Background Report Reference

AP-42 Section Number: 11.6

Background Chapter: 4

Reference Number: 73

Title: Field Data Source Test at Lone Star Industries, Davenport, California

Chemecology Corp

Chemecology Corp

May 1982

AP-42 Section 11.6
Reference Not Used
Report Sect. 4
Reference 73

CHE

690-B Garcia Avenue, Pittsburg, CA 945

FIELD DATA SOURCE TEST

PREPARED FOR: LONESTAR INDUSTRIES
Highway 1
Davenport, CA 95017

ATTENTION: John Laney

REGARDING: Particulate, NOx and SO2 Emissions

REGULATORY AGENCY: E.P.A. and Monterey Bay Unified APCD

PURPOSE: Compliance

TEST DATE: May 13, 1982

UNIT TESTED: Main Stack & Clinker Cooler Stack

ASSOCIATED REPORT NUMBERS: N/A

REPORT NUMBER: A-1400 & H-1401

PREPARED BY: L. A. Johnson

REVIEWED BY: Leslie A. Johnson

SUMMARY

PLANT: LONE STAR - SANTA CRUZ

LOCATION: DAVENPORT CALIFORNIA

TEST/IDENTIFICATION A-1400 & H-1401 DATE: MAY 1982

TESTING BY: CHEMECOLOGY CORP.

KILN/COOLER NO. 1

			PERFORMANCE		
Kiln Production	Ton/Hr.	.....	92.2	@ 1.68	K.F. Factor
Kiln Feed Rate	Ton/Hr.	.....	165		
Fuel Rate (Coal)	Ton/Hr.	.....	10.9	@ 11277	BTU/lb.
" " (Oil)	Gal/Hr.	.....			
Fuel Ash	%	.....	10.0		
Fuel Sulphur	%	.....	0.4	0.24	Kiln Feed S.
KILN (Stack)				ALLOWABLE	
Exhaust Gas Flow	DSCFM	.....	155,670		
Part. Concen.	lb/SCF	.....	0.000027		
Emission Rate	lb/Ton	.....	0.16/25.8 #/hr	0.3 / 49.5 #/hr	
SOX (Kiln) (Concentration)	PPM	.....	96		
Emission Rate	lb/Ton	.....	0.92/152 #/hr		
Emission Rate	lb/MMBTU	.....			
NOX (Kiln) (Concentration)	PPM	.....	189		
Emission Rate	lb/Ton	.....	1.30/214 #/hr		
COOLER (Stack)					
Exhaust Gas Flow	DSCFM	.....	71,200		
Part. Concen.	lb/SCF	.....	0.000014		
Emission Rate	lb/Ton	.....	0.035/5.82 #/hr	0.1 / 16.5 #/hr	

REMARKS:

Reference 41:

(1) Dry process, coal-fired kiln - No control device specified to Delete!

CHEMECOLOGY CORPORATION
690-B Garcia Avenue, Pittsburg, CA 94565 / 415-439-5766

F I E L D D A T A S O U R C E T E S T

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PREPARED BY: L. A. Johnson

REVIEWED BY: Leslie A. Johnson

CHEMECOLOGY
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ABSTRACT

On May 13, 1982 a Chemecology Corporation source test team, under the supervision of Leslie Johnson, tested at Lonestar Industries in Davenport, California cement plant. The testing was done to determine particulate, NO_x and SO_2 (NSPS and NSR) compliance with both EPA and Monterey Bay Unified APCD. Observing for EPA was Robert Bishop with Monterey Bay Unified APCD observers being Kenneth Kitts and Fred Thoits.

Triplicate EPA Method 5 tests were performed at both the Main and Clinker Cooler Stacks. Triplicate half hour NO_x, SO_2 and O_2 continuous monitoring tests were done at the Main Stack

The following table list applicable regulations and actual emissions:

	Emission Limits	Actual Emissions
Main Stack		
NO_x	165 ppm 182 lb/hr	189 214
Particulate Matter	0.30 lb/ton of feed 40 lb/hr	0.06 26.8
Clinker Cooler		
Particulate Matter	0.10 lb/ton of feed	0.02

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SELECTED RESULTS

Client: Lonestar Industries
Site: Main Stack
Date: May 13, 1982

Time:	1032-1201	1301-1426	1508-1628	
Process Conditions:				
Kiln Feed Rate; TPH:	165	165	165	165
ACFM:	226,100	226,000	228,400	
SDCFM:	156,600	155,200	158,700	156,630
T_d; °F:	194	198	195	657
% CO_2:	14.2	13.4	11.3	
% O_2:	14.3	13.8	13.5	
% H_2O:	12.9	13.1	12.5	
Particulate Emissions:				
Filter C_o; grains/SDCF:	0.0035	0.0058	0.0045	.0046
Probe & Nozzle C_o:	0.0085	0.0010	0.0004	.0045
Condensables C_c:	0.0171	0.0098	0.0093	.0121
Total C_o:	0.0291	0.0166	0.0142	.0200
E.R. lb/hr:	39.1	22.1	19.3	26.8
E.R. lb/ton of kiln feed:	0.10	0.05	0.04	0.06
Average E.R. lb/hr:	26.8			
Average E.R. lb/ton:	~~0.06~~ 0.16			
Constant Monitoring:				
% O_2:	14.2			
NO_x; ppm:	189			
NO_x; lb/hr:	214			

SELECTED RESULTS

Client: Lonestar Industries

Site: Clinker Cooler Stack

Date: May 13, 1982

Time:	1014-1134	1250-1356	1457-1604	
Process Conditions:				
Kiln Feed Rate; TPH:	165	165	165	165
ACFM:	107,500	107,400	104,500	
SDCFM:	71,300	70,800	71,500	71,200
T_d: °F:	317	317	293	309 °F
% CO_2:	0	0	0	
% O_2:	21.0	21.0	21.0	
% H_2O:	1.1	1.6	1.1	
Particulate Emissions:				
Filter C_o; grains/SDCF:	0.0058	0.0069	0.0042	
Probe & Nozzle C_o:	0.0003	0.0008	0.0012	
Condensables C_o:	0.0036	0.0017	0.0041	
Total C_o:	0.0100	0.0094	0.0095	0.00963
E.R. lb/hr:	5.93	5.71	5.83	
E.R. lb/ton of kiln feed:	0.02	0.03	0.02	
Average E.R. lb/hr:	5.82			
Average E.R. lb/ton:	0.02	0.035		

VELOCITY
&
VOLUME FLOW

CHEMECOLOGY CORPORATION

VELOCITY TRAVERSE AND VOLUME FLOW RATE

REF: Environmental Protection Agency, Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 1 and 2, 1981
: Bay Area AQMD, Manual of Procedures, San Francisco, CA, Method St-17 January, 1982
: ASME Performance Test Code #27, New York, NY, 1957
: ASTM D-2928-71
: Western Precipitation Division of Joy Manufacturing, WP-50, 1968

PROCEDURE:

Duct temperature and velocity were read at each of several traverse points within the duct. The number and location of traverse points was chosen to aid in the extraction of a representative sample (i.e. by EPA Method 1). Velocity head was determined using a calibrated type "S" pitot tube and Magnehelic differential pressure gauge. Duct temperature was measured by means of a thermocouple attached to the pitot tube. Static pressure was measured with the Magnehelic and one leg of the pitot tube. Using the molecular weight and traverse data, velocity was calculated at each traverse point. From the average velocity, duct area, temperature, pressure and composition, actual and standard gas volume flow rate were calculated for the duct.

CALCULATIONS:

Performed by computer based on the following equations:

Symbol Identification:

A_d = duct area, square feet
C_p = pitot tube correction factor, unitless
D = duct diameter (circular ducts), inches
k = number of traverse points on D or W
L = duct dimension having ports (rectangular), inches
MW = molecular weight (wet)
n = traverse point number on a diameter
Δp = velocity head, "H_2O
P_L = number of ports on dimension L
P_d & P_{std} = duct (barometric + static) and standard pressure, "Hg
Q_d = volume flow rate, actual CFM
Q_{std} = volume flow rate, standard condition (wet or dry), SCFM
T_d & T_{std} = duct and standard temperature, °R
t.p. = traverse point (distance from sample port wall), inches
v_d = velocity at duct conditions, fps
W = second duct dimension (rectangular), inches

VELOCITY TRAVERSE AND VOLUME FLOW RATE (cont)

Equations:

Location of Traverse Points:

Circular Duct:

$$t.p.\ (1st\ half) = D/2 - (D/2k) * \sqrt{k(k+1-2n)}$$

$$t.p.\ (2nd\ half) = D/2 + (D/2k) * \sqrt{k(2n-1)}$$

Where $n = 1$ to $k/2$

Rectangular Duct:

$$t.p. = W/2k + (n-1) * W/k$$

Where $k \doteq (W/L) * (P_L)$

$n = 1$ to k

Velocity & Volume Flow Rate:

$$vd = 85.49 * Cp * \sqrt{\frac{Td * \Delta p}{Pd * MW}}$$

$$Qd = 60 * vd\ (avg) * Ad = \quad ACFM$$

$$Qstd(wet) = Qd * \frac{Tstd}{Td(avg)} * \frac{Pd}{Pstd} = \quad SCFM$$

$$Qstd(dry) = Qstd(wet) * (1 - \%H2O/100) = \quad SDCFM$$

CHEMECOLOGY CORPORATION

DATA: Main Stack

Date 5/13/82 Time 1032-1134 Run # 1

Description: Four 4 inch female ports, properly located, approximately 2 diameters after and 8 diameters before disturbances.

Duct Diameter 120.0 inches Area 78.54 ft^2

Rectangular duct _____ X _____

%H_2O 12.9 MW 29.19

Duct Static Pressure -0.80 inches H_2O Pitot Tube # 5292

Standard Conditions 60 °F & 29.92 "Hg Mag Box # 373

Pitot Tube Coefficient 0.78 Handitemp # 555

Trav. Pt.	Ins. From Edge	NORTHEAST Temp °F	NORTHEAST ΔP In.	NORTHEAST Vd ft/sec	NORTHWEST Temp °F	NORTHWEST ΔP In.	NORTHWEST Vd ft/sec	SOUTHWEST Temp °F	SOUTHWEST ΔP In.	SOUTHWEST Vd ft/sec	SOUTHEAST Temp °F	SOUTHEAST ΔP In.	SOUTHEAST Vd ft/sec
1	11.0	190	0.52	41.5	195	0.46	39.2	195	0.62	45.5	195	0.60	44.7
2	60.0	195	0.74	49.7	195	0.82	52.3	195	0.76	50.3	195	0.74	49.7
3	94.6	190	0.70	48.1	195	0.80	51.6	195	0.80	51.6	195	0.80	51.6
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RESULTS:

Average Velocity (V_d) 48.0 FPS Average duct temp. 194 °F

Average Volume Flow Rate Qd 226,100 CFM at 194 °F & 29.92 "Hg

Volume Flow Rate Qstd(wet) 179,800 CFM at standard conditions

Volume Flow Rate Qstd(dry) 156,600 CFM at standard conditions

CHEMECOLOGY CORPORATION

DATA: Main Stack

Date 5/13/82 Time 1301-1426 Run # 2

Description: Four 4 inch female ports, properly located, approximately 2 diameters after and 8 diameters before disturbances in flow.

Duct Diameter 120.0 inches Area 78.54 ft^2

Rectangular duct _____ X _____

%H_2O 13.1 MW 29.04

Duct Static Pressure -0.80 inches H_2O Pitot Tube # 5292

Standard Conditions 60 °F & 29.92 "Hg Mag Box # 373

Pitot Tube Coefficient 0.78 Handitemp # 555

Trav. Pt.	Ins. From Edge	SOUTHEAST Temp °F	SOUTHEAST ΔP In.	SOUTHEAST Vd ft/sec	SOUTHWEST Temp °F	SOUTHWEST ΔP In.	SOUTHWEST Vd ft/sec	NORTHWEST Temp °F	NORTHWEST ΔP In.	NORTHWEST Vd ft/sec	NORTHEAST Temp °F	NORTHEAST ΔP In.	NORTHEAST Vd ft/sec
1	11.0	200	0.70	48.6	195	0.60	44.8	195	0.50	40.9	205	0.58	44.4
2	60.0	200	0.78	51.3	200	0.70	48.6	195	0.72	49.1	195	0.64	46.3
3	94.6	200	0.82	52.6	200	0.74	50.0	195	0.70	48.4	195	0.74	49.8
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RESULTS:

Average Velocity (V_d) 48.0 FPS Average duct temp. 198 °F

Average Volume Flow Rate Qd 226,000 CFM at 198 °F & 29.92 "Hg

Volume Flow Rate Qstd(wet) 178,600 CFM at standard conditions

Volume Flow Rate Qstd(dry) 155,200 CFM at standard conditions

DATA: Main Stack

Date 5/13/82 Time 1508-1628 Run # 3

Description: Four 4 inch female ports, properly located, approximately 2 diameters after and 8 diameters before disturbances in flow.

Duct Diameter 120. inches Area 78.54 ft^2

Rectangular duct _____ X _____

%H_2O 12.5 MW 28.81

Duct Static Pressure -0.80 inches H_2O Pitot Tube # 5292

Standard Conditions 60 °F & 29.92 "Hg Mag Box # 373

Pitot Tube Coefficient 0.78 Handitemp # 555

Trav. Pt.	Ins. From Edge	NORTHEAST Temp °F	NORTHEAST ΔP In.	NORTHEAST Vd ft/sec	NORTHWEST Temp °F	NORTHWEST ΔP In.	NORTHWEST Vd ft/sec	SOUTHWEST Temp °F	SOUTHWEST ΔP In.	SOUTHWEST Vd ft/sec	SOUTHEAST Temp °F	SOUTHEAST ΔP In.	SOUTHEAST Vd ft/sec
1	11.0	195	0.55	43.1	195	0.62	45.8	195	0.70	48.6	195	0.60	45.0
2	60.0	195	0.66	47.2	195	0.76	50.7	195	0.74	50.0	195	0.70	48.6
3	94.6	195	0.74	50.0	195	0.72	49.3	195	0.82	52.6	195	0.76	50.7
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RESULTS:

Average Velocity (V_d) 48.5 FPS Average duct temp. 195 °F

Average Volume Flow Rate Qd 228,400 CFM at 195 °F & 29.92 "Hg

Volume Flow Rate Qstd(wet) 181,300 CFM at standard conditions

Volume Flow Rate Qstd(dry) 158,700 CFM at standard conditions

CHEMECOLOGY CORPORATION

DATA: Clinker Cooler Stack

Date 5/13/82 Time 1014-1134 Run # 1

Description: Two 4-inch female ports, properly located, approximately 2 diameters after and 8 diameters before disturbances in flow.

Duct Diameter 101.0 inches Area 55.64 ft^2

Rectangular duct _____ X _____

%H_2O 1.1 MW 28.72

Duct Static Pressure -.18 inches H_2O Pitot Tube # 5352

Standard Conditions 60 °F & 29.92 "Hg Mag Box # 376

Pitot Tube Coefficient 0.81 Handitemp # 556

Trav. Pt.	Ins. From Edge	SOUTHWEST Temp °F	SOUTHWEST ΔP In.	SOUTHWEST Vd ft/sec	NORTHWEST Temp °F	NORTHWEST ΔP In.	NORTHWEST Vd ft/sec	Temp °F	ΔP In.	Vd ft/sec	Temp °F	ΔP In.	Vd ft/sec
1	4.4	320	0.26	33.6	318	0.26	33.6						
2	14.8	319	0.24	32.3	320	0.27	34.3						
3	29.9	312	0.23	31.4	325	0.24	32.4						
4	71.1	315	0.24	32.2	325	0.24	32.4						
5	86.2	305	0.22	30.6	320	0.24	32.3						
6	96.6	300	0.24	31.9	320	0.20	29.5						
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RESULTS:

Average Velocity (V_d) 32.2 FPS Average duct temp. 317 °F

Average Volume Flow Rate Qd 107,500 CFM at 317 °F & 29.97 "Hg

Volume Flow Rate Qstd(wet) 72,100 CFM at standard conditions

Volume Flow Rate Qstd(dry) 71,300 CFM at standard conditions

CHEMECOLOGY CORPORATION

DATA: Clinker Cooler

Date 5/13/82 Time 1250-1356 Run # 2

Description: Two 4 inch female ports, properly located, approximately 2 diameters after and 8 diameters before disturbances in flow.

Duct Diameter 101.0 inches Area 55.64 ft^2

Rectangular duct _____ X _____

%H_2O 1.6 MW 28.66

Duct Static Pressure -.18 inches H_2O Pitot Tube # 5352

Standard Conditions 60 °F & 29.92 "Hg Mag Box # 376

Pitot Tube Coefficient 0.81 Handitemp # 556

Trav. Pt.	Ins. From Edge	NORTHWEST Temp °F	NORTHWEST ΔP In.	NORTHWEST Vd ft/sec	SOUTHWEST Temp °F	SOUTHWEST ΔP In.	SOUTHWEST Vd ft/sec	Temp °F	ΔP In.	Vd ft/sec	Temp °F	ΔP In.	Vd ft/sec
1	4.4	321	0.25	33.0	315	0.25	32.9						
2	14.8	315	0.20	29.4	335	0.25	33.3						
3	29.9	320	0.24	32.3	315	0.20	29.4						
4	71.1	321	0.26	33.7	310	0.25	32.8						
5	86.2	322	0.25	33.0	315	0.23	31.5						
6	96.6	310	0.22	30.7	300	0.27	33.8						
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RESULTS:

Average Velocity (V_d) 32.2 FPS Average duct temp. 317 °F

Average Volume Flow Rate Qd 107,400 CFM at 317 °F & 29.97 "Hg

Volume Flow Rate Q_{std}(wet) 72,000 CFM at standard conditions

Volume Flow Rate Q_{std}(dry) 70,800 CFM at standard conditions

CHEMECOLOGY CORPORATION

DATA: Clinker Cooler

Date 5/13/82 Time 1457-1604 Run # 3

Description: Two 4 inch female ports, properly located, approximately 2 diameters after and 8 diameters before disturbances in flow.

Duct Diameter 101.0 inches Area 55.64 ft^2

Rectangular duct _____ X _____

%H_2O 1.1 MW 28.72

Duct Static Pressure -.18 inches H_2O Pitot Tube # 5352

Standard Conditions 60 °F & 29.92 "Hg Mag Box # 376

Pitot Tube Coefficient 0.81 Handitemp # 556

Trav. Pt.	Ins. From Edge	SOUTHWEST Temp °F	SOUTHWEST ΔP In.	SOUTHWEST Vd ft/sec	NORTHWEST Temp °F	NORTHWEST ΔP In.	NORTHWEST Vd ft/sec	Temp °F	ΔP In.	Vd ft/sec	Temp °F	ΔP In.	Vd ft/sec
1	4.4	310	0.24	32.1	290	0.24	31.7						
2	14.8	295	0.20	29.0	295	0.28	34.3						
3	29.9	305	0.23	31.3	300	0.21	29.8						
4	71.1	300	0 23	31.2	285	0.20	28.8						
5	86.2	285	0.27	33.5	285	0.25	32.4						
6	96.6	295	0.25	32.4	280	0.21	29.4						
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RESULTS:

Average Velocity (V_d) 31.3 FPS Average duct temp. 293 °F

Average Volume Flow Rate Qd 104,500 CFM at 293 °F & 29.97 "Hg

Volume Flow Rate Qstd(wet) 72,300 CFM at standard conditions

Volume Flow Rate Qstd(dry) 71,500 CFM at standard conditions

PARTICULATE EMISSION

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PARTICULATE EMISSIONS

REF: EPA, Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 5, 1981
: South Coast AQMD, Source Testing Manual, Los Angeles, CA, April, 1981
: State of California, Air Resources Board, Draft Stationary Source Test Methods, Method 1-5, June, 1979

SAMPLING PROCEDURE:

The apparatus consisted of a nozzle, heater wrapped probe and heated filter holder (see data sheets for type of nozzle, probe and filter holder). A series of impinger-absorbers (see data sheet for type and contents) were connected in tandem and immersed in an ice bath. The absorption train was followed by a gas drying tube containing indicating silica gel, a diaphragm pump, dry test meter and a calibrated restriction orifice fitted with a magnehelic differential pressure gauge.

The computer was used in selection of suitable sampling points, nozzle size, and orifice constant. The apparatus was leak tested, the probe heaters were brought to temperature and the nozzle was positioned at the first sampling point. The pump was immediatley started and adjusted to obtain the isokinetic sampling rate.

Duct conditions were monitored throughout the sampling period with a type "S" pitot tube and a thermocouple simultaneously positioned at the traverse point. Conditions at the sampling apparatus and metering device were constantly monitored and regularly recorded on the data sheet. Isokinetic sampling rate in terms of orifice differential pressure was calculated by computer for each set of duct and sampling apparatus conditions. Data was relayed between the computer and site by radio.

On completion of sampling from all usable traverse points, the apparatus was removed, leak-checked, sealed from possible contamination and transported to the laboratory. Replicate samples were taken as indicated by the data sheets.

Concurrent with each particulate sampling, an integrated gas sample was withdrawn from the summation of the traverse points through the train and collected at the outlet of the meter into a sample bag.

ANALYTICAL PROCEDURE:

The weight or volume increase of the impingers was measured and recorded for calculation of percent water.

The contents of the sample bladder were analyzed by Orsat for fixed gas and molecular weight determination.

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PARTICULATE EMISSIONS

Analytical Procedure (cont)

The filter section was recovered, placed in a 105°C drying oven and desiccated to constant weight. The weight increase was determined from the tare weight and recorded on the individual data sheet.

Sample was recovered from the nozzle and probe sections with distilled water and/or acetone and a rubber policeman or nylon bristle brush. A tared dish was used for subsequent evaporation, desiccation and weight determination.

If analysis of the condensable fraction of the particulate ("impinger catch" or "back half") was required, an aliquot of the impinger liquid was poured into a tared dish. The liquid was evaporated to dryness and the residue was desiccated to a constant weight.

Aliquots of blank impinger and/or probe wash reagents were evaporated to dryness in tared dishes. The residue was desiccated and weighed for subtraction of the blank residue from the total probe wash or condensables residue.

An estimate of sampling accuracy was performed by calculation of percent isokinetic rate over the entire sampling period.

CALCULATIONS:

Performed by computer based on the following equations:

Symbol Identification:

Subscripts d, m and n denote duct, dry gas meter and nozzle respectively
Subscripts std, bar and avg denote standard, barometric and average

A = area, square feet
C_o = particulate concentration, grains/SDCF
C_p = pitot tube correction, unitless
E.R. = emission rate of particulate, lb/hr
ΔH = orifice differential pressure, inches H_2O
I = percent of isokinetic sampling
k_m = orifice constant, unitless
M = mass of particulate collected, milligrams
MW = wet molecular weight of duct gas, g/mole
P = absolute pressure, inches Hg
Δp = velocity pressure head, inches H_2O
Q = volume flow rate, CFM
Q_o = parameter of volume flow rate through the orifice
T = absolute temperature, °R
t = time of sampling period, minutes
V = gas volume, CF
v = velocity, feet/second
W = water collected, grams
% H_2O = duct gas water content, percent volume

PARTICULATE EMISSIONS

Calculations (cont)

Equations:

Duct gas velocity at any traverse point (see Velocity & Volume Flow Rate):

$$v_d = 85.49 * C_p * \sqrt{\frac{T_d * \Delta p}{P_d * MW}}$$

Isokinetic sampling rate at any traverse point:

$$Q_m = Q_n * \frac{P_d * T_m}{P_m * T_d} * (1 - \% H_2O/100)$$

where $Q_n = 60 * v_n * A_n$ and for isokinetic sampling, $v_n = v_d$

$$\Delta H = Q_o^2 * \frac{P_b}{k_m^2 * T_m} * \frac{[MW - (0.18 * \% H_2O)]}{(1 - \% H_2O/100)}$$

where $Q_o = 1.23 * Q_m - 0.23 * Q_m^{(2 - Q_m)}$ (for non-linear orifice)

Percent of isokinetic sampling:

$$I = T_d * \frac{[0.00267 * W + V_m/T_m(avg) * (P_{bar} + \Delta H(avg)/13.6)]}{t * v_d(avg) * P_d * A_n * 60} * 100$$

Sampled Volume:

$$V_m(std) = V_m * \frac{T_{std}}{T_m(avg)} * \frac{(P_{bar} + \Delta H(avg)/13.6)}{P_{std}}$$

Particulate Concentration:

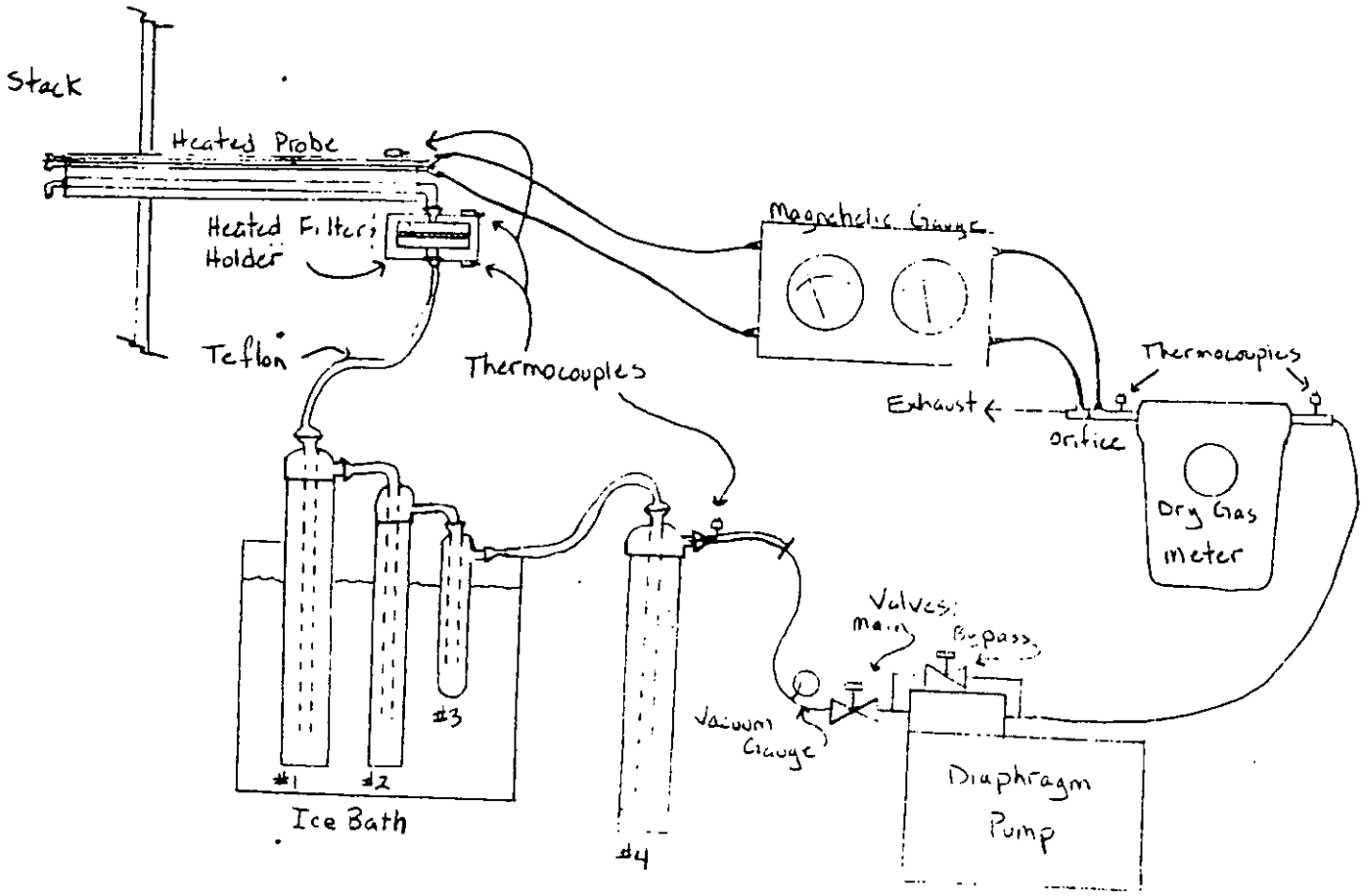
$$C_o = \frac{0.0154 * M}{V_m(std)}$$

Emission Rate:

$$E.R. = 8.58 * 10^{-3} * Q_{std}(dry) * C_o$$

CHEMECOLOGY CORPORATION

Method 5 Particulate Sampling Train



Impinger #	Contents
#1	100 mls Distilled Water
#2	100 mls Distilled Water
#3	Empty
#4	250 grms Silica Gel (8 mesh)

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS
TEST MONITOR DATA

Date 5/13/82 Run 1
Client Lonestar Industries
Unit Main Stack
Ambient Temp. 50 °F
Press.bar 29.98 in. Hg
Press.static -0.80 in. H_2O
Press.duct 29.92 in. Hg
Assumed MW 28.96 %H_2O 13.6

Sample Train Temp.:
Probe 265 °F
Filter 275 °F
Sample Line Amb °F
Post-Test Leak Check:
Leak Rate 0.00 CFM
@ 8 in. Hg Vac.

Nozzle & Probe Mat. S.S.
Filter Holder Mat. S.S.
Filter # 2
Nozzle # i.d. 6 mm
Pitot # 5292 Cp 0.78
Temp. Unit # 555
Mag. # 373 Meter # 631
Orifice km 0.7

		Duct Data			Meter Data			
Trav. Point	Time	Temp. °F	Head Δp	Velocity ft/sec	Vacuum "Hg	Temp. °F	Orifice ΔH, "H2O	Volume CF
NORTHEAST PORT								482.00
3	1032	190	0.70	48.1	4	50	1.43	
2	1037	195	0.74	49.7		65	1.52	
1	1042	190	0.52	41.5		70	1.13	
	1047	Port Change						490.80
NORTHWEST PORT								
3	1053	195	0.80	51.6		55	1.61	
2	1058	195	0.82	52.3		60	1.65	
1	1103	195	0.46	39.2		65	1.01	
	1108	Port Change						499.57
								(17.57)
								499.63
SOUTHWEST PORT								
3	1120	195	0.80	51.6		55	1.61	
2	1125	195	0.76	50.3		65	1.56	
1	1130	195	0.62	45.5		65	1.30	
	1135	Port Change						509.01
								(9.38)
								509.04
SOUTHEAST PORT								
3	1146	195	0.80	51.6	5	60	1.62	
2	1151	195	0.74	49.7		70	1.53	
1	1156	195	0.60	44.7		75	1.28	
	1201	Run #1 Completed						518.05
								(9.01)
Total	60 Minutes				Max.		TOTAL	
Average		194		48.0	Average	63	1.44	35.96

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS

DATA & RESULTS:

Site: Main Stack Run: 1

Date: 5/13/82 Time: 1032-1201

Absorber Type	Contents	Final	Tare	Net mls H2O
Lg. Grnbrg. Sm.	Distilled H2O	208	100	108
Sm. Grnbrg. Sm.	6% H2O2	100	100	0
liquid trap	empty	0	-	0
Lg. Grnbg.	silica gel	257.1	250	7.1
			TOTAL	115.1

Filter Sample: Type Flat Filter (86mm)

Sample Fraction	Final Wt.	Tare Wt.	Net mgram	Co,grains/SDCF
Filter #2	0.3961	0.3880	8.1	0.0035
Probe & Nozzle Wash	53.4161	53.3963	19.8	0.0085
Condensables(100/208)	52.9228	52.9036	(19.2) 39.9	0.0171
H2O Blank	52.7268	52.7268	0	
Acetone Blank	52.6764	52.6765	0	
		TOTAL	67.8	0.0291

Gas Composition:

CO2 14.2 % volume (dry)
O2 14.3 % volume (dry)
CO % volume (dry)
N2 71.5 % volume (dry)
H2O 12.9 % volume

MW (wet) 29.19
Excess Air %
Sampled Volume 35.96 SDCF
Isokinetic Rate 98.8 %

Particulate Concentration:

Co 0.0291 grains/SDCF @ 60 °F and 29.92 "Hg
Co 0.0119 grains/SDCF Dry Basis

Emission Rate:

E.R. 39.1 lbs/hr @ Qstd(dry) 156,600 SDCFM

E.R. 0.10 lbs/ton of kiln feed

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS
TEST MONITOR DATA

Date 5/13/82 Run 2
Client Lonestar Industris
Unit Main Stack
Ambient Temp. 60 °F
Press.bar 29.98 in. Hg
Press.static -0.80 in. H2O
Press.duct 29.92 in. Hg
Assumed MW 29.19 %H2O 12.9

Sample Train Temp.:
Probe 285 °F
Filter 275 °F
Sample Line Amb. °F
Post-Test Leak Check:
Leak Rate 0.00 CFM
@ 7 in. Hg Vac.

Nozzle & Probe Mat. SS
Filter Holder Mat. SS
Filter # 4
Nozzle # i.d. 6 mm
Pitot # 5292 Cp 0.78
Temp. Unit # 555
Mag. # 373 Meter # 631
Orifice Km 0.7

		Duct Data			Meter Data			
Trav. Point	Time	Temp. °F	Head Δp	Velocity ft/sec	Vacuum "Hg	Temp. °F	Orifice ΔH, "H2O	Volume CF
South	East Port							518.30
3	1301	200	0.82	52.6		70	1.69	
2	1306	200	0.78	51.3		80	1.64	
1	1311	200	0.70	48.6		85	1.50	
	1316	Port Change						528.06
								(9.76)
South	West Port							528.10
3	1324	200	0.74	50.0	2	60	1.52	
2	1329	200	0.70	48.6		70	1.47	
1	1334	195	0.60	44.8		70	1.29	
	1339	Port Change						537.04
								(8.94)
North	West Port							537.07
3	1347	195	0.70	48.4	3	60	1.46	
2	1352	195	0.72	49.1		65	1.50	
1	1357	295	0.50	43.9		65	0.97	
	1402	Port Change						545.45
								(8.38)
North	East Port							545.50
3	1411	195	0.74	49.8		65	1.54	
2	1416	195	0.64	46.3		65	1.36	
1	1421	205	0.58	44.4		95	1.28	
	1426	Run #2 Completed						554.18
								(8.68)
Total	60 Minutes				Max.		TOTAL	
	Average	206		48.2	Average	71	1.43	35.76

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS

DATA & RESULTS:

Site: Main Stack Run: #2

Date: 5/13/82 Time: 1301-1426

Absorber Type	Contents	Final	Tare	Net mls H_2O
Lg. Grnbg. Smith	Distilled H_2O	206	100	106
Sm. Grnbg. Smith	6% H_2O_2	100	100	0
liquid trap	empty	1	-	1
Lg. Grnbg.	silica gel	257.4	250	7.4
			TOTAL	114.4

Filter Sample: Type Flat Filter (86mm)

Sample Fraction	Final Wt.	Tare Wt.	Net mgram	Co,grains/SDCF
Filter #4	0.3996	0.3864	13.2	0.0058
Probe & Nozzel Wash	53.4007	53.3985	2.2	0.0010
Condensables (100/206)	52.7300	52.7191	(10.9)22.5	0.0098
		TOTAL	37.9	0.0166

Gas Composition:

CO_2 13.4 % volume (dry)

O_2 13.8 % volume (dry)

CO % volume (dry)

N_2 72.8 % volume (dry)

H_2O 13.1 % volume

MW (wet) 29.04

Excess Air %

Sampled Volume 35.22 SDCF

Isokinetic Rate 98.4 %

Particulate Concentration:

Co 0.0166 grains/SDCF @ 60 °F and 29.92 "Hg

C 0.0068 grains/SDCF Dry Basis

Emission Rate:

E.R. 22.1 lbs/hr @ Qstd(dry) 155,200 SDCFM

E.R. 0.05 lbs/ton kiln feed

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS
TEST MONITOR DATA

Date 5/13/82 Run 3
Client Lonestar Industries
Unit Main Stack
Ambient Temp. 60 °F
Press.bar 29.98 in. Hg
Press.static -0.80 in. H2O
Press.duct 29.92 in. Hg
Assumed MW 29.04 %H2O 13.1

Sample Train Temp.:
Probe 250 °F
Filter 255 °F
Sample Line Amb °F
Post-Test Leak Check:
Leak Rate 0.00 CFM
@ 7 in. Hg Vac.

Nozzle & Probe Mat. S.S.
Filter Holder Mat. S.S.
Filter # 6
Nozzle # i.d. 6 mm
Pitot # 5292 Cp 0.78
Temp. Unit # 555
Mag. # 373 Meter # 631
Orifice km 0.7

		Duct Data			Meter Data			
Trav. Point	Time	Temp. °F	Head Δp	Velocity ft/sec	Vacuum "Hg	Temp. °F	Orifice ΔH; "H2O	Volume CF
NORTHEAST PORT								554.35
3	1508	195	0.74	50.0		60	1.52	
2	1513	195	0.66	47.2		60	1.38	
1	1518	195	0.55	43.1		65	1.18	
	1523	Port Change						563.02
								(8.67)
								563.05
NORTHWEST PORT								
3	1530	195	0.72	49.3	4	60	1.49	
2	1535	195	0.76	50.7		75	1.59	
1	1538	195	0.62	45.8		65	1.32	
	1545	Port Change						572.00
								(8.95)
								572.05
SOUTHWEST PORT								
3	1551	195	0.82	52.6		60	1.67	
2	1556	195	0.74	50.0	3	65	1.53	
1	1601	195	0.70	48.6		70	1.47	
	1606	Port Change						581.38
								(9.33)
								581.42
SOUTHEAST PORT								
3	1612	195	0.76	50.7		60	1.56	
2	1617	195	0.70	48.6		70	1.47	
1	1623	195	0.60	45.0		75	1.15	
	1628	Run #3 Completed						590.30
								(8.88)
Total	60 Minutes				Max.		TOTAL	
Average		195		48.5	Average	65	1.44	35.83

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS

DATA & RESULTS:

Site: Main Stack Run: 3

Date: 5/13/82 Time: 1508-1628

Absorber Type	Contents	Final	Tare	Net mls H2O
Lg. Grnbrg. Sm.	Distilled H2O	202	100	102
Sm. Grnbrg. Sm.	6% H2O2	100	100	-
liquid trap	empty		-	-
Lg. Grnbg.	silica gel	258	250	8
			TOTAL	110

Filter Sample: Type Flat Filter (86mm)

Sample Fraction	Final Wt.	Tare Wt.	Net mgram	Co,grains/SDCF
Filter #6	0.4004	0.3900	10.4	0.0045
Probe & Nozzle Wash	53.4161	53.4151	1.0	0.0004
Condensables(100/202)	68.3263	68.3157	(10.6) 21.4	0.0093
		TOTAL	32.8	0.0142

Gas Composition:

CO2 11.3 % volume (dry)

O2 13.5 % volume (dry)

CO % volume (dry)

N2 75.2 % volume (dry)

H2O 12.5 % volume

MW (wet) 28.81

Excess Air %

Sampled Volume 35.66 SDCF

Isokinetic Rate 97.4 %

Particulate Concentration:

Co 0.0142 grains/SDCF @ 60 °F and 29.92 "Hg

C_o 0.0049 grains/SDCF Dry Basis

Emission Rate:

E.R. 19.3 lbs/hr @ Qstd(dry) 158,700 SDCFM

E.R. 0.04 lbs/ton kiln feed

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS
TEST MONITOR DATA

Date 5/13/82 Run 1
Client Lonestar Industries
Unit Clinker Cooler
Ambient Temp. 50 °F
Press.bar 29.98 in. Hg
Press.static -0.18 in. H_2O
Press.duct 29.97 in. Hg
Assumed MW 28.62 %H_2O 1.5

Sample Train Temp.:
Probe 300 °F
Filter 300 °F
Sample Line Amb °F
Post-Test Leak Check:
Leak Rate 0.00 CFM
@ 7 in. Hg Vac.

Nozzle & Probe Mat. S.S.
Filter Holder Mat. S.S.
Filter # 1
Nozzle # i.d. 8 mm
Pitot # 5352 C_p 0.81
Temp. Unit # 556
Mag. # 376 Meter # 630
Orifice km 0.6

		Duct Data			Meter Data			
Trav. Point	Time	Temp. °F	Head Δp	Velocity ft/sec	Vacuum "Hg	Temp. °F	Orifice ΔH, "H2O	Volume CF
SOUTHWEST PORT								324.40
6	1014	300	0.24	31.9		60	2.36	
5	1016	Shut Down - power problems						
6	1028	Begin Sampling						
5	1031	305	0.22	30.6	2	65	2.18	
4	1036	315	0.24	32.2		75	2.37	
3	1041	312	0.23	31.4		80	2.30	
2	1046	319	0.24	32.3		80	2.37	
1	1051	320	0.26	33.6		80	2.55	
	1056	Port Change						345.47
NORTHWEST PORT								
6	1104	320	0.20	29.5		60	1.96	
5	1109	320	0.24	32.3	2	70	2.34	
4	1114	325	0.24	32.4		75	2.34	
3	1119	325	0.24	32.4		75	2.34	
2	1124	320	0.27	34.2		80	2.63	
1	1129	318	0.26	33.6		80	2.55	
	1134	Run #1 Completed						366.78
Total	60 Minutes				Max.		TOTAL	
Average		317		32.2	Average	73	2.36	42.38

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS

DATA & RESULTS:

Site: Clinker Cooler Run: 1

Date: 5/13/82 Time: 1014-1134

Absorber Type	Contents	Final	Tare	Net mls H2O
Lg. Grnbrg. Sm.	Distilled H2O	102	100	2
Sm. Grnbrg. Sm.	6% H2O2	101	100	1
liquid trap	empty	-	-	0
Lg. Grnbrg.	silica gel	257.0	250	7.0
			TOTAL	10.0

Filter Sample: Type Flat Filter (86mm)

Sample Fraction	Final Wt.	Tare Wt.	Net mgram	Co,grains/SDCF
Filter #1	0.4047	0.3891	15.6	0.0058
Probe & Nozzle Wash	52.0169	52.0161	0.8	0.0003
Condensables (102)	56.7498	56.7400	9.8	0.0036
H2O Blank	52.7268	52.7268	0	-
Acetone	52.6764	52.6765	0	-
		TOTAL	28.2	0.010

Gas Composition:

CO2 0 % volume (dry)
O2 21.0 % volume (dry)
CO % volume (dry)
N2 79.0 % volume (dry)
H2O 1.1 % volume

MW (wet) 28.72
Excess Air %
Sampled Volume 41.64 SDCF
Isokinetic Rate 100.1 %

Particulate Concentration:

Co 0.010 grains/SDCF @ 60 °F and 29.92 "Hg
C 0.0061 grains/SDCF Dry Basis

Emission Rate:

E.R. 5.93 lbs/hr @ Qstd(dry) 71,300 SDCFM

E.R. 0.02 lbs/ton kiln feed

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS
TEST MONITOR DATA

Date 5/13/82 Run 2
Client Lonestar Industries
Unit Clinker Cooler
Ambient Temp. 60 °F
Press.bar 29.98 in. Hg
Press.static -0.18 in. H_2O
Press.duct 29.97 in. Hg
Assumed MW 28.72 %H_2O 1.1

Sample Train Temp.:
Probe 290 °F
Filter 300 °F
Sample Line Amb. °F
Post-Test Leak Check:
Leak Rate 0.013 CFM
@ 10 in. Hg Vac.

Nozzle & Probe Mat. SS
Filter Holder Mat. SS
Filter # 3
Nozzle # i.d. 8 mm
Pitot # 5852 Cp 0.81
Temp. Unit # 556
Mag. # 376 Meter # 630
Orifice km 0.6

		Duct Data			Meter Data			
Trav. Point	Time	Temp. °F	Head Δp	Velocity ft/sec	Vacuum "Hg	Temp. °F	Orifice ΔH, "H_2O	Volume CF
North	West Port							368.00
6	1250	310	0.22	30.7		60	2.17	
5	1255	322	0.25	33.0		70	2.43	
4	1300	321	0.36	33.7		75	2.54	
3	1305	320	0.24	32.3	0	75	2.37	
2	1310	315	0.20	29.4		75	2.03	
1	1315	321	0.25	33.0		75	2.45	
	1320	Port Change						388.75
South	West Port							
6	1326	300	0.27	33.8		65	2.65	
5	1331	315	0.23	31.5		75	2.29	
4	1336	310	0.25	32.8		75	2.48	
3	1341	315	0.20	29.4	0	75	2.03	
2	1346	335	0.25	33.3		75	2.41	
1	1351	315	0.25	32.9		75	2.47	
	1356	Port Change						409.50
Total	60 Minutes				Max.		TOTAL	41.50
	Average	317		32.2	Average	73	2.36	

CHEMECOLOGY CORPORATION

PARTICULATE EMISSIONS
TEST MONITOR DATA

Date 5/13/82 Run 3
Client Lonestar Industries
Unit Clinker Cooler
Ambient Temp. 60 °F
Press.bar 29.98 in. Hg
Press.static -0.18 in. H_2O
Press.duct 29.97 in. Hg
Assumed MW 28.66 %H_2O 1.6

Sample Train Temp.:
Probe 300 °F
Filter 280 °F
Sample Line Amb °F
Post-Test Leak Check:
Leak Rate 0.010 CFM
@ 8 in. Hg Vac.

Nozzle & Probe Mat. S.S.
Filter Holder Mat. S.S.
Filter # 5
Nozzle # i.d. 8 mm
Pitot # 5352 Cp 0.81
Temp. Unit # 556
Mag. # 376 Meter # 630
Orifice km 0.6

		Duct Data			Meter Data			
Trav. Point	Time	Temp. °F	Head Δp	Velocity ft/sec	Vacuum "Hg	Temp. °F	Orifice ΔH, "H2O	Volume CF
SOUTHWEST PORT								410.70
6	1457	295	0.25	32.4	4	75	2.51	
5	1502	285	0.27	33.5		75	2.72	
4	1507	300	0.23	31.2		80	2.33	
3	1512	305	0.23	31.3		80	2.32	
2	1517	295	0.20	29.0		80	2.07	
1	1522	310	0.24	32.1		80	2.39	
	1527	Port Change						432.05
NORTHWEST PORT								
6	1534	280	0.21	29.4		75	2.19	
5	1539	285	0.25	32.4		80	2.28	
4	1544	285	0.20	28.8	4	80	2.10	
3	1549	300	0.21	29.8		80	2.15	
2	1554	295	0.28	34.3		80	2.80	
1	1559	290	0.24	31.7		80	2.45	
	1604	Run #3 Completed						453.37
Total	60 Minutes				Max.		TOTAL	42.67
Average		293		31.3	Average	79	2.36	

PARTICULATE EMISSIONS

DATA & RESULTS:

Site: Clinker Cooler Run: 3

Date: 5/13/82 Time: 1457-1604

Absorber Type	Contents	Final	Tare	Net mls H2O
Lg. Grnbrg. Sm.	Distilled H2O	102	100	2
Sm. Grnbrg. Sm.	6% H2O2	101	100	1
liquid trap	empty	0	-	0
Lg. Grnbrg.	silica gel	256.7	250	6.7
			TOTAL	9.7

Filter Sample: Type Flat Filter (86mm)

Sample Fraction	Final Wt.	Tare Wt.	Net mgram	Co,grains/SDCF
Filter #5	0.4024	0.3912	11.2	0.0042
Probe & Nozzle Wash	53.6902	53.6869	3.3	0.0012
Condensables (all)	67.3569	67.3458	11.1	0.0041
		TOTAL	25.6	0.0095

Gas Composition:

CO2 0.0 % volume (dry)

O2 21.0 % volume (dry)

CO ____ % volume (dry)

N2 79.0 % volume (dry)

H2O 1.1 % volume

MW (wet) 28.72

Excess Air ____ %

Sampled Volume 41.51 SDCF

Isokinetic Rate 100.1 %

Particulate Concentration:

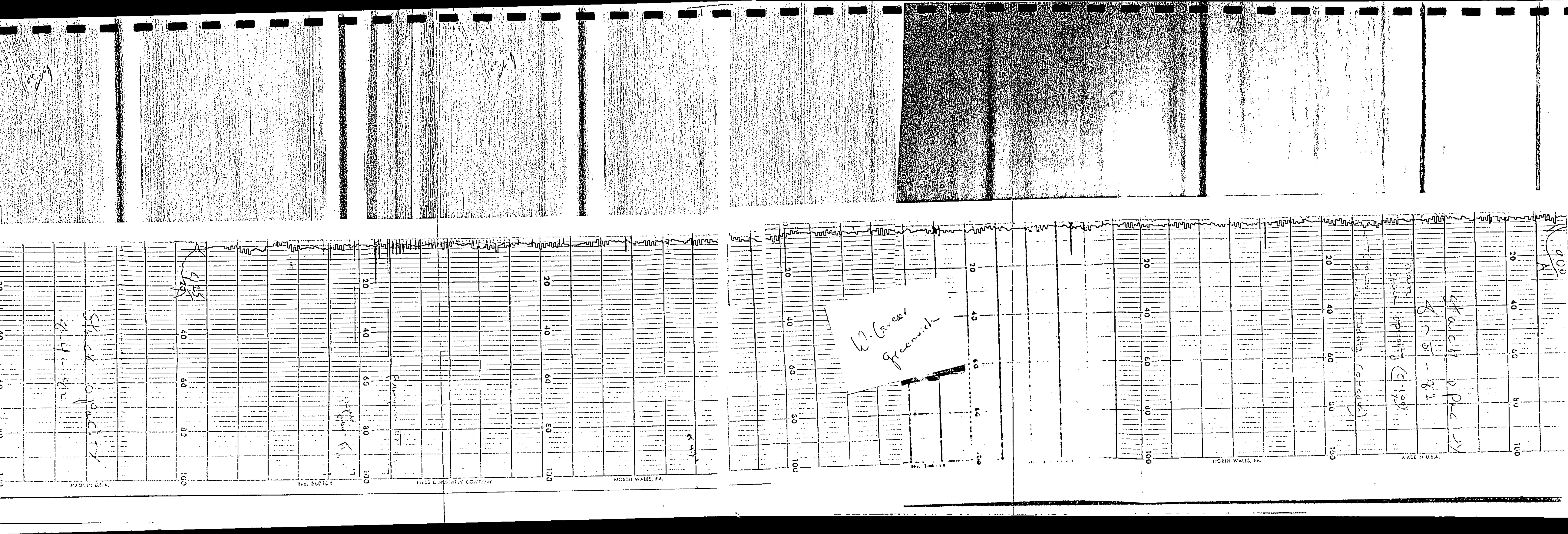
Co 0.0095 grains/SDCF @ 60 °F and 29.92 "Hg

Co 0.0054 grains/SDCF Dry Basis

Emission Rate:

E.R. 5.83 lbs/hr @ Qstd(dry) 71,500 SDCFM

E.R. 0.02 lbs/ton of kiln feed



Stack opacity
8-4-82
W. Greer
Greenwich
NORTH WALES, PA.
MADE IN U.S.A.

08-04-82

REPORT ID -- 00111 TITLE -- MBAPCD TIME 0749 DATE 08-04-82 THIS REPORT DEMANDED

POINT	DESCRIPTION	ENGR. UNITS	PREVIOUS 8 HOURLY AVERAGES FOR HOUR BEGINNING 2300	0000	0100	0200	0300	0400	0500	0600
AWT006	HILIME 1 FEED RATE	TPH	151.	155.	156.	157.	153.	161.	160.	163.
AWT004	LOW LIME FEED RATE	TPH	9.42	9.20	8.67	8.89	8.98	8.57	8.07	8.15
AWT002	SHALE FEED RATE	TPH	25.1	23.9	21.0	23.2	22.3	19.9	18.1	17.3
AWT007	IRON FEED RATE	TPH	3.76	3.83	3.80	3.84	3.78	3.85	3.80	3.83
AWT008	SAND FEED RATE	TPH	0.39	0.39	0.39	0.39	0.39	0.38	0.38	0.38
AWT104	FEEDRATE-RAW MILL	TPH	200.	200.	201.	201.	200.	199.	200.	200.
AFT130	W. SPRAY FLOWRATE-RAWMIL	GPM	-0.18	-0.16	-0.13	-0.12	-0.12	-0.12	-0.12	-0.12
AT152	INLET 1 TEMP-RM PRECIP	DEG F	187.	186.	186.	186.	187.	186.	186.	186.
AT167	OUTLET TEMP-RM PRECIP	DEG F	188.	187.	187.	187.	187.	188.	187.	187.
APT153	INLET DRAFT-RM PRECIP	IN H20	32.2	32.2	32.3	31.9	31.8	32.2	32.4	32.8
APT166	OUTLET DRAFT-RM PRECIP	IN H20	34.2	34.3	34.5	34.0	33.9	34.2	34.5	34.7
BVTD155	FIELD 1 RM PRECIP	VOLT	508.	510.	512.	513.	513.	513.	513.	513.
BVTD156	FIELD 2 RM PRECIP	VOLT	462.	465.	468.	470.	470.	470.	470.	470.
BVTD157	FIELD 3 RM PRECIP	VOLT	384.	384.	384.	384.	384.	384.	384.	384.
BVTD158	FIELD 4 RM PRECIP	VOLT	407.	407.	407.	407.	407.	407.	407.	407.
BVTD159	FIELD 5 RM PRECIP	VOLT	359.	359.	359.	359.	359.	359.	359.	359.
AT183	OPACITY RM PRECIP STACK	STACK	1.99	2.02	2.05	2.00	1.95	2.00	2.37	1.65
AGA484	NOX RM PRECIP STACK	STACK	243.	248.	249.	255.	254.	249.	245.	236.
AT103	INLET 1 TEMP-CD TOWER	DEG F	645.	648.	648.	649.	649.	650.	650.	649.
AT105	OUTLET 1 TEMP-CD TOWER	DEG F	440.	420.	406.	410.	437.	402.	393.	379.
AFT104	W. SPRAY FLOWRATE-CD.TWR	GPM	37.6	42.5	45.8	44.4	38.4	47.0	48.5	51.9
AFT507	W. SPRAY FLOW RATE	GPM	59.8	59.9	60.3	59.5	59.6	60.3	59.4	58.5
AT505	INLET 1 TEMP-BYP CD TWR	DEG F	860.	861.	860.	861.	861.	860.	860.	860.
AT506	OUTLET 1 TEMP-BYP CD TWR	DEG F	300.	300.	300.	300.	300.	300.	300.	299.
AWT357	FEEDRATE TO MILL-COAL	TPH	14.4	14.2	14.4	14.3	14.7	14.1	15.3	14.0
AWT368	FEEDRATE COAL TO PRECALC	COAL	6.59	6.56	6.52	6.54	6.59	6.59	6.62	6.65
AWT370	FEEDRATE COAL TO KILN	COAL	4.70	4.70	4.70	4.70	4.70	4.70	4.70	4.70
AWT401	KILNFEED RATE	TPH	170.	170.	170.	170.	170.	170.	170.	170.
AWT538	CLINKER BELT SCALE	TPH	.....	.....	.....	.....	.....	.....	.....	.....
AGA440	KILNEXIT GAS O2 PCT	OXYGEN	1.33	1.34	1.37	1.31	1.36	1.36	1.25	1.49
AT449	KILNEXIT GAS TEMP	DEG F	2398	2398	2398	2398	2398	2398	2398	2398
AGA425	PREHEATR EXIT GAS CO	CO	0.42	0.42	0.44	0.44	0.44	0.44	0.43	0.43
AGA424	O2 PRENTR EXIT GAS	PRENTR	1.69	1.71	1.72	1.72	1.72	1.75	1.74	1.75
AT500	OPACITY -COOLER STACK	COOLER	4.54	4.70	4.82	4.84	4.56	4.40	4.80	4.57
ADPT485	COOLR DC DIFF. PRESSURE	DIFFPR	7.61	7.91	8.03	8.02	7.88	7.57	7.90	7.80

$\frac{14.43}{6.58} = 0.78$

$\frac{4.70}{11.28} \quad \frac{11.28}{170} = 0.066$

08-04-82

REPORT ID - 00111 TITLE - NBAPCD TIME 1613 DATE 08-04-82 THIS REPORT DEMANDED

POINT	DESCRIPTION	ENGR. UNITS	PREVIOUS 8 HOURLY AVERAGES FOR HOUR BEGINNING 0800	0900	1000	1100	1200	1300	1400	1500
AWT006	MILIME 1 FEED RATE	TPH	163.	155.	159.	164.	161.	156.	140.	162.
AWT004	LOW LIME FEED RATE	TPH	8.04	8.48	8.43	8.13	8.74	8.58	7.96	9.79
AWT002	SHALE FEED RATE	TPH	17.5	20.1	19.0	15.8	18.3	18.2	16.0	21.1
AWT007	IRON FEED RATE	TPH	3.88	3.74	3.82	3.84	3.82	3.74	3.30	3.89
AWT008	SAND FEED RATE	TPH	0.39	0.39	0.38	0.38	0.38	0.37	0.37	0.37
AWT101	FEEDRATE-RAW MILL	TPH	201.	200.	200.	200.	200.	200.	177.*	200.
AFT130	W. SPRAY FLOWRATE-RAWMIL	GPM	-0.16	-0.20	-0.22	-0.22	-0.23	-0.25	2.13	-0.25
AT152	INLET 1 TEMP-RM PRECIP	DEG F	186.	186.	186.	186.	185.	187.	187.	186.
AT167	OUTLET TEMP-RM PRECIP	DEG F	187.	188.	188.	188.	187.	188.	189.	187.
APT153	INLET DRAFT-RM PRECIP	IN H20	33.2	33.1	33.7	33.0	32.4	32.4	31.5	33.1
APT166	OUTLET DRAFT-RM PRECIP	IN H20	35.1	35.1	35.5	34.9	34.4	34.4	33.6	35.1
BVTD155	FIELD 1 RM PRECIP	VOLT	513.	513.	513.	513.	513.	503.	505.	505.
BVTD156	FIELD 2 RM PRECIP	VOLT	470.	470.	470.	470.	470.	467.	467.	467.
BVTD157	FIELD 3 RM PRECIP	VOLT	384.	384.	384.	384.	384.	384.	384.	384.
BVTD158	FIELD 4 RM PRECIP	VOLT	407.	407.	407.	407.	407.	407.	407.	407.
BVTD159	FIELD 5 RM PRECIP	VOLT	359.	359.	359.	359.	359.	359.	359.	359.
AT183	OPACITY RM PRECIP STACK	STACK	1.72	1.73	19.5	⊠ 11.9	2.23	1.90	1.85	1.87
AGA184	NOX RM PRECIP STACK	STACK	125.	237.	257.	242.	261.	254.	257.	274.
AT103	INLET 1 TEMP-CD TOWER	DEG F	646.	644.	644.	643.	641.	641.	641.	639.
AT105	OUTLET 1 TEMP-CD TOWER	DEG F	389.	405.	400.	376.	381.	410.	365.	395.
AFT104	W. SPRAY FLOWRATE-CD.TWR	GPM	49.8	43.8	45.5	50.9	48.1	42.9	51.9	44.7
AFT507	W. SPRAY FLOW RATE	GPM	59.5	60.9	61.5	59.8	61.0	60.5	62.3	61.9
AT505	INLET 1 TEMP-BYP CD TWR	DEG F	860.	860.	860.	861.	860.	860.	860.	860.
AT506	OUTLET 1 TEMP-BYP CD TWR	DEG F	300.	301.	299.	300.	300.	300.	300.	299.
AWT357	FEEDRATE TO MILL-COAL	TPH	13.3	15.0	14.6	15.0	14.8	14.3	15.3	14.5
AWT368	FEEDRATE COAL TO PRECALC	COAL	6.65	6.65	6.69	6.67	6.69	6.62	6.69	6.56
AWT370	FEEDRATE COAL TO KILN	COAL	4.79	4.83	4.85	4.85	4.85	4.85	4.85	4.84
AWT401	KILNFEED RATE	TPH	170.	170.	170.	170.	170.	170.	170.	170.
AWT538	CLINKER BELT SCALE	TPH								
AGA440	KILNEXIT GAS O2 PCT	OXYGEN	1.33	1.16	1.34	1.20	1.23	1.27	1.06	1.41
AT449	KILNEXIT GAS TEMP	DEG F	2398	2398	2398	2398	2398	2398	2398	2398
AGA425	PREHEATR EXIT GAS CO	CO	0.43	0.42	0.41	0.40	0.39	0.40	0.40	0.40
AGA424	O2 PREHTR EXIT GAS	PREHTR	1.72	1.71	1.74	1.73	1.73	1.74	1.70	1.74
AT500	OPACITY -COOLER STACK	COOLER	4.63	4.54	4.56	4.22	4.14	4.77	4.56	4.08
ADPT485	COOLR DC DIFF. PRESSURE	DIFFPR	7.74	7.83	7.24	7.40	7.22	7.18	7.38	6.71
AGA185	SOX-MAIN STACK	PPM	14.0	21.5	18.7	17.6	16.6	21.1	23.5 *	22.2

* Roller Mill Feeder stopped. Rock stuck in the Feeder.

⊠ Power off : Breaker kicked off.

08-05-82

REPORT ID -- 00111 TITLE -- MBARCD TIME 0022 DATE 08-05-82 THIS REPORT DEMANDED

POINT	DESCRIPTION	ENGR. UNITS	PREVIOUS 8 HOURLY AVERAGES FOR HOUR BEGINNING 1600	1700	1800	1900	2000	2100	2200	2300
AWT006	MILIME 1 FEED RATE	TPH	155.	160.	156.	158.	156.	157.	160.	155.
AWT004	LOW LIME FEED RATE	TPH	8.15	8.26	8.65	8.84	8.62	8.17	8.33	8.07
AWT002	SHALE FEED RATE	TPH	18.3	17.4	19.5	21.5	20.9	19.4	20.9	20.1
AWT007	IRON FEED RATE	TPH	3.70	3.96	3.75	3.80	3.76	3.76	3.84	3.74
AWT008	SAND FEED RATE	TPH	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39
AWT101	FEEDRATE RAW MILL	TPH	199.	200.	201.	201.	200.	200.	200.	201.
AFT130	W. SPRAY FLOWRATE-RAWMIL	GPM	-0.25	-0.25	-0.26	-0.26	-0.23	-0.19	-0.20	-0.18
AT152	INLET 1 TEMP-RM PRECIP	DEG F	186.	185.	186.	186.	186.	186.	185.	186.
AT167	OUTLET TEMP-RM PRECIP	DEG F	188.	187.	187.	187.	187.	187.	187.	187.
AFT153	INLET DRAFT-RM PRECIP	IN H20	32.6	32.4	32.3	32.7	33.2	33.6	33.6	33.6
AFT166	OUTLET DRAFT-RM PRECIP	IN H20	34.5	34.3	34.3	34.6	35.4	35.8	35.8	35.8
BVTD155	FIELD 1 RM PRECIP	VOLT	505.	505.	505.	505.	505.	505.	505.	505.
BVTD156	FIELD 2 RM PRECIP	VOLT	467.	467.	467.	467.	467.	467.	467.	467.
BVTD157	FIELD 3 RM PRECIP	VOLT	384.	384.	384.	384.	384.	384.	384.	384.
BVTD158	FIELD 4 RM PRECIP	VOLT	407.	407.	407.	407.	407.	407.	407.	407.
BVTD159	FIELD 5 RM PRECIP	VOLT	359.	359.	359.	359.	359.	359.	359.	359.
AT183	OPACITY RM-PRECIP STACK	STACK	1.80	2.16	1.47	1.60	1.92	2.02	1.94	2.01
AGA184	NOX RM PRECIP STACK	STACK	269.	262.	239.	246.	256.	255.	262.	261.
AT103	INLET 1 TEMP-CD TOWER	DEG F	640.	639.	640.	641.	640.	641.	642.	644.
AT105	OUTLET 1 TEMP-CD TOWER	DEG F	399.	360.	389.	402.	406.	389.	394.	397.
AFT104	W. SPRAY FLOWRATE-CD.TWR	GPM	44.2	53.3	45.9	43.6	42.6	46.7	45.9	46.1
AFT507	W. SPRAY FLOW RATE	GPM	59.9	60.8	60.9	62.3	64.5	64.2	64.2	64.4
AT505	INLET 1 TEMP-BYP CD TWR	DEG F	860.	864.	860.	861.	861.	860.	860.	860.
AT506	OUTLET 1 TEMP-BYP CD TWR	DEG F	300.	300.	300.	301.	299.	300.	300.	300.
AWT357	FEEDRATE TO MILL-COAL	TPH	15.4	14.0	15.2	15.0	15.0	15.7	14.9	15.5
AWT360	FEEDRATE COAL TO PRECALC	COAL	6.58	6.68	6.68	6.72	6.80	6.79	6.68	6.66
AWT370	FEEDRATE COAL TO KILN	COAL	4.85	4.85	4.89	4.93	5.00	5.00	5.00	5.00
AWT401	KILNFEED RATE	TPH	170.	170.	170.	170.	170.	170.	170.	170.
AWT538	CLINKER BELT SCALE	TPH								
AGA440	KILNEXIT GAS O2 PCT	OXYGEN	1.19	1.33	1.18	1.04	1.12	0.95	1.08	0.98
AT449	KILNEXIT GAS TEMP	DEG F	2398	2398	2398	2398	2398	2398	2398	2398
AGA425	PREHEATR EXIT GAS CO	CO	0.40	0.40	0.40	0.41	0.40	0.40	0.42	0.42
AGA424	O2 PREHTR EXIT GAS	PREHTR	1.73	1.71	1.72	1.69	1.72	1.66	1.72	1.72
AT500	OPACITY -COOLER STACK	COOLER	4.10	4.18	4.44	5.11	3.60	3.89	3.58	3.71
ADPI485	COOLR DC DIFF PRESSURE	DIFFPR	7.91	7.22	7.26	7.66	7.46	7.68	7.60	7.76
AGA185	SOX-MAIN STACK	PPM	35.1	19.0	18.3	17.3	18.1	18.9	20.6	21.3

08-05-82

REPORT ID --- 00111 --- TITLE --- MRAPCD --- TIME --- 0419 --- DATE --- 08-05-82 --- THIS REPORT DEMANDED ---

POINT	DESCRIPTION	ENGR. UNITS	PREVIOUS 8 HOURLY AVERAGES FOR HOUR BEGINNING 1700	1800	1900	2000	2100	2200	2300	0000
AWT006	MILIME 1 FEED RATE	TPH	168.	156.	158.	156.	157.	160.	155.	161.
AWT004	LOW LIME FEED RATE	TPH	8.26	8.65	8.84	8.62	8.17	8.33	8.07	7.92
AWT002	SHALE FEED RATE	TPH	17.4	19.5	21.5	20.9	19.4	20.9	20.1	19.6
AWT007	IRON FEED RATE	TPH	3.96	3.75	3.80	3.76	3.76	3.84	3.74	3.81
AWT008	SAND FEED RATE	TPH	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
AWT101	FEEDRATE-RAW MILL	TPH	200.	201.	201.	200.	200.	200.	201.	200.
AFT130	W. SPRAY FLOWRATE-RAWMIL	GPM	-0.25	-0.26	-0.26	-0.23	-0.19	-0.20	-0.18	-0.15
AT152	INLET 1 TEMP-RM PRECIP	DEG F	185.	184.	186.	186.	186.	185.	186.	185.
AT167	OUTLET TEMP-RM PRECIP	DEG F	187.	187.	187.	187.	187.	187.	187.	187.
APT153	INLET DRAFT-RM PRECIP	IN H2O	32.4	32.3	32.7	33.2	33.6	33.6	33.6	33.6
APT166	OUTLET DRAFT-RM PRECIP	IN H2O	34.3	34.3	34.6	35.4	35.8	35.8	35.8	35.8
BVTD155	FIELD 1 RM PRECIP	VOLT	505.	505.	505.	505.	505.	505.	505.	505.
BVTD156	FIELD 2 RM PRECIP	VOLT	467.	467.	467.	467.	467.	467.	467.	467.
BVTD157	FIELD 3 RM PRECIP	VOLT	384.	384.	384.	384.	384.	384.	384.	384.
BVTD158	FIELD 4 RM PRECIP	VOLT	407.	407.	407.	407.	407.	407.	407.	407.
BVTD159	FIELD 5 RM PRECIP	VOLT	359.	359.	359.	359.	359.	359.	359.	359.
AT183	OPACITY RM PRECIP STACK	STACK	2.16	1.47	1.60	1.92	2.02	1.94	2.01	2.04
AGA184	NOX RM PRECIP STACK	STACK	262.	239.	246.	256.	255.	262.	261.	275.
AT103	INLET 1 TEMP-CD TOWER	DEG F	639.	640.	641.	640.	641.	642.	644.	646.
AT105	OUTLET 1 TEMP-CD TOWER	DEG F	360.	389.	402.	406.	389.	394.	397.	328.
AFT104	W. SPRAY FLOWRATE-CD.TWR	GPM	53.3	45.9	43.6	42.6	46.7	45.9	46.1	51.5
AFT507	W. SPRAY FLOW RATE	GPM	60.8	60.9	62.3	64.5	64.2	64.2	64.4	64.1
AT505	INLET 1 TEMP-BYP CD TWR	DEG F	861.	860.	861.	861.	860.	860.	860.	860.
AT506	OUTLET 1 TEMP-BYP CD TWR	DEG F	300.	300.	301.	299.	300.	300.	300.	300.
AWT357	FEEDRATE TO MILL-COAL	TPH	14.0	15.2	15.0	15.0	15.7	14.9	15.5	13.8
AWT368	FEEDRATE COAL TO PRECALC	COAL	6.68	6.68	6.72	6.80	6.79	6.68	6.66	6.61
AWT370	FEEDRATE COAL TO KILN	COAL	4.85	4.89	4.93	5.00	5.00	5.00	5.00	5.00
AWT401	KILNFEED RATE	TPH	170.	170.	170.	170.	170.	170.	170.	170.
AWT538	CLINKER BELT SCALE	TPH								
AGA440	KILNEXIT GAS 02 PCT	OXYGEN	1.33	1.18	1.04	1.12	0.95	1.08	0.90	1.15
AT449	KILNEXIT GAS TEMP	DEG F	2398	2398	2398	2398	2398	2398	2398	2398
AGA425	PRENCAIR EXIT GAS CO	CO	0.40	0.40	0.41	0.40	0.40	0.42	0.42	0.43
AGA424	02 PRENTR EXIT GAS	PRENTR	1.71	1.72	1.69	1.72	1.66	1.72	1.72	1.75
AT500	OPACITY -COOLER STACK	COOLER	4.18	4.44	5.11	3.60	3.89	3.58	3.71	3.46
ADPT485	COOLR DC DIFF. PRESSURE	DIFFPR	7.22	7.26	7.66	7.46	7.68	7.60	7.76	7.67
AGA185	SOX-MAIN STACK	PPM	19.0	18.3	17.3	18.1	18.9	20.6	21.3	23.6

SOx readings lower in the control Room.
It is working o.k. now.

08-04-82

REPORT ID ---- 00111 TITLE --MBAPCD TIME 1150 DATE 08-04-82 THIS REPORT DEMANDED

POINT	DESCRIPTION	ENGR. UNITS	PREVIOUS 8 HOURLY AVERAGES FOR HOUR BEGINNING 0300	0400	0500	0600	0700	0800	0900	1000
AWT006	HILIME 1 FEED RATE	TPH	153.	161.	160.	163.	159.	163.	155.	159.
AWT004	LOW LIME FEED RATE	TPH	8.98	8.57	8.07	8.15	8.26	8.04	8.48	8.43
AWT002	SHALE FEED RATE	TPH	22.3	19.9	18.1	17.3	17.6	17.5	20.1	19.0
AWT007	IRON FEED RATE	TPH	3.78	3.85	3.80	3.83	3.77	3.88	3.74	3.82
AWT008	SAND FEED RATE	TPH	0.39	0.38	0.38	0.38	0.39	0.39	0.39	0.38
AWT101	FEEDRATE-RAW MILL	TPH	200.	199.	200.	200.	200.	201.	200.	200.
AFT130	W. SPRAY FLOWRATE-RAWMIL	GPM	-0.12	-0.12	-0.12	-0.12	-0.13	-0.16	-0.20	-0.22
AT152	INLET 1 TEMP-RM PRECIP	DEG F	187.	186.	186.	186.	185.	186.	186.	186.
AT167	OUTLET TEMP-RM PRECIP	DEG F	187.	188.	187.	187.	187.	187.	188.	188.
APT153	INLET DRAFT-RM PRECIP	IN H20	31.8	32.2	32.4	32.8	33.0	33.2	33.1	33.7
APT166	OUTLET DRAFT-RM PRECIP	IN H20	33.9	34.2	34.5	34.7	35.0	35.1	35.1	35.5
BVTD155	FIELD 1 RM PRECIP	VOLT	513.	513.	513.	513.	513.	513.	513.	513.
BVTD156	FIELD 2 RM PRECIP	VOLT	470.	470.	470.	470.	470.	470.	470.	470.
BVTD157	FIELD 3 RM PRECIP	VOLT	384.	384.	384.	384.	384.	384.	384.	384.
BVTD158	FIELD 4 RM PRECIP	VOLT	407.	407.	407.	407.	407.	407.	407.	407.
BVTD159	FIELD 5 RM PRECIP	VOLT	359.	359.	359.	359.	359.	359.	359.	359.
AT103	OPACITY RM PRECIP STACK	STACK	1.95	2.00	2.37	1.65	1.67	1.72	1.73	19.5
AGA184	NOX RM PRECIP STACK	STACK	254.	249.	245.	236.	247.	125.	237.	257.
AT103	INLET 1 TEMP-CD TOWER	DEG F	649.	650.	650.	649.	649.	646.	644.	644.
AT105	OUTLET 1 TEMP-CD TOWER	DEG F	437.	402.	393.	379.	388.	383.	405.	400.
AFT104	W. SPRAY FLOWRATE-CD.TWR	GPM	38.4	47.0	48.5	51.9	48.7	49.8	43.8	45.5
AFT507	W. SPRAY FLOW RATE	GPM	59.6	60.3	59.4	58.5	59.7	59.5	60.9	61.5
AT505	INLET 1 TEMP-BYP CD TWR	DEG F	861.	860.	860.	860.	861.	860.	860.	860.
AT506	OUTLET 1 TEMP-BYP CD TWR	DEG F	300.	300.	300.	299.	300.	300.	301.	299.
AWT357	FEEDRATE TO MILL-COAL	TPH	14.7	14.1	15.3	14.0	15.9	13.3	15.0	14.6
AWT368	FEEDRATE COAL TO PRECALC	COAL	6.59	6.59	6.62	6.65	6.61	6.65	6.65	6.69
AWT370	FEEDRATE COAL TO KILN	COAL	4.70	4.70	4.70	4.70	4.75	4.79	4.83	4.85
AWT401	KILNFEED RATE	TPH	170.	170.	170.	170.	170.	170.	170.	170.
AWT538	CLINKER BELT SCALE	TPH	.....	.....	.....	.....	.....	.....	.....	.....
AGA440	KILNEXIT GAS 02 PCT	OXYGEN	1.36	1.36	1.25	1.49	1.34	1.33	1.16	1.34
AT449	KILNEXIT GAS TEMP	DEG F	2398	2398	2398	2398	2398	2398	2398	2398
AGA425	PREHEATR EXIT GAS CO	CO	0.44	0.44	0.43	0.43	0.43	0.43	0.42	0.41
AGA424	02 PREHTR EXIT GAS	PREHTR	1.72	1.75	1.74	1.75	1.84	1.72	1.71	1.74
AT500	OPACITY -COOLER STACK	COOLER	4.56	4.40	4.80	4.57	4.58	4.63	4.54	4.56
ADPI485	COOLR DC DIFF. PRESSURE	DIFFPR	7.88	7.57	7.90	7.80	7.67	7.74	7.83	7.24
AGA185	SOX-MAIN STACK	PPM	21.2	21.6	19.4	19.5	20.1	14.0	21.5	18.7

CHEMECOLOGY CORPORATION

CONSTANT MONITORING

REF: Bay Area AQMD, Manual of Procedures, San Francisco, CA, Methods ST-5, ST-6, ST-13A, ST-14, ST-19A, January, 1982
: State of California, Air Resources Board, Draft Stationary Source Test Methods, Method 1-100, June, 1979

METHOD SUMMARY:

A representative sample of duct gas was extacted through a probe, filter, condenser and sample line by a pump. The sample was then pumped into a sampling manifold for distribution to one or more sample analyzers. The analyzers output a continuous analog recording of the concentrations of the analyzed gases in the sample. All analyzers were calibrated with EPA Protocol gases (traceable to National Bureau of Standards SRMs) or with recently analyzed gases (analysis by EPA Reference Methods).

SAMPLING SYSTEM:

A Pyrex glass or stainless steel probe with a Pyrex wool or glass fibre mat filter was positioned in the duct. The end of the probe was located at a point of average duct flow and average pollutant concentrations. The probe was connected with a short (about 2 feet) Teflon line to a sample conditioning train. The conditioning train included three glass knockout traps connected in series with Teflon lines and immersed in an ice bath. The train was connected with a Teflon line (¼ inch o.d.) to the pneumatic delivery system which was housed in the monitoring van.

PNEUMATIC DELIVERY SYSTEM:

The Teflon sample line delivered sample gas into a small glass knockout trap, then through an in-line Balston filter and a Hoke four-way selector valve to the Teflon-lined diaphragm sample pump (see accompanying diagram). The flow rate of the sample gas was regulated with main and bypass-flow needle valves and was read on the main flow meter (typical setting 10 SCFH). A 10 PSI pressure-relief valve kept the entire system pressure at a safe level. The manifold pressure was regulated with an exhaust needle valve and was read on the pressure gauge (typical setting 1 PSI). The sample in the manifold was delivered through needle valves and flow meters to the various analyzers.

LEAK CHECK PROCEDURE:

The sampling system was checked for leaks by plugging the end of the probe. The exhaust needle valve was closed and the entire sample flow was directed through one analyzer flow meter (range 0-1.0 SCFH). The bypass valve was closed until the vacuum gauge showed at least 15 inches Hg vacuum. The leak rate was observed at the analyzer flow meter (maximum allowable 2% of total sample flow). The system was checked for leaks before and after sampling.

CHEMECOLOGY CORPORATION

CONSTANT MONITORING

CALIBRATION PROCEDURE:

Each analyzer was calibrated before and after each sample run. The Hoke four-way selector valve was used to direct the flow of the various calibration gases into the sample manifold. Each analyzer was calibrated with a zero gas (typically, ambient air or zero grade Nitrogen) and with a span gas (typical span gas concentration 60 to 90 percent of analyzer full scale and/or similar to expected sample concentration). All zero and span checks were recorded and noted on the recorder strip charts.

STRIP CHART DATA REDUCTION:

The analog recordings were averaged over time periods as shown on the data pages (typically 5 minutes, 15 minutes or 30 minutes). The data for each averaging period was digitized and recorded as average percent of full scale. These sample readings were then compared with the zero and span gas readings for calculation of the average concentration for each averaging period.

Any drift[1/] of the zero and span readings from the beginning to the end of a sampling period was corrected by calculating apparent zero and span readings for the midpoint of each averaging period. The sample average concentrations were then calculated from the sample readings and the apparent zero and span readings.

1/ Drift is defined as any change in zero or span readings of more than one percent full scale from the beginning to the end of a sampling period.

CONSTANT MONITORING (cont)

CALCULATIONS (Strip Chart Analysis):

Calculations were performed based on the following equations:

Symbol Identification

Subscripts i and f indicate initial and final respectively (beginning and end of sampling period)

z = zero reading, % full scale
s = span reading, % full scale
t = averaging time period numbered 1 to n
n = number of t's in the sampling period
Δz = rate of change of zero reading, % full scale/time interval
Δs = rate of change of span reading, % full scale/time interval
R_t = average sample reading over time t, % full scale
z_t = corrected (apparent) zero reading for midpoint of t, % full scale
s_t = corrected (apparent) span reading for midpoint of t, % full scale
C_s = span gas concentration, ppm or % vol. (as shown on data sheet)
C_t = average sample concentration for time t, ppm or % vol. (as indicated)

Equations:

Apparent Zero:

$$\Delta z = (z_f - z_i)/n$$

For each t from 1 to n,

$$z_t = \Delta z/2 + \Delta z * (t - 1)$$

Apparent Span:

$$\Delta s = (s_f - s_i)/n$$

For each t from 1 to n,

$$s_t = \Delta s/2 + \Delta s * (t - 1)$$

Average Sample Concentration

$$C_t = \frac{R_t - z_t}{s_t - z_t} * C_s$$

CONSTANT MONITORING

ANALYZERS:

Monitor Labs 8430 Nitrogen Oxides Analyzer

The Monitor Labs chemiluminescent analyzer is used to measure parts per million dry volume of Nitrogen Oxides in the sample gas. The analyzer measures the concentration of NO_x by converting NO_x to NO and then measuring the light emitted by the reaction of NO with ozone.

The sample gas is drawn into the analyzer by a vacuum pump which partially evacuates the reaction chamber. The sample flows through a NO2-to-NO converter1/ for NOx analysis or may bypass the converter for NO analysis. The sample then flows through a temperature controlled critical orifice into the partially evacuated reaction chamber.

Ambient air is also drawn into the analyzer as an ozone carrier. The air flows through a desiccant cartridge for drying, then through an ozone generator which converts some of the oxygen in the air to ozone. The ozonated air then flows through a temperature-controlled critical orifice into the reaction chamber.

The sample gas and the ozonated air are mixed in the reaction chamber, where the following reaction takes place:

$$NO + O_3 \longrightarrow NO_2 + O_2 + h\nu$$

The intensity of the chemiluminescence is proportional to the concentration of NO in the reaction chamber. The light emitted by this chemiluminescent reaction shines through a window in the chamber onto a photomultiplier tube (PMT). A spinning light chopper wheel between the reaction chamber and the PMT allows the PMT output with no light to be compared electronically with the PMT output with light. The signal is processed electronically and output for recording of the concentration of NO (or NO_x if the converter is used).

1/ Either of two types of converter may be used-a 300°C Molybdenum-catalyst converter or a 900°C stainless steel converter.

CONSTANT MONITORING

ANALYZERS:

DuPont Series 400 Sulfur Dioxide Analyzer

The DuPont 400 analyzer is used to measure parts per million dry volume of Sulfur Dioxide in the sample gas. The analyzer measures the concentration of SO2 by measuring its absorption of ultraviolet light.

The sample gas flows through a tubular cell 50.8 cm long. An ultraviolet lamp shines a light beam through the sample cell to a beam splitter at the other end. The split beam shines through optical filters onto phototubes which measure the beam intensity at the filtered wavelengths (see diagram). The reference phototube measures at a wavelength (578 nm) that is not absorbed by SO2. The measuring phototube measures at a wavelength (280 nm) that is strongly absorbed by an SO2 in the sample. Each phototube conducts a current to the logarithmic amplifier that is proportional to the light intensity striking the phototube. The signals are linearized and compared electronically to determine the absorption of 280 nm wavelength light and therefore to determine the concentration of SO2 in the sample gas.

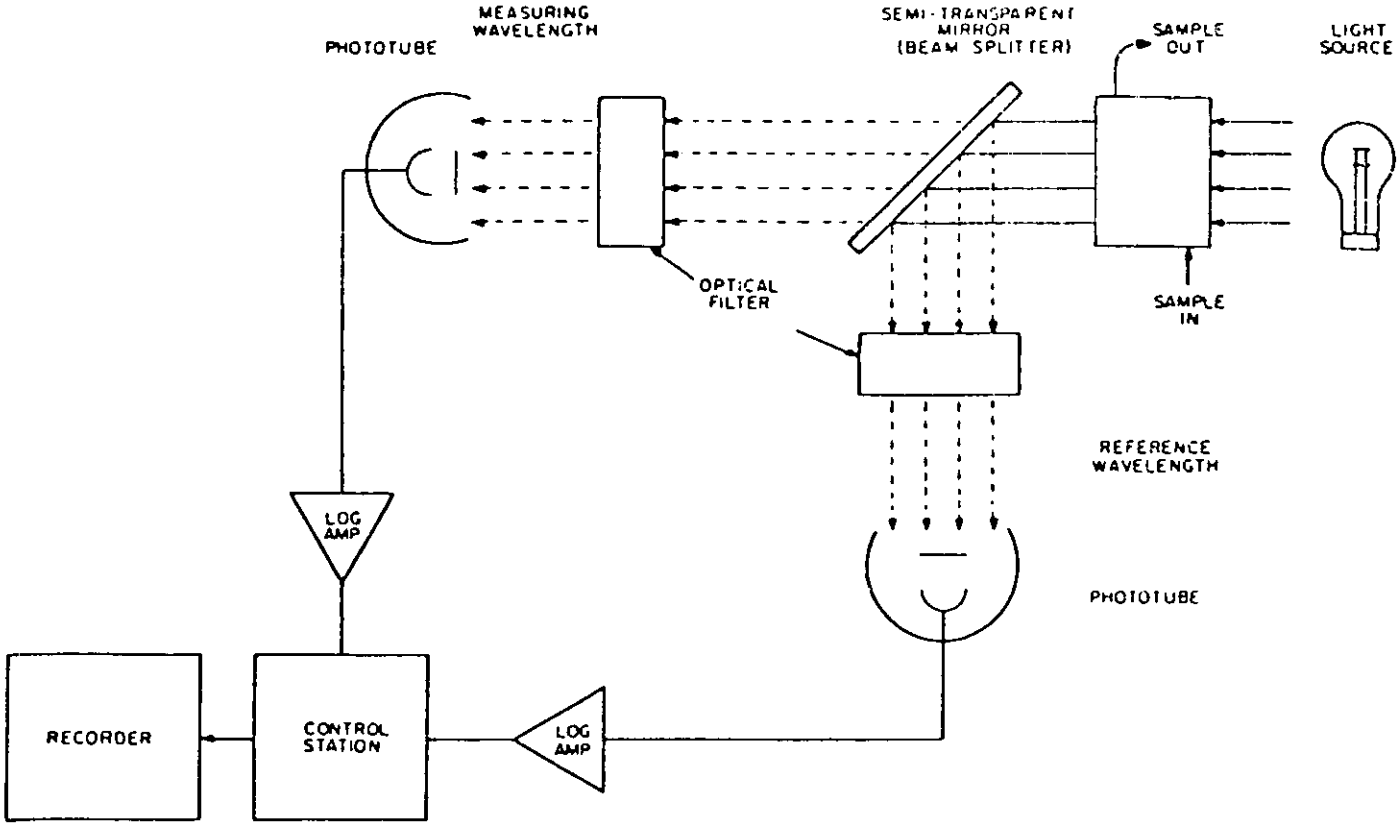


Figure 1. Analyzer Block Diagram

CONSTANT MONITORING

ANALYZERS:

Taylor Servomex OA250 or OA580 Oxygen Analyzer

The Taylor paramagnetic analyzer is used to measure the percent dry volume of oxygen in the sample gas. This analyzer contains a quartz-glass "dumb-bell" that is filled with nitrogen and suspended in a non-uniform magnetic field. The spheres at the ends of the dumb-bell are repelled from the strongest part of the field by their diamagnetic property. The dumb-bell therefore rotates to a position where the repellent force and the torque-resistance of the suspension are in equilibrium.

The sample gas flows into a sample cell which encases the dumb-bell. The paramagnetism of any oxygen in the sample gas reduces the intensity of the field and therefore alters the position of the dumb-bell. A small mirror at the center of the dumb-bell reflects a beam of light onto twin photocells (see schematic diagram). The output of the photocells is amplified and fed back to a coil around the dumb-bell. The current required to keep the dumb-bell at the zero position is a direct measure of the magnetic force and is therefore a measure of the oxygen content of the sample gas.

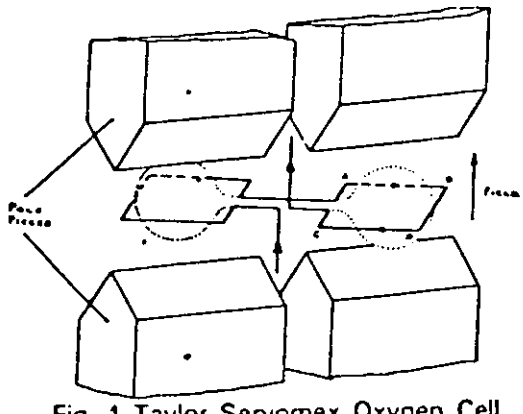


Fig. 1. Taylor Servomex Oxygen Cell — Schematic using Munday's principles

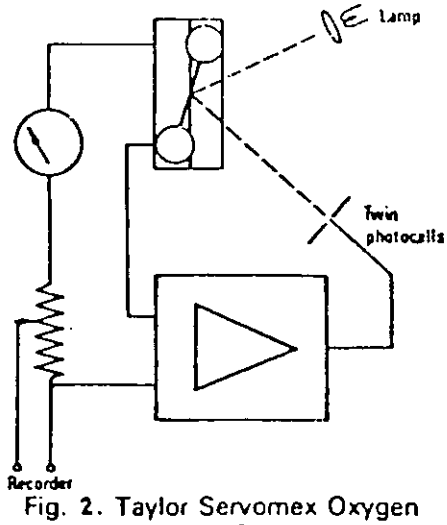
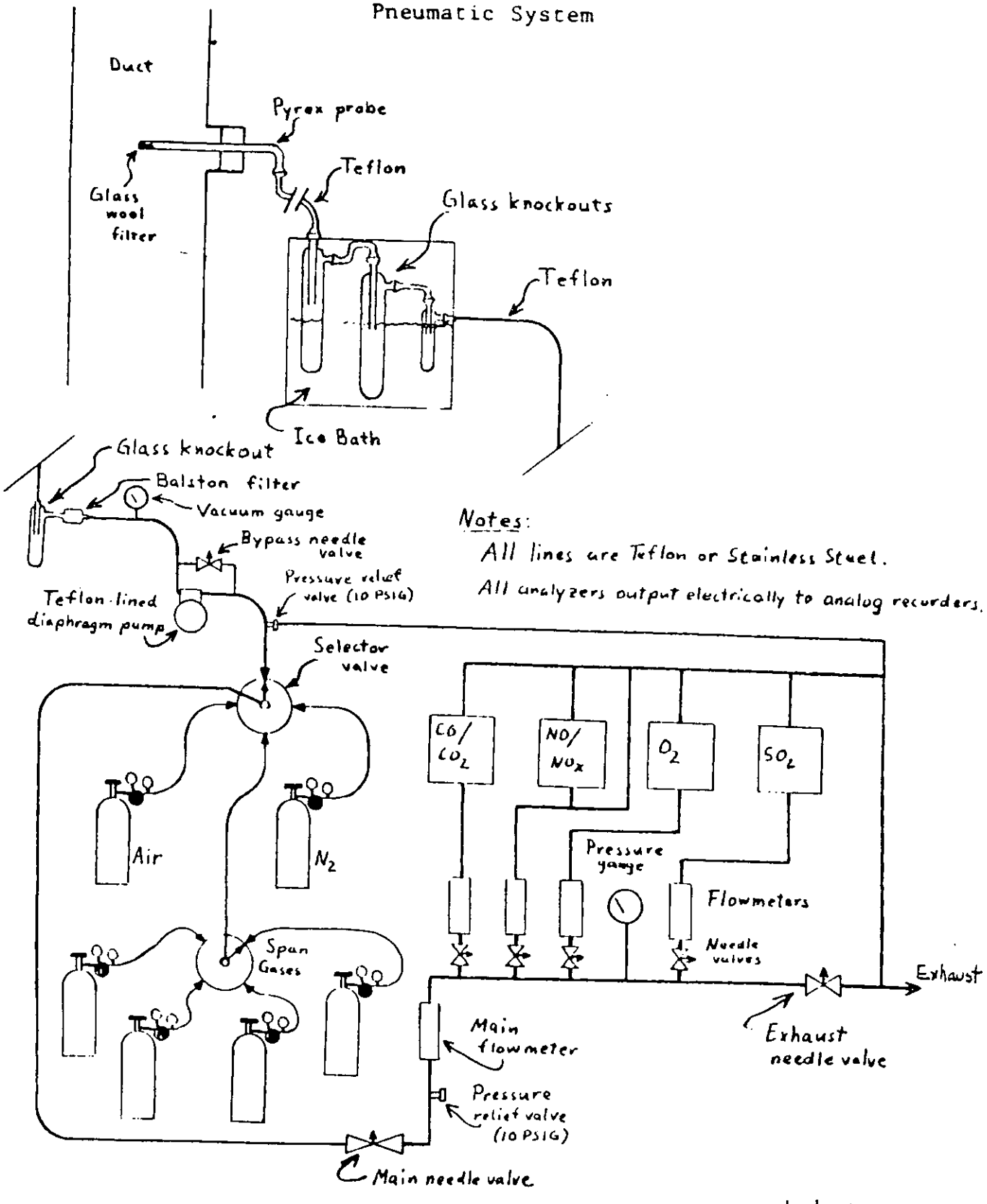


Fig. 2. Taylor Servomex Oxygen Analyser — Schematic

CONSTANT MONITOR

Pneumatic System



Notes:

All lines are Teflon or Stainless Steel.

All analyzers output electrically to analog recorders.

5/11/82 KJC

CHEMECOLOGY CORPORATION

CONSTANT MONITORING
DATA SUMMARY

CLIENT: Lonestar, Davenport, CA

UNIT: Main Stack

DATE: 5/13/82

Time	CONCENTRATIONS			Volume Flow Rate, SDCFM[1]	EMISSION RATES	
	NO_x,ppm	SO_2,ppm	O_2, %		NO_x as NO_2, lt/hr	SO_2, lb/hr
1213 to 1245	200	106	14.1	156,600	228	168
1315 to 1343	188	86	14.2	155,200	212	135
1420 to 1502	178	97	14.2	155,200	201	153
Average	189	96	14.2	[illegible]	214	152

1. Standard conditions are 60°F and 29.92 in. Hg

CHEMECOLOGY CORPORATION

CONSTANT MONITORING

DATA & RESULTS

Client: Lonestar, Davenport, CA
Unit: Main Stack
Date: 5/13/82

Analyzed Gas: NO_x
Analyzer Range: 0 to 500 ppm
Recorder Range: 0 to 500 ppm

Zero Gas : Zero Grade N_2/Ambient Air
Span Gas: 302.5 ppm NO with SO_2 in N_2

Time	% FULL SCALE						Average Concentration ppm NO_x
	Initial		Final		Apparent		Sample Reading	
	Zero	Span	Zero	Span	Zero	Span		
1205	0.1	61.1						
1213 to 1245					0.05	61.25	40.5	200
1255			0.0	61.4				
1315 to 1343					-0.05	62.45	38.8	188
1400			-0.1	63.5				
1420 to 1502					-0.05	64.25	37.8	178
1520			0.0	65.0				

CONSTANT MONITORING

DATA & RESULTS

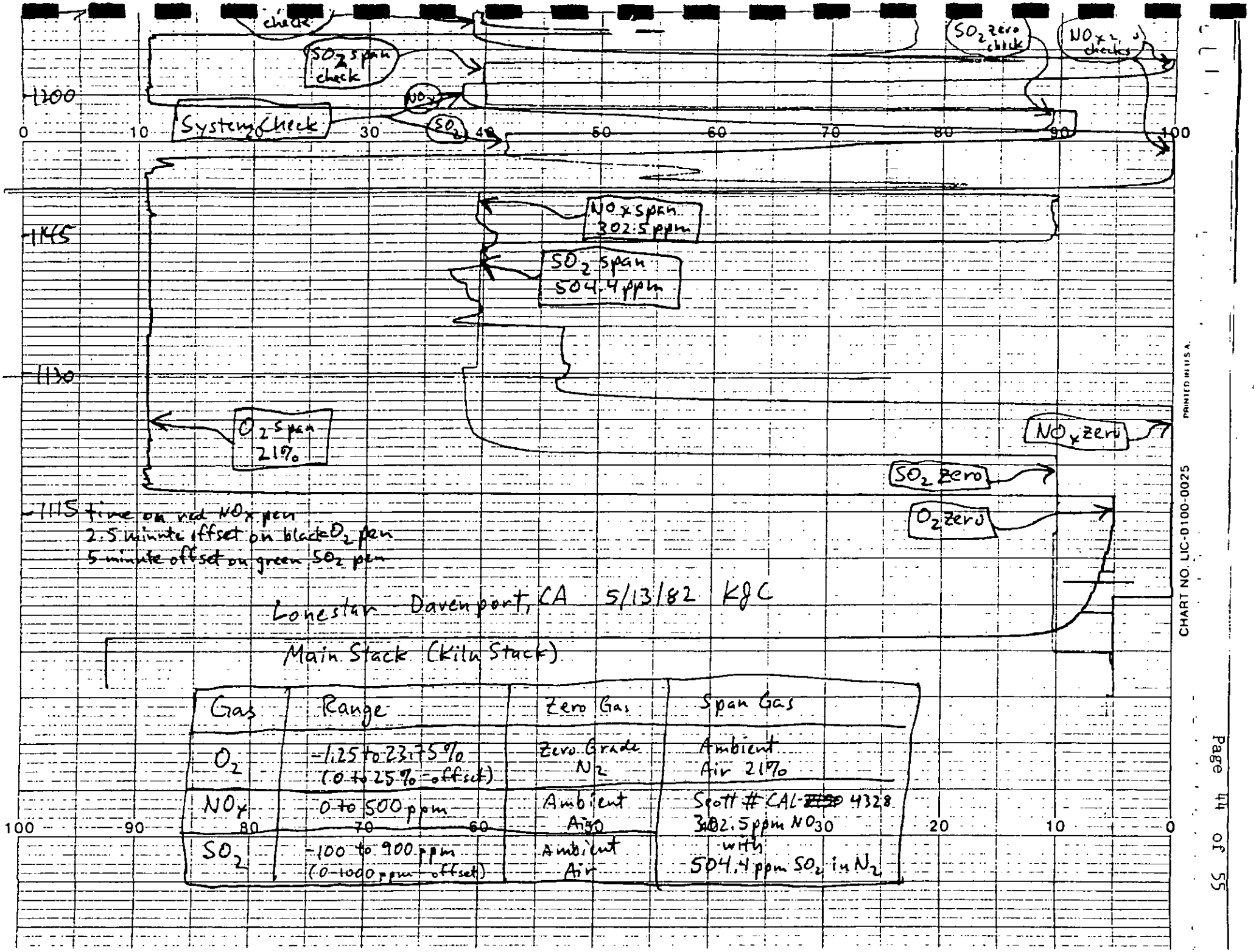
Client: Lonestar, Davenport, CA
Unit: Main Stack
Date: 5/13/82

Analyzed Gas: O2
Analyzer Range: 0 to 25%
Recorder Range: -1.25 to 23.75%

Zero Gas :
Span Gas:

Time	% FULL SCALE							Average Concentration % O2
	Initial		Final		Apparent		Sample Reading	
	Zero	Span	Zero	Span	Zero	Span		
1120	5.1	89.0						
1213 to 1245					5.2	88.85	61.3	14.1
1300			5.3	88.7				
1315 to 1343					5.5	88.9	61.8	14.2
1405			5.7	89.1				
1420 to 1502					6.0	89.7	62.7	14.2
1525			6.3	90.3				

STRIP CHARTS



Gas	Range	Zero Gas	Span Gas
O_2	-1.25 to 23.75% (0 to 25% = offset)	Zero Grade N_2	Ambient Air 21%
NO_x	0 to 500 ppm	Ambient Air	Scott # CAL-~~4330~~ 4328 302.5 ppm NO_x
SO_2	-100 to 900 ppm (0-1000 ppm = offset)	Ambient Air	with 504.4 ppm SO_2 in N_2

PRINTED IN U.S.A.

CHART NO. LIC-0100-0025

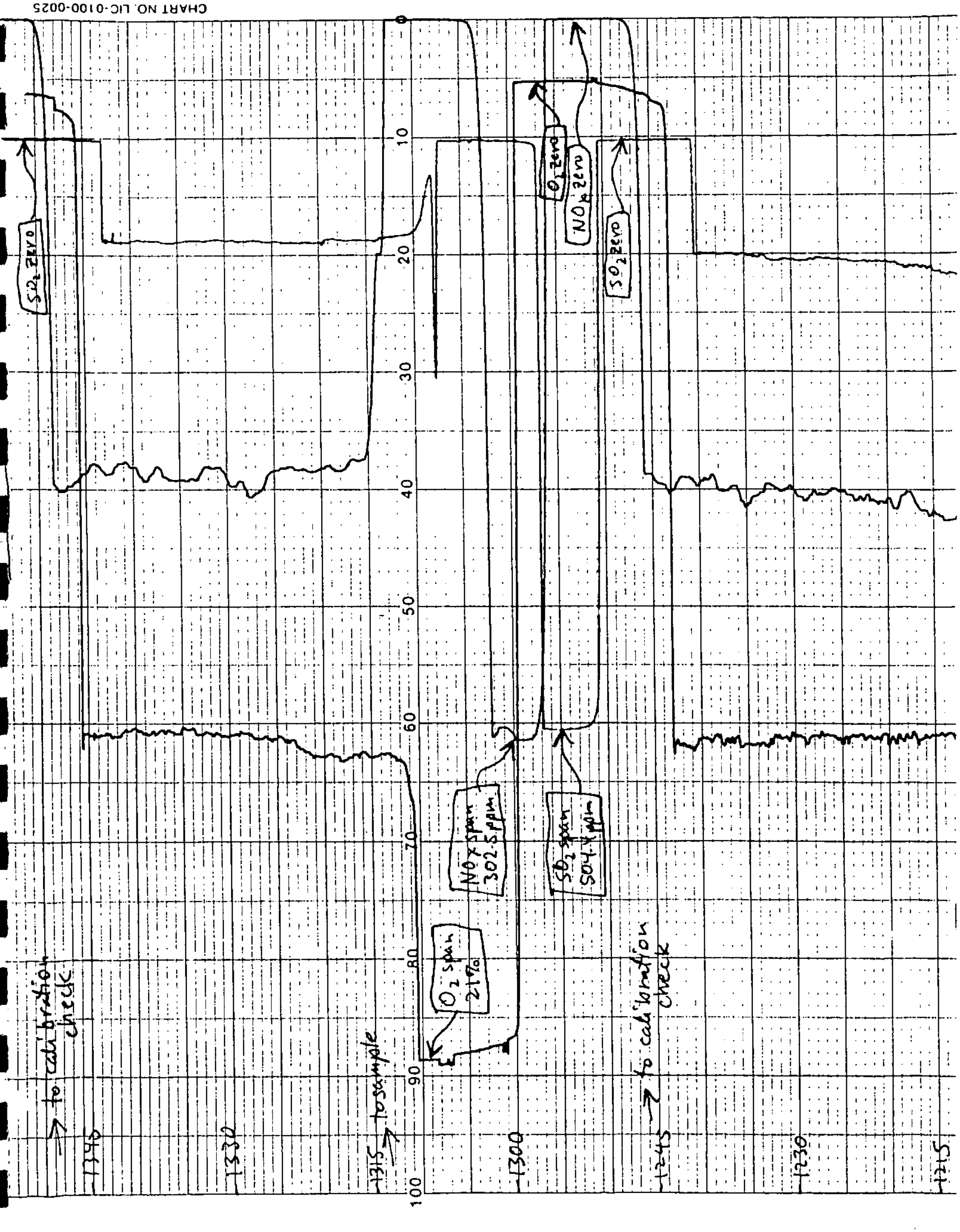
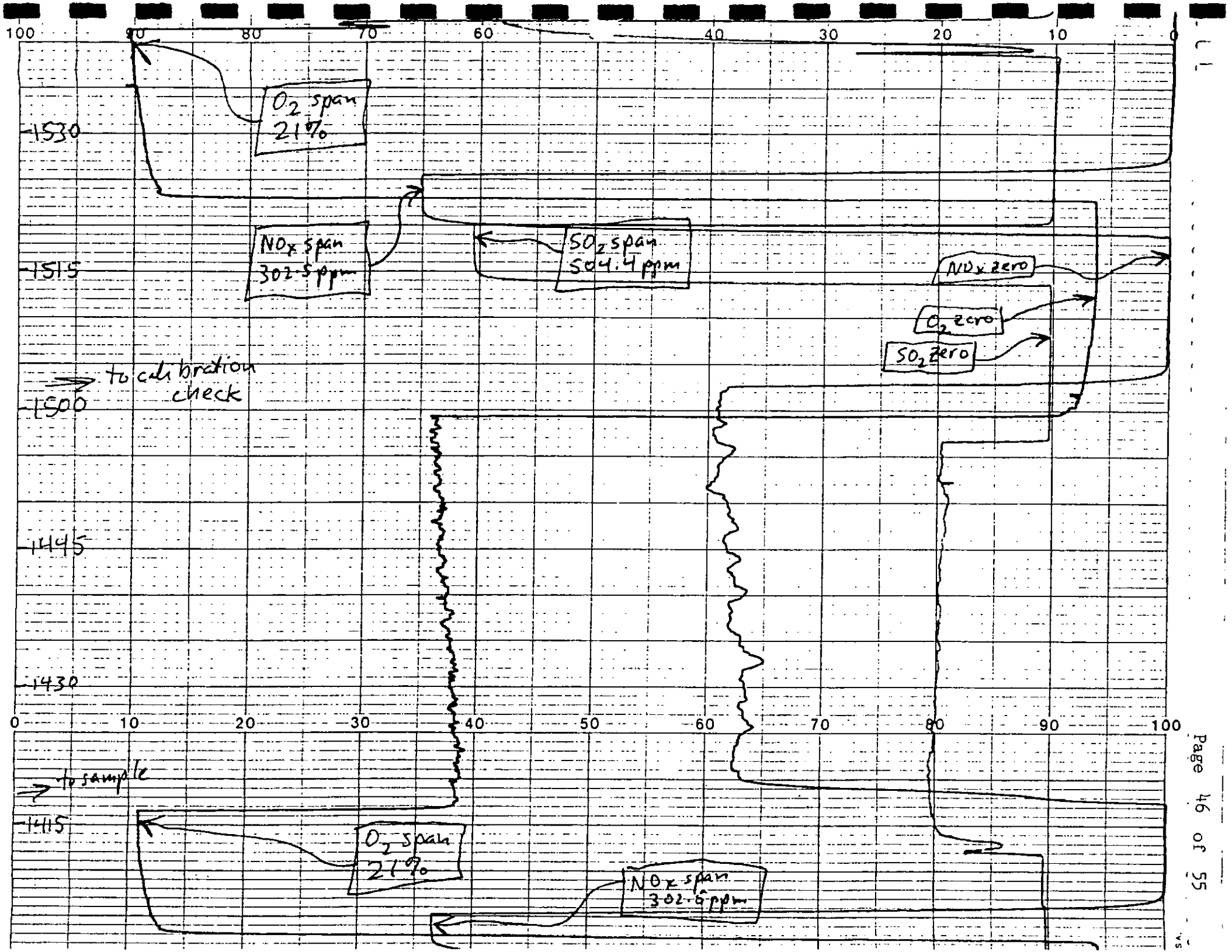
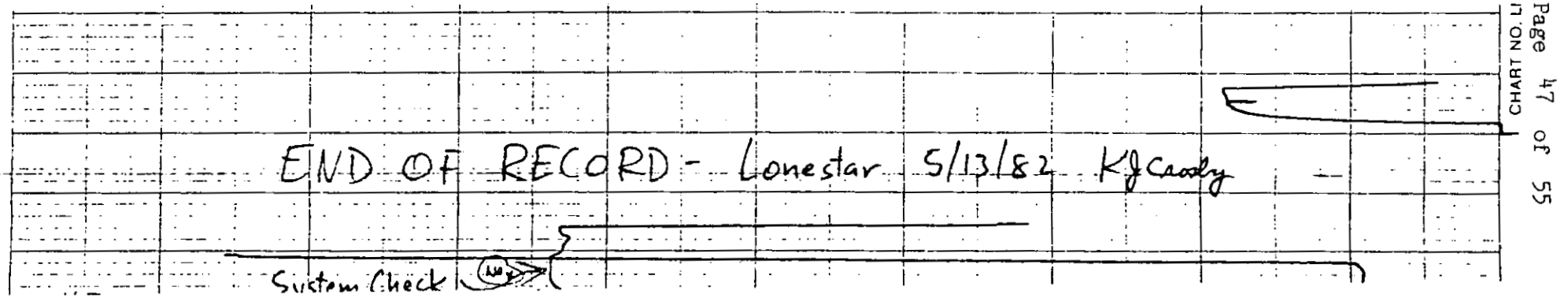


CHART NO. LIC-0100-0025
0
10
20
30
40
50
60
70
80
90
100
SO2 zero
O2 zero
NOx zero
SO2 zero
NOx span 302.5 ppm
SO2 span 504.4 ppm
O2 span 21%
→ to calibration check
1315 → to sample
→ to calibration check
1345
1330
1315
1300
1245
1230
1215


100
90
80
70
60
40
30
20
10
0
1530
1515
1500
1445
1430
1415
O_2 span
21%
NO_x span
302.5 ppm
SO_2 span
504.4 ppm
NO_x zero
O_2 zero
SO_2 zero
to calibration check
to sample
O_2 span
21%
NO_x span
302.6 ppm


END OF RECORD - Lonestar 5/13/82 KJ Caudy
System Check

APPENDIX A

PITOT TUBE CALIBRATION
DATA SUMMARY

DATE: Jan. 25 1982
PERSONNEL: LTB/RHH

Pitot Tube #	Description		Conditions 1	2	3	4
5191	3 ft Initial	Pstd	.26	.49	.91	1.70
		Ppit	.42	.81	1.57	2.69
		Cp	.78	.78	.77	.80
5211	3 ft Stainless	Pstd	.26	.49	.91	1.70
		Ppit	.40	.78	1.48	2.60
		Cp	.81	.73	.74	.81
5281	6 ft Glass	Pstd	.26	.49	.91	1.70
		Ppit	.40	.78	1.48	2.54
		Cp	.81	.80	.78	.82
5324	6 ft Glass	Pstd	.26	.49	.91	1.70
		Ppit	.40	.79	1.50	2.55
		Cp	.81	.79	.78	.82
5292	6 ft Stainless	Pstd	.26	.49	.91	1.70
		Ppit	.39	.77	1.48	2.63
		Cp	.92	.79	.78	.81
5331	9 ft Initial	Pstd	.26	.49	.91	1.70
		Ppit	.41	.80	1.51	2.63
		Cp	.81	.77	.78	.81
5352	9 ft Stainless	Pstd	.26	.49	.91	1.70
		Ppit	.40	.79	1.50	2.65
		Cp	.91	.78	.78	.80
5353	9 ft Stainless	Pstd	.26	.49	.91	1.70
		Ppit	.39	.79	1.54	2.59
		Cp	.92	.79	.77	.91
5340	9 ft Glass	Pstd	.26	.49	.91	1.70
		Ppit	.39	.78	1.50	2.63
		Cp	.91	.81	.78	.81
5342	9 ft Glass	Pstd	.26	.49	.91	1.70
		Ppit	.39	.78	1.50	2.65

PUMP/METER ASS'Y CALIBRATION DATA

DATE. 4-16 82

PUMP NO.	%	METER FACTER		OLD NO.	
3-630	-1.40	1.014			
3-631	-0.01	1.000			
3-632	-1.02*	1.010			P-73
3-633	+0.86*	.9915			P-71
3-634	-0.01	1.001			P-76
3-635	+1.59	98.43			P-70
3-636	-0.55	1.003			P-72
3-637	+0.35*	.9965			P-75
3-638	IN SHOP				P-77
3-639	-0.26	1.003			P-74
3-640	+1.10	.9891			P-78
3-641	+0.24	.9970			P-79
3-642	IN SHOP				P-80

MISC# 7291

* ADJUSTED PRIOR TO TEST

MAGNEHELIC GAUGE BOXES

INCLINE MANOMETER	# 3-373	CORREC. FACTOR	# 3-374	CORREC. FACTOR	# 3-370	CORREC FACTOR	# 3-376	CORREC FACTOR	#	CORR FAC
DATE	4-19-82		4-19-82		4-21-82		4-22-82			
				0 - 5						
5.00	4.90	1.02	4.90	1.02	4.85	1.03	4.95	1.01		
4.50	4.45	1.01	4.37	1.03	4.40	1.02	4.50	1.00		
4.00	3.98	1.01	3.87	1.03	3.90	1.03	4.00	1.00		
3.50	3.47	1.01	3.37	1.04	3.45	1.01	3.52	.99		
3.00	2.97	1.01	2.89	1.04	2.95	1.02	3.00	1.00		
2.50	2.48	1.01	2.44	1.02	2.51	1.00	2.52	.99		
2.00	1.95	1.01	1.99	1.03	2.01	1.00	2.02	.99		
1.74	1.73	1.00	1.73	1.00	1.75	.99	1.76	.99		
1.48	1.47	1.01	1.47	1.01	1.51	.98	1.51	.98		
1.24					1.26	.98	1.26	.98		
1.08					1.11	.97	1.10	.98		
1.0	.99	1.01	1.02	.98	1.01	.99	1.00	1.00		
Σ		10.10		10.20		12.02		11.91		
$\bar{x}$		1.01		1.02		1.00		.99		
$\sigma \cdot \sqrt{x}$		1.00		1.01		1.00		1.00		
				0 — 1						
1.00	.96	1.04	.99	1.01	.96	1.04	.98	1.02		
.88	.85	1.04	.88	1.00	.84	1.05	.83	1.06		
.77	.76	1.01	.76	1.01	.62	1.05	.61	1.07		
.65	.65	1.02	.63	1.03	.50	1.04	.49	1.06		
.52	.51	1.02	.51	1.02			.29	1.03		
.30	.29	1.03	.29	1.03	.31	.97	.21	1.05		
.24	.24	1.00	.24	1.00	.24	1.00	.11	1.09		
.12	.12	1.00	.12	1.00	.12	1.00				
Σ		8.16		8.10		7.16		7.35		
$\bar{x}$		1.02		1.01		1.02		1.05		
$\sigma \cdot \sqrt{x}$		1.00		1.01		1.01		1.02		

MAGNEHELIC GAUGE READINGS WERE COMPARED TO READINGS ON WALL MOUN
DWYER INCLINE MANOMETER AS A STANDARD & CALCULATED A CORRECTION
INCLINE MANOMETER

Scott Specialty Gases Scott Environmental Technology, Inc.
PLUMSTEADVILLE, PA. 18949 PHONE 215-766-8861 TWX. 510-665-9344

Date Shipped 12/22/81
Our Project No: 314740
Your P.O. No: 225
Page 1 of 1

CHEMECOLOGY CORPORATION
ATTN: JOETTA
690 GARCIA AVENUE
PITTSBURG, CA

CERTIFICATE OF ANALYSIS – EPA PROTOCOL GASES*

(Concentrations are in mole % or ppm)

Cylinder Number CAL-2450 Certified Accuracy ±1 % NBS Traceable Analysis Dates: First 12/14/81 Last 12/21/81

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND
NITRIC OXIDE	91.08 ppm	6/21/82	Chemiluminescence	1684B, 1683F	91.22 ppm	90.93 ppm
SULFUR DIOXIDE	48.12 ppm		Ecolyzer	1694A, 1693A	48.10 ppm	48.14 ppm
NITROGEN	BALANCE					

Cylinder Number CAL-4328 Certified Accuracy ±1 % NBS Traceable Analysis Dates: First 12/14/81 Last 12/21/81

COMPONENTS	CERTIFIED CONC	EXPIRATION DATE	ANALYTICAL PRINCIPLE	PRIMARY STANDARD NBS/SRM's	REPLICATE CONCENTRATIONS FIRST	SECOND
NITRIC OXIDE	302.5 ppm	6/21/82	Chemiluminescence	1687B, 1686B	301.8 ppm	303.1 ppm
SULFUR DIOXIDE	504.4 ppm		Ecolyzer	1663A, 1662A	504.9 ppm	503.9 ppm
NITROGEN	BALANCE					

*We hereby certify the cylinder gas has been analyzed according to EPA Protocol No: 1

Analyst Pamela Trilling Approved By Francis Nevill

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

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 AREA CODE 312 726-8434

ESTERN DIVISION MANAGER
AIL D. PALMER

PLEASE ADDRESS ALL CORRESPONDENCE TO
[redacted]

224 South Carbon Avenue
Price, Utah 84501
Phone: (801) 637-7540

TOWER RESOURCES INC.
P. O. Box 1027
Price, Utah 84501

February 10, 1982

Sample identification
by Tower Resources, Inc.

LS #1

Kind of sample reported to us: Coal

Sample taken at: Wildcat

Sample taken by: Tower Resources, Inc.

Date sampled: 2-2-82

Date received: 2-3-82

FEB 11 1982

Tower Resources Inc.

Analysis report no57-8687

SHORT PROXIMATE ANALYSIS

	As Received	Dry Basis
% Moisture	7.78	xxxx
% Ash	12.04	13.06
Btu/lb	11324	12279
% Sulfur	0.57	0.62

% Air Dry Loss =	5.86
Moisture, Ash-free Btu =	14124
Pounds of SO2 per 10^6 Btu =	1.01
Moist, Mineral matter free Btu * =	13031
(Based on as rec'd moisture) *	
Pounds of Sulfur per 10^6 Btu =	0.51

JB/dt

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

JACK D. BLAIR, Manager, Price Laboratory

[redacted]

Charter Member

5-13-02

PORT ID - 00501 TITLE - MBAPCD TIME 1727 DATE 05-13-02 THIS REPOR Demanded

INT	DESCRIPTION	ENGR. UNITS	PREVIOUS 8 HOURLY AVERAGES FOR HOUR BEGINNING 0900	1000	1100	1200	1300	1400	1500	1600
T006	HILIME 1 FEED RATE	TPH	157.	160.	176.	159.	167.	144.	148.	162.
T004	LOW LIME FEED RATE	TPH	0.12	0.07	0.15	5.43	6.11	14.1	4.50	0.04
T002	SHALE FEED RATE	TPH	28.2	25.2	18.5	16.5	19.5	23.1	27.6	28.8
T007	IRON FEED RATE	TPH	1.53	1.74	1.56	1.39	1.51	1.40	1.45	1.53
T008	SAND FEED RATE	TPH	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
T101	FEEDRATE-RAW MILL	TPH	200.	201.	200.	199.	200.	199.	201.	200.
T130	W. SPRAY FLOWRATE-RAWMIL	GPM	-0.09	-0.11	-0.12	-0.13	-0.14	-0.14	-0.16	-0.15
152	INLET 1 TEMP-RM PRECIP	DEG F	181.	180.	180.	180.	180.	180.	180.	181.
167	OUTLET TEMP-RM PRECIP	DEG F	185.	185.	185.	185.	185.	184.	184.	185.
T153	INLET DRAFT-RM PRECIP	IN H2O	32.5	31.4	32.3	32.6	32.2	33.1	33.1	31.4
T166	OUTLET DRAFT-RM PRECIP	IN H2O	35.3	34.1	34.9	35.2	34.9	35.9	35.9	34.1
TD155	FIELD 1 RM PRECIP	VOLT	434.	434.	434.	434.	434.	434.	434.	434.
TD156	FIELD 2 RM PRECIP	VOLT	467.	467.	467.	467.	467.	467.	467.	467.
TD157	FIELD 3. RM PRECIP	VOLT	391.	391.	391.	391.	391.	391.	391.	391.
TD158	FIELD 4 RM PRECIP	VOLT	422.	422.	422.	422.	422.	422.	422.	422.
TD159	FIELD 5 RM PRECIP	VOLT	391.	391.	391.	391.	391.	391.	391.	391.
183	OPACITY RM PRECIP STACK	STACK	1.71	1.60	1.58	1.57	1.93	1.41	1.56	1.51
A184	NOX RM PRECIP STACK	STACK	208.	216.	210.	206.	201.	188.	197.	205.
103	INLET 1 TEMP-CD TOWER	DEG F	672.	672.	672.	672.	671.	670.	670.	671.
105	OUTLET 1 TEMP-CD TOWER	DEG F	477.	452.	421.	414.	407.	439.	474.	469.
T104	W. SPRAY FLOWRATE-CD.TWR	GPM	36.4	40.8	48.5	49.4	50.4	42.7	34.6	36.9
T507	W. SPRAY FLOW RATE	GPM	30.8	32.2	31.1	30.5	31.6	32.9	35.5	34.1
505	INLET 1 TEMP-BYP CD TWR	DEG F	748.	766.	759.	751.	758.	775.	799.	798.
506	OUTLET 1 TEMP-BYP CD TWR	DEG F	304.	300.	300.	300.	301.	300.	300.	300.
T357	FEEDRATE TO KILN-COAL	TPH	13.2	12.9	13.2	13.1	13.3	14.1	13.8	13.1
T368	FEEDRATE COAL TO PRECALC	COAL	6.05	6.04	6.03	6.02	6.16	6.29	6.19	6.13
T370	FEEDRATE COAL TO KILN	COAL	4.35	4.35	4.35	4.37	4.44	4.50	4.55	4.50
T401	KILNFEED RATE	TPH	165.	165.	165.	165.	165.	165.	165.	165.
T538	CLINKER BELT SCALE	TPH	97.9	88.8	93.2	91.8	96.8	91.3	83.8	79.4
440	KILNEXIT GAS 02 PCT	OXYGEN	1.78	1.85	1.83	1.72	1.63	1.56	1.76	1.89
449	KILNEXIT GAS TEMP	DEG F	-----	Thermocouple burned out			-----	-----	-----	-----
425	PREHEATR EXIT GAS CO	CO	0.40	0.39	0.38	0.38	0.37	0.37	0.37	0.37
424	02 PREHTR EXIT GAS	PREHTR	5.01	5.09	5.14	5.14	5.05	4.94	4.95	5.02
500	OPACITY -COOLER STACK	COOLER	3.14	16.0	3.51	3.46	4.08	4.22	3.02	3.19
T485	COOLR DC DIFF. PRESSURE	DIFFPR	5.99	5.74	5.96	5.86	5.70	5.47	5.10	4.83

NOT VALID
ANALYZER MALFUNCTION

05-13-82

REPORT ID - 00501 TITLE - MBAPCD TIME 0810 DATE 05-13-82 THIS REPO
Demanded

POINT	DESCRIPTION	ENGR. UNITS	PREVIOUS 8 HOURLY AVERAGES FOR HOUR BEGINNING 0000	0100	0200	0300	0400	0500	0600	0700
AWT006	HILIME 1 FEED RATE	TPH	129.	120.	132.	137.	136.	136.	130.	143.
AWT004	LOW LIME FEED RATE	TPH	0.66	0.47	0.62	0.79	0.76	0.37	0.23	0.03
AWT002	SHALE FEED RATE	TPH	19.0	14.7	7.83	6.33	8.50	18.2	26.9	34.2.
AWT007	IRON FEED RATE	TPH	1.25	1.16	1.20	1.23	1.24	1.33	1.49	1.79
AWT008	SAND FEED RATE	TPH	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38
AWT101	FEEDRATE-RAW MILL	TPH	150.	150.	150.	154.	156.	165.	173.	193.
APT130	W. SPRAY FLOWRATE-RAWMILL	GPM	0.00	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05
AT152	INLET 1 TEMP-RM PRECIP	DEG F	180.	181.	180.	179.	179.	179.	180.	180.
AT167	OUTLET TEMP-RM PRECIP	DEG F	185.	186.	185.	184.	184.	183.	184.	184.
APT153	INLET DRAFT-RM PRECIP	IN H20	23.6	25.6	26.3	27.0	26.4	28.1	28.6	31.7
APT166	OUTLET DRAFT-RM PRECIP	IN H20	25.9	28.1	28.8	29.6	28.9	30.7	31.2	34.6
POINT NOT IN HISTRY BVTD 155										
POINT NOT IN HISTRY										
POINT NOT IN HISTRY										
POINT NOT IN HISTRY										
POINT NOT IN HISTRY 159										
AT183	OPACITY RM PRECIP STACK	STACK	2.11	1.95	1.68	1.52	1.32	1.49	1.60	1.74
GA184	NOX RM PRECIP STACK	STACK	263.	244.	217.	202.	192.	191.	196.	203.
T103	INLET 1 TEMP-CD TOWER	DEG F	653.	656.	650.	656.	650.	660.	657.	663.
T105	OUTLET 1 TEMP-CD TOWER	DEG F	307.	453.	354.	328.	340.	390.	450.	507.
FT104	W. SPRAY FLOWRATE-CD.TWR	GPM	17.2	39.0	45.4	52.7	49.1	43.2	32.3	25.4
FT307	W. SPRAY FLOW RATE	GPM	27.1	29.2	31.1	31.8	30.6	30.2	29.8	28.3
T505	INLET 1 TEMP-BYP CD TWR	DEG F	820.	830.	827.	822.	817.	812.	811.	807.
T506	OUTLET 1 TEMP-BYP CD TWR	DEG F	441.	440.	424.	401.	401.	401	400.	400.
WT357	FEEDRATE TO MILL-COAL	TPH	10.3	11.3	10.7	11.4	12.3	12.0	12.5	13.5
WT360	FEEDRATE COAL TO PRECALC	COAL	4.44	4.70	4.88	5.20	5.38	5.54	5.73	6.03
WT370	FEEDRATE COAL TO KILN	COAL	3.90	3.90	3.93	3.95	3.95	3.99	4.18	4.26
WT401	KILNFEED RATE	TPH	103.	110.	118.	123.	132.	134.	142.	158.
T538	CLINKER BELT SCALE	TPH	78.2	89.7	84.4	75.2	77.4	78.6	73.0	85.4
A440	KILNEXIT GAS O2 PCT	OXYGEN	1.78	1.86	1.85	1.94	1.91	1.90	1.73	2.00
A42?	KILNEXIT GAS TEMP	DEG F	1	Thermocouple Burned out						
A425	PREHEATR EXIT GAS CO	CO	0.36	0.36	0.37	0.37	0.38	0.38	0.40	0.40
A426	O2 PREHTR EXIT GAS	PREHTR	5.12	-----	-----	5.14	5.04	4.84	4.97	5.03
500	OPACITY COOLER STACK	COOLER	4.23	3.47	3.53	3.22	3.13	3.45	3.89	3.99
POINT NOT IN HISTRY ADPT 495										