Texaco Refining & Marketing, Inc.
P. O. Box 1476
Bakersfield, California 93302

BOILERS A AND B

Prepared by

Steiner Environmental, Inc.
4930 Boylan Street
Bakersfield, California 93308

ANNUAL COMPLIANCE TEST

June 19, 1992

EPA NSR 4-4-8; SJ 7877
Kern County APCD Number 2007213 and 2007214

Report PS-92-2818/Project 7204-92

Test Team Leader: Phil Sandberg

Approved by : 
Jim Steiner, Project Manager
July 8, 1992

SUMMARY OF SOURCE TEST RESULTS FOR EPA

Company : TEXACO R & M

Permit Number : NSR 4-4-8;SJ 7877

Unit Number or Name :BOILERS A & B

Location : COMMON STACK

Pollutant/Other	Test Method	Test Date	Emission / Other*	
			Test Results	Permit Limit
			lb/MMBtu	lb/MMBtu
SO2	U.S. EPA METHOD 5/8	JUNE 19,1992	0.047 lb/MMBtu	0.020 lb/MMBtu
NOx as NO2	CARB Method 1-100	JUNE 19,1992	4.47 lb/hr	15.00 lb/hr
Hydrocarbon			lb/MMBtu	lb/MMBtu
Sulfur Content			percent	percent
Fuel Usage				
Excess Oxygen				
Other				

* Emissions/Other should be at standard conditions (68dF and 29.92 inches of Hg) and in units of EPA's Authority to Construct/Modify.

Prepared by : Jim Steiner

Title : President

Date : 7/8/92

SUMMARY OF SOURCE TEST RESULTS

Company : TEXACO R & M Test Date: JUNE 19,1992 APCD No.:2007213 2007214 Unit No. : BOILERS A & B

POLLUTANT	INLET Concentration gr/scf	INLET Concentration @12% CO2	INLET Concentration ppm(v)	INLET Mass Flow Rate lb/hr	OUTLET Concentration gr/scf	OUTLET Concentration @12% CO2	OUTLET Concentration ppm(v)	OUTLET Concentration @O2 CORR*	OUTLET Mass Flow Rate lb/hr	Removal Percent	Emission Factor Outlet
Particulate					0.0039	0.0062			0.34		
					0.0034	0.0056			0.30		
					0.0025	0.0036			0.21		
avg.					0.0033	0.0051			0.28		
Sulfate					0.0013	0.0020			0.11		0.0008
					0.0013	0.0021			0.11		lb/MMBtu
					0.0011	0.0016			0.09		as Sulfur
avg.					0.0012	0.0019			0.10		
SO2 (wet)							19.95		2.01		0.0237
							20.11		2.03		lb/MMBtu
							18.07		1.80		as Sulfur
avg.							19.38		1.95		
NOx as NO2 (dry)							70.09	93.91	4.51		
							67.97	89.33	4.32		0.1086
							72.01	88.23	4.58		lb/MMBtu
avg.							70.02	90.49	4.47		
HC (> C1) avg.											
CO							1.00		0.04		
							1.80		0.07		
							1.02		0.04		
avg.							1.27		0.05		
avg.											

Scrubber Liquor Analysis : Chlorides - mg/l Specific Gravity -

For Kern County Use Only ANNUAL 2101 + EPA

Comments : 3.0 % O2 correction.

TABLE OF CONTENTS

SECTION 1

INTRODUCTION

At the request of Texaco Refining & Marketing, Inc., Steiner Environmental, Inc. conducted a series of measurements on the effluent of Boilers A and B located at their Bakersfield Refinery Plant. These tests were conducted on June 19, 1992. The purpose of these tests was to determine compliance with EPA and Kern County Rules and Regulations.

Triplicate 60-minute continuous monitor tests for NO_x, CO, CO_2 and O_2 were performed at the common stack using CARB Method 1-100. Triplicate particulate, sulfate and SO_2 tests were performed using EPA Method 5/8. A sample of the fuel gas fired in the boilers was collected by Steiner Environmental, Inc. and analyzed by Pacific Gas Technology using ASTM procedures.

Messrs. Phil Sandberg and Scott Wine of Steiner Environmental conducted these tests. Mr. Bill Kerstan of Texaco Refining & Marketing was on-site to oversee the operation of the boilers. Kern County APCD did not have a representative present to observe the test program.

SECTION 2

WET METHOD DATA SUMMARIES

A. FIELD DATA SUMMARY

PLANT : TEXACO R & M
BOILERS A & B
DATE : JUNE 19,1992

	RUN 1	RUN 2	RUN 3
Vlc = Vol water collected in train, ml	219.5	253.6	222.2
Vm = Sample gas vol, meter cond., dacf	89.220	86.512	85.347
Y = Meter calibration factor	1.0076	1.0076	1.0076
Pbar = Barometric pressure, in. Hg	29.91	29.88	29.82
Pstatic = Stack static pressure, in. H2O	-0.28	-0.23	-0.24
dH = Avg meter pressure diff, in. H2O	2.41	2.34	2.29
Tm = Absolute meter temp., degrees R	566.9	548.3	543.9
Vm(std) = Sample gas vol, Std. cond., dscf	82.929	83.031	82.408
Bws = Water vapor in gas stream, fraction	0.109	0.124	0.111
MF = Moisture factor (1 - Bws)	0.891	0.876	0.889
CO2 = Carbon Dioxide, dry, volume %	8.43	8.46	9.17
O2 = Oxygen, dry, volume %	7.54	7.28	6.29
N2 = Nitrogen, dry volume %	84.03	84.26	84.54
Md = Molecular weight of stack gas, dry	29.65	29.64	29.72
Ms = Molecular weight of stack gas, wet	28.38	28.20	28.42
Cp = Pitot tube coefficient	0.84	0.84	0.84
Sq.Rt. dP = Avg. square root of each dP	0.4677	0.4684	0.4661
Ts = Absolute stack temp., degrees R	973.0	972.7	979.5
A = Area of stack, ft2	8.62	8.62	8.62
Qstd = Volumetric flowrate, dscfm	8,845	8,737	8,749
An = Nozzle area, ft2	8.25E-04	8.25E-04	8.25E-04
O = Sample time, minutes	96.00	96.00	96.00
%I = Isokinetic variation, percent	101.98	103.38	102.46

B. PARTICULATE DATA SUMMARY

PLANT : TEXACO R & M
BOILERS A & B
DATE : JUNE 19,1992

	RUN 1	RUN 2	RUN 3
Particulate Weight (FHW + MF + BHW), mg ...	23.86	21.44	15.05
Meter Volume, standard cond., Vm(std)	82.929	83.031	82.408
Carbon Dioxide, percent	8.43	8.46	9.17
Particulate Concentration :			
gr/scf	0.0040	0.0035	0.0025
gr/dscf	0.0044	0.0040	0.0028
gr/dscf @ 12 % CO2	0.0063	0.0057	0.0037
Particulate Emission Rate :			
lbs/hr	0.34	0.30	0.21

C. SULFATE DATA SUMMARY

PLANT : TEXACO R & M
BOILERS A & B
DATE : JUNE 19,1992

Normality of BaCl2, Front Half: 0.0099601
Normality of BaCl2, Back Half : 0.0099800

	RUN 1	RUN 2	RUN 3
FILTERABLE SULFATE :			
Front Half Sulfate (FHS), mg H2SO4	5.03	4.73	4.05
Sample Volume, ml	100	100	100
Sample Aliquot, ml	10	10	10
Volume of Titer, ml	1.10	1.04	0.90
Volume of Titer Blank, ml	0.07	0.07	0.07
CONDENSIBLE SULFATE :			
Back Half Sulfate (BHS) , mg H2SO4	2.69	3.33	2.64
Sample Volume, ml	100	100	100
Sample Aliquot, ml	10	10	10
Volume of Titer, ml	0.62	0.75	0.61
Volume of Titer IPA Blank, ml	0.06	0.06	0.06
grains, [mg x (15.4324E-3)], Front Half ...	0.077625	0.072995	0.062501
grains, [mg x (15.4324E-3)], Back Half	0.041513	0.051390	0.040742
grains, Total (Front Half + Back Half)	0.119138	0.124385	0.103243
Meter Volume, standard cond., Vm(std)	82.929	83.031	82.408
Carbon Dioxide, percent	8.43	8.46	9.17
Total Sulfate Concentration :			
gr/scf	0.0013	0.0013	0.0011
gr/dscf	0.0014	0.0015	0.0013
gr/dscf @ 12 % CO2	0.0020	0.0021	0.0016
Total Sulfate Emission Rate :			
lbs/hr	0.11	0.11	0.09

D. SULFUR DIOXIDE DATA SUMMARY

PLANT : TEXACO R & M
BOILERS A & B
DATE : JUNE 19,1992

Normality of BaCl2 ..... 0.0099601

	RUN 1	RUN 2	RUN 3
SO2 ANALYSIS :			
SO2 Analysis, mg H2SO4	217.67	223.29	196.30
Sample Volume, ml	400	430	410
Sample Aliquot, ml	10	10	10
Volume of Titer, ml	11.24	10.73	9.90
Volume of Titer Blank, ml	0.09	0.09	0.09
Meter Volume, standard cond., Vm(std)	82.929	83.031	82.408
Qstd = Volumetric flowrate, dscfm	8,845	8,737	8,749
Sulfur Dioxide Concentration :			
lb/dscf x 1+E6	3.783	3.875	34.328
ppm (wet)	19.95	20.11	18.07
Sulfur Dioxide Emission Rate :			
lbs/hr	2.01	2.03	1.80

G. CONTINUOUS MONITOR DATA

TEXACO R & M
BOILERS A & B

Date : 6/19/92

3 % O2 Correction

Nitrogen Dioxide

Run #	% O2	Corrected ppm (dry)	Corrected ppm (dry) @O2 Corr.*	lb/hr
1	7.54	70.09	93.87	4.51
2	7.28	67.97	89.35	4.32
3	6.29	72.01	88.20	4.58
Average	7.03	70.02	90.47	4.47

Sulfur Dioxide

Run #	ppm (wet)	ppm (dry)	lb/hr
1			
2			
3			
Average			

Carbon Monoxide

Run #	Corrected ppm (dry)	lb/hr
1	1.00	0.04
2	1.80	0.07
3	1.02	0.04
Average	1.27	0.05

SECTION 3

WET TEST METHOD CALCULATIONS

SOURCE TEST CALCULATIONS

PLANT : TEXACO R & M
BOILERS A & B

RUN NO.: 1
DATE : JUNE 19,1992

STANDARD TEMP.: 60 DEG. F

METER TEMP.	=	106.85 DEG. F	STATIC PRESS.	=	-0.28 in. H2O
STACK TEMP.	=	513.00 DEG. F	Cp	=	0.840
SQ.RT. dP	=	0.4677 in. H2O	STACK I.D.	=	39.75 inch
METER ORIFICE	=	2.41 in. H2O	DUCT LENGTH	=	inch
METER VOLUME	=	89.220 Cu.Ft.	DUCT WIDTH	=	inch
METER Y	=	1.0076	STACK AREA	=	8.618 Sq.Ft.
BAR. PRESSURE	=	29.91 in.Hg	TEST TIME	=	96.00 min.
COND.(Vlc)	=	219.5 ml	NOZZLE DIA.	=	0.3890 inch

GAS ANALYSIS	=	7.54 % O2	0.00 % CO	
		8.43 % CO2	84.03 % N2	

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Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	=	82.929	dscf
Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic	=	10.175	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	=	0.109	Lower Bws value used.
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	=	1.000	
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100	=	51.49	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)]	=	29.65	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	=	28.38	
P(stack) = Pbar + [Pstatic / 13.6]	=	29.89	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)]	=	35.97	ft/sec
Qs = vs x As x 60	=	18,601	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92)	=	8,845	dscf/min
I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60)	=	101.98	%

SOURCE TEST CALCULATIONS

PLANT : TEXACO R & M
BOILERS A & B

RUN NO.: 2
DATE : JUNE 19,1992

STANDARD TEMP.: 60 DEG. F

METER TEMP.	= 88.33 DEG. F		STATIC PRESS.	= -0.23	in. H2O
STACK TEMP.	= 512.67 DEG. F		Cp	= 0.840	
SQ.RT. dP	= 0.4684 in. H2O		STACK I.D.	= 39.75	inch
METER ORIFICE	= 2.34 in. H2O		DUCT LENGTH	=	inch
METER VOLUME	= 86.512 Cu.Ft.		DUCT WIDTH	=	inch
METER Y	= 1.0076		STACK AREA	= 8.618	Sq.Ft.
BAR. PRESSURE	= 29.88 in.Hg		TEST TIME	= 96.00	min.
COND.(Vlc)	= 253.6 ml		NOZZLE DIA.	= 0.3890	inch

GAS ANALYSIS : 7.28 % O2 0.00 % CO
8.46 % CO2 84.26 % N2

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Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	= 83.031	dscf
Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic	= 11.756	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	= 0.124	Lower Bws value used.
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	= 1.000	
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100	= 48.65	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)]	= 29.64	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	= 28.20	
P(stack) = Pbar + [Pstatic / 13.6]	= 29.86	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)]	= 36.15	ft/sec
Qs = vs x As x 60	= 18,692	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92)	= 8,737	dscf/min
I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60)	= 103.38	%

SOURCE TEST CALCULATIONS

PLANT : TEXACO R & M
BOILERS A & B

RUN NO.: 3
DATE : JUNE 19,1992

STANDARD TEMP.: 60 DEG. F

METER TEMP.	=	83.88 DEG. F	STATIC PRESS. =	-0.24	in. H2O
STACK TEMP.	=	519.50 DEG. F	Cp =	0.840	
SQ.RT. dP	=	0.4661 in. H2O	STACK I.D. =	39.75	inch
METER ORIFICE	=	2.29 in. H2O	DUCT LENGTH =		inch
METER VOLUME	=	85.347 Cu.Ft.	DUCT WIDTH =		inch
METER Y	=	1.0076	STACK AREA =	8.618	Sq.Ft.
BAR. PRESSURE	=	29.82 in.Hg	TEST TIME =	96.00	min.
COND.(Vlc)	=	222.2 ml	NOZZLE DIA. =	0.3890	inch

GAS ANALYSIS : 6.29 % O2 0.00 % CO
9.17 % CO2 84.54 % N2

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Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	=	82.408	dscf
Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic	=	10.301	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	=	0.111	Lower Bws value used.
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	=	1.000	
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100	=	39.24	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)]	=	29.72	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	=	28.42	
P(stack) = Pbar + [Pstatic / 13.6]	=	29.80	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)]	=	36.00	ft/sec
Qs = vs x As x 60	=	18,613	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92)	=	8,749	dscf/min
I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60)	=	102.46	%

EMISSION RATE CALCULATIONS

PLANT :TEXACO R & M
BOILERS A & B

RUN NO.: 1
DATE : JUNE 19,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.01753 grams	Vm(std)	82.929 ft3
Mass Filter (MF)	0.00185 grams	Vw(std)	10.175 ft3
Back Half Wash (BHW)	0.00448 grams	Qs(std)	8,845 dscfm
Front Half Sulfate (FHS)	5.03 mg H2SO4	Bws	0.109
Back Half Sulfate (BHS)	2.69 mg H2SO4	CO2	8.43 %
H2O2 Catch (SO2)	217.67 mg H2SO4	O2	7.54 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8476.93 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0032 gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0036 gr/dscf
gr/dscf x (12 / %CO2)	0.0051 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.27 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0068 lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0040 gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0044 gr/dscf
gr/dscf x (12 / %CO2)	0.0063 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.34 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0084 lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0013 gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0014 gr/dscf
gr/dscf x (12 / %CO2)	0.0020 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.11 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0027 lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	22.40 ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	30.02 @ O2 corr.
ppm x (1 - Bws)	19.95 ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	2.01 lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0502 lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 3.78E-06	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0251 lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0009 lb/MMBtu
Total Sulfur	0.0260 lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :TEXACO R & M
BOILERS A & B

RUN NO.: 2
DATE : JUNE 19,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.01510 grams	Vm(std)	83.031 ft3
Mass Filter (MF)	0.00085 grams	Vw(std)	11.756 ft3
Back Half Wash (BHW)	0.00549 grams	Qs(std)	8,737 dscfm
Front Half Sulfate (FHS)	4.73 mg H2SO4	Bws	0.124
Back Half Sulfate (BHS)	3.33 mg H2SO4	CO2	8.46 %
H2O2 Catch (SO2)	223.29 mg H2SO4	O2	7.28 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8476.93 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0026	gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0030	gr/dscf
gr/dscf x (12 / %CO2)	0.0042	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.22	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0055	lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0035	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0040	gr/dscf
gr/dscf x (12 / %CO2)	0.0057	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.30	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0074	lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0013	gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0015	gr/dscf
gr/dscf x (12 / %CO2)	0.0021	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.11	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0028	lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	22.95	ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	30.17	@ O2 corr.
ppm x (1 - Bws)	20.11	ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	2.03	lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0504	lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 3.88E-06		lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0252	lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0009	lb/MMBtu
Total Sulfur	0.0261	lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :TEXACO R & M
BOILERS A & B

RUN NO.: 3
DATE : JUNE 19,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.00956 grams	Vm(std)	82.408 ft3
Mass Filter (MF)	0.00150 grams	Vw(std)	10.301 ft3
Back Half Wash (BHW)	0.00399 grams	Qs(std)	8,749 dscfm
Front Half Sulfate (FHS)	4.05 mg H2SO4	Bws	0.111
Back Half Sulfate (BHS)	2.64 mg H2SO4	CO2	9.17 %
H2O2 Catch (SO2)	196.30 mg H2SO4	O2	6.29 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8476.93 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0018 gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0021 gr/dscf
gr/dscf x (12 / %CO2)	0.0027 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.16 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0036 lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0025 gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0028 gr/dscf
gr/dscf x (12 / %CO2)	0.0037 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.21 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0049 lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0011 gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0013 gr/dscf
gr/dscf x (12 / %CO2)	0.0016 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.09 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0022 lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	20.33 ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	24.91 @ O2 corr.
ppm x (1 - Bws)	18.07 ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	1.80 lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0416 lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 3.43E-06	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0208 lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0007 lb/MMBtu
Total Sulfur	0.0215 lb/MMBtu

SECTION 4

CONTINUOUS METHODS DATA

A. CALIBRATION AND CORRECTION DATA

Company : TEXACO R & M
Station : BOILERS A & B

Date : 6/19/92
Test Run : 1
Test Condition: REF GAS

	Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Point #										
1	7.90	7.87	8.40	8.42	1.00	1.00			72.80	72.61
2	7.80	7.72	8.44	8.49	1.00	1.00			71.80	71.25
3	7.40	7.28	8.50	8.58	1.00	1.00			72.20	71.28
4	7.48	7.31	8.44	8.56	1.00	1.00			71.80	70.53
5	6.85	6.66	8.74	8.90	1.00	1.00			75.60	73.88
6	7.25	7.00	8.54	8.73	1.00	1.00			71.60	69.63
7	8.05	7.72	8.12	8.33	1.00	1.00			74.70	72.28
8	9.13	8.71	7.24	7.46	1.00	1.00			61.50	59.24
MEAN		7.54		8.43		1.00				70.09

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	0.00	0.00		-0.20
Span Check	17.02	14.98	392.50		85.20
Cal. Gas	16.18	15.47	392.00		81.80
Scf	0.00649	-0.00396	0.00016		0.00550
Zcf	0.00000	0.00000	0.00000		-0.02500

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings
Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings
Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]
B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

A. CALIBRATION AND CORRECTION DATA

Company : TEXACO R & M

Station : BOILERS A & B

Date : 6/19/92

Test Run : 2

Test Condition: REF GAS

	Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Point #										
1	6.00	6.00	9.10	9.11	0.53	0.53			75.40	75.38
2	7.63	7.62	8.40	8.42	2.00	2.01			68.00	67.96
3	7.38	7.36	8.34	8.38	0.70	0.70			67.00	66.93
4	8.13	8.09	8.16	8.21	3.00	3.02			67.00	66.90
5	6.88	6.84	8.30	8.36	2.80	2.83			65.50	65.38
6	7.85	7.80	8.20	8.28	1.70	1.72			65.40	65.25
MEAN		7.28		8.46		1.80				67.97

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	0.00	0.00		0.00
Span Check	16.30	15.38	7.70		82.00
Cal. Gas	16.18	15.54	7.80		81.80
Scf	0.00124	-0.00172	-0.00214		0.00041
Zcf	0.00000	0.00000	0.00000		0.00000

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings
Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings
Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]
B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

A. CALIBRATION AND CORRECTION DATA

Company : TEXACO R & M
Station : BOILERS A & B

Date : 6/19/92
Test Run : 3
Test Condition: REF GAS

	Concentration : Drift Uncorrected (A) / Corrected (B)									
	%O2		%CO2		ppm CO		ppm SO2		ppm NOx	
	A	B	A	B	A	B	A	B	A	B
Point #										
1	6.33	6.34	8.80	8.80	1.00	1.00			68.20	68.12
2	5.25	5.28	9.66	9.65	1.00	1.00			75.80	75.55
3	7.18	7.24	8.74	8.73	1.00	1.00			68.70	68.32
4	5.73	5.80	9.36	9.34	1.00	1.00			74.30	73.72
5	6.25	6.35	9.46	9.43	1.10	1.10			77.00	76.23
6	6.58	6.71	9.10	9.07	1.00	1.00			71.00	70.14
MEAN		6.29		9.17		1.02				72.01

	%O2	%CO2	ppm CO	ppm SO2	ppm NOx
Zero Check	0.00	0.00	0.00		0.00
Span Check	15.85	15.60	199.20		82.90
Cal. Gas	16.18	15.54	199.80		81.30
Scf	-0.00340	0.00064	-0.00050		0.00224
Zcf	0.00000	0.00000	0.00000		0.00000

Scf, Span Drift Correction Factor = (% Drift / 100) / # of Readings
Zcf, Zero Drift Correction Factor = Zero Drift / # of Readings
Cz, Zero Corr. Concentration = measured value - [Zcf x (Point # - 0.5)]
B, Corrected Concentration = Cz / [1 + (Scf x (Point # - 0.5))]

B. ZERO AND SPAN DRIFT PERCENT CALCULATIONS

Company : TEXACO R & M Date : 6/19/92

Station : BOILERS A & B

Run 1	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	16.18	15.47	392.00		81.80
Measured Span	17.02	14.98	392.50		85.20
Zero Drift	0.00	0.00	0.00		-0.20
Final, Actual Span	17.02	14.98	392.50		85.40
Percent Drift	5.2	-3.2	0.1		4.4

Run 2	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	16.18	15.54	7.80		81.80
Measured Span	16.30	15.38	7.70		82.00
Zero Drift	0.00	0.00	0.00		0.00
Final, Actual Span	16.30	15.38	7.70		82.00
Percent Drift	0.7	-1.0	-1.3		0.2

Run 3	O2 (%)	CO2 (%)	CO (ppm)	SO2 (ppm)	NOx (ppm)
Initial Span	16.18	15.54	199.80		81.80
Measured Span	15.85	15.60	199.20		82.90
Zero Drift	0.00	0.00	0.00		0.00
Final, Actual Span	15.85	15.60	199.20		82.90
Percent Drift	-2.0	0.4	-0.3		1.3

Final, Actual Span = Measured Span - Zero Drift

Percent Drift = (Final, Actual Span - Initial Span) / Initial Span x 100

EMISSION RATE CALCULATIONS

PLANT : TEXACO R & M
SOURCE : BOILERS A & B

Temp. Std. : 60 dF
Press. Std.: 29.92 in. Hg. 3 % O2 Correction

Run No.	1	2	3	AVERAGE
Date	6/19/92	6/19/92	6/19/92	
Oxygen (%)	7.54	7.28	6.29	7.03
Qs(std), dscfm	8,845	8,737	8,749	8,777
NOx, ppm	70.09	67.97	72.01	70.02
SO2, ppm				
CO, ppm	1.00	1.80	1.02	1.27
HC, ppm				
F-Factor	8476.93	8476.93	8476.93	8476.93
NOx, MW = 46.005				
NOx, lb/hr	4.51	4.32	4.58	4.47
NOx, ppm @ O2	93.87	89.35	88.20	90.47
NOx, lb/MMBtu	0.1127	0.1073	0.1059	0.1086
SO2, MW = 64.058				
SO2, lb/hr				
SO2, ppm @ O2				
SO2, lb/MMBtu				
CO, MW = 28.010				
CO, lb/hr	0.04	0.07	0.04	0.05
CO, ppm @ O2	1.34	2.37	1.25	1.65
CO, lb/MMBtu	0.0010	0.0017	0.0009	0.0012
HC, MW = 16.043				
HC, lb/hr				
HC, ppm @ O2				
HC, lb/MMBtu				

* lb/hr = 8.223E-5 x Qs(std) x MW x ppm / (Tstd + 460)

* ppm @ O2 = ppm measured x [(20.9 - O2% correction) / (20.9 - %O2 measured)]

* lb/MMBtu = F-Factor x MW x [1.3711E-6 / (Tstd + 460)] x [20.9 / (20.9 - O2%)] x ppm

* lb/Bbl = (lb/MMBtu) x (MMBtu/Bbl)

SECTION 5

ANALYSIS PROCEDURES

This section of the report describes the procedures used to analyze the samples collected during the test program. Pacific Gas Technology performed the fuel gas analysis. All other analyses were performed in the Steiner Environmental laboratory in Bakersfield.

5.1 ANALYSIS OF PARTICULATE-SO_x SAMPLES

5.1.1 Nozzle, Probe, Filter Holder Wash

The volume of the acetone washings was measured and the washings were transferred to clean, tared, aluminum weighing dishes. The dishes were placed on temperature-controlled water bath under a fume hood and gently heated to dryness (100°F). The dishes with the dry residue were desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to the nearest 0.01 mg with a tolerance of <0.1 mg between weighings). The ACS reagent grade acetone blank was treated in the same manner.

5.1.2 Filter

The 100-mm filter was removed from its petri dish and transferred to an oven where it was heated for 2 hours at 105°C. The filter was then desiccated and weighed repeatedly at 6-hour intervals until a constant

weight was achieved (to nearest 0.01 mg with a tolerance of <0.1 mg between weighings). An unused, tared blank filter was treated in the same manner.

5.1.3 Filterable Particulate Sulfate

The acetone washings residue and the 100-mm filter were combined and then leached with distilled water to remove sulfate and the leachate was diluted to 100-ml. An aliquot was passed through ion exchange resin and titrated against 0.01N $BaCl_2$ (which was previously standardized against 0.0100N H_2SO_4) using the barium-thorin titration procedure specified in EPA Method 8. The acetone blank and 100-mm filter blank were treated in an identical manner.

5.1.4 Condensible Particulate, Sulfate, and SO_3

The 47-mm glass fiber filter was leached with distilled water and the leachate was added to the contents and washings from impinger 1. The volume was measured and the entire volume was transferred to a clean, tared glass evaporating dish. The dish was placed on a temperature-controlled hot plate under a fume hood and gently heated to dryness (150°F). The dish with the dry residue was desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to nearest 0.01 mg with a tolerance of <0.1 mg between weighings). The dry residue was dissolved in distilled water and diluted to 100-ml using distilled water and analyzed for sulfate using the barium-thorin titration procedure. A blank 47-mm filter and 80-percent IPA solution were treated in the same manner.

5.1.5 SO_2

The volume of contents and washings from bubbler 2 and impinger 3 was measured and an aliquot was analyzed for sulfate using the barium-thorin procedure. A 3-percent H_2O_2 blank was treated in the same manner.

5.2 FUEL

A sample of the fuel fired during this test program was collected and sent to Pacific Gas Technology for analysis. Analysis was performed by PGT in accordance with EPA Title 40 Section 60.45. The specific procedures are itemized in Table 5-1. The results appear at the end of this section.

TABLE 5-1. FUEL ANALYSIS METHODS

LABORATORY TEST PROCEDURES FOR FUEL OILS AND FUEL GASES

Reference: EPA Title 40, Section 60.45

FUEL OIL TESTS:	
Sediment and Water, Vol. %	ASTM D4007-81
Gravity by Hydrometer (API)	ASTM D1298-80
API Gravity Corrected to 60°F	ASTM Table 5A
Gross Calorific Value (Btu/lb)	ASTM D2015-77
Ultimate Analysis (C, H, O, N, S, wt. %)	
Carbon, Hydrogen	ASTM D3178-73
Nitrogen (chemiluminescence detector)	ASTM D3431-80
Sulfur	ASTM D2622-82
Ash	ASTM D482
Oxygen	ASTM D3176-74
GASEOUS FUELS BY GAS-LIQUID CHROMATOGRAPHY:	
Gas Analysis	ASTM D1945-81
Sulfur Analysis	CPA B16
Calculation of Gross Calorific Value	ASTM D3588-81
Component Weight %, F-factor calculations	EPA 40:60.45
PROCEDURES FOR SCRUBBER LIQUOR ANALYSIS:	
Specific Gravity	ASTM D1429
Chlorides	ASTM D512-67

PACIFIC GAS TECHNOLOGY

2122 Q Street
Bakersfield, California 93301
805/324-1317
Fax: 805/324-2746

GAS ANALYSIS BY CHROMATOGRAPH

STEINER ENVIRONMENTAL, INC
4930 Boylan Street
Bakersfield, CA 93308

Attention: J. Steiner

RECEIVED
JUN 26 1992
Ans'd.....

SAMPLED: JUNE 19, 1992
SUBMITTED: JUNE 22, 1992
REPORTED: JUNE 23, 1992

LAB # 4421

Sample ID : TEXACO\AREA 3
BOILERS A & B
REFINERY GAS

STEINER ID # 33077

ANALYZED GAS	MOLE %	WT %	CHONS WT %	
OXYGEN	0.04	0.06	CARBON	77.42
NITROGEN	0.13	0.18	HYDROGEN	22.34
CARBON DIOXIDE	ND	0.00	OXYGEN	0.06
HYDROGEN	12.86	1.25	NITROGEN	0.18
CARBON MONOXIDE	ND	0.00	SULFUR	0.00
HYDROGEN SULFIDE	ND	0.00		
METHANE	58.14	45.10		
ETHANE	17.09	24.85		
ETHYLENE	1.37	1.86		
PROPYLENE	1.48	3.01		
PROPANE	4.00	8.53		
iso-BUTANE	0.49	1.38		
n-BUTANE	1.69	4.75		
1-BUTENE/isoBUTYLENE	0.63	1.71		
TRANS BUTENE	0.15	0.41		
Cis BUTENE	0.08	0.22		
1,3-BUTADIENE	0.17	0.44		
iso-PENTANE	0.45	1.57		
n-PENTANE	0.65	2.27		
HEXANE +	0.58	2.42		

SPECIFIC GRAVITY * : 0.714

SPECIFIC VOLUME : 18.35 cu ft/lb

HYDROGEN SULFIDE (Draeger) : ppm

TOTAL * BTU/cu ft	DRY :	1265	NET * BTU/cu ft	DRY :	1149
	WET :	1243		WET :	1129
BTU/lb	:	23209	BTU/lb	:	21087

* CALCULATED ACCORDING TO : ASTM D-3588

SECTION 6

SAMPLING PROCEDURES

This section of the report describes the equipment and procedures used to conduct the particulate and gaseous tests on this program.

6.1 PRELIMINARY MEASUREMENTS

Before conducting the stack tests a series of preliminary measurements were made to determine:

- The location of the sampling site and the number and location of the sampling points to be used (EPA Method 1)
- The velocity, temperature, and pressure of the gases in the stack (EPA Method 2)
- The composition of the stack gases (EPA Method 3)
- The moisture content of the stack gases (EPA Method 4)

Using the results of these preliminary measurements and the calibration constants for the sampling train, a series of calculations were made to determine the value of K, a constant, and N_d, ideal nozzle diameter, required to run an isokinetic test according to the equation:

$$\Delta H = \left[\frac{60^2\ \pi^2\ (K_p)^2\ (C_p)^2\ (1-B_{wo})^2\ P_s\ MW_d}{576^2\ (K_o)^2\ MW_s\ P_m}\right] (N_d)^4 \left(\frac{T_m}{T_s}\right) (\Delta P)$$

where

$$K = \left[\frac{60^2 \, \pi^2 \, (K_p)^2 \, (C_p)^2 \, (1 - B_{wo})^2 \, P_s \, MW_d}{576^2 \, (K_o)^2 \, MW_s \, P_m} \right]$$

An actual nozzle, whose diameter was as close as possible to the ideal nozzle diameter, was selected for the test. Isokinetic sampling rates for each sampling point in the stack were computed using the equation:

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

Since K and N_d are known, and remain constant during a test, the only variables are the meter temperatures, the stack gas temperature and the velocity pressure for each sampling point.

6.2 PREPARATION OF THE PARTICULATE-SO_x SAMPLING TRAIN

All sampling train components were cleaned in the laboratory (soap and water, tap water rinse, distilled water rinse, and IPA rinse) to eliminate previous contamination. The sampling train components were sealed and transported to the sampling site in a mobile lab. The EPA Method 5/8 equipment used to measure particulates (filterable and total) and SO_x consisted of:

- A calibrated Quartz nozzle for isokinetic sampling
- A heated Quartz sampling probe (6 feet long) equipped with an S-type pitot tube and a thermocouple to measure stack velocity pressure and temperature

- A heated Pyrex glass filter holder containing a weighed 100-mm Whatman 934 AH glass fiber filter
- A Pyrex glass impinger train in an icebath (impinger 1 contained 100-ml 80-percent IPA; a Pyrex glass filter holder containing a 47-mm Whatman 934 AH filter; bubbler 2 and impinger 3 each contained 100-ml of 3-percent H_2O_2; bubbler 4 contained a weighed amount of silica gel)
- An umbilical to connect the probe and sample box to the control module
- A control module containing a vacuum pump, a calibrated dry gas meter and a calibrated orifice meter to measure the pressure, temperature and flowrate throughout the train.

The sampling train was charged in the mobile lab using freshly prepared reagents. Each impinger and its contents was weighed to the nearest 0.1 gm on a calibrated electronic balance. Blanks of all filters and reagents were retained for subsequent analysis. The sampling point locations were marked on the probe using a high-temperature marker. The sampling train was completely assembled and lifted to the sampling site.

6.3 SAMPLING PROCEDURES FOR PARTICULATE-SO_x SAMPLING TRAIN

Prior to a test, the sampling train was heated and leak-checked at 15-inches Mercury to insure leakage was less than 0.02 or 4% of the average sampling rate. The S-type pitot tube was also leak-checked. The sampling train was installed on the unirail and the probe was inserted into the stack at the farthest point. An isokinetic sampling rate was calculated using an HP-41CV calculator for each sampling point on the traverse (12 points per traverse; 2 traverses at 90°). Each point was

sampled for an equal period of time (4 minutes) and all pertinent data were recorded on the data sheet for each point. The probe and sample box were maintained at 250°F throughout the traverse. The gases leaving the impinger train were maintained at <68°F. At the end of a traverse, the probe was withdrawn from the stack and the entire sampling train was transferred intact to the next sampling port. Another traverse of the stack was completed and the sampling train was withdrawn for the final leak-check. This leak-check was performed at 15-inches Mercury or at the highest vacuum achieved during the test. The S-type pitot tube was also checked at this time. The sampling train was then purged with ambient air for 15-minutes using the highest ΔH measured during the test. After the train was purged, the filter holder and impinger train were sealed with aluminum foil and lowered to the mobile lab for sample recovery.

6.4 SAMPLE RECOVERY PROCEDURES FOR PARTICULATE-SO_x SAMPLING TRAIN

Sample recovery for the nozzle and probe occurred on the stack. The nozzle and probe were brushed and rinsed three times using ACS reagent grade acetone into a polyethylene sample bottle. Sample recovery for the filter holder and impinger train occurred in the mobile lab. The 100-mm filter was removed from the 4-inch filter holder and sealed in its petri dish. The glass fibers stuck to the gasket were scraped off and put into the petri dish. The front half of the 4-inch glass filter holder was brushed and rinsed with acetone. Each impinger was removed from the icebath, wiped dry and weighed to the nearest 0.1 gm. The contents of impinger 1 were transferred to a polyethylene sample bottle. The back half of the 4-inch glass filter holder, the glass connectors, impinger 1, and the front half of the 2-inch filter holder were rinsed

with 80-percent IPA and the rinsings were transferred to this same bottle. The 47-mm filter from the 2-inch filter holder was sealed in its petri dish. The contents of bubbler 2 and impinger 3 were transferred to a polyethylene sample bottle. Distilled water rinsings of the back half of the 2-inch filter holder, bubbler 2, the connector, and impinger 3 were transferred to this same bottle. All sample bottles and petri dishes were marked and labeled. A chain-of-custody log was completed and the field data sheet was also labeled with the sample ID numbers. The sampling train was then recharged in preparation for the next test.

6.5 SAMPLING PROCEDURES FOR CONTINUOUS MONITORING

The continuous monitors used in the Steiner Environmental Mobile Monitoring Lab are shown in Table 6-1. Figure 6-1 is a schematic of the continuous monitoring system. The procedures used to continuously monitor stack gases for NO_x, O_2, CO and CO_2 strictly follow CARB Method 1-100.

Sample was taken from the stack at a single point using a 316 stainless steel probe. A heated Balston filter holder and fiberglass filter (99.9999 percent efficiency retention of 0.6 micron particles) was connected to the outlet of the probe. Sample gas was transported through heated Teflon sample line (maintained at >250°F) by a Teflon-lined diaphragm pump to a 316 stainless steel refrigeration type conditioner (Hankison Model E-4G-SS). The sample gas was passed through the conditioner two separate times under vacuum before entering the pump, then two additional times under pressure. The clean, dry sample gas (~35°F) was then transported to the continuous analyzer system through an unheated Teflon line. A series of flowmeters, valves, and regulators maintain constant flow through the system at a constant pressure.

TABLE 6-1. CONTINUOUS MONITORING LAB - TRAILERS 1, 2 AND 4

NO_x CHEMILUMINESCENT ANALYZER -- THERMO ELECTRON MODEL 10

Response Time (0-90%)	1.5 sec -- NO mode; 1.7 sec -- NO_x mode
Zero Drift	Negligible after 1/2 hour warmup
Linearity	±1% of full scale
Accuracy	Derived from the NO or NO_2 calibration gas, ±1% of full scale
Output	0-10 V
Operating Ranges	0-2, 10, 25, 100, 250, 1000, 2500 and 10,000 ppm
Flowrate = 2 scfh	0-2.5

O_2 ANALYZER, FUEL TYPE -- TELEDYNE MODEL 326

Response Time (0-90%)	60 seconds
Accuracy	±1% of scale at constant temperatures; ±1% of scale of ±5% of reading, whichever is greater, over the operating temperature range
Output	0-1 V
Operating Ranges	0-5%, 10%, 25% O_2
Flowrate	2 scfh

CO_2/CO INFRARED ANALYZER -- ANARAD MODEL AR-600

Response Time (0-90%)	5 seconds
Zero Drift	±1%
Span Drift	±1%
Linearity	1%
Resolution	Less than 1% of full scale
Output	0-1 V
Operating Ranges	0-20% CO_2/0-10,000 ppm CO
Flowrate	1000 cc/min

CO GAS FILTER CORRELATION -- THERMO ELECTRON MODEL 48

Response Time (0-95%)	1 minute
Zero Drift	±0.2 ppm CO
Span Drift	Less than 1% full scale in 24 hours
Linearity	±1% full scale, all ranges
Accuracy	±0.1 ppm CO
Output	0-10 V
Operating Ranges	1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 ppm
Flowrate	.5 - 2 lpm

SO_2 UV ANALYZER -- DUPONT MODEL 400

Response Time (0-90%)	Less than 60 seconds
Zero Drift	Less than 2% full scale in 24 hours
Linearity	±1% full scale
Accuracy	±2% full scale
Output	0-5 V
Operating Ranges	0-100 ppm, 1-1000 ppm
Flowrate	500 - 1500 cc/min

STRIP CHART RECORDERS (3) -- LINSEIS 7025

Pen Response	0.35 seconds Full Scale
Input Spans	1, 2, 5, 10, 20, 50, 100 MV
Zero Set	Stable access entire chart-width ±100%
Accuracy	.35% of Span
Dead Band	.15% of Span
Linearity	.25% of Span
Chart Speed	1, 2, 5, 10, 20, 50, 100 cm/min; 1, 2, 5, 10, 20, 50 cm/hr; fast advance 100 cm/min; LED indicator; forward and reverse selector
Recording Pen	Fiber tip pen
Chart Width	250 mm

SCOTSMAN TRAILER

Fully Insulated	Air Conditioned -- 8 feet x 14 feet x 11 feet

1. Filter 0.6 μ, 99.9999 percent efficient
2. Duct
3. 316 stainless steel probe
4. 3/8-inch, heated (250°F) Teflon
5. Four-pass conditioner-dryer, 316 stainless steel internals
6. 3/8-inch, unheated Teflon
7. Teflon-lined sample pump
8. 3/8-inch unheated Teflon
9. Rotameter
10. 1/4-inch Teflon tubing
11. Calibration gas manifold
12. Calibration gas selector valve
13. Calibration gas cylinders
14. Backpressure regulator
15. Auxiliary analysis port

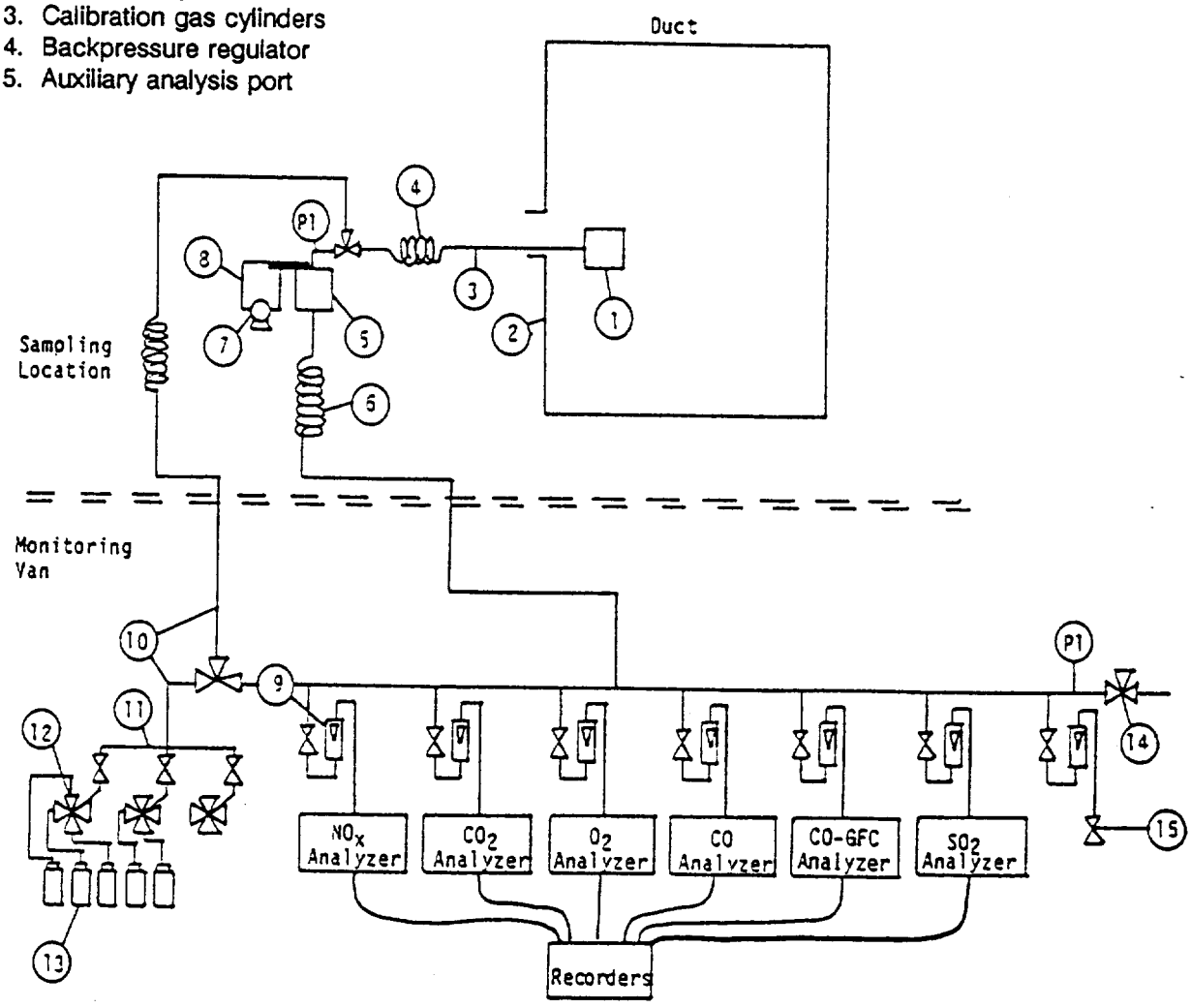


FIGURE 6-1. SCHEMATIC OF CONTINUOUS MONITORING SYSTEM

Calibrations of the continuous analyzers were performed using EPA Protocol 1 calibration gases (±1%) for NO_x and NBS certified calibration gases (±1%) for CO, CO_2 and O_2. Copies of the gas certifications are included in the Quality Assurance Section of this report. All pertinent data (date, time, test locations, analyzer range, cal gas value) were recorded on both the field data sheets and continuous analyzer strip charts in the field.

At the start of a test day, a leak-check was performed. The sample probe was removed from the stack and the end was sealed. A leak-check was successful only if pressure at the analyzer system and flow through the rotameters to the individual analyzers all dropped to zero. A mandatory leak-check was performed at the completion of each test day.

An initial calibration was performed at the start of a test period by introducing zero and span gases for each analyzer and making the necessary adjustments. Calibration gas values were recorded on the continuous monitor strip charts and field data sheets. A calibration check was completed at the end of a test and adjustments (if necessary) to the analyzers were made in preparation for another test.

An external calibration of the sampling system was performed at the start of a test day. EPA Protocol 1 gas was flowed through the entire sampling system from the probe tip. The response of the analyzers had to be within ±5% of the certified tank value before testing could proceed. An external calibration was also performed at the end of each test day.

Test data was collected by recording 10-minute averages from the strip chart recordings onto the field data sheets. Data collected over

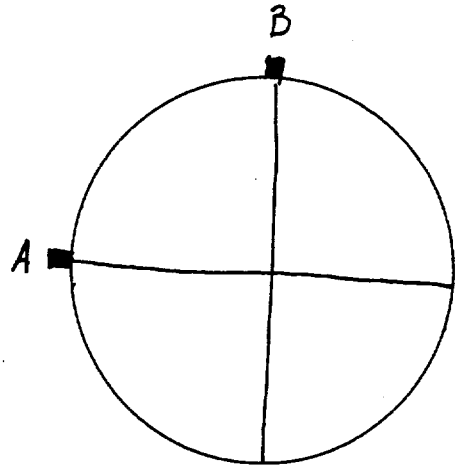
the test period was averaged and reported. A fuel analysis was used to calculate the F-factor, dscf/MMBtu corrected to zero percent O_2 (standard conditions 60°F, 29.92 inches Mercury), as described in 40 CFR 60.45. The pollutant concentration and the F-factor were used to calculate an emission factor in lb/MMBtu.

SECTION 7

RAW DATA

Steiner Environmental, Inc.

SAMPLING POINT LOCATION DATA SHEET



Plant TEXACO Area 3 BKFLD
Date 6-19-92
Test Location Boilers A + B
Upstream Dist./Dia. 186" / 4.7 Ø
Downstream Dist./Dia. 312" / 7.8 Ø
No. of Sampling Points 24
Stack Dimension 39.75"
Coupling Length 11.25"
4-inch MPT/FPI/Flange
50' ROPE 100' POWER NONE ON STACK
BRING TRANSFORMER HAS HOOKS.
XEQ PNT

Sample Point	Dist	Sample Point	Dist	Sample Point	Dist	Sample Point	Dist
1	12.1						
2	13.9						
3	15.9						
4	18.3						
5	21.2						
6	25.4						
7	36.9						
8	41.4						
9	44.0						
10	46.3						
11	48.3						
12	50.2						

SAMPLING POINT RELOCATION: #1 TO 12.3"
#12 TO 50.0"

Steiner Environmental, Inc.

EPD

PLANT Texaco Area 3 TEST TYPE M-5/8 FIELD TEST DATA SHEET (Page 1 of 2)

IMPINGER VOLUMES/WEIGHTS				GAS COMPOSITION			
Contents	Final	Initial	Net	Time	CO_2	O_2	CO
80% IPA	670.7	560.3	110.4				
3% H_2O_2	599.5	557.5	42.0				
3% H_2O_2	561.5	542.6	18.9				
				Leakrate	cfm		"Hg
S.G.	780.0	731.8	48.2	Initial	0.015		15"
		TOTAL	219.5	Final	0008		6"

Date 6-19-92 Barometric Pressure 29.91
Test Location Boilers A+B Static in.wg. -0.28
Run Number #1 Probe Type/Length QT./6'
Stack Diameter 39.75 Pitot Coefficient 0.84
Operator SW Meter Box No./Y 21313/1.0076
Filter No. 890 Nozzle No./Size #1023/0.3890

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	TEMPERATURE °F						Pump Vacuum in.Hg	√ΔP	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
A-1	1720	0.20	2.23	841.356	503	260	257	75	111	111	5.0	0.447	Pitot ok
2	4	0.24	2.64	844.971	517	267	261	69	112	109	5.5	0.490	33078
3	8	0.25	2.76	848.824	510	258	271	68	110	108	6.0	0.500	
4	12	0.25	2.71	852.818	525	245	271	67	109	107	6.0	0.500	33077
5	16	0.26	2.81	856.757	529	262	271	65	109	107	6.0	0.510	
6	20	0.24	2.61	860.780	522	262	260	68	109	106	5.5	0.490	33076
7	24	0.23	2.51	864.672	518	263	251	67	109	107	5.5	0.480	
8	28	0.245	2.68	868.474	518	244	251	68	110	107	6.0	0.495	33075
9	32	0.21	2.32	872.408	508	255	242	71	109	108	5.5	0.458	
10	36	0.20	2.19	876.094	514	258	252	72	109	106	5.0	0.447	33074
11	40	0.19	2.10	879.661	509	251	257	73	109	107	5.0	0.436	
12	44	0.15	1.67	883.142	503	261	242	73	109	107	4.0	0.387	33073
	18:08			886.240									
													33072

7-3

Steiner Environmental, Inc.

PLANT TEXACO AREA 3 TEST TYPE EPA M-5/8 FIELD TEST DATA SHEET (Page 2 of 2)
DATE 6-19-92 RUN NO. #1
TEST LOCATION Boilers A+B OPERATOR SW

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	TEMPERATURE °F						Pump Vacuum in.Hg	√ΔP	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
B-1	18:15	0.175	1.95	886.240	503	248	259	78	109	109	4.5	0.418	
2	4	0.23	2.56	889.565	500	249	242	69	109	108	5.5	0.480	
3	8	0.24	2.63	893.385	514	241	265	67	108	106	5.5	0.490	
4	12	0.255	2.78	897.303	518	253	255	67	108	107	6.0	0.505	
5	16	0.22	2.41	901.311	514	243	241	65	107	107	5.5	0.469	
6	20	0.245	2.62	905.038	522	262	273	66	98	98	5.5	0.495	
7	24	0.25	2.74	908.945	512	248	257	67	106	106	6.0	0.500	
8	28	0.21	2.30	912.898	512	247	249	70	105	105	5.0	0.458	
9	32	0.22	2.39	916.562	517	266	258	71	106	104	5.5	0.469	
10	36	0.21	2.29	920.269	512	259	247	70	104	103	5.0	0.458	
11	40	0.175	1.91	923.929	509	260	243	69	104	102	5.0	0.418	
12	44	0.18	1.98	927.233	503	261	251	69	103	102	5.0	0.424	Pitot ✓ OK
	19:03			930.576									Purged 15 min
T/A	96 min		2.41	89.220	513.00				106.	85		0.4677	

7-4

Steiner Environmental, Inc.

PLANT Texaco Area 3 BKFLD TEST TYPE METHOD 5-8 FIELD TEST DATA SHEET (Page 1 of 2)

Date 6-1992 Barometric Pressure 29.88
Test Location Boilers A+B Static in.wg. -0.23
Run Number #2 Probe Type/Length Qt / 6'
Stack Diameter 39.75" Pitot Coefficient 0.84
Operator SW Meter Box No./γ 21313 / 1.0076
Filter No. 881 Nozzle No./Size #1023 / .3890

IMPINGER VOLUMES/WEIGHTS			
Contents	Final	Initial	Net
80% IPA	645.9	517.1	128.8
3% H2O2	575.2	537.3	37.9
3% H2O2	585.8	548.6	37.2
S.G.	8645	814.8	49.7
		TOTAL	253.6

GAS COMPOSITION			
Time	CO_2	O_2	CO
Leakrate	cfm		"Hg
Initial	0.013		15"
Final	0.008		5"

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	TEMPERATURE °F						Pump Vacuum in.Hg	√ΔP	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
A-1	2030	0.22	2.38	953.453	503	262	241	72	93	92	4.0	0.469	Pitot OK
2	4	0.26	2.73	957.134	526	255	240	70	91	91	4.5	0.510	
3	8	0.24	2.55	961.053	513	262	245	67	90	90	4.0	0.490	33071
4	12	0.26	2.69	964.824	537	273	247	65	88	89	4.5	0.510	
5	16	0.245	2.61	968.686	510	268	244	61	89	89	4.5	0.495	33069
6	20	0.20	2.11	972.493	518	256	254	67	88	88	4.0	0.447	
7	24	0.19	2.05	975.951	500	256	254	65	89	89	4.0	0.436	33070
8	28	0.225	2.37	979.310	520	255	259	68	89	89	4.5	0.474	
9	32	0.205	2.19	982.948	508	257	257	71	89	89	4.0	0.453	33067
10	36	0.21	2.24	986.459	509	265	255	71	89	89	4.0	0.458	
11	40	0.13	1.39	989.990	505	271	253	71	88	89	3.5	0.361	33068
12	44	0.175	1.88	992.828	503	262	258	70	89	88		0.418	
	21:18			996.032									
													33066

7-5

Steiner Environmental, Inc.

PLANT Texaco Area 3 BKFID TEST TYPE EPA M-5/8 FIELD TEST DATA SHEET (Page 2 of 2)
DATE 6-19-92 RUN NO. #2
TEST LOCATION Boilers A + B OPERATOR SW

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	TEMPERATURE °F						Pump Vacuum in.Hg	√ΔP	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
B-1	21:25	0.18	1.93	996.032	503	259	255	79	88	89	3.5	0.424	
2	4	0.23	2.47	999.278	501	249	259	72	89	88	4.0	0.480	
3	8	0.23	2.44	1002.939	511	263	257	69	88	88	4.0	0.480	
4	12	0.25	2.64	1006.648	517	256	255	69	88	88	4.5	0.500	
5	16	0.265	2.77	1010.477	525	258	260	68	88	87	5.0	0.515	
6	20	0.24	2.53	1014.390	517	254	256	66	87	88	4.5	0.490	
7	24	0.23	2.41	1018.173	522	265	260	66	87	87	4.5	0.480	
8	28	0.24	2.53	1021.854	517	256	258	65	87	87	4.5	0.490	
9	32	0.24	2.51	1025.601	523	270	258	65	87	87	4.5	0.490	
10	36	0.23	2.44	1029.354	508	255	257	63	86	87	4.5	0.480	
11	40	0.18	1.92	1033.043	504	251	258	64	87	86	4.0	0.424	
12	44	0.22	2.35	1036.345	504	248	257	64	86	86	4.0	0.469	Pitot OK
				1039.965									Purged 15 min
T/A	96 min		2.34	86.512	512.67				88.	33		2.4684	

Steiner Environmental, Inc.

PLANT Texaco Area 3 BKFLD TEST TYPE EPA M-5/8 FIELD TEST DATA SHEET (Page 1 of 2)

IMPINGER VOLUMES/WEIGHTS				GAS COMPOSITION			
Contents	Final	Initial	Net	Time	CO_2	O_2	CO
IPA	692.6	577.6	115.0				
3% H_2O_2	602.2	561.9	40.3				
3% H_2O_2	557.2	534.9	22.3				
				Leakrate	cfm		"Hg
S.G.	754.6	710.0	44.6	Initial	0.019		15"
		TOTAL	222.2	Final	0.010		4"

Date 6/19/92 Barometric Pressure 29.82
Test Location Boilers A+B Static in.wg. -0.24
Run Number #3 Probe Type/Length Qt / 6'
Stack Diameter 39.75 Pitot Coefficient 0.84
Operator SW Meter Box No./γ #21313 / 1.0076
Filter No. 891 Nozzle No./Size #10 / .3890

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	TEMPERATURE °F						Pump Vacuum in.Hg	√ΔP	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
A-1	11:55	020	2.14	955.784	508	252	243	78	91	88	5.0	0.447	Pitot OK.
2	4	0.25	2.61	059.198	521	259	250	71	84	83	7.0	0.500	IMF 33104 BLK
3	8	0.19	2.00	063.000	512	269	253	64	84	83	5.0	0.436	
4	12	0.20	2.10	066.368	514	254	252	63	84	83	5.0	0.449	MF 33105 BLK
5	16	0.24	2.45	069.771	544	246	252	62	84	83	6.5	0.490	
6	20	0.235	2.38	073.463	549	273	242	63	84	83	6.0	0.485	FHW 33106 BLK
7	24	0.20	2.03	077.097	546	258	248	63	84	83	5.0	0.447	
8	28	0.105	1.07	080.469	540	240	250	63	83	83	3.0	0.324	IPA 33107 BLK
9	32	0.23	2.43	083.007	506	260	245	63	83	83	6.0	0.480	
10	36	0.235	2.44	086.618	522	267	250	62	83	82	6.0	0.485	DI 33108 BLK
11	40	0.23	2.40	090.323	520	267	250	62	83	83	6.0	0.480	
12	44	0.17	1.78	093.977	516	259	247	63	83	82	4.0	0.412	AMF 33109 3
	00:43			097.177									BHW 33110 3 H_2O_2
					H 33115 BLK	HK 33114 3	33113 FHW 3	33112 AMF 3	BHW 33111 3				

7-7

Steiner Environmental, Inc.

PLANT Texaco Area 3 BKFLD. TEST TYPE EPA M-5/8 FIELD TEST DATA SHEET (Page 2 of 2)
DATE 6-19-92 RUN NO. #3
TEST LOCATION Boilers A+B OPERATOR SW

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	TEMPERATURE °F						Pump Vacuum in.Hg	√ΔP	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
B-1	00:50	0.20	2.11	097.177	506	263	246	70	82	82	5.0	0.447	
2	4	0.27	2.77	100.505	536	261	258	65	84	83	7.0	0.520	
3	8	0.25	2.61	104.373	518	265	257	61	83	82	6.5	0.500	
4	12	0.215	2.25	108.225	520	253	255	60	84	85	6.0	0.464	
5	16	0.18	1.94	111.847	492	247	250	60	85	84	5.0	0.424	
6	20	0.255	2.71	115.105	505	254	258	61	85	84	6.5	0.505	
7	24	0.24	2.50	118.972	525	258	245	58	85	84	6.5	0.490	
8	28	0.265	2.76	122.722	524	253	252	59	85	83	7.0	0.515	
9	32	0.22	2.33	126.607	509	250	243	58	85	84	6.0	0.469	
10	36	0.26	2.71	130.224	524	255	258	59	85	83	7.0	0.510	
11	40	0.22	2.33	134.090	506	258	251	58	85	84	6.0	0.469	
12	44	0.195	2.07	137.712	505	250	240	60	85	83	5.0	0.442	Ptot ✓ OK
	01:38			141.131									Purged 15 min
T/A	96 min		2.29	85.347	519.50				83.	88		0.4661	

Steiner Environmental, Inc.

CONTINUOUS MONITOR DATA SHEET

Plant TEXACO – AREA 3
Date 6/19/92 Run No. #1
Test Location BOILERS A & B – COMMON STACK
Operator AES
Fuel Type REFGAS Trailer No. #1

APCD Witness/Number NONE
Client Rep BILL KERSTAN
Generator Type
Burner Type
O_2 Controller Type

		[Dry Uncorrected]							
Time	Sample Point	O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	Comments	Miscellaneous Information
1523		Ø	Ø	Ø			Ø	ZERO VALUES	CALIBRATION GASES
		16.18	15.47	836			81.8	SPAN VALUES	NO_x CC40033
									~~SO_2~~ CC40111
1553		Ø.Ø					81.8	EXTERNAL CHECKS	CO CC81166, CC91386
									$CO/CO_2/O_2$ CC81159, CC37841
1716		Ø	Ø	Ø			Ø	RECAL – ZERO VALUE	
		16.18	15.20	392			81.8	SPAN VALUES	Wet Bulb: ____ Dry Bulb: ____
									Barometric Press: ____
								START RUN #1 @1734	
1734	A1	7.90	8.40	<1			72.8		RESPONSE TIME
1744	A2	7.80	8.44	<1			71.8		Upscale: ____ Downscale: ____
1754	A3	7.40	8.50	<1			72.2		Upscale: ____ Downscale: ____
1804	A4	7.48	8.44	<1			71.8		Upscale: ____ Downscale: ____
1814	B1	6.85	8.74	<1			75.6		
1824	B2	7.25	8.54	<1			71.6		PROCESS DATA
1834	B3	8.05	8.12	<1			74.7		Fuel Flow:
1844	B4	9.13	7.24	<1			61.5		Steam Flow:
1854		Ø	Ø	Ø			-02	ZERO CHECK – NO ADJ	Rating:
		17.02	14.98	392.5			85.2	SPAN CHECK – NO ADJ	
									CONVERTER GAS
									Cal Gas Values | Actual Values
									NO ____ | ____
									NO_2 ____ | ____
									Conv. Efficiency:

Steiner Environmental, Inc.

CONTINUOUS MONITOR DATA SHEET

Plant TEXACO - AREA 3
Date 6/19/92 Run No. #2
Test Location BOILERS A&B COMMON STACK
Operator PES
Fuel Type REF GAS Trailer No. #1

APCD Witness/Number NONE
Client Rep BILL KERSTAN
Generator Type
Burner Type
O_2 Controller Type

		[Dry Uncorrected]							
Time	Sample Point	O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	Comments	Miscellaneous Information
1850		16.18	15.54	7.80			81.8	SPAN GAS VALUES	CALIBRATION GASES
		Ø	Ø	Ø			Ø	ZERO VALUES	NO_x SEE RUN #1 CM SHEET
									SO_2
								START RUN #2 @ 2026	CO
2026	1	6.00	9.10	0.53			75.4		$CO/CO_2/O_2$
2036	2	7.63	8.40	2.0*			68.0	* INDICATES CO "SPIKE"	
2046	3	7.38	8.34	0.7*			67.0	(MAX SPIKE = 6.52 PPM)	Wet Bulb: Dry Bulb:
2056	4	8.13	8.16	3.0*					Barometric Press:
2106	5	6.88	8.30	2.8*			65.5		
2116	6	7.85	8.20	1.7*			65.4		RESPONSE TIME
2026		Ø	Ø	Ø			Ø	ZERO CHECK - NO ADJ	Upscale: Downscale:
		16.30	15.38	7.70			82.0	SPAN CHECK - NO ADJ	Upscale: Downscale:
									Upscale: Downscale:
									PROCESS DATA
									Fuel Flow:
									Steam Flow:
									Rating:
									CONVERTER GAS
									Cal Gas Values | Actual Values
									NO |
									NO_2 |
									Conv. Efficiency:

Steiner Environmental, Inc.

CONTINUOUS MONITOR DATA SHEET

Plant TEXACO - AREA 3
Date 6/19/92 Run No. #3
Test Location BOILERS A&B COMMON STACK
Operator PES
Fuel Type REF GAS Trailer No. #1

APCD Witness/Number NONE
Client Rep BILL KERSTON
Generator Type
Burner Type
O_2 Controller Type

[Dry Uncorrected]

Time	Sample Point	O_2 %	CO_2 %	CO ppm	SO_2 ppm	NO ppm	NO_x ppm	Comments
2311		16.18	15.54	7.80			81.8	SPAN GAS VALUES
		Ø	Ø	Ø			Ø	ZERO VALUE
2337				199.8				RECAL CO - SPAN VALUE
				Ø				ZERO VALUE
								CO RANGE = 0-200 PPM
				8.0				CO LIN ✓ (7.8 PPM)
								START RUN #3 @ 2353
2353		6.33	8.80	<1.0			68.2	
0003		5.25	9.66	<1.0			75.8	
0013		7.18	8.74	<1.0			68.7	
0023		5.73	9.36	<1.0			74.3	
0033		6.25	9.46	1.1			77.0	
0043		6.58	9.10	<1.0			71.0	
0053		Ø	Ø	Ø			Ø	ZERO CHECK - NO ADJ
		15.85	15.60	199.2			82.9	SPAN CHECK - NO ADJ
0117		Ø.Ø					81.2	EXTERNAL CHECK
				8.00				CO LIN ✓ (7.8 PPM)

Miscellaneous Information

CALIBRATION GASES

NO_x SEE RUN #1 SHEET
SO_2
CO
$CO/CO_2/O_2$

Wet Bulb: _____ Dry Bulb: _____
Barometric Press: _____

RESPONSE TIME

Upscale: _____ Downscale: _____
Upscale: _____ Downscale: _____
Upscale: _____ Downscale: _____

PROCESS DATA

Fuel Flow:
Steam Flow:
Rating:

CONVERTER GAS

	Cal Gas Values	Actual Values
NO		
NO_2		

Conv. Efficiency:

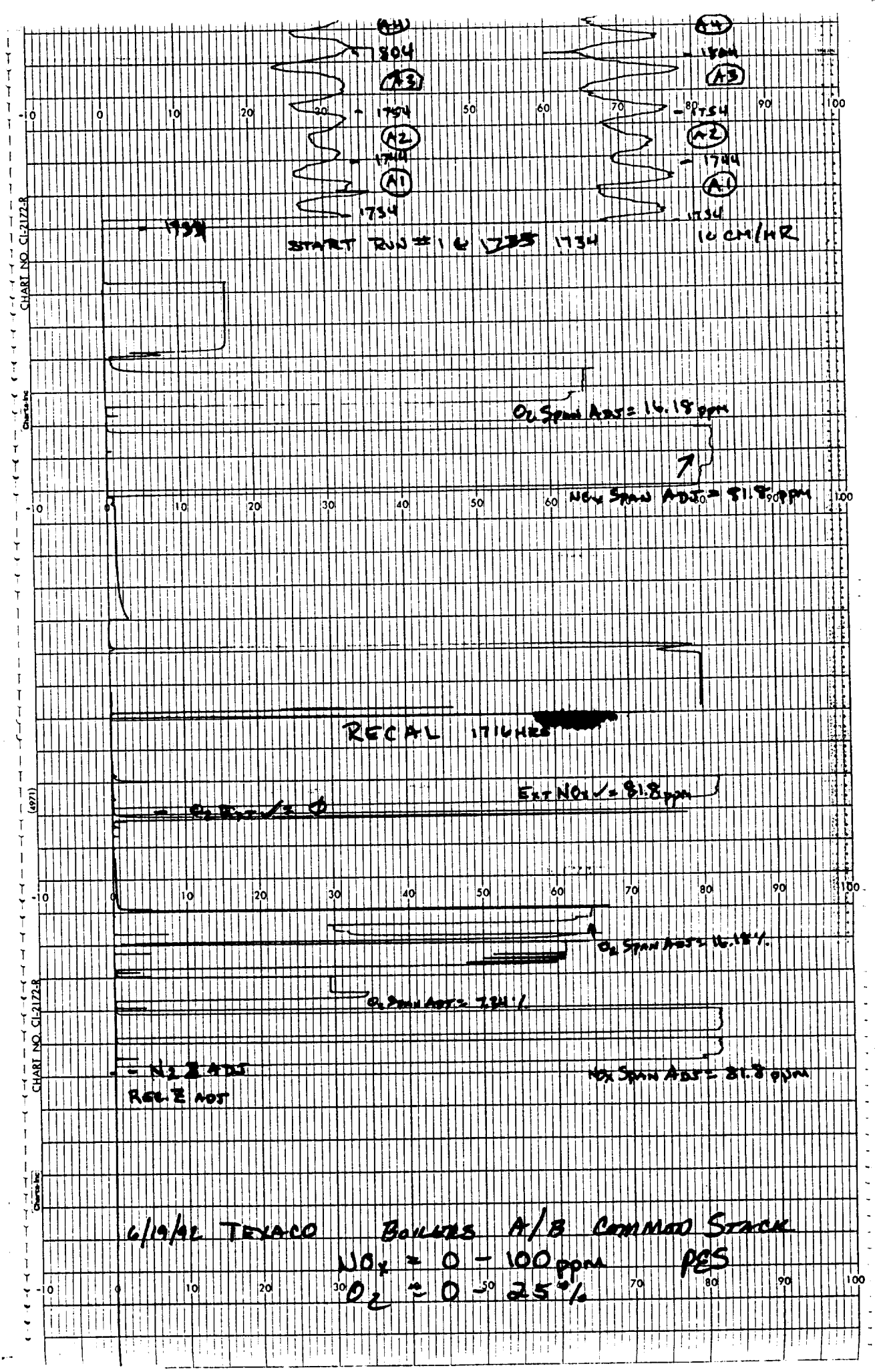


CHART NO. CL-2172-8
Charts Inc
(4971)
CHART NO. CL-2172-8
Charts Inc
A4
A3
A2
A1
START RUN #16
1734
10 CM/HR
O2 Span Adj = 16.18 ppm
NEW Span Adj = 81.8 ppm
RECAL 1716 HRS
Ext NOx = 81.8 ppm
O2 Span Adj = 16.18%
O2 Span Adj = 7.34%
NOx Span Adj = 81.8 ppm
= N2 & Adj
Rec. E Adj
6/19/92 Texaco Boilers A/B Common Stack
NOx = 0 - 100 ppm PES
O2 = 0 - 25%

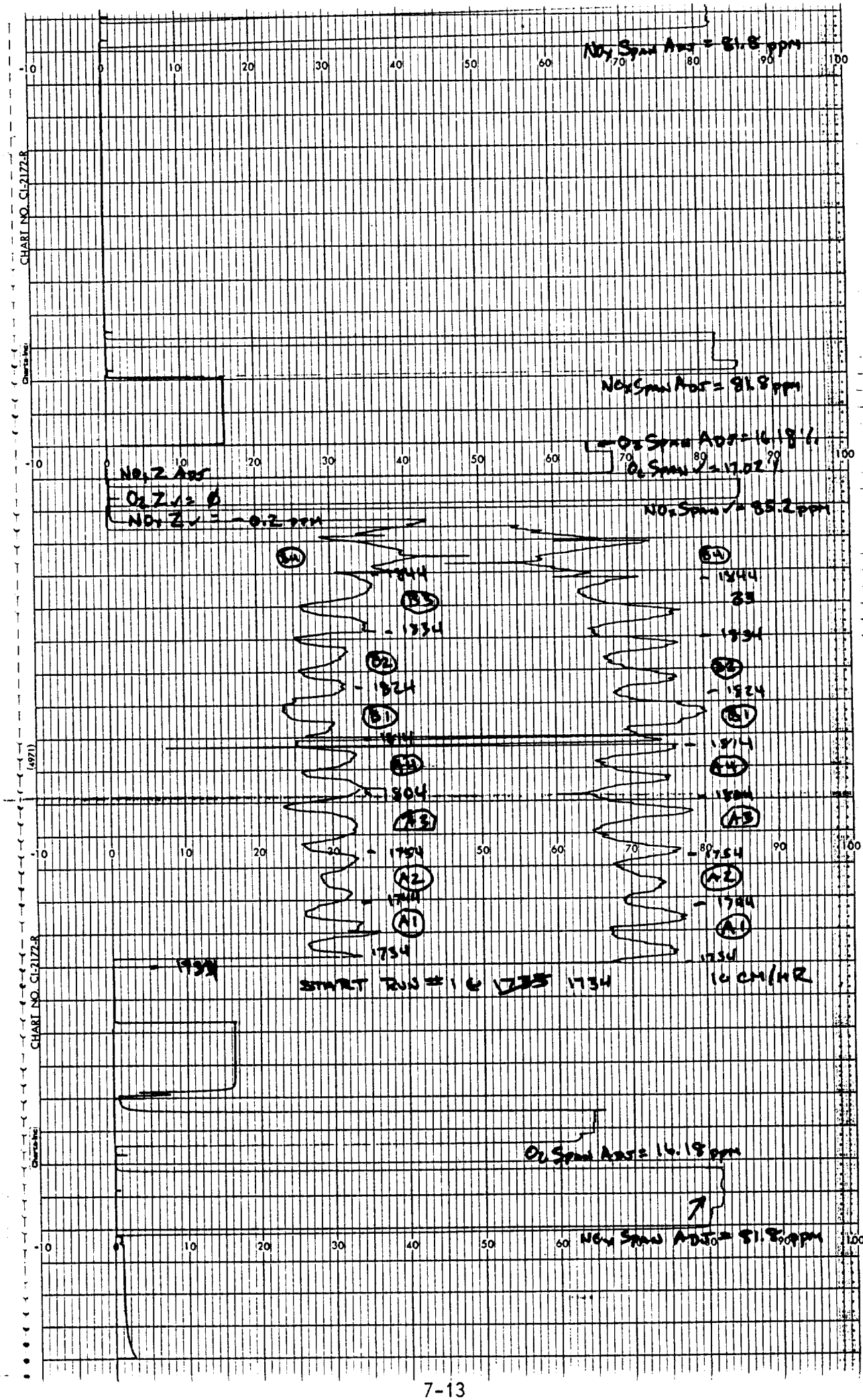


CHART NO. CI-2172-R
NO$_x$ Span Adj = 81.8 ppm
NO$_x$ Span Adj = 81.8 ppm
O$_2$ Span Adj = 16.18 %
O$_2$ Span = 17.02 %
NO$_x$ Span = 85.2 ppm
NO$_x$ Z Adj
O$_2$ Z = 0
NO$_x$ Z = -0.2 ppm
B4
1844
B3
1834
B2
1824
B1
1814
A4
1804
A3
1754
A2
1744
A1
1734
1938
START RUN #1 @ 1735
1734
10 CM/HR
O$_2$ Span Adj = 16.18 ppm
NO$_x$ Span Adj = 81.8 ppm

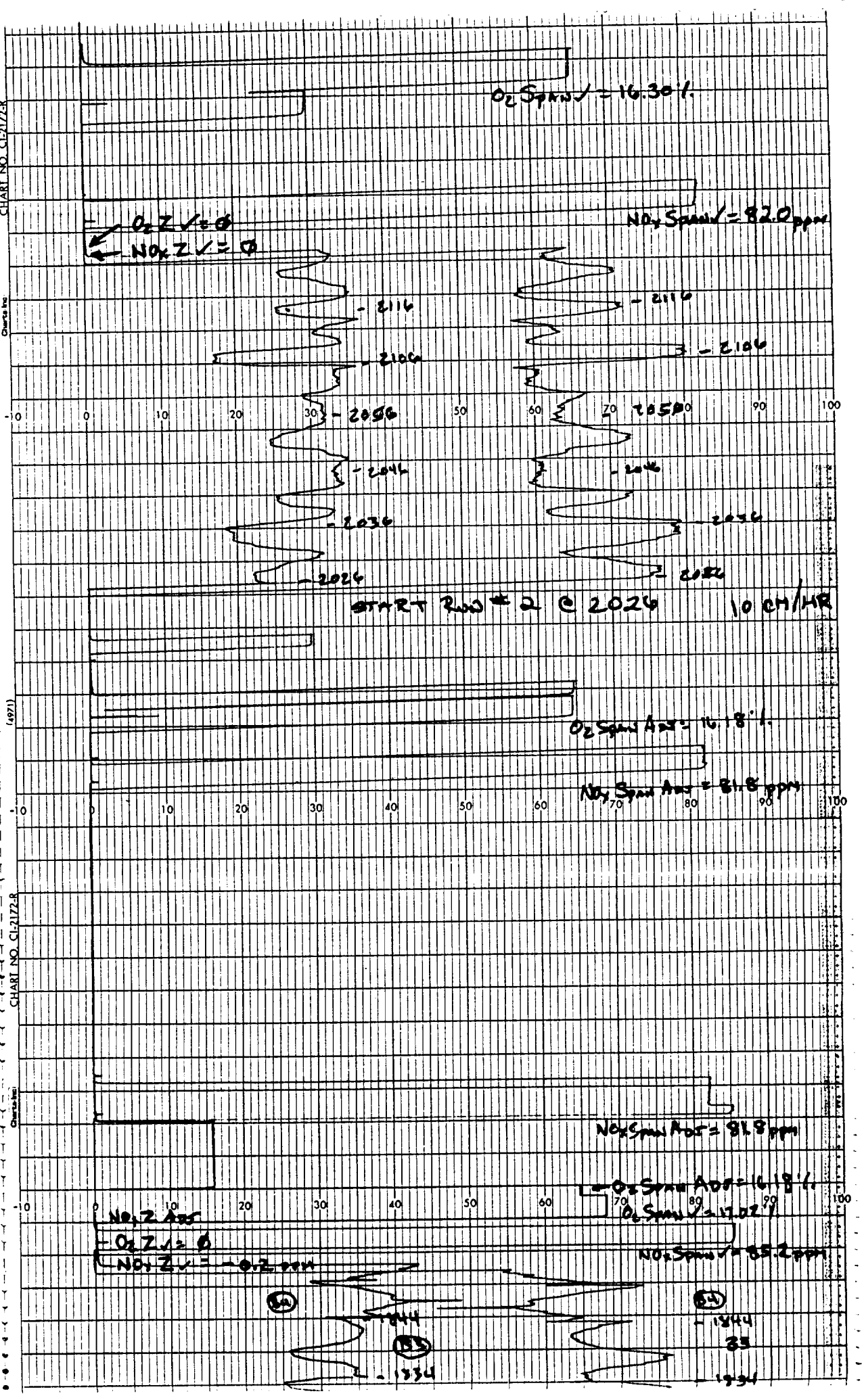
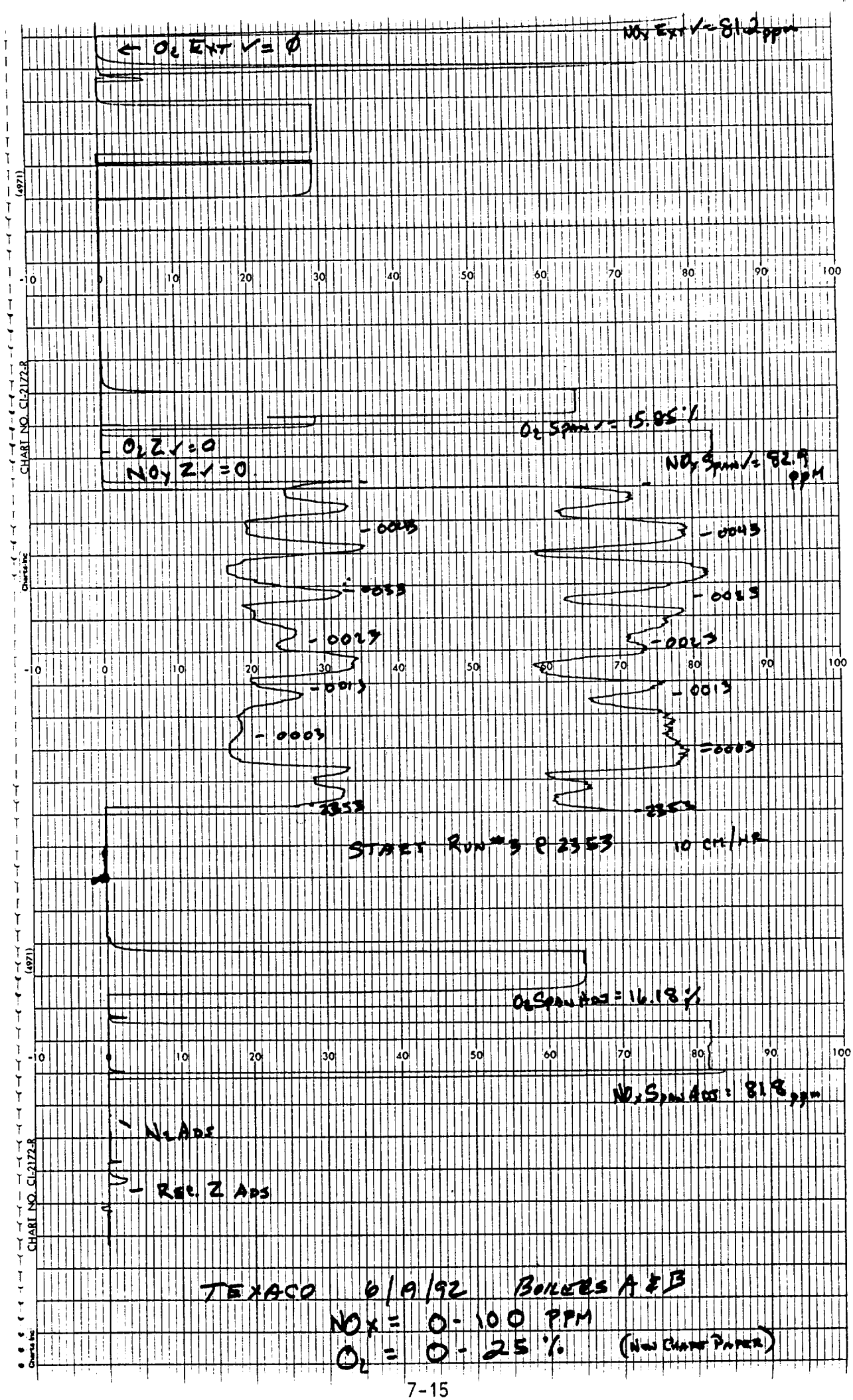
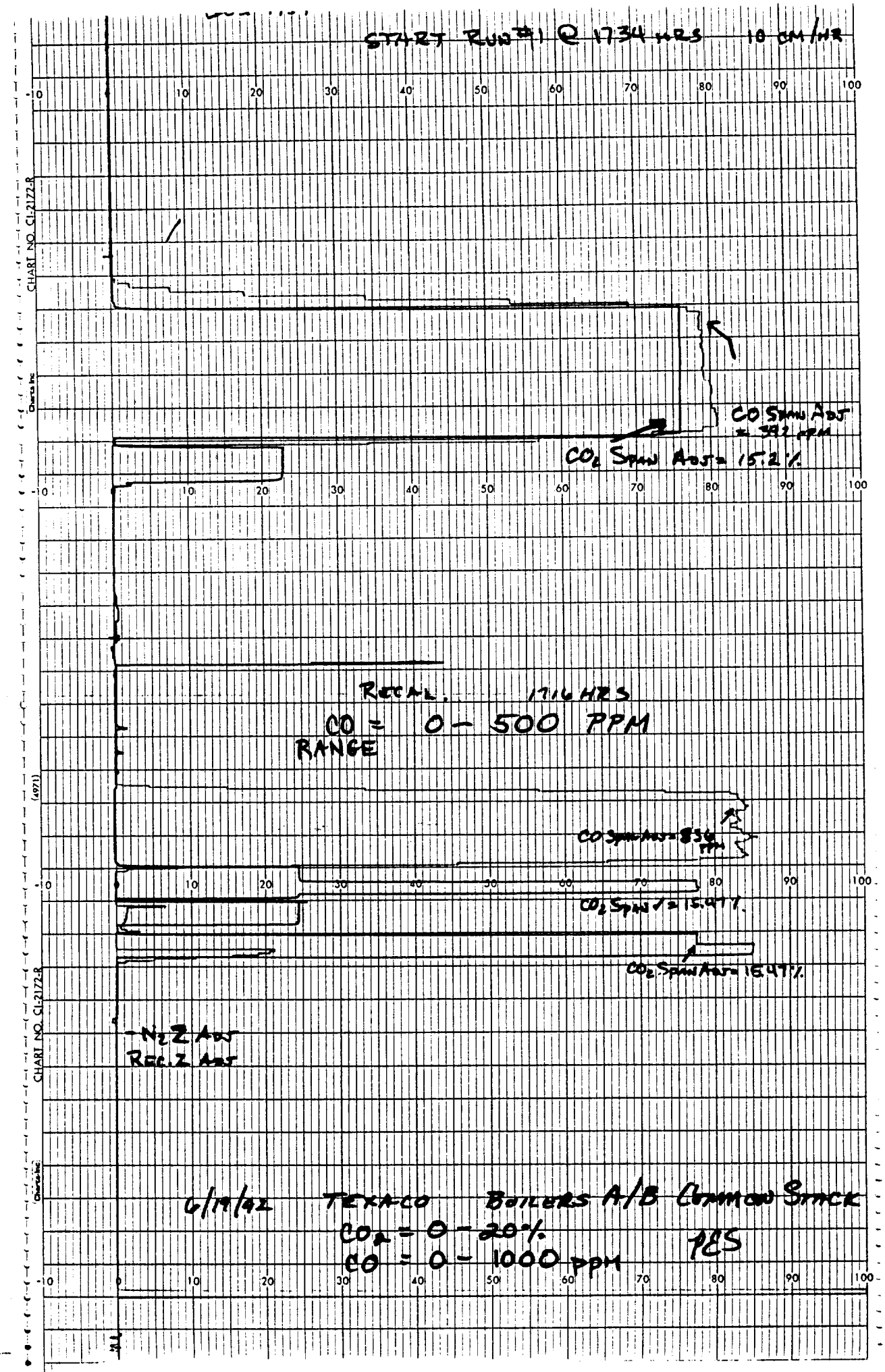
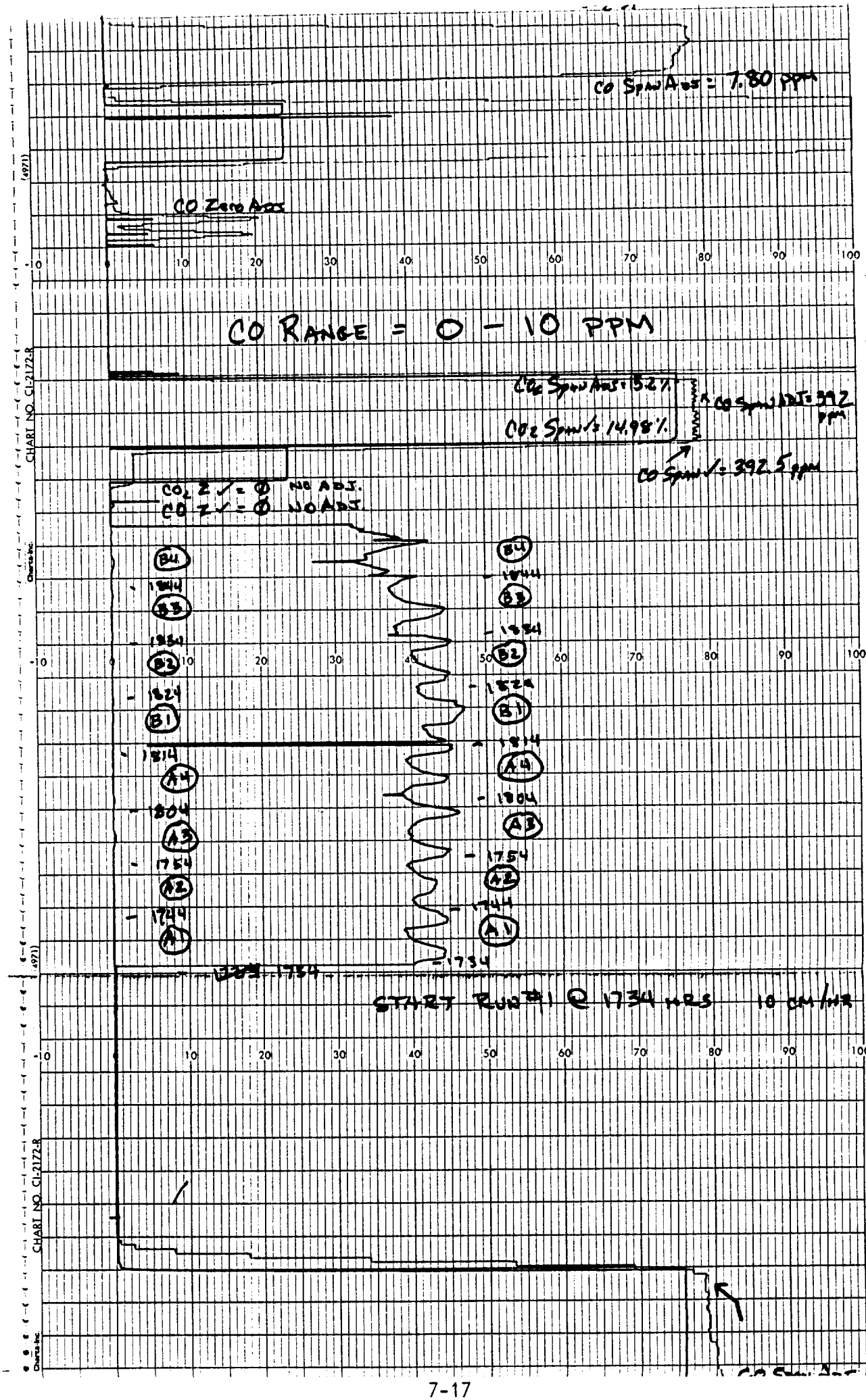
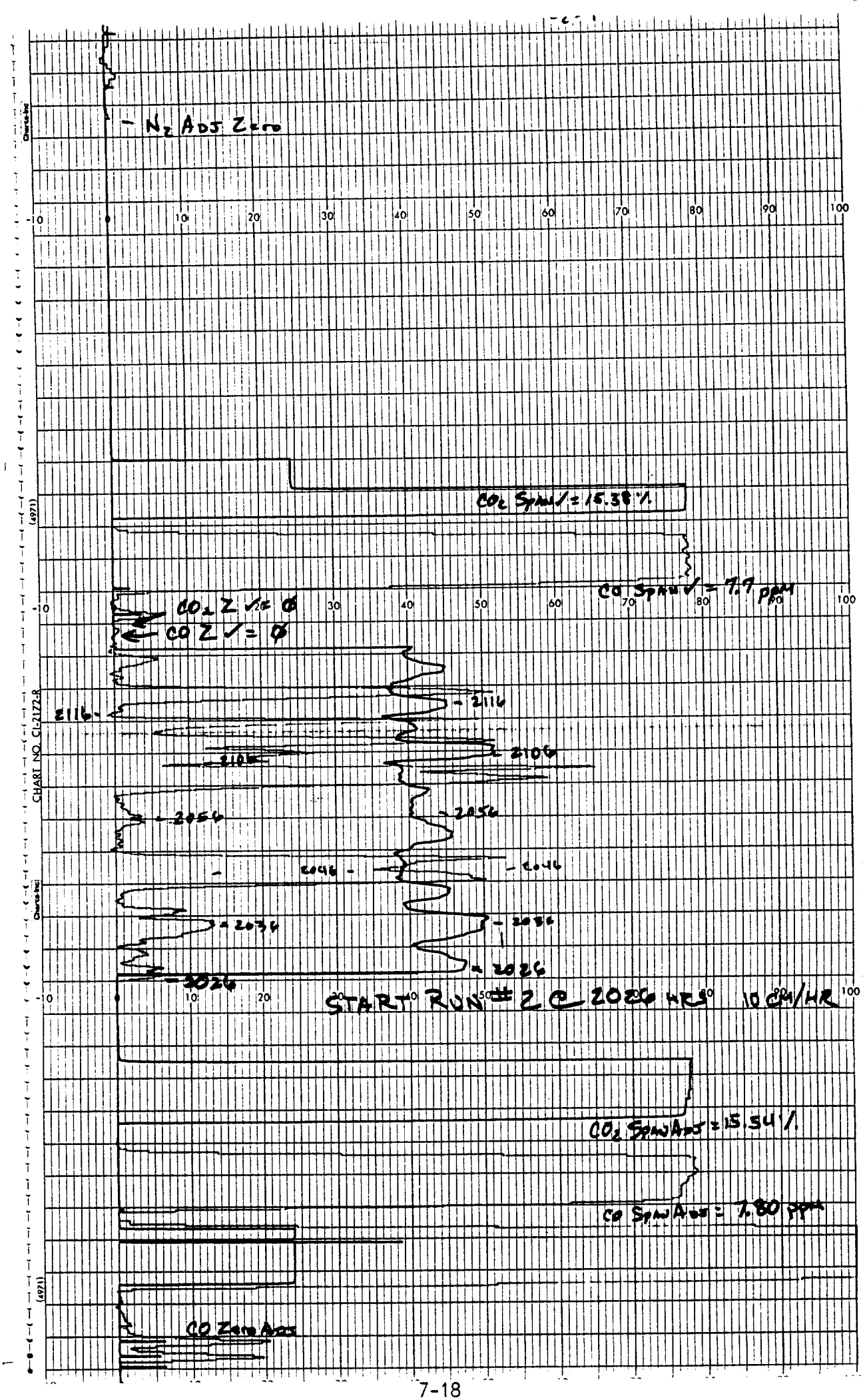


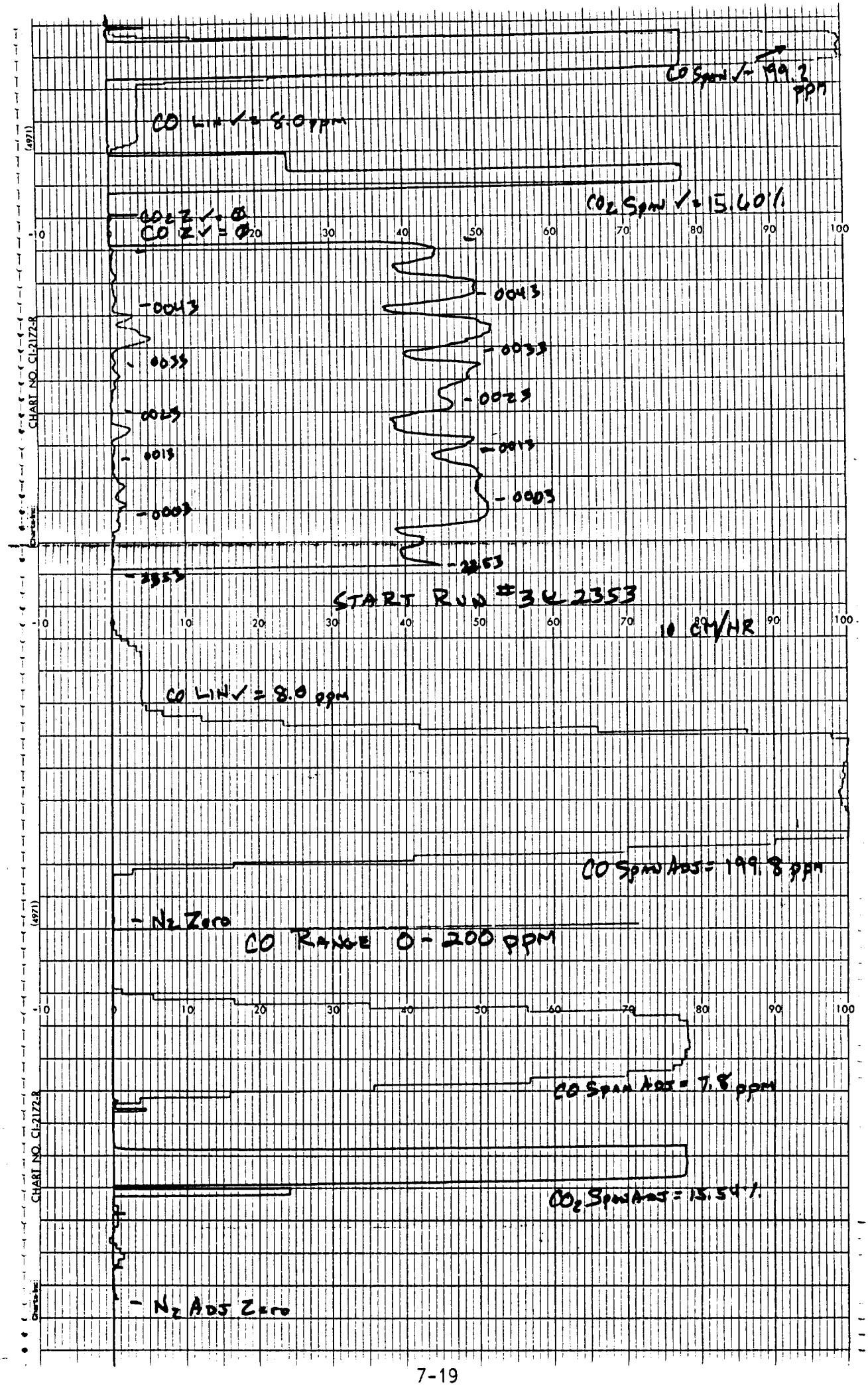
CHART NO. CI-2172-R
O_2 Span ✓ = 16.30 %
O_2 Z ✓ = 0
NOx Z ✓ = 0
NOx Span ✓ = 82.0 ppm
2116
2106
2056
2046
2036
2026
START RUN # 2 @ 2026
10 CM/HR
O_2 Span Adj = 16.18 %
NOx Span Adj = 81.8 ppm
CHART NO. CI-2172-R
NOx Span Adj = 81.8 ppm
O_2 Span Adj = 16.18 %
O_2 Span ✓ = 17.02 %
NOx Span ✓ = 85.2 ppm
NOx Z Adj
O_2 Z ✓ = 0
NOx Z ✓ = -0.2 ppm
1844
1834
84
83
35


← O2 EXT V = 0
NOx EXT V = 81.2 ppm
O2 SPAN V = 15.85 V
NOx SPAN V = 82.9 ppm
O2 Z V = 0
NOx Z V = 0
-0043
-0033
-0023
-0013
-0003
-2353
START RUN @ 2353
10 CM/HR
O2 SPAN ADS = 16.18 %
NOx SPAN ADS = 81.8 ppm
O2 ADS
REC. Z ADS
TEXACO 6/9/92 BOILERS A & B
NOx = 0 - 100 PPM
O2 = 0 - 25 %
(NEW CHART PAPER)
CHART NO. CI-2172-R
(4971)


START RUN #1 @ 1734 HRS 10 CM/HR
CO SPAN ADJ = 592 PPM
CO2 SPAN ADJ = 15.2 %
RECAL. 1716 HRS
CO = 0 - 500 PPM
RANGE
CO SPAN ADJ = 836 PPM
CO2 SPAN ADJ = 15.4 %
CO2 SPAN ADJ = 16.4 %
N2 Z ADJ
REC. Z ADJ
CHART NO. C1-2172-R
6/19/92 TEXACO BOILERS A/B COMMON STACK
CO2 = 0 - 20 %
CO = 0 - 1000 PPM
PES


CO Span Adj = 7.80 ppm
CO Zero Adj
CO RANGE = 0 - 10 PPM
CO2 Span Adj = 5.2%
CO2 Span % = 14.98%
CO Span Adj = 392 ppm
CO Span % = 392.5 ppm
CO2 Z % = 0 NO ADJ.
CO Z % = 0 NO ADJ
B4 1844
B3 1854
B2 1824
B1 1814
A4 1804
A3 1754
A2 1744
A1 1734
START RUN #1 @ 1734 HRS 10 CM/HR
CHART NO. C1-2172-R


- N_2 ADJ ZERO
10
20
30
40
50
60
70
80
90
100
CO_2 SPAN ✓ = 15.38 %
CO SPAN ✓ = 7.9 ppm
CO_2 ZERO ✓ = 0
CO ZERO ✓ = 0
2116
2106
2056
2046
2036
2026
START RUN # 2 @ 2026 HRS
10 CM/HR
CO_2 SPAN ADJ = 15.54 %
CO SPAN ADJ = 7.80 ppm
CO ZERO ADJ
CHART NO. CL-2172-R
(4971)
Chart Inc


CO Span ✓ = 199.2 PPM
CO Lin ✓ = 8.0 PPM
CO2 Span ✓ = 15.60 %
CO2 Z ✓ = 0
CO Z ✓ = 0
-.0043
-.0033
-.0023
-.0013
-.0003
-.2353
START RUN #3 4 2353
10 CM/HR
CO Lin ✓ = 8.0 ppm
CO Span Adj = 199.8 ppm
- N2 Zero
CO RANGE 0 - 200 PPM
CO Span Adj = 7.8 ppm
CO2 Span Adj = 15.54 %
- N2 Adj Zero
CHART NO. CI-2172-R
(4971)

Steiner Environmental, Inc.

Date: 6/19/92

Test Location: TEXACO - AREA 3
BOILERS A & B

SAMPLE HANDLING/LOG-IN

NO	SAMPLE TYPE	VOLUME	COMMENTS
1	33078 5/8 Meth MF Sample 1 Test		RUN #1
2	33077 5/8 Meth FUEL Sample 1 Test		RUN #1
3	33076 5/8 Meth FHW Sample 1 Test	~130ml	RUN #1
4	33075 5/8 Meth HC Sample 1 Test		RUN #1
5	33074 5/8 Meth AMF Sample 1 Test		RUN #1
6	33073 5/8 Meth EPA BHW Sample 1 Test	~300ml	RUN #1
7	33072 5/8 Meth H_2O_2 Sample 1 Test	~350	RUN #1
8	33071 5/8 Meth HC Sample 2 Test		RUN #2
9	33069 5/8 Meth FHW Sample 2 Test		
10	33070 5/8 Meth MF Sample 2 Test		
11	33067 5/8 Meth EPA BHW Sample 2 Test		
12	33068 5/8 Meth AMF Sample 2 Test		
	33066 5/8 Meth H_2O_2 Sample 2 Test		

CHAIN-OF-CUSTODY

Signature	Date/Time	Signature	Date/Time
P Sands	6/19/92 ALNITE!		
M. Carrasco	6/22/92		

Steiner Environmental, Inc.

Date: 6-20-92

Test Location: TEXACO Area 3 BKFLD Boilers A+B

SAMPLE HANDLING/LOG-IN

NO	SAMPLE TYPE	VOLUME	COMMENTS
1	33104 5/8 (Meth) AMF (Sample) BLK (Test)		
2	33105 5/8 (Meth) MF (Sample) BLK (Test)		
3	33106 5/8 (Meth) FHW (Sample) BLK (Test)		
4	33107 5/8 (Meth) BHW (Sample) BLK (Test)		
5	33108 5/8 (Meth) BHW (Sample) BLK (Test)		
6	33109 5/8 (Meth) AMF (Sample) 3 (Test)		
7	33110 5/8 (Meth) BHW H202 (Sample) 3 (Test)		
8	33111 5/8 (Meth) IPA BHW (Sample) 3 (Test)		
9	33112 5/8 (Meth) MF (Sample) 3 (Test)		
10	33113 5/8 (Meth) FHW (Sample) 3 (Test)		
11	33114 5/8 (Meth) HC (Sample) 3 (Test)		
12	33115 5/8 (Meth) H2O2 (Sample) BLK (Test)		

CHAIN-OF-CUSTODY

Signature	Date/Time	Signature	Date/Time
Scott E Win	6-20-92 / 17:15		
M. Carrasco	6/22/92		

A N A L Y T I C A L R E P O R T

SAMPLE TYPE : FHW ANALYSIS (g)
SAMPLING METHOD : M5/8
SAMPLE COMPONENT : ACETONE
REQUESTED BY : TEXACO BOILERS A & B
ANALYTICAL METHOD : GRAVIMETRIC

TEST DATE :06-19-92
ANALYSIS DATE :06-29-92
ANALYST : MC/WB

Sample ID #	Test No.	Sample Volume (ml)	Analytical Result (total sample) Uncorrected	Blank Corr. (g)
33076	1	195	0.01776	0.01753
33069	2	260	0.01541	0.01510
33113	3	190	0.00979	0.00956
33106	Bk	100	0.00012	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE : FILTERABLE PARTICULATE
SAMPLING METHOD : M5/8
SAMPLE COMPONENT : 100 mm FILTER
REQUESTED BY : TEXACO BOILERS A & B
ANALYTICAL METHOD : GRAVIMETRIC

TEST DATE :06-19-92
ANALYSIS DATE :06-29-92
ANALYST :MC/WB

Sample ID #	Test No.	Filter No.	Analytical Result (total sample) Uncorrected	Blank Corr. (g)
33078	1	890	0.00200	0.00185
33070	2	881	0.00103	0.00088
33112	3	891	0.00165	0.00150
33105	Bk	927	0.00015	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE : CONDENSIBLE PARTICULATE TEST DATE :06-19-92
SAMPLING METHOD : M5/8 ANALYSIS DATE:06-29-92
SAMPLE COMPONENT : 80% IPA + Amf ANALYST :
REQUESTED BY : TEXACO BOILERS A & B
ANALYTICAL METHOD : GRAVIMETRIC

Sample ID #	Test No.	Sample Volume	Analytical Result (total sample) Uncorrected	Blank Corr. (g)
33073	1	415	0.00582	0.00448
33067	2	415	0.00683	0.00549
33111	3	415	0.00533	0.00399
33107	IPA Bk	100	0.00011	
33104	Amf Bk	100	0.00108	
	DI Bk	100	0.00020	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE	: FILTERABLE SO4	TEST DATE	:06-19-92
SAMPLING METHOD	: M5/8	ANALYSIS DATE	:06-29-92
SAMPLE COMPONENT	: FHW + MF	ANALYST	:MC/WB
REQUESTED BY	: TEXACO BOILERS A & B		
ANALYTICAL METHOD	: BaCl2 Titration		

Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
1	100	10	1.10	5.03
2	100	10	1.04	4.73
3	100	10	0.90	4.05
Blank	100	10	0.07	0.34

% Duplicate = 97.3 RUN NO. 1

% Recovery = 99.5 RUN NO. 3

% CONFIDENCE = 101.9 EPA SO2 LOT 0882 3XXX
NORMALITY = 0.0099601

A N A L Y T I C A L R E P O R T

SAMPLE TYPE : CONDENSIBLE SULFATE
SAMPLING METHOD : M5/8
SAMPLE COMPONENT : BHW + AMF
REQUESTED BY : TEXACO BOILERS A & B
ANALYTICAL METHOD : BaCL2 Titration

TEST DATE :06-19-92
ANALYSIS DATE:06-29-92
ANALYST :MC/WB

Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
1	100	10	0.62	2.69
2	100	10	0.75	3.33
3	100	10	0.61	2.64
IPA BK	100	10	0.06	0.29
AMF BK	100	10	0.06	0.29
DI BK	100	10	0.05	0.24

% Duplicate = 103.3 RUN NO. 1

% Recovery = 99.3 RUN NO. 3
% CONFIDENCE = 99.8 EPA SO2 LOT 0882 3XXX
NORMALITY = 0.00998

A N A L Y T I C A L R E P O R T

SAMPLE TYPE : SO2
SAMPLING METHOD : M5/8
SAMPLE COMPONENT : 3% H2O2
REQUESTED BY : TEXACO BOILERS A & B

TEST DATE :06-19-92
ANALYSIS DATE :06-29-92
ANALYST :WB

ANALYTICAL METHOD : BaCL2 Titration

Sample ID #	Test No.	Sample Volume	Sample Aliquot	TITER mls or (Absorbance)	Analyt. Result (total sample) mg H2SO4
33072	1	400	10	11.24	217.67
33066	2	430	10	10.73	223.29
33110	3	410	10	9.90	196.30
33115	Bk	100	10	0.09	0.44

% Duplicate = 100.7 RUN NO. 1

% Recovery = 99.1 RUN NO. 3

% CONFIDENCE = 101.9 EPA SO2 LOT 0584 3XXX
NORMALITY = 0.0099601

SECTION 8

QUALITY ASSURANCE

8.1 PARTICULATE/SO_x SAMPLING EQUIPMENT

A detailed record of repair and maintenance to each sampling train is kept. Preventative maintenance to each system is performed periodically to avoid complete component breakdown during a field test.

A detailed record of sampling system calibrations is also kept. Calibration data for the sampling nozzles, pitot tubes, dry gas meters and orifice meters are available for review. Results of the EPA Quality Assurance Branch biannual audits of the dry gas meter and orifice meter combinations are also logged and verify our in-house calibration data. The calibration data for the equipment used on this program can be found at the end of this section.

8.2 LAB ANALYSIS

All field samples are assigned a label and an ID number. This ID is also affixed to a chain-of-custody log and to the field data sheet to eliminate any chance of sample mixup.

Prior to analysis, all glassware is thoroughly cleaned (soap and water, tap water rinse, distilled water rinse, IPA rinse) to eliminate any contamination. The evaporating dishes used to evaporate the washings are treated the same as a sample (dried in an oven, desiccated and

weighed repeatedly at 6-hour intervals until a constant weight is achieved). The glassware used to measure volumes and make transfers and dilutions are all NBS Class A to insure accurate measurements. All weighings are carried out on a Sartorius Research Model R160P electronic semi-micro balance supported by a marble table in a separate room from the main analytical laboratory. The balance is calibrated regularly against an NBS Class S-1 weight.

All reagents used in the field and in the laboratory are ACS reagent grade and blanks of these reagents are evaluated for every set of tests. Blanks are taken in the field from the squeeze bottles and not the original container. Records are kept on these blanks to insure consistent quality of the reagents. Prior to use, the IPA is also analyzed to insure no peroxides are present which could lead to high SO_3 and low SO_2 values.

A quality control program consisting of duplicate analyses (to measure precision), spikes (to measure recovery efficiency) or analysis of blind standards supplied by EPA's Quality Assurance Branch (to measure accuracy) is implemented for each test program. Table 8-1 summarizes the results of the QC checks on this program. Records of our lab's participation in the EPA biannual audits for SO_2 are kept on file and verify our in-house QA/QC effort.

8.3 CONTINUOUS MONITORS

The NO_x analyzer is calibrated before and after each test using an EPA Protocol 1 gas (±1%) traceable to NBS. The CO, CO_2 and O_2 analyzers are calibrated before and after each test using a NBS certified gas mixture (±1%). Copies of the calibration gas certificates appear in the at the end of this section.

A sampling system check was performed at the beginning and end of each test day. This was done by introducing an EPA Protocol 1 gas at the sampling probe and measuring the system response. The purpose of this was to check the system for leaks and sample loss.

Multipoint calibration linearity checks of the continuous analyzers were performed on Janaury 28, 1992 through January 30, 1992. These results were well within CARB limitations of ±2% of full scale. Tables 8-2 through 8-6 list the results of these checks.

TABLE 8-1. QUALITY ASSURANCE CHECKS

Test No.	Sample Description	Duplicate %	Spike Recovery %	Confidence %
1	Filterable Sulfate	97.3		
3	Filterable Sulfate		99.5	
	EPA SO_2 Lot 0882 3XXX			101.9
1	Condensible Sulfate	103.3		
3	Condensible Sulfate		99.3	
	EPA SO_2 Lot 0882 3XXX			99.8
1	SO_2	100.7		
3	SO_2		99.1	
	EPA SO_2 Lot 0882 3XXX			101.9

TABLE 8-2. NO_x CALIBRATION SUMMARY

Monitoring Trailer: 1		Calibrated by: JP 1/30/92	
Analyzer:	TECO	Calibrator Manufacturer:	Environics
Model:	10 AR	Model:	201-1520
Serial Number:	15311-154	Serial Number:	1122
NO_x Standard:	CC7204, CC72048		
Concentration:	9760 ppm, 1039 ppm		
Cylinder Pressure:	1900 psi, 1900 psi		

NO_x CALIBRATION AND LINEARITY CHECKS

Range 0-10.000 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	NO_x out ppm	Chart ppm	% Difference +2% Full Scale
Zero	980	--	0	0	0
80% URL	182	810	7968	7968	0
1	381	597	5962	6010	+ .48
2	579	399	3984	4105	+ 1.21
3	780	202	2005	2100	+ .95

Range 0-1000 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	NO_x out ppm	Chart ppm	% Difference +2% Full Scale
Zero	8852	--	0	0	0
80% URL	8128	716	791	791	0
1	8306	538	594	600	+ .6
2	8488	360	397	407	+ 1.0
3	8669	182	201	203	+ .2

TABLE 8-2. NO_x CALIBRATION AND LINEARITY CHECKS (Concluded)

TECO Model 10-AR/Trailer #1/January 30, 1992

Range 0-100 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	NO_x out ppm	Chart ppm	% Difference +2% Full Scale
Zero	8360	--	0	0	0
80% URL	7716	636	79.2	79.2	0
1	7878	478	59.5	60.0	+ .5
2	8037	320	39.8	40.2	+ .4
3	8196	162	20.1	20.5	+ .4

Range 0-25 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	NO_x out ppm	Chart ppm	% Difference +2% Full Scale
Zero	2169	--	0	0	0
80% URL	2130	42.0	19.86	19.86	0
1	2140	31.4	15.00	15.40	+ 1.6
2	2150	21.1	10.10	10.30	+ .8
3	2159	11.0	5.25	5.27	+ .08

Range 0-10 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	NO_x out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9637	0.0	0	0	0
80% URL	9563	73.0	7.90	7.90	0
1	9580	55.0	5.95	5.92	.3
2	9595	37.0	3.98	3.94	.4
3	9615	19.0	2.03	2.02	.1

TABLE 8-3. CO CALIBRATION SUMMARY

Monitoring Trailer: 1		Calibrated by: JP 1/30/92	
Analyzer:	ANARAD	Calibrator Manufacturer:	Environics
Model:	AR 602	Model:	201-1520
Serial Number:	1482	Serial Number:	1122
CO Standard:	ALM17548		
Concentration:	42490 ppm		
Cylinder Pressure:	1800 psi		

CO CALIBRATION AND LINEARITY CHECKS

Range 0-10.000 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	4921	0	0	0	0
80% URL	3999	930.8	8022	8022	0
1	4230	687.6	5942	5950	+ .08
2	4460	460.0	3974	4009	+ .35
3	4690	232.0	2003	2180	+ 1.77

TABLE 8-4. CO CALIBRATION SUMMARY

Monitoring Trailer: 1		Calibrated by: JP 1/30/92	
Analyzer:	TECO	Calibrator Manufacturer:	Environics
Model:	48	Model:	201-1520
Serial Number:	21130-195	Serial Number:	1122
CO Standard:	CC81181		
Concentration:	10430 ppm		
Cylinder Pressure:	1700 psi		

CO CALIBRATION AND LINEARITY CHECKS

Range 0-20 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9500	0	0	0	0
80% URL	9335	16.5	18.4	18.4	0
1	9686	11.6	12.5	12.7	+ 1.0
2	9688	8.0	8.6	8.8	+ 1.0
3	9691	4.3	4.7	5.0	+ 1.5

Range 0-100 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9600	0	0	0	0
80% URL	9568	74.3	80.4	80.4	0
1	9585	55.0	59.5	59.5	0
2	9605	37.0	39.9	39.4	- .5
3	9627	19.0	20.3	19.9	- .4

TABLE 8-4. CO CALIBRATION AND LINEARITY CHECKS (Concluded)

TECO Model 48/Trailer #1/January 30, 1992

Range 0-500 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9500	0	0	0	0
80% URL	8985	356.0	397.4	397.4	0
1	9078	267.5	298.5	300.0	.3
2	9166	180.0	200.5	195.0	- 1.1
3	9453	91.7	100.3	95.5	- .96

Range 0-1000 ppm

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO out ppm	Chart ppm	% Difference +2% Full Scale
Zero	9000	0	0	0	0
80% URL	8181	671.0	790.6	790.6	0
1	8346	504.0	594.0	594.0	0
2	8515	337.0	397.0	398.0	.1
3	8684	170.3	200.8	196.2	- .46

TABLE 8-5. CO_2 CALIBRATION SUMMARY

Monitoring Trailer: 1		Calibrated by: JP 1/30/92	
Analyzer:	ANARAD	Calibrator Manufacturer:	Environics
Model:	AR 602	Model:	201-1520
Serial Number:	1482	Serial Number:	1122
CO_2 Standard:	CC86353		
Concentration:	41.2%		
Cylinder Pressure:	1000 psi		

CO_2 CALIBRATION AND LINEARITY CHECKS

Range 0-20 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	CO_2 out %	Chart %	% Difference ±2% Full Scale
Zero	2172	0	0	0	0
80% URL	1339	973.8	17.40	17.40	0
1	1549	718.0	13.05	13.00	- .25
2	1762	471.6	8.70	8.56	- .70
3	1968	237.1	4.40	4.29	- .55

TABLE 8-6. O_2 CALIBRATION SUMMARY

Monitoring Trailer: 1		Calibrated by: JP 1/28/92	
Analyzer:	Teledyne	Calibrator Manufacturer:	Environics
Model:	326A	Model:	201-1520
Serial Number:	36423	Serial Number:	1122
O_2 Standard:	A14722		
Concentration:	45%		
Cylinder Pressure:	1700 psi		

O_2 CALIBRATION AND LINEARITY CHECKS

Range 0-5 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	O_2 out %	Chart %	% Difference +2% Full Scale
Zero	3945	0	0	0	0
80% URL	3597	356.7	4.07	4.07	0
1	7348	532.6	3.04	3.11	+ 1.4
2	7525	356.2	2.04	2.09	+ 1.0
3	7699	180.2	1.03	1.09	+ 1.2

Range 0-10 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	O_2 out %	Chart %	% Difference +2% Full Scale
Zero	4925	--	0	0	0
80% URL	4056	900.0	8.17	8.17	0
1	4271	664.0	6.06	6.18	+ 1.20
2	4487	444.0	4.05	4.24	+ 1.90
3	4705	223.7	2.04	2.21	+ .80

TABLE 8-6. O_2 CALIBRATION AND LINEARITY CHECKS (Concluded)

Teledyne Model 326A/Trailer #1/January 28, 1992

Range 0-25 %

Calibration Points	Flow, Dil. cc/min	Flow, Std. cc/min	O_2 out %	Chart %	% Difference +2% Full Scale
Zero	1973	0	0	0	0
80% URL	1101	899.2	20.30	20.30	0
1	1317	663.8	15.09	15.16	+ .28
2	1535	443.9	10.10	10.15	+ .20
3	1753	223.7	5.09	5.14	+ .20

DRY GAS METER / ORIFICE METER CALIBRATION DATA

Date .....APRIL 30 1992 — Dry Gas Meter No. ... 1037070
Bar. Press, in.Hg 29.89 — Standard Test Meter # 69279
Meter Box No. ... 21313 — Operator ..... AB

STANDARD TEST METER			DRY TEST METER				
Press. dHs (in. H2O)	Temp. Ts (dF)	Volume Vs (ft3)	Press. dH (in. H2O)	Temp. Tdi (dF)	Temp. Tdo (dF)	Volume Vd (ft3)	Time t (min)
	65.0	630.526		75	73	165.753	
-1.1	64.0	606.826	0.5	77	74	141.754	56.0
Avg/Net :	64.5	23.700			75	23.999	
	64.0	605.793		77	74	140.712	
-1.7	64.0	566.692	1.0	78	77	101.261	66.0
Avg/Net :	64.0	39.101			77	39.451	
	64.0	508.084		80	75	42.635	
-2.2	66.0	484.515	1.5	75	74	18.804	34.0
Avg/Net :	65.0	23.569			76	23.831	
	64.0	536.524		82	78	71.192	
-2.8	64.0	509.106	2.0	80	75	43.653	34.0
Avg/Net :	64.0	27.418			79	27.539	
	64.0	565.873		78	77	100.434	
-3.9	64.0	538.049	3.0	82	78	72.722	28.0
Avg/Net :	64.0	27.824			79	27.712	

$$y = Vs \times (Pbar + (dHs / 13.6)) \times (Avg.\ Td + 460) / [\ Vd \times (Pbar + (dH / 13.6)) \times (\ Ts + 460)]$$

$$Ko = [(Vs/t) \times [(Tdo + 460) / (Ts + 460)] \times [(Pbar + (dHs/13.6) / (Pbar + (dH/13.6)] / [((Tdo + 460) \times dH) / (Pbar + (dH/13.6)) \times (Mm)]^{0.5}$$

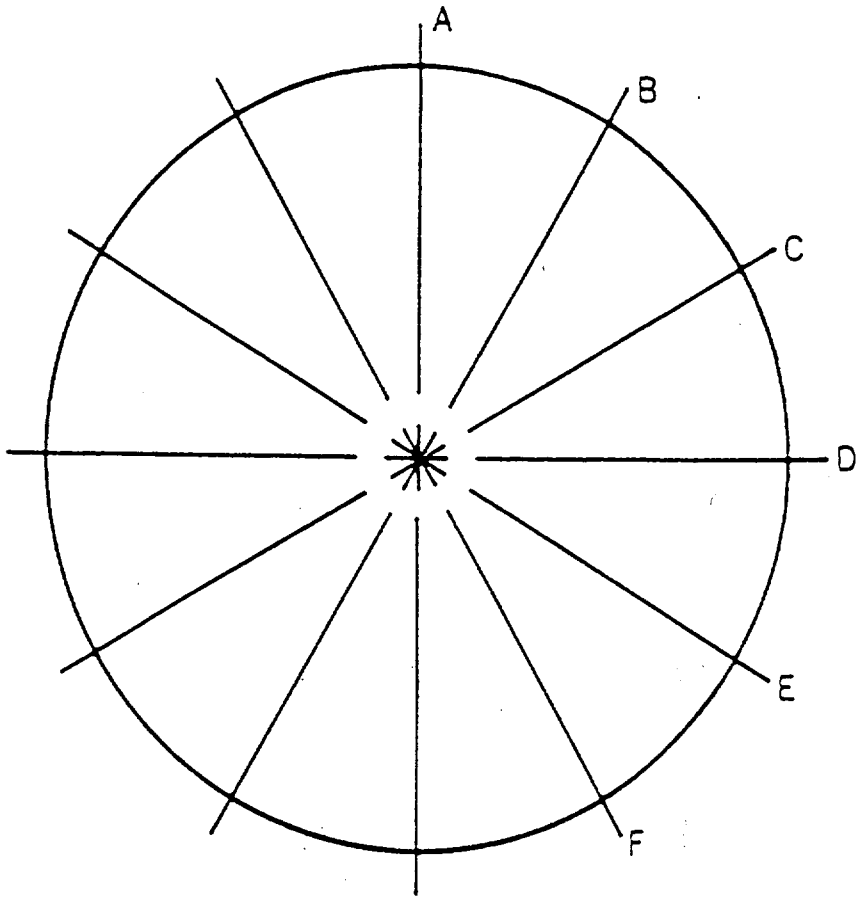
dH :	0.5	1.0	1.5	2.0	3.0	Avg.	Std.Dev.
y :	1.0029	1.0080	1.0006	1.0116	1.0149	1.0076	0.0053
Ko :	0.7729	0.7656	0.7280	0.7347	0.7369	0.7476	0.0180

y : 0.53 % Relative Std. Dev.

Ko : 2.41 % Relative Std. Dev.

Steiner Environmental, Inc.

NOZZLE CALIBRATION



DIAMETER (in.)

A 0.387

B 0.390

C 0.389

D 0.390

E _____

F _____

AVG. 0.3890

DATE 3-24-92

NOZZLE NO. #1023

OPERATOR SW

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: SP-2750-90 R.59 PAGE 2 05/21/92

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: CC40033						
			Monitor Labs Model 8440		05/08/92	05/21/92
Nitric Oxide	81.8 ± 0.8 ppm	GMIS	S/N 136	11/21/93	81.7 ppm	81.8 ppm
NOx	81.8 ppm	Cylinder #	Continuous		81.6 ppm	81.9 ppm
Nitrogen,O2-Free Balance		CC106651	Chemiluminescence		81.7 ppm	81.7 ppm
Cylinder Pressure: 2000 psig		@ 98.9 ppm	Last Cal Date: 03/05/92		Mean: 81.7 ppm	81.8 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

STEI01

TO:

DATE: 11/18/91

SUE POWERS
STEINER ENVIRONMENTAL, INC.
4950 BOYLAN STREET
BAKERSFIELD, CA 93308

CUSTOMER ORDER NUMBER: SP-2750-90REL43

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC40111	Carbon Monoxide	392 ± 4 ppm	SRM 1680b
	Oxygen	3.85 ± 0.04 %	SRM 2658a
	Carbon Dioxide	15.20 ± 0.15 %	SRM 1675b
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: _____ M.S. Calhoun

Approved: _____ J.T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

STEI01

TO:

DATE : 04/22/92

Sue Powers
Steiner Environmental, Inc,
4930 Boylan Street
Bakersfield, CA 93308-

CUSTOMER ORDER NUMBER: SP-2750-90REL56

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: CC12038						
			Interscan Model RM2450P		04/07/92	04/21/92
Sulfur Dioxide	492 ± 5 ppm	GMIS	S/N 72138	10/21/93	487 ppm	488 ppm
		Cylinder #	Electrochemical		498 ppm	490 ppm
Nitrogen	Balance	CC87779	Gas Chromatography		491 ppm	494 ppm
Cylinder Pressure: 2000 psig		@ 486 ppm	Last Cal Date: 02/21/92		Mean: 492 ppm	491 ppm
CYLINDER NO.: CC63459						
			Carle Insts Model 8000		04/01/92	04/20/92
Carbon Monoxide	5.43 ± 0.11 ppm	GMIS	S/N 8249	10/20/93	5.49 ppm	5.37 ppm
		Cylinder #	Methanation/FID		5.42 ppm	5.48 ppm
Nitrogen	Balance	CC163	Gas Chromatography		5.39 ppm	5.45 ppm
Cylinder Pressure: 2000 psig		@ 9.84 ppm	Last Cal Date: 01/29/92		Mean: 5.43 ppm	5.43 ppm
CYLINDER NO.: CC81166						
			Carle Insts Model 8000		04/09/92	04/21/92
Carbon Monoxide	836 ± 8 ppm	SRM 1681b	S/N 8249	10/21/93	837 ppm	844 ppm
		Cylinder #	Methanation/FID		833 ppm	836 ppm
Nitrogen	Balance	CAL4193	Gas Chromatography		835 ppm	827 ppm
Cylinder Pressure: 2000 psig		@ 950 ppm	Last Cal Date: 02/28/92		Mean: 835 ppm	835 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: Mark Monson
M.J. Monson

Approved:
J.T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

STEI01

TO:

SUE POWERS
STEINER ENVIRONMENTAL
4930 BOYLAN STREET
BAKERSFIELD, CA 93308-

DATE : 06/16/92

CUSTOMER ORDER NUMBER: SP-2750-90REL63

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: CC91386						
			Carle Insts Model 8000		06/08/92	06/15/92
Carbon Monoxide	7.80 ± 0.16 ppm	GMIS	S/N 8249	12/15/93	7.78 ppm	7.84 ppm
		Cylinder #	Methanation/FID		7.86 ppm	7.70 ppm
Nitrogen	Balance	CC163	Gas Chromatography		7.84 ppm	7.74 ppm
Cylinder Pressure: 2000 psig		@ 9.84 ppm	Last Cal Date: 05/05/92		Mean: 7.83 ppm	7.76 ppm
CYLINDER NO.: CC28732						
			Carle Insts Model 8000		06/08/92	06/15/92
Carbon Monoxide	7.87 ± 0.16 ppm	GMIS	S/N 8249	12/15/93	7.85 ppm	7.85 ppm
		Cylinder #	Methanation/FID		7.91 ppm	7.92 ppm
Nitrogen	Balance	CC163	Gas Chromatography		7.88 ppm	7.78 ppm
Cylinder Pressure: 2000 psig		@ 9.84 ppm	Last Cal Date: 05/05/92		Mean: 7.88 ppm	7.85 ppm
CYLINDER NO.: CC182						
			Carle Insts Model 8000		06/08/92	06/15/92
Carbon Monoxide	7.75 ± 0.16 ppm	GMIS	S/N 8249	12/15/93	7.70 ppm	7.81 ppm
		Cylinder #	Methanation/FID		7.69 ppm	7.83 ppm
Nitrogen	Balance	CC163	Gas Chromatography		7.71 ppm	7.75 ppm
Cylinder Pressure: 2000 psig		@ 9.84 ppm	Last Cal Date: 05/05/92		Mean: 7.70 ppm	7.80 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: Mark Monson
M.J. Monson

Approved:
J.T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

STEI01

TO:

DATE: 05/28/92

SUE POWERS
STEINER ENVIRONMENTAL
4930 BOYLAN STREET
BAKERSFIELD, CA 93308-

CUSTOMER ORDER NUMBER: SP-2750-90REL62/Reanalysis

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC81159	Carbon Monoxide	199.8 ± 2.0 ppm	SRM 2636
	Carbon Dioxide	15.54 ± 0.16 %	SRM 1675b
	Oxygen	7.34 ± 0.07 %	SRM 2658a
	Nitrogen	Balance	
	Cylinder Pressure:	1500 psig	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: _____ M.S. Calhoun

Approved: _____ J.T. Marrin

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

STEI01

TO:

SUE POWERS
STEINER ENVIRONMENTAL INC.
4930 BOYLAN STREET
BAKERSFIELD, CA 93308

DATE: 11/21/91

CUSTOMER ORDER NUMBER: SP-2750-90REL45

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC101245	Carbon Monoxide	16.15 ± 0.32 ppm	SRM 2613a
	Carbon Dioxide	4.83 ± 0.05 %	SRM 1674b
	Oxygen	16.32 ± 0.16 %	SRM 2659
	Nitrogen	Balance	
CC37841	Carbon Monoxide	15.71 ± 0.31 ppm	SRM 2613a
	Carbon Dioxide	4.72 ± 0.05 %	SRM 1674b
	Oxygen	16.18 ± 0.16 %	SRM 2659
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: M.S. Calhoun

Approved: J.T. Marrin

APPENDIX A

RESULTS AT EPA STANDARD CONDITIONS

Table A-1 presents the summary of source emission test data collected during this program. The data is presented at EPA standard conditions (68°F, 29.2 inches Mercury).

The particulate mass is reported in two ways -- front half and front half plus back half. The front half catch (nozzle, probe, filter holder wash and filter) represent matter which is filterable at 250°F. EPA bases compliance on this value. The back half catch represents condensible matter which is caught in the 80-percent isopropanol impinger and the acid mist filter. Kern County APCD bases compliance on the combined front half and back half catches. The sulfate data is reported as H_2SO_4 and represents the total sulfate measured in the front and back half catches. Kern County bases compliance on this value. The SO_2 values reported represent the SO_2 collected in the hydrogen peroxide portion of the sample train.

TABLE A-1. SUMMARY OF SOURCE EMISSION TEST DATA (68°F)

Unit Tested: Texaco R & M Boilers A & B — Date: June 19, 1992

Test Number	1	2	3	Average
Barometric Pressure (in. Hg)	29.91	29.88	29.82	29.87
Stack Pressure (in. Hg)	29.89	29.86	29.80	29.85
Stack Area (Ft^2)	8.62	8.62	8.62	8.62
Elapsed Sampling Time (min.)	96.00	96.00	96.00	96.00
Volume Gas Sampled (dscf)	84.205	84.308	83.676	84.063
F-Factor	8,607.34	8,607.34	8,607.34	8,607.34
GAS DATA				
Average Gas Velocity (fps)	35.97	36.15	36.00	36.04
Average Gas Temperature (°F)	513.00	512.67	519.50	515.06
Gas Flowrate (dscfm)	8,981	8,871	8,884	8,912
Gas Analysis (Volume %)				
Carbon Dioxide, dry	8.43	8.46	9.17	8.69
Oxygen, dry	7.54	7.28	6.29	7.04
Water	10.93	12.40	11.11	11.48
EMISSION CONCENTRATION				
Filterable Particulate (gr/dscf)	0.0036	0.0029	0.0020	0.0028
Total Particulate (gr/dscf)	0.0044	0.0039	0.0028	0.0037
Total Sulfate (gr/dscf)	0.0014	0.0015	0.0012	0.0014
CO (ppm)	1.00	1.80	1.02	1.27
SO_2 (ppm)	22.40	22.95	20.33	21.90
NO_x (ppm)	70.09	67.97	72.01	70.02
EMISSION RATE - lb/hr				
Filterable Particulate	0.27	0.22	0.16	0.22
Total Particulate	0.34	0.30	0.21	0.28
Total Sulfate	0.11	0.11	0.09	0.10
CO	0.04	0.07	0.04	0.05
SO_2	2.01	2.03	1.80	1.95
NO_x	4.51	4.32	4.58	4.47
EMISSION FACTOR - lb/MMBtu				
Filterable Particulate	0.0068	0.0055	0.0036	0.0053
Total Particulate	0.0084	0.0074	0.0049	0.0069
Total Sulfate	0.0027	0.0028	0.0022	0.0026
CO	0.0010	0.0017	0.0009	0.0012
SO_2	0.0502	0.0504	0.0416	0.0474
NO_x	0.1127	0.1072	0.1059	0.1086

SOURCE TEST CALCULATIONS

PLANT : TEXACO R & M
BOILERS A & B

RUN NO.: 1
DATE : JUNE 19,1992

STANDARD TEMP.: 68 DEG. F

METER TEMP.	= 106.85 DEG. F		STATIC PRESS. =	-0.28	in. H2O
STACK TEMP.	= 513.00 DEG. F		Cp =	0.840	
SQ.RT. dP	= 0.4677 in. H2O		STACK I.D. =	39.75	inch
METER ORIFICE	= 2.41 in. H2O		DUCT LENGTH =		inch
METER VOLUME	= 89.220 Cu.Ft.		DUCT WIDTH =		inch
METER Y	= 1.0076		STACK AREA =	8.618	Sq.Ft.
BAR. PRESSURE	= 29.91 in.Hg		TEST TIME =	96.00	min.
COND.(Vlc)	= 219.5 ml		NOZZLE DIA. =	0.3890	inch

GAS ANALYSIS = 7.54 % O2 0.00 % CO
8.43 % CO2 84.03 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	=	84.205	dscf
Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic	=	10.332	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	=	0.109	Lower Bws value used.
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	=	1.000	
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100	=	51.49	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)]	=	29.65	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	=	28.38	
P(stack) = Pbar + [Pstatic / 13.6]	=	29.89	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)]	=	35.97	ft/sec
Qs = vs x As x 60	=	18,601	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92)	=	8,981	dscf/min
I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60)	=	101.98	%

SOURCE TEST CALCULATIONS

PLANT : TEXACO R & M
BOILERS A & B

RUN NO.: 2
DATE : JUNE 19,1992

STANDARD TEMP.: 68 DEG. F

METER TEMP.	=	88.33 DEG. F	STATIC PRESS.	=	-0.23 in. H2O
STACK TEMP.	=	512.67 DEG. F	Cp	=	0.840
SQ.RT. dP	=	0.4684 in. H2O	STACK I.D.	=	39.75 inch
METER ORIFICE	=	2.34 in. H2O	DUCT LENGTH	=	inch
METER VOLUME	=	86.512 Cu.Ft.	DUCT WIDTH	=	inch
METER Y	=	1.0076	STACK AREA	=	8.618 Sq.Ft.
BAR. PRESSURE	=	29.88 in.Hg	TEST TIME	=	96.00 min.
COND.(Vlc)	=	253.6 ml	NOZZLE DIA.	=	0.3890 inch

GAS ANALYSIS : 7.28 % O2 0.00 % CO
8.46 % CO2 84.26 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 84.308 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic = 11.937 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.124 | Lower Bws value used.

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 48.65

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.64

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.20

P(stack) = Pbar + [Pstatic / 13.6] ..... = 29.86 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)] ..... = 36.15 ft/sec

Qs = vs x As x 60 ..... = 18,692 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92) ..... = 8,871 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60) = 103.38 %

SOURCE TEST CALCULATIONS

PLANT : TEXACO R & M
BOILERS A & B

RUN NO.: 3
DATE : JUNE 19,1992

STANDARD TEMP.: 68 DEG. F

METER TEMP.	= 83.88 DEG. F		STATIC PRESS.	= -0.24	in. H2O
STACK TEMP.	= 519.50 DEG. F		Cp	= 0.840	
SQ.RT. dP	= 0.4661 in. H2O		STACK I.D.	= 39.75	inch
METER ORIFICE	= 2.29 in. H2O		DUCT LENGTH	=	inch
METER VOLUME	= 85.347 Cu.Ft.		DUCT WIDTH	=	inch
METER Y	= 1.0076		STACK AREA	= 8.618	Sq.Ft.
BAR. PRESSURE	= 29.82 in.Hg		TEST TIME	= 96.00	min.
COND.(Vlc)	= 222.2 ml		NOZZLE DIA.	= 0.3890	inch

GAS ANALYSIS : 6.29 % O2 0.00 % CO
9.17 % CO2 84.54 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	=	83.676	dscf
Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic	=	10.459	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	=	0.111	Lower Bws value used.
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	=	1.000	
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100	=	39.24	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)]	=	29.72	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	=	28.42	
P(stack) = Pbar + [Pstatic / 13.6]	=	29.80	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)]	=	36.00	ft/sec
Qs = vs x As x 60	=	18,613	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92)	=	8,884	dscf/min
I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60)	=	102.46	%

EMISSION RATE CALCULATIONS

PLANT :TEXACO R & M
BOILERS A & B

RUN NO.: 1
DATE : JUNE 19,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 68 DEG. F

Front Half Wash (FHW)	0.01753 grams	Vm(std)	84.205 ft3
Mass Filter (MF)	0.00185 grams	Vw(std)	10.332 ft3
Back Half Wash (BHW)	0.00448 grams	Qs(std)	8,981 dscfm
Front Half Sulfate (FHS)	5.03 mg H2SO4	Bws	0.109
Back Half Sulfate (BHS)	2.69 mg H2SO4	CO2	8.43 %
H2O2 Catch (SO2)	217.67 mg H2SO4	O2	7.54 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8607.34 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0032 gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0036 gr/dscf
gr/dscf x (12 / %CO2)	0.0051 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.27 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0068 lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0039 gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0044 gr/dscf
gr/dscf x (12 / %CO2)	0.0062 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.34 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0084 lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0013 gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0014 gr/dscf
gr/dscf x (12 / %CO2)	0.0020 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.11 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0027 lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	22.40 ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	30.02 @ O2 corr.
ppm x (1 - Bws)	19.95 ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	2.01 lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0502 lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 3.73E-06	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0251 lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0009 lb/MMBtu
Total Sulfur	0.0260 lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :TEXACO R & M
BOILERS A & B

RUN NO.: 2
DATE : JUNE 19,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 68 DEG. F

Front Half Wash (FHW)	0.01510 grams	Vm(std)	84.308 ft3
Mass Filter (MF)	0.00085 grams	Vw(std)	11.937 ft3
Back Half Wash (BHW)	0.00549 grams	Qs(std)	8,871 dscfm
Front Half Sulfate (FHS)	4.73 mg H2SO4	Bws	0.124
Back Half Sulfate (BHS)	3.33 mg H2SO4	CO2	8.46 %
H2O2 Catch (SO2)	223.29 mg H2SO4	O2	7.28 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8607.34 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0026	gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0029	gr/dscf
gr/dscf x (12 / %CO2)	0.0041	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.22	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0055	lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0034	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0039	gr/dscf
gr/dscf x (12 / %CO2)	0.0056	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.30	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0074	lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0013	gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0015	gr/dscf
gr/dscf x (12 / %CO2)	0.0021	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.11	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0028	lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	22.95	ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	30.17	@ O2 corr.
ppm x (1 - Bws)	20.11	ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	2.03	lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0504	lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 3.82E-06		lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0252	lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0009	lb/MMBtu
Total Sulfur	0.0261	lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :TEXACO R & M
BOILERS A & B

RUN NO.: 3
DATE : JUNE 19,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 68 DEG. F

Front Half Wash (FHW)	0.00956 grams	Vm(std)	83.676 ft3
Mass Filter (MF)	0.00150 grams	Vw(std)	10.459 ft3
Back Half Wash (BHW)	0.00399 grams	Qs(std)	8,884 dscfm
Front Half Sulfate (FHS)	4.05 mg H2SO4	Bws	0.111
Back Half Sulfate (BHS)	2.64 mg H2SO4	CO2	9.17 %
H2O2 Catch (SO2)	196.30 mg H2SO4	O2	6.29 %

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... 8607.34 dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0018 gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0020 gr/dscf
gr/dscf x (12 / %CO2)	0.0027 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.16 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0036 lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0025 gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0028 gr/dscf
gr/dscf x (12 / %CO2)	0.0036 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.21 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0049 lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	0.0011 gr/scf
0.015432 x (FHS + BHS) / Vm(std)	0.0012 gr/dscf
gr/dscf x (12 / %CO2)	0.0016 @ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.09 lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	0.0022 lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	20.33 ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	24.91 @ O2 corr.
ppm x (1 - Bws)	18.07 ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	1.80 lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	0.0416 lb/MMBtu
lb/hr / (dscfm x 60 min/hr) 3.38E-06	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	0.0208 lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	0.0007 lb/MMBtu
Total Sulfur	0.0215 lb/MMBtu