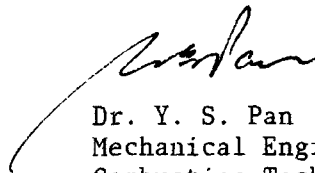
Dear Mr. DeRosier:

At your request, I am sending you four copies of the laboratory analyses for the following samples:

1. Coal used during the coal-water mixture (CWM) test on June 17, 1982.
2. Fly ash (2) collected during the same test.
3. Furnace ash collected from the boiler after the test.

The CWM used on June 17 contained 59.4 percent dry coal, 0.5 percent Lomar D, and the remainder was water.

Sincerely,



Dr. Y. S. Pan
Mechanical Engineer
Combustion Technology Branch

4 Enclosures



COAL-ANALYSIS REPORT

USED

LAB NO. L14787

ORGANIZATION: COMBUSTION TECHNOLOGY
SAMPLE ID: COMB #UC2-4-27-#2; 2% ASH VA.

CAN NO: -

OPR: -
STATE: - COUNTY: -
TOWN: -MINE: -
BED: -DATE OF SAMPLING: 4-27-82 DATE RECEIVED: 5-18-82 DATE OF REPORT: 6-4-82
COLLECTOR: T. BROWNCOAL COAL COAL
[AS RECD.] [MOIST FREE] [MOIST, ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	1.92	N/A	N/A
VOLATILE MATTER	39.97	40.76	41.85
FIXED CARBON	55.54	56.62	58.15
ASH	2.57	2.62	N/A

ULTIMATE ANALYSIS

HYDROGEN	5.70	5.60	5.75
CARBON	80.65	82.23	84.45
NITROGEN	1.57	1.60	1.65
SULFUR	1.17	1.19	1.22
OXYGEN [IND]	8.34	6.76	6.95
ASH	2.57	2.62	N/A

HEATING VALUE [BTU/LB] 14544 14829 15228

MAJOR ELEMENTS IN ASH

SILICA	38.88
AL2 O3	32.97
FE2 O3	18.79
TI O2	1.56
CA O	5.49
MG O	.48
NA2 O	1.47
K2 O	1.68
SULFITES	1.36



COAL-ANALYSIS REPORT

LAB NO. L15816

ORGANIZATION: COMBUSTION TECHNOLOGY
SAMPLE ID: COMB; #150-~~70~~-C; FLYASH 700 HP
104

CAN NO: -

OPR: -
STATE: - COUNTY: -
TOWN: -MINE: -
BED: -

150 #2

DATE OF SAMPLING: 6-17-82 DATE RECEIVED: 7-12-82 DATE OF REPORT: 7-14-82
COLLECTOR: T. BROWN

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST, ASH FREE]
MOISTURE	3.13	N/A	N/A
ASH	35.58	36.73	N/A
HYDROGEN	.73	.40	.63
CARBON	58.25	60.13	95.05
SULFUR	.84	.87	1.37



COAL-ANALYSIS REPORT

LAB NO. L15821

ORGANIZATION: COMBUSTION TECHNOLOGY
SAMPLE ID: COMB; #150-70-C; FLYASH 700 HP

CAN NO: -

OPR: -
STATE: - COUNTY: -
TOWN: -MINE: -
BED: -

150 #1

DATE OF SAMPLING: 6-17-82 DATE RECEIVED: 7-12-82 DATE OF REPORT: 7-14-82
COLLECTOR: T. BROWN

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST, ASH FREE]
MOISTURE	3.27	N/A	N/A
ASH	32.92	34.03	N/A
HYDROGEN	.94	.60	.90
CARBON	60.94	63.00	95.50
SULFUR	.81	.84	1.27



COAL-ANALYSIS REPORT

B2UFAZ
6-17-82

LAB NO. L15825

ORGANIZATION: COMBUSTION TECHNOLOGY

SAMPLE ID: COMB; #ASH 6-22-1; FURNACE ASH 700 HP
CAN NO: -

OPR: -

MINE: -

STATE: - COUNTY: -

BED: -

TOWN: -

DATE OF SAMPLING: 6-17-82 DATE RECEIVED: 7-12-82 DATE OF REPORT: 7-15-82
COLLECTOR: T. BROWNCOAL
[AS RECD.]COAL
[MOIST FREE]COAL
[MOIST, ASH FREE]

MOISTURE

ASH

.....	1.34	.....	N/A	.....	N/A
.....	54.53	.....	55.27	.....	N/A

HYDROGEN

CARBON

SULFUR

.....	1.90	.....	1.78	.....	3.97
.....	35.23	.....	35.71	.....	79.84
.....	2.62	.....	2.66	.....	5.95

LABORATORY CERTIFICATE

COPY

CURTIS & TOMPKINS, LTD.

ESTABLISHED 1878

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

SOUTHERN DIVISION
401 Canal Street
Wilmington, CA 90748
213-549-6740
TWX 910-345-6620
ANALYST WILN

290 Division Street
San Francisco, CA 94103
415-861-1863
Telex: 171042
CABLE: ANALYST SFO

FOOD TECHNOLOGISTS
ENVIRONMENTAL ANALYSTS
MEMBERS, OFFICIAL CHEMISTS
AND/OR SAMPLERS FOR GOVERNMENT
AGENCIES AND TRADE ORGANIZATIONS

Laboratory No. 82m33
Preliminary No. 0684

Reported 11/3/82
Sampled -----
Received 10/26/82

For ACUREX CORPORATION

Report on 2 samples of Compost

Mark 1) Job #307735.41, Pele/DOF Date 6-17-82, Coal Water
2) Fuel Composite 2A + 2B, A82-04-043
Subcontract No. RB59186A, Release No. 4, Purchase Order
No. EM 93331A.

	DRY BASIS
	1
Carbon (C), %	75.37
Hydrogen (H), %	5.25
Oxygen (O) (by difference), %	13.49
Sulfur (S):	
First Run, %	1.20
Second Run, %	1.30
Third Run, %	1.28
Nitrogen (N):	
First Run, %	1.62
Second Run, %	1.56
Third Run, %	1.62
Specific Gravity 60°F	--
Higher Heating Value:	
BTU per Pound	14,451
Moisture (as received), %	36.45
Specific Gravity (as received)	
72°F/72°F	1.1655

6-17-82
CWS fuel

5-10

Curtis & Tompkins Ltd.

SAMPLES DISCARDED 30 DAYS AFTER RECEIPT UNLESS OTHERWISE REQUESTED

5.2 SASS PARTICULATE EMISSIONS

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ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant PETCPerformed by DePuy, et alDate 6-17-82Sample Location Boiler outletTest No./Type 1 - SASS

Barometric Pressure (in. Hg)	P_b	29.00
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha} \right) \left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460} \right)$ $17.64 \left(\frac{344.34}{1.017} \right) \left(\frac{(29) + \frac{13}{13.6}}{(28.3) + 460} \right)$	$V_{m \text{ std}}$	315.224
Volume of liquid collected (grams)	V_{l_c}	1025
Volume of liquid at standard condition (scf) $V_{l_c} \times 0.04707$	$V_{w \text{ std}}$	48.25
Stack gas proportion of water vapor $\frac{V_{w \text{ std}}}{V_{w \text{ std}} + V_{m \text{ std}}}, \frac{48.25}{48.25 + 315.224}$	B_{wo}	13.3
Molecular weight, stack gas dry (lb/lb-mole) $(\% \text{ CO}_2 \times 0.44) + (\% \text{ O}_2 \times 0.32) + (\% \text{ N}_2 + \% \text{ CO} \times 0.28)$ $(15.6 \times 0.44) + (20.8 \times 0.32) + (80.2 \times 0.28)$	M_d	30.58
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo}), 30.58(1-13.3) + 18(13.3)$	M_s	28.91
Absolute stack pressure (in. Hg) $P_b + \frac{P_{\text{stack}} (\text{in. H}_2\text{O})}{13.6}, 29.00 + \frac{(-30)}{13.6}$	P_s	28.78

Temperature stack gas, average (°F)	T_s	525
Stack velocity (fps) $85.49 (C_p) (\sqrt{4P_{s \text{ avg}}}) \sqrt{\frac{T_{s \text{ avg}} + 460}{P_s M_s}}$ $85.49 (\underline{0.814}) (\sqrt{4(28.78)}) \sqrt{\frac{(525) + 460}{(28.78)(28.9)}}$	$V_{s(\text{avg})}$	62.92
Total sample time (minutes)	θ	115
Nozzle diameter, actual (inches)	N_d	0.559
Percent isokinetic (%) $17.33 (T_s + 460)(V_w \text{ std} + V_m \text{ std})$ $\frac{\theta V_s P_s N_d^2}{17.33 (525 + 460)(118.25 + 875.224)}$ $\frac{(115)(62.92)(28.78)(0.559)^2}{(115)(62.92)(28.78)(0.559)^2}$	%I	95.4
Area of stack (ft ²) $\pi = 3.1416$ $\pi r^2 \div 144, \quad \pi (\underline{2})^2 \div 144$	A_s	3.1416
Stack gas volume at standard conditions (dscfm) $60 (1 - B_{wo}) V_{s \text{ avg}} A_s \left(\frac{528}{T_{s \text{ avg}} + 460} \right) \left(\frac{P_s}{29.92} \right)$ $60 (1 - \underline{0.33}) (\underline{62.92}) (\underline{3.1416}) \left(\frac{528}{525 + 460} \right) \left(\frac{28.78}{29.92} \right)$	Q_s	5302
Particulate matter concentration, dry (gr/dscf) $15.432 \frac{M_p(\text{grams})}{V_{m \text{ std}}}, \quad 15.432 \frac{(\underline{60.8338})}{(\underline{315.224})}$	$C_{s(\text{std})}$	2.978
Emission rate of particulate matter (lb/hr) $0.00857 (Q_s) C_{s(\text{std})}, \quad 0.00857 (\underline{5302}) (\underline{2.978})$	E_p	135.3



CUSTOMER CMEA DATE
CUSTOMER CONTRACT NO. 307736.42 ACUREX CONTRACT NO. A82-06-026
RESULTS REPORT TO L. Waterland TELEPHONE
ADDRESS PETC-DOE

[illegible]ANALYST J. Labash

REVIEWER G. Nicoll

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5.3 EPA METHOD 5 PARTICULATE EMISSIONS

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ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant P.L.C. / D.L.C.

Performed by J. J. J. J.

Date 11-11-82

Sample Location Exhaust to Atmosphere

Test No./Type 11-5/8 12 #1

Barometric Pressure (in. Hg)	P_b	29.13
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha} \right) \left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460} \right)$ $17.64 \left(\frac{(7582)}{(723)} \right) \left(\frac{(29.13) + \frac{(44.1)}{13.6}}{(527.1) + 460} \right)$	$V_{m \text{ std}}$	43.406
Volume of liquid collected (grams)	V_{l_c}	307.1
Volume of liquid at standard condition (scf) $V_{l_c} \times 0.04707$	$V_{w \text{ std}}$	9.748
Stack gas proportion of water vapor $\frac{V_{w \text{ std}}}{V_{w \text{ std}} + V_{m \text{ std}}} = \frac{(9.748)}{(9.748) + (43.406)}$	B_{wO}	18.34%
Molecular weight, stack gas dry (lb/lb-mole) $(\% \text{ CO}_2 \times 0.44) + (\% \text{ O}_2 \times 0.32) + (\% \text{ N}_2 + \% \text{ CO} \times 0.28)$ $(\text{ } \times 0.44) + (\text{ } \times 0.32) + (\text{ } + \text{ } \times 0.28)$	M_d	30.20
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wO}) + 18(B_{wO}), (\text{ })(1-\text{ }) + 18(\text{ })$	M_s	28.09
Absolute stack pressure (in. Hg) $P_b + \frac{P_{\text{stack}} (\text{in. H}_2\text{O})}{13.6} = \frac{(29.13)}{13.6} + \frac{(-1.25)}{13.6}$	P_s	28.95

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Temperature stack gas, average (°F)	T _s	521.1
Stack velocity (fps) $85.49 (C_p) (\sqrt{\Delta P_{s \text{ avg}}}) \sqrt{\frac{T_{s \text{ avg}} + 460}{P_s M_s}}$ $85.49 (0.778) \sqrt{\frac{(521.1) + 460}{(28.97)(29.92)}}$	V _s (avg)	6505
Total sample time (minutes)	θ	71.9
Nozzle diameter, actual (inches)	N _d	0.252
Percent isokinetic (%) $17.33 (T_s + 460)(V_w \text{ std} + V_m \text{ std})$ $\frac{\theta V_s P_s N_d^2}{17.33 (521.1 + 460)((9.748) + (43.408))}$ $\frac{(71.9)(6505)(28.97)(0.252)^2}{(17.33)(521.1 + 460)((9.748) + (43.408))}$	%I	105.1
Area of stack (ft ²) $\pi = 3.1416$ $\pi r^2 \div 144, \pi (\text{inches})^2 \div 144$	A _s	3.1416
Stack gas volume at standard conditions (dscfm) $60 (1 - B_{wo}) V_{s \text{ avg}} A_s \left(\frac{528}{T_{s \text{ avg}} + 460} \right) \left(\frac{P_s}{29.92} \right)$ $60 (1 - 0.034) (6505) (3.1416) \left(\frac{528}{521.1 + 460} \right) \left(\frac{28.97}{29.92} \right)$	Q _s	5213.9
Particulate matter concentration, dry (gr/dscf) $15.432 \frac{M_p (\text{grams})}{V_{m \text{ std}}}, 15.432 \frac{(\text{grams})}{(43.406)}$	C _s (std)	
Emission rate of particulate matter (lb/hr) $0.00857 (Q_s) C_{s(\text{std})}, 0.00857 (5213.9) (\text{grams})$	E _p	

7602/5/81/Rev 1

ISOKINETIC PERFORMANCE WORKSHEET & PARTICULATE CALCULATIONS

Plant PETC / DOE

Performed by Murtiff

Date 6/17/82

Sample Location DOC HP Boiler, Inlet to Bag House

Test No./Type 2 m 5/8

Barometric Pressure (in. Hg)	P_b	28.92
Meter volume (std), $17.64 \left(\frac{V_m}{\alpha} \right) \left(\frac{P_b + \frac{\Delta H}{13.6}}{T_m + 460} \right)$ $17.64 \left(\frac{(4.131)}{(1.002)} \right) \left(\frac{(28.92) + \frac{(1.225)}{13.6}}{(75.7) + 460} \right)$	$V_{m \text{ std}}$	39.174
Volume of liquid collected (grams)	V_{l_c}	153.5
Volume of liquid at standard condition (scf) $V_{l_c} \times 0.04707$	$V_{w \text{ std}}$	7.225
Stack gas proportion of water vapor $\frac{V_{w \text{ std}}}{V_{w \text{ std}} + V_{m \text{ std}}} = \frac{(7.225)}{(7.225) + (39.174)}$	B_{wo}	15.57%
Molecular weight, stack gas dry (lb/lb-mole) $(\% \text{ CO}_2 \times 0.44) + (\% \text{ O}_2 \times 0.32) + (\% \text{ N}_2 + \% \text{ CO} \times 0.28)$ $(14 \times 0.44) + (3 \times 0.32) + (83 + \text{---} \times 0.28)$	M_d	30.36
Molecular weight, stack gas wet (lb/lb-mole) $M_d(1-B_{wo}) + 18(B_{wo})$, $(30.36)(1-0.1557) + 18(0.1557)$	M_s	28.44
Absolute stack pressure (in. Hg) $P_b + \frac{P_{\text{stack}} (\text{in. H}_2\text{O})}{13.6}$, $(28.92) + \frac{(-3.0)}{13.6}$	P_s	28.70

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Temperature stack gas, average (°F)	T_s	505
Stack velocity (fps) $85.49 (C_p) (\sqrt{\Delta P_{s \text{ avg}}}) \sqrt{\frac{T_{s \text{ avg}} + 460}{P_s M_s}}$ $85.49 (0.89) (\sqrt{0.831}) \sqrt{\frac{(505) + 460}{(28.7)(28.44)}}$	$V_{s(\text{avg})}$	60.95
Total sample time (minutes)	θ	67.63
Nozzle diameter, actual (inches)	N_d	0.252
Percent isokinetic (%) $\frac{17.33 (T_s + 460) (V_w \text{ std} + V_m \text{ std})}{\theta V_s P_s N_d^2}$ $\frac{17.33 (505 + 460) ((7.225) + (39.174))}{(67.63) (60.95) (28.70) (0.252)^2}$	%I	103.3
Area of stack (ft ²) $\pi = 3.1416$ $\pi r^2 \div 144, \quad \pi (\frac{12}{12})^2 \div 144$	A_s	3.146
Stack gas volume at standard conditions (dscfm) $60 (1 - B_{wo}) V_{s \text{ avg}} A_s \left(\frac{528}{T_{s \text{ avg}} + 460} \right) \left(\frac{P_s}{29.92} \right)$ $60 (1 - .155) (60.95) (3.146) \left(\frac{528}{505 + 460} \right) \left(\frac{28.7}{29.92} \right)$	Q_s	509.0
Particulate matter concentration, dry (gr/dscf) $15.432 \frac{M_p (\text{grams})}{V_m \text{ std}}, \quad 15.432 \frac{(\quad)}{(39.174)}$	$C_{s(\text{std})}$	
Emission rate of particulate matter (lb/hr) $0.00857 (Q_s) C_{s(\text{std})}, \quad 0.00857 (\quad) (\quad)$	E_p	

7602/5/81/Rev 1

ACUREX ANALYTICAL REPORT

Sample of: CMEA - PETC/DOE

Sample Date: 6/10 - 6/11/83

Requested By: L. Waterland / B. DeLozier

I.D. Number: 307735.41

Analytical Method: Gravimetric Analysis of Method 5/8 Filters + Probe Washes

Date of Analysis: 11/83

Lab I.D. Number	Component	Analytical Result	Unit
815511 TEST #1	Particulate Filter	Final WT - TARE WT = NET WT 4.68148g - 1.04080g = 3.64068g	Grams particulate
815510 TEST #1	PROBE WASH (248 MLS)	68.31353g - 67.67063g = 0.6429g LESS BLANK = 0.64283g net	Grams particulate
815537 TEST #2	PARTICULATE FILTER	7.73567g - 1.03915g = 6.69652g	GRAMS PARTICULATE
815538 TEST #2	PROBE WASH (295 MLS)	69.01945g - 67.67063g = 1.34882g LESS BLANK = 1.34880g	GRAMS PARTICULATE
815501	2-Propanol Blank 150 MLS	68.36830 - 68.36829 = 0.00001g	GRAMS PARTICULATE

5-23

Analysis By Martin M. Murphy

Date 11/21/83

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5.4 EPA METHOD 8 ANALYSES (SULFUR OXIDES)

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ACUREX ANALYTICAL REPORT

Sample of: CMEH:PETC/DOE

Sample Date: 6/10 - 6/11/83

Requested By: L. Watland / B. DeRosier

I.D. Number: 307735.41

Analytical Method: Sulfate analysis of EPA 5/8 impinger samples

Date of Analysis: 11/21/83

Lab I.D. Number	Component	Analytical Result	Unit
815504	6% H ₂ O ₂ BLANK	0.0 INSTANT ENDPOINT	mg SO ₄ ⁻
815502 TEST # 1	2nd + 3rd Impingers (232 mls)	1534.8 } 1540.2 } AVG 1537.5	mg SO ₄ ⁻
815500 815503	1st Impinger Filter (247 mls)	4.2	mg SO ₄ ⁻
815501 TEST # 1	80% 2-Propanol Blank	0.0 INSTANT ENDPOINT	mg SO ₄ ⁻
815505	H ₂ O BLANK	0.0 INSTANT ENDPOINT	mg SO ₄ ⁻
815536 815539 TEST # 2	1st IMPINGER FILTER (270 mls)	0.0	mg SO ₄ ⁻
815540 TEST # 2	2nd + 3rd Impingers (262 mls)	3531.7	mg SO ₄ ⁻
815535	6% H ₂ O ₂ BLANK	0.0	mg SO ₄ ⁻

** 0.009785N BaCl₂ · 2 H₂O used for TITRANT

Analysis By Maria M. Myrsky

5-27

Date 11/21/83

5.5 TRACE ELEMENT ANALYSIS

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

Reply to



To: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: December 3, 1982

Subcontract #SW59159A
Release #8

Analyst: G. Meagher

P. O. No.:

REVISED

Sample No.: 815223
PETC Fuel

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN PPM WEIGHT

IAD No.: 97-K776-116-11

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	0.5	Terbium	0.06	Ruthenium		Vanadium	3
Thorium	0.5	Gadolinium	0.2	Molybdenum	1	Titanium	63
Bismuth	0.03	Europium	0.07	Niobium	0.5	Scandium	0.3
Lead	2	Samarium	0.3	Zirconium	2	Calcium	MC
Thallium	0.2	Neodymium	0.6	Yttrium	4	Potassium	MC
Mercury	NR	Praseodymium	0.3	Strontium	34	Chlorine	3
Gold		Cerium	1	Rubidium	0.2	Sulfur	MC
Platinum		Lanthanum	2	Bromine	1	Phosphorus	37
Iridium		Barium	25	Selenium	0.3	Silicon	MC
Osmium		Cesium	0.2	Arsenic	1	Aluminum	>53
Rhenium		Iodine	0.2	Germanium	0.5	Magnesium	MC
Tungsten	0.1	Tellurium	0.2	Gallium	2	Sodium	>14
Tantalum	0.1	Antimony	0.4	Zinc	2	Fluorine	≈5
Hafnium	≤0.3	Tin	0.04	Copper	3	Oxygen	NR
Lutetium	0.01	Indium	STD	Nickel	2	Nitrogen	NR
Ytterbium	0.1	Cadmium	≤0.04	Cobalt	1	Carbon	NR
Thulium	≤0.02	Silver	0.2	Iron	MC	Boron	0.5
Erbium	0.1	Palladium		Manganese	2	Beryllium	0.4
Holmium	0.1	Rhodium		Chromium	2	Lithium	0.7
Dysprosium	0.2					Hydrogen	NR

Note: Sample thermally ashed @ 450°C
for ≈2 hrs. prior to analyses

STD — Internal Standard

NR — Not Reported

All elements not detected < 0.01 ppm

MC — Major Component >100 ppm

INT — Interference

5-31

Approved:

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: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 16, 1982

Subcontract #SW59159A
Release #8

Analyst: G. Meagher

P. O. No.:

Sample No.: Parr Bomb Blank

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-K776-116-11

CONCENTRATION IN $\mu\text{g/ml}$

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.006
Thorium		Gadolinium		Molybdenum	0.04	Titanium	0.3
Bismuth		Europium		Niobium	≤ 0.01	Scandium	≤ 0.004
Lead	≤ 0.02	Samarium		Zirconium	0.03	Calcium	3
Thallium		Neodymium		Yttrium	≤ 0.002	Potassium	0.4
Mercury	NR	Praseodymium		Strontium	0.008	Chlorine	0.8
Gold		Cerium		Rubidium	≤ 0.002	Sulfur	0.05
Platinum		Lanthanum		Bromine	0.03	Phosphorus	≤ 0.01
Iridium		Barium	0.09	Selenium		Silicon	0.5
Osmium		Cesium		Arsenic	0.003	Aluminum	0.02
Rhenium		Iodine		Germanium		Magnesium	0.1
Tungsten		Tellurium		Gallium	0.02	Sodium	0.3
Tantalum	*0.7	Antimony		Zinc	0.2	Fluorine	≈ 0.1
Hafnium		Tin		Copper	0.06	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.02	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	≤ 0.005	Carbon	NR
Thulium		Silver		Iron	0.2	Boron	0.007
Erbium		Palladium		Manganese	0.007	Beryllium	
Holmium		Rhodium		Chromium	0.01	Lithium	0.005
Dysprosium						Hydrogen	NR

* Possible contamination from the source.

STD — Internal Standard

NR — Not Reported

All elements not detected $< 0.003 \mu\text{g/ml}$

MC — Major Component $> 10 \mu\text{g/ml}$

INT — Interference

5-32

Approved:

Robert L. Jorgensen
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.

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

Reply to

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042
Subcontract #SW59159A
Release #8



Date: November 16, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026-8 SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
PETC XAD

IAD No.: 97-K776-116-11

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.04
Thorium		Gadolinium		Molybdenum	0.6	Titanium	0.8
Bismuth		Europium		Niobium		Scandium	0.03
Lead	0.1	Samarium		Zirconium	0.9	Calcium	18
Thallium		Neodymium	0.07	Yttrium	0.04	Potassium	8
Mercury	NR	Praseodymium	0.3	Strontium	0.3	Chlorine	4
Gold		Cerium	0.6	Rubidium	<0.01	Sulfur	6
Platinum		Lanthanum	0.9	Bromine	0.2	Phosphorus	0.5
Iridium		Barium	1	Selenium	0.06	Silicon	5
Osmium		Cesium	0.01	Arsenic	≤0.01	Aluminum	0.5
Rhenium		Iodine	0.1	Germanium		Magnesium	3
Tungsten		Tellurium		Gallium	0.3	Sodium	2
Tantalum	*1	Antimony		Zinc	1	Fluorine	≈1
Hafnium		Tin		Copper	0.4	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.6	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.05	Carbon	NR
Thulium		Silver	0.1	Iron	22	Boron	0.03
Erbium		Palladium		Manganese	0.2	Beryllium	
Holmium		Rhodium		Chromium	0.4	Lithium	0.02
Dysprosium		* Possible contamination from the source.				Hydrogen	NR

STD — Internal Standard

NR — Not Reported

All elements not detected < 0.01 ppm

MC — Major Component > 100 ppm

INT — Interference

5-33

Approved:

Robert L. Jeyler
19 Nov 82

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: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 16, 1982

Subcontract #SW59159A
Release #8

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026-11
PETC XAD Blank

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-K776-116-11

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	<0.01
Thorium		Gadolinium		Molybdenum	0.06	Titanium	0.2
Bismuth		Europium		Niobium	<0.01	Scandium	<0.01
Lead	0.07	Samarium		Zirconium	0.3	Calcium	17
Thallium		Neodymium		Yttrium		Potassium	2
Mercury	NR	Praseodymium		Strontium	0.4	Chlorine	1
Gold		Cerium		Rubidium	<0.01	Sulfur	2
Platinum		Lanthanum		Bromine	0.06	Phosphorus	≤0.02
Iridium		Barium	0.7	Selenium		Silicon	4
Osmium		Cesium	<0.01	Arsenic	<0.01	Aluminum	0.1
Rhenium		Iodine	<0.01	Germanium		Magnesium	0.5
Tungsten		Tellurium		Gallium	0.1	Sodium	0.9
Tantalum	*2	Antimony		Zinc	0.3	Fluorine	≈0.2
Hafnium		Tin	0.09	Copper	0.3	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.2	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	<0.01	Carbon	NR
Thulium		Silver	0.02	Iron	3	Boron	<0.01
Erbium		Palladium		Manganese	0.03	Beryllium	
Holmium		Rhodium		Chromium	0.1	Lithium	<0.01
Dysprosium		* Possible contamination from the source.				Hydrogen	NR

STD - Internal Standard

NR - Not Reported

All elements not detected < 0.01 ppm

MC - Major Component > 100 ppm

INT - Interference

5-34

Approved:

Robert L. Taylor
12 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.

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

Reply to

To: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042
Subcontract #SW59159A
Release #8



Date: November 12, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026 4+5
PETC 10+15 µm ash SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-K776-116-11

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	16	Terbium	3	Ruthenium		Vanadium	180
Thorium	31	Gadolinium	5	Molybdenum	20	Titanium	MC
Bismuth		Europium	2	Niobium	19	Scandium	11
Lead	150	Samarium	17	Zirconium	230	Calcium	MC
Thallium		Neodymium	16	Yttrium	79	Potassium	MC
Mercury	NR	Praseodymium	21	Strontium	MC	Chlorine	410
Gold		Cerium	85	Rubidium	39	Sulfur	MC
Platinum		Lanthanum	75	Bromine	35	Phosphorus	MC
Iridium		Barium	MC	Selenium	15	Silicon	MC
Osmium		Cesium	3	Arsenic	30	Aluminum	MC
Rhenium		Iodine	4	Germanium	4	Magnesium	MC
Tungsten	9	Tellurium	1	Gallium	15	Sodium	MC
Tantalum	15	Antimony	11	Zinc	*88	Fluorine	≈160
Hafnium	4	Tin	1	Copper	110	Oxygen	NR
Lutetium	2	Indium	STD	Nickel	30	Nitrogen	NR
Ytterbium	6	Cadmium	6	Cobalt	14	Carbon	NR
Thulium	0.3	Silver	≤0.6	Iron	MC	Boron	8
Erbium	4	Palladium		Manganese	92	Beryllium	8
Holmium	6	Rhodium		Chromium	170	Lithium	25
Dysprosium	9					Hydrogen	NR

* Heterogeneous

STD — Internal Standard

NR — Not Reported

All elements not detected < 0.2 ppm
MC — Major Component > 1000 ppm

INT — Interference

5-35

Approved:

Robert L. Jeylen
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.

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

Reply to

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Subcontract #SW59159A
Release #8



Date: November 16, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026 3A+B

PETC 3 μ m + filter

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-K776-116-11

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	8	Terbium	0.6	Ruthenium		Vanadium	400
Thorium	9	Gadolinium	2	Molybdenum	26	Titanium	MC
Bismuth	2	Europium	1	Niobium	9	Scandium	61
Lead	77	Samarium	5	Zirconium	45	Calcium	MC
Thallium	6	Neodymium	6	Yttrium	120	Potassium	MC
Mercury	NR	Praseodymium	6	Strontium	MC	Chlorine	MC
Gold		Cerium	61	Rubidium	18	Sulfur	>330
Platinum		Lanthanum	54	Bromine	30	Phosphorus	MC
Iridium		Barium	MC	Selenium	29	Silicon	MC
Osmium		Cesium	0.3	Arsenic	440	Aluminum	MC
Rhenium		Iodine	3	Germanium	53	Magnesium	MC
Tungsten	3	Tellurium	0.4	Gallium	430	Sodium	MC
Tantalum	4	Antimony	18	Zinc	73	Fluorine	$\approx$ 180
Hafnium	0.8	Tin	6	Copper	710	Oxygen	NR
Lutetium	0.6	Indium	STD	Nickel	480	Nitrogen	NR
Ytterbium	3	Cadmium	3	Cobalt	270	Carbon	NR
Thulium	0.4	Silver	4	Iron	MC	Boron	120
Erbium	1	Palladium		Manganese	>530	Beryllium	4
Holmium	2	Rhodium		Chromium	170	Lithium	74
Dysprosium	3					Hydrogen	NR

STD - Internal Standard

NR - Not Reported

All elements not detected < 0.1 ppm

MC - Major Component > 1000 ppm

INT - Interference

5-36

Approved:

Robert L. Jeylin
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.

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

Reply to

To: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042
Subcontract #SW59159A
Release #8



Date: November 16, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: 815237
PETC Imp.1

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
CONCENTRATION IN $\mu\text{g/ml}$

IAD No.: 97-K776-116-11

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.02
Thorium		Gadolinium		Molybdenum	0.3	Titanium	0.1
Bismuth		Europium		Niobium	0.01	Scandium	0.04
Lead	0.02	Samarium		Zirconium		Calcium	1
Thallium		Neodymium		Yttrium	0.02	Potassium	1
Mercury	NR	Praseodymium		Strontium	0.04	Chlorine	0.04
Gold		Cerium		Rubidium	0.02	Sulfur	MC
Platinum		Lanthanum		Bromine	0.09	Phosphorus	0.2
Iridium		Barium	0.06	Selenium	0.2	Silicon	1
Osmium		Cesium		Arsenic	0.002	Aluminum	0.1
Rhenium		Iodine	0.004	Germanium	0.002	Magnesium	0.3
Tungsten		Tellurium	0.009	Gallium	0.03	Sodium	>7
Tantalum	0.02	Antimony	0.009	Zinc	0.4	Fluorine	≈ 1
Hafnium		Tin	0.03	Copper	0.2	Oxygen	NR
Lutetium		Indium	STD	Nickel	1	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.05	Carbon	NR
Thulium		Silver	0.01	Iron	MC	Boron	0.01
Erbium		Palladium		Manganese	0.9	Beryllium	
Holmium		Rhodium		Chromium	0.3	Lithium	0.002
Dysprosium						Hydrogen	NR

STD — Internal Standard

NR — Not Reported

All elements not detected < 0.002 $\mu\text{g/ml}$

MC — Major Component > 10 $\mu\text{g/ml}$

INT — Interference

5-37

Approved:

Robert L. Jorgensen
19 Nov 82

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: Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 16, 1982

Subcontract #SW59159A
Release #8

Analyst: G. Meagher

P. O. No.:

Sample No.: 815541
PETC Imp. 1 Blank

SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS

IAD No.: 97-K776-116-11

CONCENTRATION IN $\mu\text{g/ml}$

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.005
Thorium		Gadolinium		Molybdenum	0.05	Titanium	0.08
Bismuth		Europium		Niobium	0.002	Scandium	0.008
Lead	0.1	Samarium		Zirconium	0.02	Calcium	0.3
Thallium		Neodymium		Yttrium	0.001	Potassium	0.05
Mercury	NR	Praseodymium	0.002	Strontium	0.005	Chlorine	0.5
Gold		Cerium	0.003	Rubidium	<0.001	Sulfur	0.7
Platinum		Lanthanum	0.008	Bromine	0.02	Phosphorus	0.1
Iridium		Barium	0.08	Selenium	0.004	Silicon	0.5
Osmium		Cesium		Arsenic		Aluminum	0.04
Rhenium		Iodine	0.008	Germanium		Magnesium	0.3
Tungsten		Tellurium	0.009	Gallium	0.005	Sodium	0.2
Tantalum	0.3	Antimony		Zinc	0.05	Fluorine	≈ 0.06
Hafnium		Tin		Copper	0.02	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.01	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.002	Carbon	NR
Thulium		Silver	≤ 0.05	Iron	0.2	Boron	≤ 0.002
Erbium		Palladium		Manganese	0.002	Beryllium	
Holmium		Rhodium		Chromium	0.009	Lithium	<0.001
Dysprosium						Hydrogen	NR

STD - Internal Standard

NR - Not Reported

All elements not detected < $0.002 \mu\text{g/ml}$

MC - Major Component > $10 \mu\text{g/ml}$

INT - Interference

5-38

Approved:

Robert C. Jaylen
19 Nov 82

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: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Date: November 12, 1982

Subcontract #SW59159A
Release #8

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026-16 SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
PETC Bottom Ash

IAD No.: 97-K776-116-11

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	18	Terbium	2	Ruthenium		Vanadium	MC
Thorium	22	Gadolinium	5	Molybdenum	57	Titanium	MC
Bismuth	3	Europium	1	Niobium	35	Scandium	47
Lead	MC	Samarium	9	Zirconium	130	Calcium	MC
Thallium	7	Neodymium	23	Yttrium	270	Potassium	MC
Mercury	NR	Praseodymium	11	Strontium	MC	Chlorine	110
Gold		Cerium	120	Rubidium	39	Sulfur	MC
Platinum		Lanthanum	93	Bromine	8	Phosphorus	MC
Iridium		Barium	MC	Selenium	11	Silicon	MC
Osmium		Cesium	1	Arsenic	110	Aluminum	MC
Rhenium		Iodine	4	Germanium	5	Magnesium	MC
Tungsten	9	Tellurium	1	Gallium	45	Sodium	MC
Tantalum	8	Antimony	21	Zinc	MC	Fluorine	≈71
Hafnium	5	Tin	41	Copper	270	Oxygen	NR
Lutetium	0.8	Indium	STD	Nickel	190	Nitrogen	NR
Ytterbium	4	Cadmium	9	Cobalt	21	Carbon	NR
Thulium	0.2	Silver	≤3	Iron	MC	Boron	54
Erbium	4	Palladium		Manganese	MC	Beryllium	7
Holmium	5	Rhodium		Chromium	620	Lithium	38
Dysprosium	8					Hydrogen	NR

STD — Internal Standard

NR — Not Reported

All elements not detected < 0.2 ppm

MC — Major Component > 1000 ppm

INT — Interference

5-39

Approved:

Robert L. Taylor
19 Nov-82

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: R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042
Subcontract #SW59159A
Release #8

Date: November 12, 1982

Analyst: G. Meagher

P. O. No.:

Sample No.: A82-06-026-17 SPARK SOURCE MASS SPECTROGRAPHIC ANALYSIS
PETC Baghouse Ash

IAD No.: 97-K776-116-11

CONCENTRATION IN PPM WEIGHT

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium	19	Terbium	2	Ruthenium		Vanadium	MC
Thorium	42	Gadolinium	7	Molybdenum	28	Titanium	MC
Bismuth	0.8	Europium	4	Niobium	51	Scandium	32
Lead	450	Samarium	21	Zirconium	160	Calcium	MC
Thallium	3	Neodymium	55	Yttrium	320	Potassium	MC
Mercury	NR	Praseodymium	51	Strontium	MC	Chlorine	620
Gold		Cerium	140	Rubidium	21	Sulfur	MC
Platinum		Lanthanum	200	Bromine	85	Phosphorus	MC
Iridium		Barium	MC	Selenium	44	Silicon	MC
Osmium		Cesium	2	Arsenic	100	Aluminum	MC
Rhenium		Iodine	5	Germanium	22	Magnesium	MC
Tungsten	12	Tellurium	0.6	Gallium	160	Sodium	MC
Tantalum	*100	Antimony	13	Zinc	160	Fluorine	≈86
Hafnium	2	Tin	9	Copper	330	Oxygen	NR
Lutetium	1	Indium	STD	Nickel	60	Nitrogen	NR
Ytterbium	6	Cadmium	4	Cobalt	190	Carbon	NR
Thulium	0.3	Silver	≤2	Iron	MC	Boron	51
Erbium	3	Palladium		Manganese	500	Beryllium	16
Holmium	4	Rhodium		Chromium	230	Lithium	35
Dysprosium	6					Hydrogen	NR

* Heterogeneous

STD — Internal Standard

NR — Not Reported

All elements not detected < 0.2 ppm
MC — Major Component > 1000 ppm

INT — Interference

5-40

Approved:

Robert L. Jeylan
19 Nov 82

COMMERCIAL TESTING & ENGINEERING CO.



Reply to

Instrumental Analysis Division
490 Orchard Street
Golden, CO 80401

January 21, 1983

Phone: 303-278-9521

Mr. R. Schroeder
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Re: IAD #97-K914-116-07
Subcontract #SW 59159A
Release #8

Analytical Report

Eleven (11) samples were received for analysis on October 28, 1982. These samples were assigned our IAD identification #97-K776-116-11 and were analyzed by spark source mass spectrometry (SSMS) for trace elements. Analytical reports were mailed on November 12, 1982.

Per the request of Mr. Larry Waterland of Acurex Corporation, elements found to be major components were to be quantified by other analytical methods. Seven (7) of the samples were relogged and reassigned our IAD identification #97-K914-116-07.

Except for Phosphorus and Sulfur, all elements were determined by flame atomic absorption/emission spectrophotometry. Phosphorus was determined colorimetrically. Sulfur was determined turbidimetrically except for sample #815223 where X-ray fluorescence spectrometry was used.

The results of these determinations are presented in Table No. I and Table No. II and are reported in weight per cent (wt.%) on an "as received" basis except as noted.



Table No. I
(Concentrations in Wt%)

<u>Parameter</u>	<u>A82-06-026-17</u> <u>Baghouse Ash</u>	<u>A82-06-026-16</u> <u>Bottom Ash</u>	<u>A82-06-026-4&5</u> <u>PETC 10+15µm Ash</u>	<u>A82-06-026-3A&B</u> <u>PETC 3µm + Filter</u>
Sodium	1.16	1.33	0.82	3.46
Magnesium	0.19	0.28	0.12	0.45
Aluminum	4.30	6.07	3.13	7.33
Silicon	6.30	10.43	6.06	12.37
Phosphorus	0.23	0.60	0.16	0.28
Sulfur	<1	<1	<1	<1
Potassium	0.25	0.50	0.21	0.45
Calcium	0.83	1.42	0.44	2.38
Titanium	<0.5	<0.4	<0.4	<0.7
Vanadium	<0.3	<0.3	--	--
Iron	3.61	4.35	2.41	4.05
Strontium	0.03	0.03	0.01	0.03
Barium	<0.10	<0.10	<0.10	0.16
Manganese	--	0.05	--	--
Lead	--	0.52	--	--
Zinc	--	0.46	--	--

Table No. II
(Concentrations in Wt.%)

<u>Parameter</u>	<u>815223</u> <u>PETC Fuel</u>	<u>815237</u> <u>PETC Imp. 1</u>
Sodium	0.01	--
Iron	0.07	✓ 0.003
Aluminum	1.34	--
Silicon	6.92	--
Potassium	1.03	--
Calcium	3.81	--
Nickel	--	--
Vanadium	--	--
Sulfur	0.44	--

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

Harold A. Connell
Harold A. Connell
Asst. Lab Supervisor

c1

Robert L. Taylor
R. L. Taylor, Ph.D., Mngr. 21 Jan 83
Instrumental Analysis Div.

COMMERCIAL TESTING & ENGINEERING CO.



Reply to
Instrumental Analysis Division
490 Orchard Street
Golden, CO 80401

Phone: 303-278-9521

March 31, 1983

Mr. Larry Waterland
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

RE: IAD #97-L494-116-01
Subcontract #SW59159A
Release #8

Analytical Report

One sample, originally received for analysis on October 28, 1982, was re-logged on March 16, 1983. This sample, previously assigned our IAD identification #97-K776-116-11, was re-assigned #97-L494-116-01.

Per the telephone conversation between Mr. Waterland of Acurex Corporation and Mr. Wilson of our IAD laboratory, the sample was analyzed for Chlorine.

An accurately weighed portion of the sample was fused with sodium hydroxide. The fusion melt was put in solution using sulfuric acid and then diluted to an appropriate volume using deionized water. The resulting solution was analyzed for Chlorine by selective ion electrode methodology.

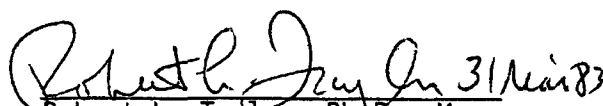
The result of this determination is presented in Table No. I and is reported in micrograms per gram ($\mu\text{g/g}$) on an "as received" basis.

Table No. I
($\mu\text{g/g}$ -As Received)

<u>Sample I.D.</u>	<u>Chlorine</u>
A82-06-026-3A & B PETC 3 μm + filter	8,400 (0.84%)

If you have any questions concerning this result, please call.


Harold A. Connell
Assistant Lab Manager


Robert L. Taylor, Ph.D., Mngr.
Instrumental Analysis Div.



DATA REPORTING FORM

CUSTOMER CMEA DATE _____
 CUSTOMER CONTRACT NO. 307736.42 ACUREX CONTRACT NO. A82-06-026, -10-025
 RESULTS REPORT TO L. Waterland TELEPHONE _____
 ADDRESS _____
PETC-DOE

SAMPLE ID (CUSTOMER)	Fuel	1632a** NBS Coal	15 μ +10 μ	3 μ +Filter	XAD	Imp 1	Imp 2+3	Bottom Ash	Baghouse Ash	
SAMPLE ID (LAB)	6	12	4	1	8	15	9	16	17	
PARAMETER										UNITS
Mercury Aliquot	<0.05*	0.09*	0.23*	0.85*	<0.03*	5	<3	<2	0.55*	μ g/L
Mercury Blank Aliquot	<1	<1	<1	<1	<0.03*	<3	<3	<1	<1	μ g/L
Mercury	<0.05*	0.09*	9.4	16	<4	8	<3	<2	0.55*	μ g/train
Arsenic Aliquot	--	--	--	--	--	--	<3	--	--	μ g/L
Arsenic Blank Aliquot	--	--	--	--	--	--	<2	--	--	μ g/L
Arsenic	--	--	--	--	--	--	<3	--	--	μ g/train
Antimony Aliquot	--	--	--	--	--	--	<6	--	--	μ g/L
Antimony Blank Aliquot	--	--	--	--	--	--	<1	--	--	μ g/L
Antimony	--	--	--	--	--	--	<6	--	--	μ g/train

*Units are mg/kg
 **True value is 0.13 mg/kg

ANALYST J. Labash
 REVIEWER G. Nicoll

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5.6 C₁ TO C₆ HYDROCARBONS BY GAS CHROMATOGRAPHY

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5.6.1 FROM JUNE 11, 1982

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GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETL, DOE, Location PITTSBURGH, Job No. _____Injection Date 6-11-82, Time 08:34:15, Instrument ID _____
Recorder/Printout Reference No. 1, Recorder ID _____
Purpose of Run C₁-C₆ CALIBRATIONSample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2 μ l, Inj. Port or Sample Loop Used Loop
Detector Used: FID 1, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase , Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. , Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.33	1578			C ₁
0.40	5736			C ₂
0.63	9390			C ₃
1.02	10255			C ₄
1.90	18031			C ₅
3.78	23312			C ₆

Name of Operator MARK CHIPS, Date JUNE 11 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PITTSBURGH, Job No. _____Injection Date 6-11-82, Time 08:51:24, Instrument ID _____
Recorder/Printout Reference No. 2, Recorder ID _____
Purpose of Run C₁-C₆ calibration repeatSample Description Cal cgl # 6-428

GC CONDITIONS

Amount Injected 2 cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range 16x 10⁻¹¹
Column: Liquid Phase , Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. , Material SS
Temperature: Injector 120°C, Oven 180°C, Detector 250°C
Temperature Program isothermal

SAMPLE RUN

Sampling Method Direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.41	7192			C ₁
0.64	9299			C ₂
1.03	10211			C ₃
1.91	17917			C ₄
3.20	23420			C ₅
7.87	29567			C ₆

Name of Operator MARK CHIPS, Date JUNE 11 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PITTSBURGH, Job No. _____Injection Date 6-11-82, Time 09:10:13, Instrument ID _____
Recorder/Printout Reference No. 3, Recorder ID _____
Purpose of Run C₁-C₆ calibrationSample Description Cal cyl #6-428

GC CONDITIONS

Amount Injected 2 μ l, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD _____, FPD _____, TCD _____ (Current _____)
Detector Attenuation 2, Amplifier or Range 6×10^{-11}
Column: Liquid Phase _____, Solid Phase Porapak Q,
Length 6', O.D. 1/8", I.D. _____, Material SS
Temperature: Injector 120°, Oven 180°, Detector 250°
Temperature Program isothermal

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.46	6605			C ₁
0.78	9363			C ₂
1.42	10239			C ₃
2.74	17874			C ₄
4.71	23095			C ₅
7.31	30115			C ₆
17.13	6343			

Name of Operator Mark Chips, Date 6-11-1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PITTSBURG, Job No. _____Injection Date 6-11-82, Time 09:41:18, Instrument ID _____
Recorder/Printout Reference No. 4, Recorder ID _____
Purpose of Run C1-C6 calibrationSample Description cal cgl #6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
Column: Liquid Phase , Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. , Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program isothermal

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.42	7076			C ₁
0.64	9184			C ₂
1.03	10107			C ₃
1.92	17819			C ₄
3.81	23103			C ₅
7.88	30902			C ₆

Name of Operator MARK CHIPS, Date June 11 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Peto, Joe, Location Pittsburg, Job No. _____Injection Date 6-11-82, Time 10:57:03, Instrument ID _____
Recorder/Printout Reference No. 5, Recorder ID _____
Purpose of Run stack gas sampling + analysisSample Description grab sample flue gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID X, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range $1/2 \times 10^{-11}$
Column: Liquid Phase , Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. , Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermal

SAMPLE RUN

Sampling Method grab sample

RT min	Area	Peak Height	Amount ()	Component
0.36	2706			C ₁
0.80	5381			C ₂

Name of Operator MARK CHIPS, Date JUNE 11, 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client Port. Co., Location Pittsburg, Job No. _____

Injection Date 6-11-82, Time 11:11:36, Instrument ID _____
 Recorder/Printout Reference No. 6, Recorder ID _____
 Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2 μ c, Inj. Port or Sample Loop Used loop
 Detector Used: FID x, ECD _____, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 2, Amplifier or Range 16x10⁻⁴
 Column: Liquid Phase _____, Solid Phase porapak Q,
 Length 6', O.D. 1/8", I.D. _____, Material SS
 Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
 Temperature Program isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.36	2898			C ₁
0.79	4050			C ₂

Name of Operator MARK CHIPS, Date June 11, 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETE, DOE, Location Pittsburg, Job No. _____Injection Date 6-11-82, Time 13:21:46, Instrument ID _____Recorder/Printout Reference No. 7, Recorder ID _____Purpose of Run stack gas analysisSample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loopDetector Used: FID x, ECD , FPD , TCD (Current)Detector Attenuation 2, Amplifier or Range 16x10⁴Column: Liquid Phase , Solid Phase porapak QLength 6', O.D. 1/8", I.D. , Material SSTemperature: Injector 120°C, Oven 180°C, Detector 250°CTemperature Program isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.36	1682	.		C ₁
0.81	2799			C ₂

Name of Operator MARK CHIPS, Date JUNE 11 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Per. Doc, Location Petersburg, Job No. _____Injection Date 6/1/82, Time 1336:57, Instrument ID _____
Recorder/Printout Reference No. 8, Recorder ID _____
Purpose of Run stack gas analysisSample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID X, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range 16×10^{-11}
Column: Liquid Phase , Solid Phase Porapak Q,
Length 6', O.D. 1/8", I.D. , Material CS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program isothermal

SAMPLE RUN

Sampling Method Grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.36	1560	.		C ₁
0.79	4808			C ₂
4.28	711			C ₃

Name of Operator MARK CHIPS, Date JAN 11 19 82

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Pete Doe, Location Pittsburg, Job No. _____Injection Date 6/1/82, Time 13:49:16, Instrument ID _____
Recorder/Printout Reference No. 9, Recorder ID _____
Purpose of Run stack gas analysisSample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
Column: Liquid Phase , Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. , Material SS
Temperature: Injector 120°C, Oven 180 °C, Detector 250 °C
Temperature Program isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.36	1554	.		C ₁
0.79	486			C ₂

Name of Operator MARK CHIPS, Date JUNE 11 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client Pete Lee, Location Pittsburg, Job No. _____Injection Date 6-11-82, Time 1428:46, Instrument ID _____
Recorder/Printout Reference No. 10, Recorder ID _____
Purpose of Run Stack gas analysisSample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
Column: Liquid Phase , Solid Phase porapak Q,
Length 5', O.D. 1/8", I.D. , Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
3.36	1534			C ₁
0.80	3683			C ₂

Name of Operator Mark Chips, Date June 11 19 82

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client Pete Doe, Location Attorneys, Job No. _____Injection Date 6-11-82, Time 14:43:08, Instrument ID _____Recorder/Printout Reference No. 11, Recorder ID _____Purpose of Run C1-C6 calibrationSample Description cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loopDetector Used: FID +, ECD —, FPD —, TCD — (Current _____)Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹Column: Liquid Phase _____, Solid Phase porapak QLength 6', O.D. 1/8", I.D. _____, Material SSTemperature: Injector 120 °C, Oven 180 °C, Detector 250 °CTemperature Program isothermal

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.42	6966	.		C ₁
0.65	9235			C ₂
1.06	10258			C ₃
1.96	17996			C ₄
3.89	24080			C ₅
8.05	29104			C ₆

Name of Operator Mark Chips, Date June 11 1982

GAS CHROMAT .APH OPERATING CONDITIONS AND FIELD LOG

Client BTC DOE, Location POMERIS, Job No. _____

Injection Date 6-11-82, Time 14:59:48 Instrument ID _____
 Recorder/Printout Reference No. 12, Recorder ID _____
 Purpose of Run C1-C6 CALIBRATION

Sample Description CAL CYL # 6-428

GC CONDITIONS

Amount Injected 2 μ L, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID X, ECD , FPD , TCD (Current)
 Detector Attenuation 2, Amplifier or Range 1.5×10^{-11}
 Column: Liquid Phase , Solid Phase PORAPACK Q,
 Length 6', O.D. 1/8", I.D. , Material SS
 Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
 Temperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method DIRECT INJECTION

RT (min)	Area	Peak Height	Amount ()	Component
0.42	7195			C ₁
0.66	9215			C ₂
1.06	10977			C ₃
1.96	18212			C ₄
3.90	23603			C ₅
8.08	29835			C ₆

Name of Operator MARK CHIPS, Date JUNE 11 19 82

5.6.2 FROM JUNE 17, 1982

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GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PITTSBURG, Job No. _____

Injection Date 6-17-82, Time 12:24:50, Instrument ID _____
 Recorder/Printout Reference No. 1, Recorder ID _____
 Purpose of Run C1-C6 calibration

Sample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
 Detector Used: FID X, ECD _____, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
 Column: Liquid Phase _____, Solid Phase porapak Q,
 Length 6', O.D. 1/8", I.D. _____, Material SS
 Temperature: Injector 120°, Oven 110°, Detector 250°
 Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.40	7680			C ₁
0.61	9503			C ₂
0.99	10417			C ₃
1.83	18491			C ₄
3.62	23987			C ₅
7.51	30131			C ₆

Name of Operator MARK CHIPS, Date JUNE 17, 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client Pete, Doe, Location Pittsburgh, Job No. _____

Injection Date 6-17-82, Time 12:38:08, Instrument ID _____
 Recorder/Printout Reference No. 2, Recorder ID _____
 Purpose of Run C1-C6 calibration

Sample Description Cal gas cal # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop
 Detector Used: FID 1, ECD , FPD , TCD (Current)
 Detector Attenuation 2, Amplifier or Range 16 x 10⁻¹¹
 Column: Liquid Phase , Solid Phase porapak Q,
 Length 6', O.D. 1/8", I.D. , Material SS
 Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
 Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.40	7497			C ₁
0.61	9516			C ₂
0.99	10769			C ₃
1.83	18606			C ₄
3.63	24000			C ₅
7.52	29797			C ₆

Name of Operator Mark Chips, Date June 17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PITTSBURGH, Job No. _____Injection Date 6-17-82, Time 12:51:09, Instrument ID _____Recorder/Printout Reference No. 3, Recorder ID _____Purpose of Run stack gas samplingSample Description grab sample stack gas

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used LoopDetector Used: FID X, ECD , FPD , TCD (Current)Detector Attenuation 2, Amplifier or Range 15 x 10⁻¹¹Column: Liquid Phase , Solid Phase Porapak QLength 6', O.D. 1/8", I.D. , Material SSTemperature: Injector 120°, Oven 180°, Detector 250°Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab

RT min	Area	Peak Height	Amount ()	Component
0.34	1898			C ₁
0.80	2935			C ₂

Name of Operator MARIC CHIPS, Date JUNE 17, 1982

GAS CHROMAT. GRAPH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location FITTSBURG, Job No. _____Injection Date 7-7-82, Time 1302:41, Instrument ID _____Recorder/Printout Reference No. 4, Recorder ID _____Purpose of Run stack gas samplingSample Description stack gas grab sample

GC CONDITIONS

Amount Injected 200, Inj. Port or Sample Loop Used loopDetector Used: FID X, ECD , FPD , TCD (Current)Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹Column: Liquid Phase , Solid Phase porapak QLength 6', O.D. , I.D. 1/8", Material SSTemperature: Injector 120 °C, Oven 180 °C, Detector 250 °CTemperature Program ISOTHERMAL

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.34	2082			C ₁
0.80	2645			C ₂

Name of Operator Mark Chips, Date 6-17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETE, BOE, Location PITTSBURG, Job No. _____Injection Date 8-17-83, Time 1351:37, Instrument ID _____Recorder/Printout Reference No. 5, Recorder ID _____Purpose of Run Stack Gas SamplingSample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loopDetector Used: FID X, ECD _____, FPD _____, TCD _____ (Current _____)Detector Attenuation 2, Amplifier or Range 16 x 10⁻¹¹Column: Liquid Phase _____, Solid Phase porapak QLength 6', O.D. 1/8", I.D. _____, Material SSTemperature: Injector 120°, Oven 180°, Detector 250°Temperature Program isothermic

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.35	2761			C ₁
0.50	3924			C ₂
3.10	564			C ₃

Name of Operator MARK CHIPS, Date JUNE 17 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETE, DOE, Location PITTSBURGH, Job No. _____

Injection Date 6-17-82, Time 140310, Instrument ID _____
 Recorder/Printout Reference No. 6, Recorder ID _____
 Purpose of Run Stack gas sampling
 Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop
 Detector Used: FID X, ECD _____, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 2, Amplifier or Range 16 x 10⁻¹¹
 Column: Liquid Phase _____, Solid Phase Porapak Q,
 Length 6', O.D. 1/8", I.D. _____, Material CS
 Temperature: Injector 120 °, Oven 180 °, Detector 250 °
 Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.35	1256			C ₁
0.79	3174			C ₂

Name of Operator MARK CHIPS, Date JUNE 17, 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PITTSBURGH, Job No. _____

Injection Date 6-17-83, Time 1414:25, Instrument ID _____
 Recorder/Printout Reference No. 7, Recorder ID _____
 Purpose of Run C₁-C₆ CALIBRATION

Sample Description CAL C₅/ # 6-428

GC CONDITIONS

Amount Injected 2 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID x, ECD , FPD , TCD (Current)
 Detector Attenuation 2, Amplifier or Range 16 x 10¹¹
 Column: Liquid Phase , Solid Phase PARAPACK Q,
 Length 6', O.D. 1/8, I.D. , Material SS
 Temperature: Injector 120 °, Oven 180 °, Detector 250 °
 Temperature Program ISOTHERMIC

SAMPLE RUN

Sampling Method DIRECT INJECTION

RT	Area	Peak Height	Amount ()	Component
<u>0.40</u>	<u>7644</u>	<u> </u>	<u> </u>	<u>C₁</u>
<u>0.61</u>	<u>9732</u>	<u> </u>	<u> </u>	<u>C₂</u>
<u>0.99</u>	<u>10872</u>	<u> </u>	<u> </u>	<u>C₃</u>
<u>1.83</u>	<u>18969</u>	<u> </u>	<u> </u>	<u>C₄</u>
<u>3.63</u>	<u>24391</u>	<u> </u>	<u> </u>	<u>C₅</u>
<u>7.54</u>	<u>30948</u>	<u> </u>	<u> </u>	<u>C₆</u>

Name of Operator MARK CHIPS, Date JUNE 17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Est. Lee, Location PITTSBURGH, Job No. _____

Injection Date 6-17-82, Time 1522:31, Instrument ID _____
Recorder/Printout Reference No. 8, Recorder ID _____
Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID D, ECD _____, FPD _____, TCD _____ (Current _____)
Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
Column: Liquid Phase _____, Solid Phase porapak Q,
Length 6', O.D. 1/8", I.D. _____, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT min	Area	Peak Height	Amount ()	Component
<u>0.35</u>	<u>1616</u>			<u>Li</u>

Name of Operator MARIC CHIPS, Date June 17, 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PITTSBURG, Job No. _____

Injection Date 6-17-82, Time 1532:59, Instrument ID _____
 Recorder/Printout Reference No. 9, Recorder ID _____
 Purpose of Run stack gas analysis

Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
 Detector Used: FID x, ECD , FPD , TCD (Current)
 Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
 Column: Liquid Phase , Solid Phase Porapak Q,
 Length 6', O.D. 1/8", I.D. , Material SS
 Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
 Temperature Program Isothermic

SAMPLE RUN

Sampling Method grab sample

RT min	Area	Peak Height	Amount ()	Component
0.33	2337			C1
0.80	1714			C2

Name of Operator MARK CHIPS, Date JUNE 17, 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Pete Doe, Location Pittsburg, Job No. _____Injection Date 6-17-82, Time 1546:30, Instrument ID _____
Recorder/Printout Reference No. 10, Recorder ID _____
Purpose of Run C1-C6 CALIBRATIONSample Description Cal cyl # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop
Detector Used: FID A, ECD , FPD , TCD (Current)
Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
Column: Liquid Phase , Solid Phase Porapak Q,
Length 6', O.D. 1/8", I.D. , Material SS
Temperature: Injector 130 °C, Oven 180 °C, Detector 250 °C
Temperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT	Area	Peak Height	Amount ()	Component
<u>0.40</u>	<u>7290</u>	<u> </u>	<u> </u>	<u>C1</u>
<u>0.62</u>	<u>9486</u>	<u> </u>	<u> </u>	<u>C2</u>
<u>0.99</u>	<u>10380</u>	<u> </u>	<u> </u>	<u>C3</u>
<u>1.84</u>	<u>18561</u>	<u> </u>	<u> </u>	<u>C4</u>
<u>3.65</u>	<u>25759</u>	<u> </u>	<u> </u>	<u>C5</u>
<u>7.55</u>	<u>30900</u>	<u> </u>	<u> </u>	<u>C6</u>

Name of Operator MARK CHIPS, Date June 17 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETC, DFE, Location PITTSBURGH, Job No. _____Injection Date 6-17-82, Time 1558:25, Instrument ID _____Recorder/Printout Reference No. 11, Recorder ID _____Purpose of Run C₁-C₆ CALIBRATIONSample Description C₁ C₆ # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loopDetector Used: FID x, ECD , FPD , TCD (Current)Detector Attenuation 2, Amplifier or Range 16 x 10⁻¹¹Column: Liquid Phase , Solid Phase porapak QLength 6', O.D. 1/8", I.D. , Material SSTemperature: Injector 120 °C, Oven 120 °C, Detector 250 °CTemperature Program Isothermic

SAMPLE RUN

Sampling Method direct injection

RT (min)	Area	Peak Height	Amount ()	Component
0.40	8507			C ₁
0.62	10149			C ₂
1.00	10681			C ₃
1.84	18821			C ₄
3.65	24385			C ₅
7.56	30513			C ₆

Name of Operator MARK CHIPS, Date JUNE 17 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETE DOE, Location PROBURY, Job No. _____

Injection Date 6-17-82, Time 1703:31, Instrument ID _____
Recorder/Printout Reference No. 12, Recorder ID _____
Purpose of Run Stack gas analysis

Sample Description Grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
Detector Used: FID x, ECD _____, FPD _____, TCD _____ (Current _____)
Detector Attenuation 2, Amplifier or Range 16x10⁻¹¹
Column: Liquid Phase _____, Solid Phase Porapak Q,
Length 6', O.D. 1/8", I.D. _____, Material SS
Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
Temperature Program isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.34	1941			C ₁
0.82	57			C ₂

Name of Operator MARK CHIPS, Date JUNE 17 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client Pete Doe, Location Proctorville, Job No. _____

Injection Date 6-17-82, Time 17:41, Instrument ID _____
 Recorder/Printout Reference No. 13, Recorder ID _____
 Purpose of Run stack gas analysis
 Sample Description grab sample

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loop
 Detector Used: FID x, ECD , FPD , TCD (Current)
 Detector Attenuation 2, Amplifier or Range 6x10⁻¹¹
 Column: Liquid Phase , Solid Phase porapak Q,
 Length 6', O.D. 1/8", I.D. , Material SS
 Temperature: Injector 120°C, Oven 180°C, Detector 250°C
 Temperature Program isothermal

SAMPLE RUN

Sampling Method grab sample

RT (min)	Area	Peak Height	Amount ()	Component
0.34	1926			C ₁
0.79	4283			C ₂

Name of Operator MARK CHIPS, Date JUNE 17, 1982

GAS CHROMAT. APH OPERATING CONDITIONS AND FIELD LOG

Client PETE, DSE, Location AMERBURG, Job No. _____

Injection Date 8-17-82, Time 1727118, Instrument ID _____
 Recorder/Printout Reference No. 14, Recorder ID _____
 Purpose of Run CALIBRATION

Sample Description C-6 A 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used Loop
 Detector Used: FID X, ECD _____, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 2, Amplifier or Range 6x10⁻¹¹
 Column: Liquid Phase _____, Solid Phase porapak Q,
 Length 6', O.D. 1/8", I.D. _____, Material SS
 Temperature: Injector 120 °C, Oven 180 °C, Detector 250 °C
 Temperature Program ISO thermal

SAMPLE RUN

Sampling Method direct injection

RT(min)	Area	Peak Height	Amount ()	Component
0.40	8131			C1
0.62	10427			C2
1.00	12675			C3
1.84	19184			C4
3.66	24947			C5
7.58	30985			C6

Name of Operator MARK CHIPS, Date JUNE 17 1982

GAS CHROMAT. .APH OPERATING CONDITIONS AND FIELD LOG

Client PETE, DOE, Location PITTSBURGH, Job No. _____Injection Date 6-17-82, Time 1737:20, Instrument ID _____

Recorder/Printout Reference No. _____, Recorder ID _____

Purpose of Run C-L CALIBRATIONSample Description Cal C-1 # 6-428

GC CONDITIONS

Amount Injected 2cc, Inj. Port or Sample Loop Used loopDetector Used: FID x, ECD _____, FPD _____, TCD _____ (Current _____)Detector Attenuation 2, Amplifier or Range 6×10^{-11} Column: Liquid Phase _____, Solid Phase Porapak Q,Length 6', O.D. 1/8", I.D. _____, Material SSTemperature: Injector 120 °C, Oven 180 °C, Detector 250 °CTemperature Program isothermal

SAMPLE RUN

Sampling Method direct injection

RT min	Area	Peak Height	Amount ()	Component
0.40	9017			C ₁
0.62	10511			C ₂
1.00	11078			C ₃
1.85	19160			C ₄
3.66	24630			C ₅
7.58	30120			C ₆

Name of Operator MARK CHIPS, Date JUNE 17 1982

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5.7 N₂O BY GAS CHROMATOGRAPHY

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GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____Injection Date 7/14/82, Time _____, Instrument ID _____
Recorder/Printout Reference No. 25, Recorder ID _____
Purpose of Run GC 851Sample Description 25 ml 100

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop
Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
Detector Attenuation 16x70", Amplifier or Range _____
Columns: Liquid Phase _____, Solid Phase 12' Poropak Q,
6' Super Q,
Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
Temperature: Injector 110 °C, Oven 34 °C, Detector 240 °C
Temperature Program _____

SAMPLE RUN

Sampling Method _____

RT	Area	Peak Height	Amount ()	Component
<u>7.55</u>	<u>377.1</u>			

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 4, Recorder ID _____
 Purpose of Run 1.0 SL 1.0

Sample Description 55 1.0

GC CONDITIONS

Amount Injected 1.00, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16x20", Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q,
6' Supra Q,
 Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 100 °, Oven 70 °, Detector 340 °
 Temperature Program _____

SAMPLE RUN

Sampling Method _____

RT	Area	Peak Height	Amount ()	Component
<u>1.8</u>	<u>543</u>			
<u>7.67</u>	<u>60940</u>			

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 5, Recorder ID _____
 Purpose of Run 1.5 cc sample

Sample Description 45% 1.5 cc sample

GC CONDITIONS

Amount Injected 1 cc, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q,
6' Super Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 170 °, Oven 39 °, Detector 250 °
 Temperature Program _____

SAMPLE RUN

Sampling Method _____

RT	Area	Peak Height	Amount ()	Component
<u>1.53</u>	<u>556</u>			
<u>7.56</u>	<u>61878</u>			

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 25, Recorder ID _____
 Purpose of Run 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

Sample Description 91

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16x20", Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q,
6' Super Q,
 Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven 30 °, Detector 350 °
 Temperature Program _____

SAMPLE RUN

Sampling Method _____

RT	Area	Peak Height	Amount ()	Component
<u>7.15</u>	<u>57102</u>			

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 27, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815512 @ 1010 6/11/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
61 Supra Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven 300 °, Detector 300 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.83</u>	<u>85972</u>			
<u>7.56</u>	<u>24016</u>		<u>28.8</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 28, Recorder ID _____
 Purpose of Run 815512 REPEAT OF TEST 1

Sample Description N₂O ANALYSES

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Super Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven 70 °, Detector 250 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>74011</u>			
<u>7.56</u>	<u>23984</u>		<u>28.8</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 29, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815514 @ 1205 6/11/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Super Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven _____ °, Detector _____ °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>52887</u>			
<u>7.58</u>	<u>28974</u>		<u>34.8</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____Injection Date 7/14/82, Time _____, Instrument ID _____Recorder/Printout Reference No. 30, Recorder ID _____Purpose of Run N₂O ANALYSESSample Description 815514 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOPDetector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Super QLength 12' + 6', O.D. 1/8", I.D. _____, Material _____

Temperature: Injector _____ °, Oven _____ °, Detector _____ °

Temperature Program _____

SAMPLE RUN

Sampling Method BOMB C.R.A.B

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>40239</u>			
<u>6.52</u>	<u>2746</u>			
<u>7.59</u>	<u>148680</u>		<u>178.4</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 31, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815514 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Super Q, Length 19' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 130 °, Oven _____ °, Detector _____ °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB CRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>32159</u>			
<u>7.59</u>	<u>28501</u>		<u>34.2</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 32, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815516 @ 1409 6/11/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Porapak Q
6' Supra Q2, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven 120 °, Detector 0 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>39532</u>			
<u>7.59</u>	<u>21196</u>		<u>25.4</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 33, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815516 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q,
6' Supelco, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 110 °, Oven 100 °, Detector 250 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.85</u>	<u>42903</u>			
<u>7.59</u>	<u>2717.7</u>		<u>32.6</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 34, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815516 REPEAT TEST #1

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
61 Super Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven 120 °, Detector 300 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>39584</u>			
<u>7.58</u>	<u>23624</u>		<u>28.4</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 35, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815513 @ 11.55 6/17/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Supco Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 170 °, Oven 250 °, Detector 350 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.83</u>	<u>15006</u>			
<u>7.48</u>	<u>55252</u>		<u>66.3</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 36, Recorder ID _____
 Purpose of Run N2O ANALYSIS

Sample Description 815513 REPEAT OF TEST #2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Super Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 100 °, Oven 250 °, Detector 0 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.83</u>	<u>15045</u>			
<u>7.41</u>	<u>78040</u>		<u>93.7</u>	<u>N2O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 37, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815513 REPEAT TEST #2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16×10^{-11} , Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Porapak Q
6' Supra Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 125 °, Oven 300 °, Detector 75 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.82</u>	<u>101930</u>			
<u>7.35</u>	<u>81047</u>		<u>97.3</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 38, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815515 @ 1317 6/17/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 1/8" Poropak Q
 Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven 200 °, Detector 250 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB CRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.82</u>	<u>31677</u>			
<u>7.31</u>	<u>73009</u>		<u>87.6</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 39, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815515 REPEAT TEST #2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16×10^{-11} , Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Porapak Q
6' Super Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 115 °, Oven _____ °, Detector 250 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.82</u>	<u>37589</u>			
<u>5.58</u>	<u>8033</u>			
<u>7.29</u>	<u>72283</u>		<u>86.8</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____Injection Date 7/14/82, Time _____, Instrument ID _____Recorder/Printout Reference No. 40, Recorder ID _____Purpose of Run N₂O ANALYSESSample Description 815517 C 1433 6/17/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOPDetector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Supra QLength 12' + 6', O.D. 1/8", I.D. _____, Material _____Temperature: Injector 1 °, Oven _____ °, Detector _____ °

Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.83</u>	<u>238580</u>			
<u>5.61</u>	<u>8432</u>			
<u>7.35</u>	<u>88851</u>		<u>106.6</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 41, Recorder ID _____
 Purpose of Run N₂O ANALYSIS

Sample Description 815517 REPEAT #2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Supelco
 Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 125 °, Oven 20 °, Detector 250 °
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.83</u>	<u>278950</u>			
<u>5.65</u>	<u>9160</u>			
<u>7.41</u>	<u>91203</u>		<u>109.5</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____

Recorder/Printout Reference No. 42, Recorder ID _____

Purpose of Run N₂O ANALYSES

Sample Description 815236 @ 1628 6/17/82

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop

Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)

Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____

Column: Liquid Phase _____, Solid Phase 1/4" Poropak Q,
6' Super Q

Length 12' + 6', O.D. 1/8", I.D. _____, Material _____

Temperature: Injector 125 °, Oven 3 °, Detector 400 °

Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>255590</u>			
<u>5.69</u>	<u>9597</u>			
<u>7.46</u>	<u>36812</u>		<u>44.2</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 43, Recorder ID _____
 Purpose of Run N₂O ANALYSES

Sample Description 815236 REPEAT #2

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16×10^{-11} , Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Supor Q, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120°, Oven 300°, Detector 350°
 Temperature Program _____

SAMPLE RUN

Sampling Method BOMB CRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>286890</u>			
<u>5.74</u>	<u>11117</u>			
<u>7.53</u>	<u>37539</u>		<u>45.1</u>	<u>N₂O</u>

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____Injection Date 7/14/82, Time _____, Instrument ID _____Recorder/Printout Reference No. 44, Recorder ID _____Purpose of Run N₂O STANDARDSample Description 9.5 ppm N₂O, 10.4% CO₂ in N₂

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOPDetector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Supina Q2Length 12' + 6', O.D. 1/8", I.D. _____, Material _____Temperature: Injector 1 °, Oven 3 °, Detector 300 °

Temperature Program _____

SAMPLE RUN

Sampling Method BOMB GRAB

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>6547</u>			
<u>5.82</u>	<u>7043</u>			
<u>7.59</u>	<u>79597</u>			

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 45, Recorder ID _____
 Purpose of Run N₂O STANDARD

Sample Description 95ppm N₂O, 10.4% CO₂ in N₂

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used Loop
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16 x 10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Super Q
 Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 120 °, Oven 30 °, Detector _____ °
 Temperature Program _____

SAMPLE RUN

Sampling Method _____

RT	Area	Peak Height	Amount ()	Component
<u>1.85</u>	<u>2860</u>			
<u>5.84</u>	<u>4705</u>			
<u>7.61</u>	<u>79456</u>			

Name of Operator CHIPS, Date _____ 19__

GAS CHROMATOGRAPH OPERATING CONDITIONS AND FIELD LOG

Client EPA, Location PETC, Job No. _____

Injection Date 7/14/82, Time _____, Instrument ID _____
 Recorder/Printout Reference No. 46, Recorder ID _____
 Purpose of Run N₂O STANDARD

Sample Description 10 ppm N₂O in N₂

GC CONDITIONS

Amount Injected 1 CC, Inj. Port or Sample Loop Used LOOP
 Detector Used: FID _____, ECD ☒, FPD _____, TCD _____ (Current _____)
 Detector Attenuation 16x10⁻¹¹, Amplifier or Range _____
 Column: Liquid Phase _____, Solid Phase 12' Poropak Q
6' Supra Q2, Length 12' + 6', O.D. 1/8", I.D. _____, Material _____
 Temperature: Injector 100 °, Oven 70 °, Detector 300 °
 Temperature Program _____

SAMPLE RUN

Sampling Method _____

RT	Area	Peak Height	Amount ()	Component
<u>1.84</u>	<u>1381</u>			
<u>7.61</u>	<u>10258</u>			

Name of Operator CHIPS, Date _____ 19__

Client EPA, Location PETC, Job No. _____

Recorder/Printout Reference No. 47, Recorder ID _____

Purpose of Run N20 STANDARD

Sample Description 1 lb. L.C.

Amount Injected 1cc, Inj. Port or Sample Loop Used Loop

Detector Used: FID , ECD ✓, FPD , TCD (Current)

Detector Attenuation 16×10^{-11} , Amplifier or Range

Column: Liquid Phase _____, Solid Phase ¹²¹ Porapak Q
₆₁ Super Q

Length 12' + 6', O.D. 1/8", I.D. _____, Material _____

Temperature: Injector 120° , Oven 220° , Detector 340°

Temperature Program

Sampling Method _____

[illegible]

Name of Operator CHIPS, Date _____ 19____

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5.8 TOTAL CHROMATOGRAPHABLE ORGANICS (TCO), GRAVIMETRIC ORGANICS (GRAV),
IR SPECTRA, GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS), LIQUID
CHROMATOGRAPHY (LC), AND LOW RESOLUTION MASS SPECTROMETRY (LRMS)

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Acurex/ES (CMEA)
M/S 2-2260

Attention: Larry Waterland

November 15, 1982
Acurex ID#: A82-06-026, A82-10-025
Client PO#: 307736.42
Page 1 of 5

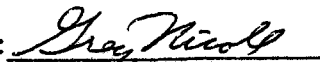
Sample: PETC SASS Train; Received 6/18/82

The above-referenced samples were analyzed by Level 1 protocol. 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, other organics including 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 40 µg/mL of extract.

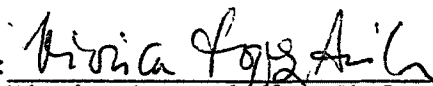
The XAD and OMC extract was concentrated to 11 ml. It would not concentrate further without loss of material. Two phases were observed at this point. For analysis, the extract was mixed by sonification.

If you have any questions, please call.

Submitted by:


Greg Nicoll
Chemist

Approved by:


Viorica Lopez-Avila, Ph.D.
Technical Director

GN/VLA/sla

DATA REPORTING FORM

CUSTOMER CMEA DATE November 12, 1982
 CUSTOMER CONTRACT NO. 307736.42 ACUREX CONTRACT NO. A82-06-026
 RESULTS REPORT TO L. Waterland TELEPHONE _____
 ADDRESS _____
PETC-DOE

SAMPLE ID (CUSTOMER)	15μ+10μ	3μ+Filter	XAD+OMC	Bottom Ash	Baghouse Ash					
SAMPLE ID (LAB)	4	1	8	16	17					
PARAMETER										UNITS
GRAV Aliquot	4	3	267	163	4					mg
GRAV Blank Aliquot	<2	<2	4	2	2					mg
GRAV	6	4	285	6,400*	<100*					mg/train
TCO Aliquot	--	--	4800;4,100	3,900	18					ng/μL
TCO Blank Aliquot	--	--	<10	<10	<10					ng/μL
TCO	--	--	57;49	1,600*	0.72*					mg/train

*mg/kg

ANALYST J. Labash
 REVIEWER G. Nicoll

IN REPORT

SAMPLE:

A82-06-026-4

 $15\mu + 10\mu$ [illegible]

IA REPORT

SAMPLE:

A82-06-026-1

Filter + 3μ

[illegible]

SAMPLE:

Bottom Ash

5-115

IA REPORT

SAMPLE: A82-06-026-17

Baghouse Ash

[illegible]

IN REPORT

SAMPLE: A8Z-06-026-8

XAD and OMC

[illegible]

SAMPLE: A82-06-026-2 Filter Blank

A82-06-026-2

Filter Blank

No peaks

SAMPLE:

XAD Blank

5-119

IR REPORT

SAMPLE:

A82-06-026-13

Shake-Out Blank

[illegible]

IR REPORT

SAMPLE:

A82-06-026-14

GRAV Blank

[illegible]

CONCENTRATION IN SAMPLE ALIQUOTS (µg/mL)

	10µ+15µ	Filter+3µ	Bottom Ash	Baghouse Ash	Filter Blank	XAD+ OMC	XAD Blank	Shakeout Blank
<u>Priority Pollutants</u>								
Naphthalene	5	47	104	8	*	*,*	3	*
Benzo(j+k)fluoranthenes	*	*	1	*	*	*,*	*	*
Chrysene	*	*	2	*	*	*,*	*	*
Benz(a)anthracene	*	*	1	*	*	*,*	*	*
Pyrene	*	*	5	*	*	*,*	*	*
Fluoranthene	*	*	4	*	*	*,*	*	*
Phenanthrene	*	*	28	*	*	*,*	*	*
Anthracene	*	*	3	*	*	*,*	*	*
Fluorene	*	*	5	*	*	*,*	*	*
Acenaphthene	*	*	3	*	*	*,*	*	*
Acenaphthylene	*	*	5	*	*	*,*	*	*
2,4-Dimethylphenol	<5	<5	13	<5	<5	<5,<5	<5	<5
Bis(2-ethylhexyl)phthalate	2	48	213	11	4	6,6	3	1
Butylbenzylphthalate	1	5	298	2	2	3,<1	2	*
Diethylphthalate	*	5	*	*	*	*,*	*	*
Final Volume	1 ml	1 ml	10 ml	1 ml	1 ml	11 ml	1 ml	1 ml

*Not detected, detection limit = 1 µg/mL

CONCENTRATION ($\mu\text{g}/\text{Train}$)

Compound	10 μ +15 μ	Filter+3 μ	Bottom Ash*	Baghouse Ash*	XAD+OMC**
Naphthalene	8	69	42	0.3	<10,<10
Benzo(j+k)fluoranthenes	<2	<1	0.4	<0.04	↓ ↓
Chrysene	↓	↓	0.8	↓	↓ ↓
Benz(a)anthracene	↓	↓	0.4	↓	↓ ↓
Pyrene	↓	↓	2	↓	↓ ↓
Fluoranthene	↓	↓	2	↓	↓ ↓
Phenanthrene	↓	↓	11	↓	↓ ↓
Anthracene	↓	↓	1	↓	↓ ↓
Fluorene	↓	↓	2	↓	↓ ↓
Acenaphthene	↓	↓	1	↓	↓ ↓
Acenaphthylene	↓	↓	2	↓	↓ ↓
2,4-Dimethylphenol	<8	<7	5	<0.2	<60,<60
Bis(2-ethylhexyl)phthalate	6	69	85	0.3	70,70
Butylbenzylphthalate	3	7	120	0.08	<30,<20
Diethylphthalate	<2	7	<0.4	<0.04	<10,<10

*Units are mg/kg

**Duplicate injections

APPROXIMATED CONCENTRATION OF TENTATIVELY IDENTIFIED COMPOUNDS (µg/Train)

Sample	Compound	Concentration
10µ+15µ	Octamethylcyclotetrasiloxane	120
Filter+3µ	C ₃ -Alkylbenzene	88
	Trimethylbenzene	37
	C ₄ -Alkylbenzene	15
	Benzothiazole	73
Bottom Ash	Sulfur	100*
	4-Methyldibenzofuran	17*
	Trimethylnaphthalene (second)	33*
	Trimethylnaphthalene (first)	14*
	Dibenzofuran	13*
	Dimethylnaphthalene	29*
	Ethylnaphthalene	14*
	Methylnaphthalene (second)	48*
	Methylnaphthalene (first)	64*
Baghouse Ash	No Peaks Identified	--
XAD + OMC	Ethylbenzoic acid	520
	Benzoic acid	2,600
	Ethylbenzaldehyde	150

*Units are mg/kg

GCMS Detection Limits

<u>ACID COMPOUND</u>		<u>ng</u>	<u>BASE/NEUTRAL COMPOUNDS</u>		<u>ng</u>
21A	2,4,6-trichlorophenol	5	41B	4-bromophenyl phenyl ether	1
22A	p-chloro-m-cresol	5	42B	bis(2-chloroisopropyl)ether	1
24A	2-chlorophenol	5	43B	bis(2-chloroethoxy)methane	1
31A	2,4-dichlorophenol	5	52B	hexachlorobutadiene	1
34A	2,4-dimethylphenol	5	53B	hexachlorocyclopentadiene	1
57A	2-nitrophenol	5	54B	isophorone	1
58A	4-nitrophenol	20	55B	naphthalene	1
59A	2,4-dinitrophenol	20	56B	nitrobenzene	1
60A	4,6-dinitro-o-cresol	20	61B	N-nitrosodimethylamine	NA
64A	pentachlorophenol	5	62B	N-nitrosodiphenylamine	1
65A	phenol	1	63B	N-nitrosodi-n-propylamine	5
<u>BASE/NEUTRAL COMPOUNDS</u>			66B	bis(2-ethylhexyl)phthalate	1
1B	acenaphthene	1	67B	butylbenzyl phthalate	1
5B	benzidine	20	68B	di-n-butyl phthalate	1
8B	1,2,4-trichlorobenzene	1	69B	di-n-octyl phthalate	1
9B	hexachlorobenzene	1	70B	diethyl phthalate	1
12B	hexachloroethane	1	71B	dimethyl phthalate	1
18B	bis(2-chloroethyl)ether	1	72B	benzo(a)anthracene	1
20B	2-chloronaphthalene	1	73B	benzo(a)pyrene	1
25B	1,2-dichlorobenzene	1	74B	3,4-benzofluoranthene	1
26B	1,3-dichlorobenzene	1	75B	benzo(k)fluoranthene	1
27B	1,4-dichlorobenzene	1	76B	chrysene	1
28B	3,3'-dichlorobenzidine	5	77B	acenaphthylene	1
35B	2,4-dinitrotoluene	1	78B	anthracene	1
36B	2,6-dinitrotoluene	1	79B	benzo(ghi)perylene	5
37B	1,2-diphenylhydrazine (as azobenzene)	1	80B	fluorene	1
39B	fluoranthene	1	81B	phenanthrene	1
40B	4-chlorophenyl phenyl ether	1	82B	dibenzo(a,h)anthracene	5
			83B	indeno(1,2,3-cd)pyrene	5
			84B	pyrene	1

Acurex/ES

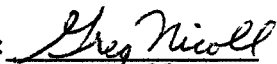
Attention: Larry Waterland

Reference: Samples PETC Bottom Ash and XAD Plus
OMC Extracts; Received 11/22/82December 20, 1982
Acurex ID# A82-11-029
Client PO# 307736.42
Page 1 of 28

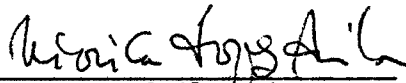
The above referenced samples were subjected to Level 1 liquid chromatography. The seven resulting fractions for each sample were subjected to gravimetric, TCO, and infrared analyses using Level 1 methodology. The results of these analyses are presented in the attached data forms.

The low recovery of the XAD plus OMC liquid chromatography fractions appears to be due to material being retained within the LC column.

Prepared by:


Greg Nicoll
Section Leader

Approved by:


Viorica Lopez-Avila, Ph.D.
Technical Director

GN/VLA/sla

Attachments

SAMPLE: PETC XAD & OMC A82-11-029-2 (29% of Extract)

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/dscm
Total Sample ¹	53	285	338	
Taken for LC ²	15	83	98	
Recovered ³	0.16	15.8	16	

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/dscm
	Found in Fraction	Blank	Cor- rected	Total ⁴	Found in Fraction	Blank	Cor- rected	Total ⁴		
1	<0.02	<0.02	<0.02	<0.07	0.8	<0.5	0.8	3	3	
2	<0.01	<0.01	<0.01	<0.03	0.4	<0.4	0.4	1	1	
3	<0.01	<0.01	<0.01	<0.03	0.6	<0.4	0.6	2	2	
4	0.13	<0.01	0.13	0.45	0.6	<0.4	0.6	2	2	
5	0.03	<0.01	0.03	0.10	0.4	<0.4	0.4	1	1	
6	<0.01	<0.01	<0.01	<0.03	0.6	<0.4	0.6	2	2	
7	<0.01	0.01	<0.01	<0.03	12.4	0.4	12.0	41	41	
Sum	0.16	<0.08	0.16	0.55	15.8	<2	15.4	52	52	

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample

SAMPLE: PETC Bottom Ash A82-11-029-3 (50% of Extract of 25g)

	TCO mg	GRAV mg	TCO + GRAV Total mg	Concentration mg/dscm
Total Sample ¹	40	160	200	
Taken for LC ²	20	80	100	
Recovered ³	3.6	115.8	119.4	

Fraction	TCO in mg				GRAV in mg				TCO + GRAV Total mg	Concentration mg/dscm
	Found in Fraction	Blank	Cor- rected	Total ⁴	Found in Fraction	Blank	Cor- rected	Total ⁴		
1	3.3	<0.02	3.3	6.6	34.0	<0.5	34.0	68.0	74.6	
2	0.10	<0.01	0.10	0.2	23.0	<0.4	23.0	46.0	46.2	
3	0.06	<0.01	0.06	0.1	15.6	<0.4	15.6	31.2	31.3	
4	0.09	<0.01	0.09	0.2	10.4	<0.4	10.4	20.8	21.0	
5	0.09	<0.01	0.09	0.2	11.0	<0.4	11.0	22.0	22.2	
6	<0.01	<0.01	<0.01	<0.02	16.2	<0.4	16.2	32.2	32.2	
7	0.01	0.01	<0.01	<0.02	6.0	0.4	5.6	11.2	11.2	
Sum	3.6	<0.08	3.6	7.3	116.2	<2.0	115.8	231.4	238.7	

1. Quantity in entire sample, determined before LC
2. Portion of whole sample used for LC, actual mg
3. Quantity recovered from LC column, actual mg
4. Total mg computed back to total sample

SAMPLE:

LCF1

Bottom Ash

PETC

[illegible]

[illegible]

SAMPLE:

LCF7

Bottom Ash

PETC

Page 14 of 28

5-135

SAMPLE:

LCF2

XAD Blank

PETC

[illegible]

5-144

SAMPLE:

LCF3

XAD/OMC

PETC

[illegible]

PETC

5-149

Acurex/ES

April 11, 1983

Acurex ID#: 8301-029

Client PO#: 307736.42

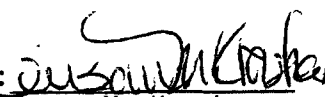
Attention: L. Waterland

Sample: PETC extracts

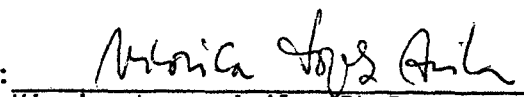
The above referenced samples were analyzed by direct probe mass spectrometry. Searches have been made for classes of compounds according to procedures described in the "IERL-RTP Procedures Manual: Level 1 Environmental Assessment". Losses of very volatile compounds such as naphthalene are normally observed with this procedure. The following fragment ions used for the search are given below:

<u>Compound Class</u>	<u>Fragment ions (m/e)</u>
Polycyclic aromatic hydrocarbons	178,202,216,228,252,276
Aliphatic hydrocarbons	57,71
Halogenated aliphatics	49,63,79,81,93,95,107,109
Aromatic hydrocarbons	50,51,77,78,79,91
Ethers	45,59,73
Alcohols	45,59,61,73,75
Phenols	51,77,94
Nitriles	54,68,82
Phthalate esters	149,167
Amines	44,58
Ketones	51,71
N-heterocyclics	117,129,167,179
Mercaptans, sulfides	47,61,75
Benzothiophenes	57,58,59,69,70,85,97,111,125
Carboxylic acids	60,73,149
Amides	58,72,86,100

Prepared by:


Susan M. Kraska
Staff Chemist

Approved by:


Viorica Lopez-Avila, Ph.D.
Technical Director

SMK/VLA/ats

LIMS REPORT

SAMPLE: 8301-029-1 PETC Front Half

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LAMS REPORT

SAMPLE: 8301-029-2 PETC Baghouse Ash

Major Categories

Intensity	Category	MW Range
100	Alkylbenzenes	106-148
100	Halogenated aliphatics	.

Sub-Categories, Specific Compounds

[illegible]

Other

LIMS REPORT**SAMPLE:** 8301-029-3 PETC XAD + Omc**Major Categories**

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-4 XAD + Omc LC Fractions 1 - 3

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LAMS REPORT**SAMPLE:** 8301-029-8 XAD + Omc LC Fractions 4-6**Major Categories**

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-11 XAD + Omc LC Fraction 7

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT**SAMPLE:** 8301-029-12 Bottom Ash LC Fraction 1

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT**SAMPLE:** 8301-029-14 Bottom Ash LC Fraction 2**Major Categories**

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT**SAMPLE:** 830k-029-15 Bottom Ash LC Fraction 3

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT**SAMPLE:** 8301-029-16 Bottom Ash LC Fraction 4**Major Categories**

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT

SAMPLE: 8301-029-17 Bottom Ash LC Fraction 5

Major Categories

Intensity	Category	MW Range
100	Alkylbenzenes	106-148

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LAMS REPORT

SAMPLE: 8301-029-18 Bottom Ash LC Fraction 6

Major Categories

Intensity	Category	MW Range
100	Alkylbenzenes	106-148
100	Carboxylic acids	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

LRMS REPORT**SAMPLE:** 8301-029-19 Bottom Ash LC Fraction 7

Major Categories

Intensity	Category	MW Range
	None detected	

Sub-Categories, Specific Compounds

Intensity	Category	m/e	Composition

Other

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5.9 BIOASSAY REPORTS

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BIONETICS

5516 Nicholson Lane, Kensington, Maryland 20895 301 881-5600 • Telex 89-8369

March 22, 1983

Mr. Chris Mann
Acurex Corporation
485 Clyde Avenue
Mountain View, CA 94042

Re: Acurex Subcontract No. RB59178A,
Release No. 5

Dear Mr. Mann:

Enclosed are five bound, and one unbound, copies of the final reports for the one XAD resin extract and four particulate ash samples submitted for testing and evaluation in IERL-EPA Level 1 Ames/Salmonella mutagenesis and CHO cytotoxicity bioassays. All studies were conducted and evaluated under IERL/EPA Level 1 guidelines.

Sample CWM XAD + OMC (A82-11-29-2) could not be tested up to the recommended maximum applicable dose (MAD) based upon weight of organics per plate because of limited amount of test material. Testing with this sample was modified by eliminating less responsive tester strains in the Ames assay and eliminating the highest recommended dose in the CHO clonal toxicity assay.

The ranking of the five samples, the criteria used to evaluate the results, and the critical data upon which the evaluations were based are summarized in three attached tables.

If you have any questions or comments concerning the reports, please feel free to contact me at (301) 881-5600, extension 536.

Sincerely,

LITTON BIONETICS, INC.

Robert R. Young
Environmental Assessment Section
Department of Molecular Toxicology

RRY/mg
Enclosures: Ames and CHO 6791-6795 Reports

cc: Contracts

TABLE 1
BIOASSAY SUMMARY TABLE

Technical Directive or Project No. LBI Tier Numbers 20988 and 20993

Contract No. EPA No. 68-02-3188; Acurex Subcontract No. RB59178A, Release No. 5.

[illegible]

a Test results could not be evaluated and ranked because of insufficient sample amount supplied. Test resulted indicate low (L) toxicity or less.
ND = No Detectable Toxicity

L = Low Toxicity

M = Moderate Toxicity

H = High Toxicity

U = Undetermined. Exact toxicity range could not be determined due to insufficient amount of sample.

TABLE 2

DEFINITION OF TOXICITY CATEGORIES FOR HEALTH EFFECTS ASSAYS

Assay ^a	Activity Measured ^b	Sample Type ^c	MAD ^d	Units	Range of Concentration or Dosage			
					High	Moderate	Low	Not Detectable (ND)
Ames	MEC (mutagenesis)	S	5	mg/plate	<0.05	0.05-0.5	0.5-5	ND at >5
		AL, NAL	200	µl/plate	<2	2-20	20-200	ND at >200
		E	5000	L/plate	<50	50-500	500-5000	ND at >5000
RAM	EC ₅₀ (lethality)	S	1	mg/ml	<0.01	0.01-0.1	0.1-1	ND at >1
		AL	600	µl/ml	<6	6-60	60-600	ND at >600
		NAL	20	µl/ml	<0.2	0.2-2	2-20	ND at >20
		E	1000	L/ml	<10	10-100	100-1000	ND at >1000
CHO	EC ₅₀ (lethality)	S	1	mg/ml	<0.01	0.01-0.1	0.1-1	ND at >1
		AL	600	µl/ml	<6	6-60	60-600	ND at >600
		NAL	20	µl/ml	<0.2	0.2-2	2-20	ND at >20
		E	1000	L/ml	<10	10-100	100-1000	ND at >1000
WAT	LD ₅₀ (lethality and toxic signs)	S	5	gm/kg	<0.05	0.05-0.5	0.5-5	ND at >5
		AL, NAL	5	ml/kg	<0.05	0.05-0.5	0.5-5	ND at >5

^aStandard test abbreviations are as follows:

Ames: Ames Salmonella/microsome mutagenesis assay

RAM: Rabbit alveolar macrophage cytotoxicity assay

CHO: Rodent cell clonal toxicity assay

WAT: Acute in vivo test in rodents (whole animal test)

^bStandard abbreviations for measured endpoints are as follows:

MEC: Minimum effective concentration

EC₅₀: Calculated concentration expected to produce effect in 50 percent of population

LD₅₀: Calculated dose expected to kill 50 percent of population

^cS = Solid, AL = Aqueous liquid, NAL = Nonaqueous liquid, E = Extract and/or concentrate of unknown organic content (use equivalent volume of SASS train gas)

^dMAD = Maximum applicable dose

TABLE 3

HEALTH EFFECTS CRITICAL DATA SUMMARY FORM^a

Contract No. EPA No. 68-02-3188 Technical Directive or Project No. LBI Tier No. 20988 and Site Sampled CWM site code.
 Acurex Subcontract No. RB59178A, 20993
 Release No. 5

RAM Cytotoxicity [EC50]^c

Rodent Toxicity

Sample Identification	Ames Mutagenicity [MEC] ^b	CHO Clonal Toxicity [EC50] ^c	RAM Cytotoxicity [EC50] ^c				Rodent Toxicity	
			Viability	Viability Index	ATP	ATP/Per 10 ⁶ Cells	LD ₅₀ ^d	Toxic Signs ^e
CWM XAD + OMC	2300 µg ^f	>230 µg						
(A82-11-29-2)								
CWM 10 + 15 µm Ash	> 10 mg	97 µg						
(A82-06-026-4 + 5)								
CWM 3 µm + Filter Ash	> 10 mg	1200 µg						
(A82-06-026-3 A + B)								
CWM Bottom Ash	> 10 mg	110 µg						
(A82-6-26 815534)								
CWM Baghouse Ash)	> 10 mg	600 µg						
(A82-6-26 815234)								

^aThe assays, observed parameters and evaluation criteria are presented in IERL-RTP Procedures Manual; Level 1 Environmental Assessment Biological Tests, [EPA Contract No. 68-02-2681, Litton Bionetics, Inc., Kensington, Md.]

^bMEC: Minimum Effective Concentration - Lowest concentration for any tester strain giving a mutagenic response.

^cEC₅₀: Effective concentration that reduces the observed parameter to 50 percent of the appropriate negative control.

^dLD₅₀: The dose lethal to 50 percent of treated animals.

^eToxic signs are identified in a numbered list in the Level 1 manual. Only the number is reported here.

^fConcentrations are per plate for the Ames assay and per milliliter of culture medium for the CHO assay.

TECHNICAL REPORT DATA <i>(Please read instructions on the reverse before completing)</i>		
1. REPORT NO. EPA-600/7-86-004b	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Environmental Assessment of a Watertube Boiler Firing a Coal/Water Slurry; Volume II. Data Supplement	5. REPORT DATE February 1986	
	6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S) R. DeRosier and L.R. Waterland	8. PERFORMING ORGANIZATION REPORT NO.	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Acurex Corporation P.O. Box 7555 Mountain View, California 94039	10. PROGRAM ELEMENT NO.	
	11. CONTRACT/GRANT NO. 68-02-3188	
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Air and Energy Engineering Research Laboratory Research Triangle Park, NC 27711	13. TYPE OF REPORT AND PERIOD COVERED Final; 1/84 - 3/85	
	14. SPONSORING AGENCY CODE EPA/600/13	
15. SUPPLEMENTARY NOTES AEERL project officer is Robert E. Hall, Mail Drop 65, 919/541-2477. Volume I gives technical results of the work.		
16. ABSTRACT The report is a compendium of detailed test sampling and analysis data obtained in field tests of a watertube industrial boiler burning a coal/water slurry (CWS). Test data included in the report include preliminary stack test data, boiler operating data, and complete flue gas emission results. Flue gas emission measurements included continuous monitoring for criteria pollutants; onsite gas chromatography (GC) for volatile hydrocarbons (C1-C6); Methods 5/8 sampling for particulate, SO2, and SO3 emissions; source assessment sampling system (SASS) for total organics in two boiling point ranges (100 to 300 C and > 300 C), organic compound category information using infrared spectrometry (IR), liquid column (LC) chromatography separation, and low resolution mass spectrometry (LRMS), specific quantitation of the semivolatile organic priority pollutants using gas chromatography/mass spectrometry (GC/MS), and trace element emissions using spark source mass spectrometry (SSMS) and atomic absorption spectroscopy (AAS); N2O emissions by gas chromatography electron capture detector (GC/ECD); and biological assay testing of SASS and ash stream samples.		
17. KEY WORDS AND DOCUMENT ANALYSIS		
a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Pollution Water Tube Boilers Slurries Coal Sampling	Pollution Control Stationary Sources Test Data Industrial Boilers Analyzing	13B 13A 11G 08G, 21D 14B
18. DISTRIBUTION STATEMENT Release to Public	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 213
	20. SECURITY CLASS (This page) Unclassified	22. PRICE