Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Background Report Reference

AP-42 Section Number: 12.11

Background Chapter: 2

Reference Number: 29

Title: Particulate, Lead, & SO2 EMission Tests Conducted on the Refinery, Blast Furnace, and Reverberatory Ventilaton Systems in Leeds, AL, for Interstate Lead Company, Inc.

Guardian Systems, Inc.

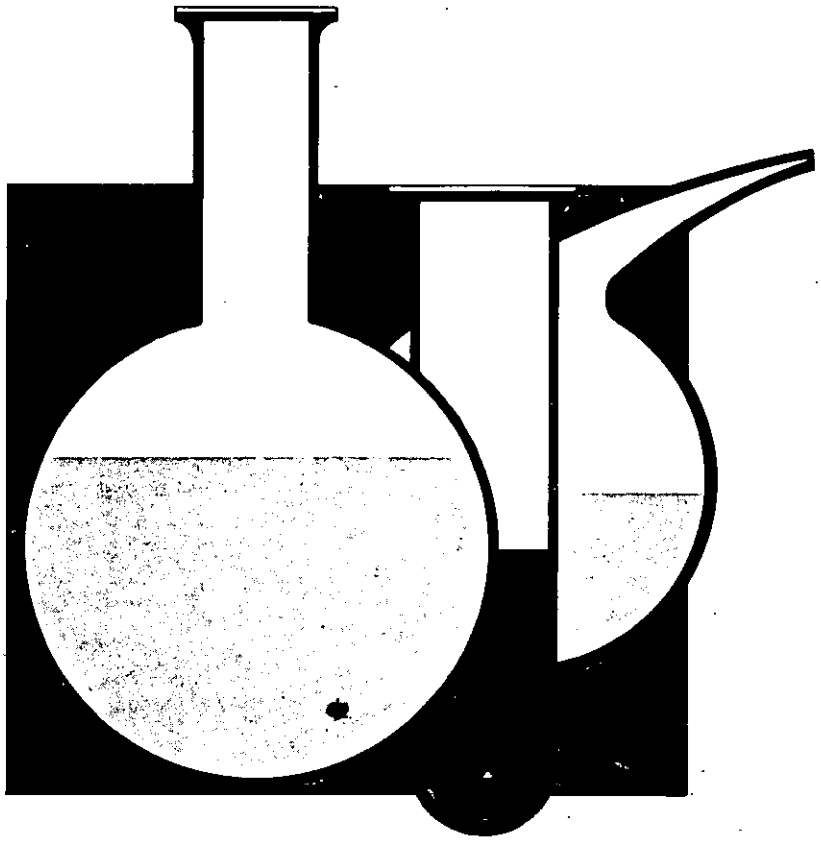
June 1987

#29

GUARDIAN SYSTEMS INC.

P.O. Box 300
Leeds, Alabama 35094
205/699-6647

Jefferson County Dept



Test Report

1987 JUL -8 AM 10: 32
RECEIVED J.C.H.D.
BUREAU OF ENV. HEALTH

PARTICULATE, LEAD, & SO_2 EMISSION TESTS

CONDUCTED ON THE

REFINERY, BLAST FURNANCE, AND REVERBERATORY

VENTILATION SYSTEMS

IN

LEEDS, ALABAMA

FOR

INTERSTATE LEAD COMPANY, INC

ON

JUNE 22 & 23, 1987

Approved by: Tom Lotz
Tom Lotz
Director
Field Services Division

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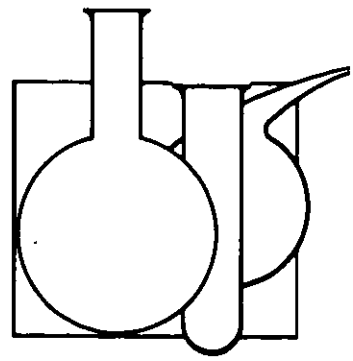
Introduction



I. INTRODUCTION AND PROCESS DESCRIPTION

On June 22 & 23, 1987, Guardian Systems, Inc. performed a series of particulate, lead, and sulfur dioxide emission tests on the Refinery Baghouse Stack, the Metallurgical Baghouse Stack, the Blast Furnace Sanitary Baghouse, and the Reverberatory Furnace Sanitary Baghouse. These tests were conducted in accordance to the rules and regulations expressed in the Code of Federal Regulations, Title 40, Section 60, Reference Methods 1-4 , 8 & 12 as amended and approved by the Jefferson County Department of Health, Air Pollution Control (JCHD). These methods were combined into one inclusive test method. See enclosed letters.

The secondary lead industry processes a variety of lead bearing scrap and residue to produce lead and lead alloy ingots, battery lead oxide, and lead pigments. Processing may involve scrap pretreatment, smelting, and refining/casting. **Figures 1, 2,** and **3** show this process and the air handling systems for the emissions from each source.

The following test program was used:

1. Mass, Lead & SO_2 sampling was conducted on the Metallurgical Baghouse Stack and Refinery Baghouse Stack on day one.
2. Mass, Lead & SO_2 sampling was conducted on the Blast Furnace and Reverberatory Furnace Sanitary Baghouse Stacks on day two.

The following personnel were present during the actual field sampling and represented the companies indicated:

Mr. Bob Wilson	ILCO
Mr. Frank Lightsey	ILCO
Mr. Ralph Fulton	JCHD
Ms. Veda Hampton	JCHD
Mr. Joe Wilson	JCHD
Mr. Frank Cargo	JCHD
Mr. Brian Debrow	JCHD
Mr. Tom Lotz	Guardian Systems, Inc
Mr. Greg Karstens	Guardian Systems, Inc.
Mr. Chuck Turner	Guardian Systems, Inc.
Mr. Barry Armstrong	Guardian Systems, Inc.

Guardian Systems

Box 300, 305 Ashville Road
Leeds, Alabama 35094
205/699-6647

June 18, 1987

Ms. Veda Hamption, Air Pollution Control Engineer
Jefferson County Department of Health
Bureau of Enviromental Health
1400 Sixth Avenue South
Birmingham, AL 35233

Reference: Test protocol for ILCO stack testing.

Dear Veda:

We propose to sample the four (4) stacks at ILCO for particulate, sulfur dioxide and lead using a modified method 12. The method will be modified as follows: the first impinger will contain approximately 100 ml of 80% IPA, the second and third approximately 100 ml of 3% hydrogen peroxide, and the fourth approximately 100 ml of 0.1N nitric acid. The last impinger will be followed by a gel tube to remove any remaining moisture. The impingers (or their respective cleanup bottles) will be weighed to determine moisture content. The clean up will use acetone for the probe and filter holder, distilled water for the hydrogen peroxide and 0.1 N nitric acid for the last impinger. The front half (filter and probe wash) will be analyzed for particulate content as described in Method 5. The second and third impingers will be analyzed for sulfur dioxide content as described in Method 8. The front half catch (filter and acetone rinse) and the impingers will be analyzed for total lead content as described in Method 12. Blanks will be taken of all solutions used in the cleanup procedures.

I hope this modified procedure will meet with your approval. It should shorten the time required to perform the testing. We anticipate to be on jobsite, Monday, June 21, 1987 at 8:00am to begin testing.

6/18/87

Ralph,
Put this with your other ILCO Information. I've Already Replied.
Veda

Sincerely,

Tom Lotz
Director of Field Services

JEFFERSON COUNTY DEPARTMENT OF HEALTH
1400 SIXTH AVENUE, SOUTH P.O. BOX 2646 BIRMINGHAM, ALABAMA 35202 205/933-9110

Bureau of Environmental Health
Paul Pate, Director

June 19, 1987

Mr. Tom Lotz
Director of Field Services
Guardian Systems
Box 300
305 Ashville Road
Leeds, AL 35094

Dear Mr. Lotz:

This acknowledges receipt of your proposed testing protocol to sample the four (4) stacks at ILCO for particulate, sulfur dioxide, and lead using a modified Method 12. Our staff has reviewed the modified procedure and approve its use.

Representatives of our staff will be on the job site at 7:30 a.m., Monday, June 22, 1987.

Sincerely,

Veda M. Hampton
Air Pollution Control Engineer
Air Pollution Control Program

VMH/bb

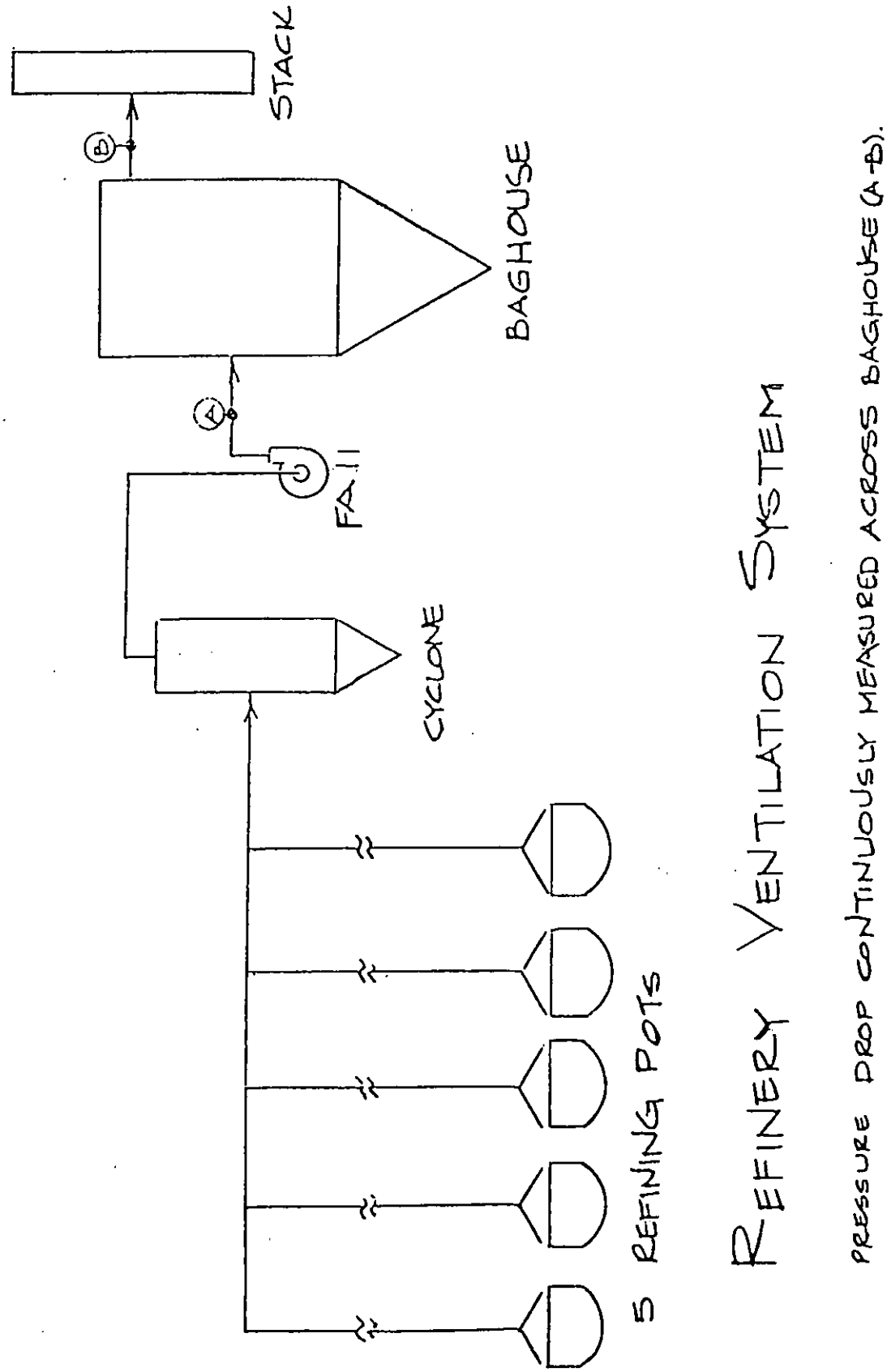

STACK
B
BAGHOUSE
A
FAN
CYCLONE
5 REFINING POTS
REFINERY VENTILATION SYSTEM
PRESSURE DROP CONTINUOUSLY MEASURED ACROSS BAGHOUSE (A-B).

Figure 1

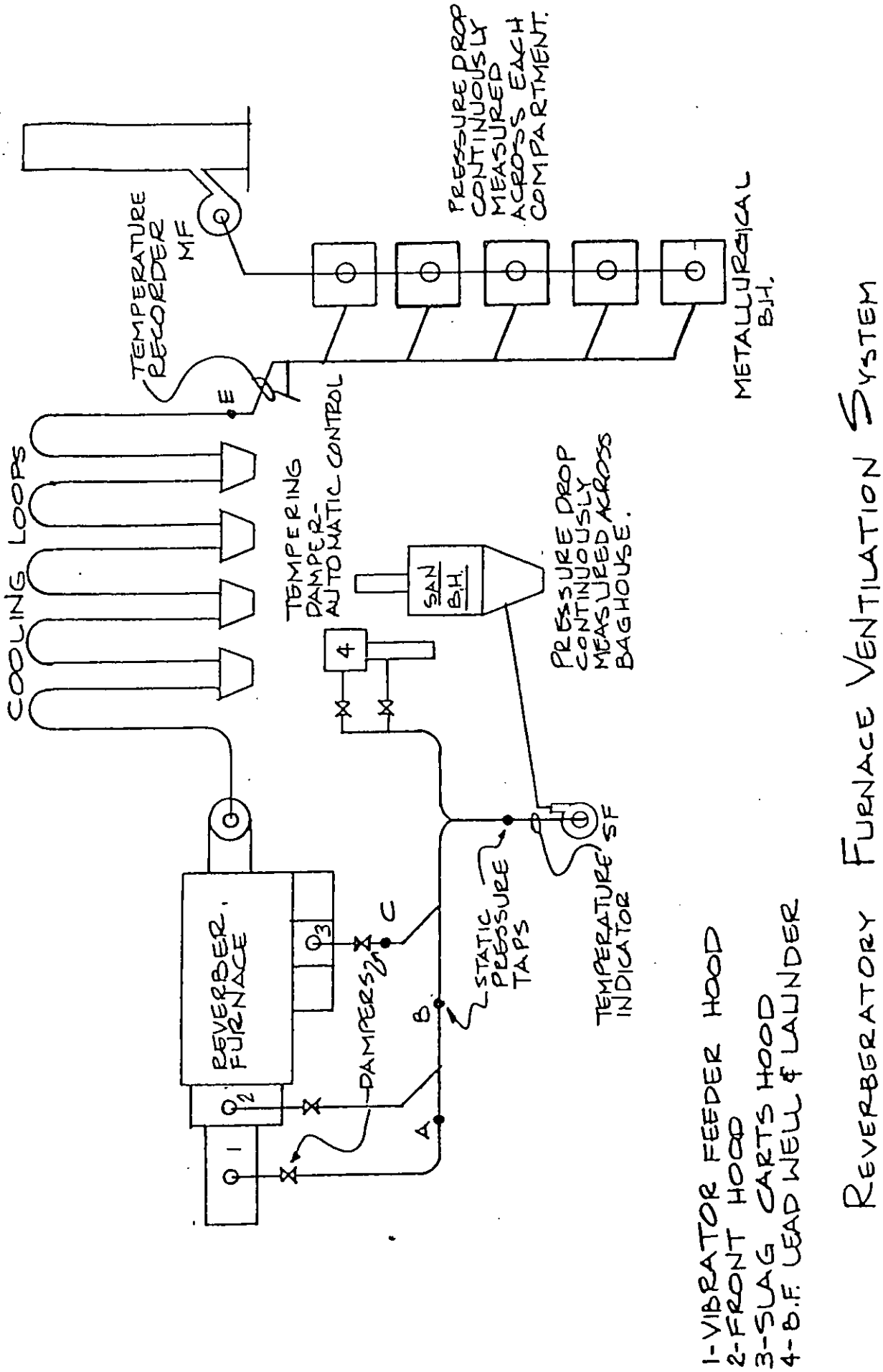
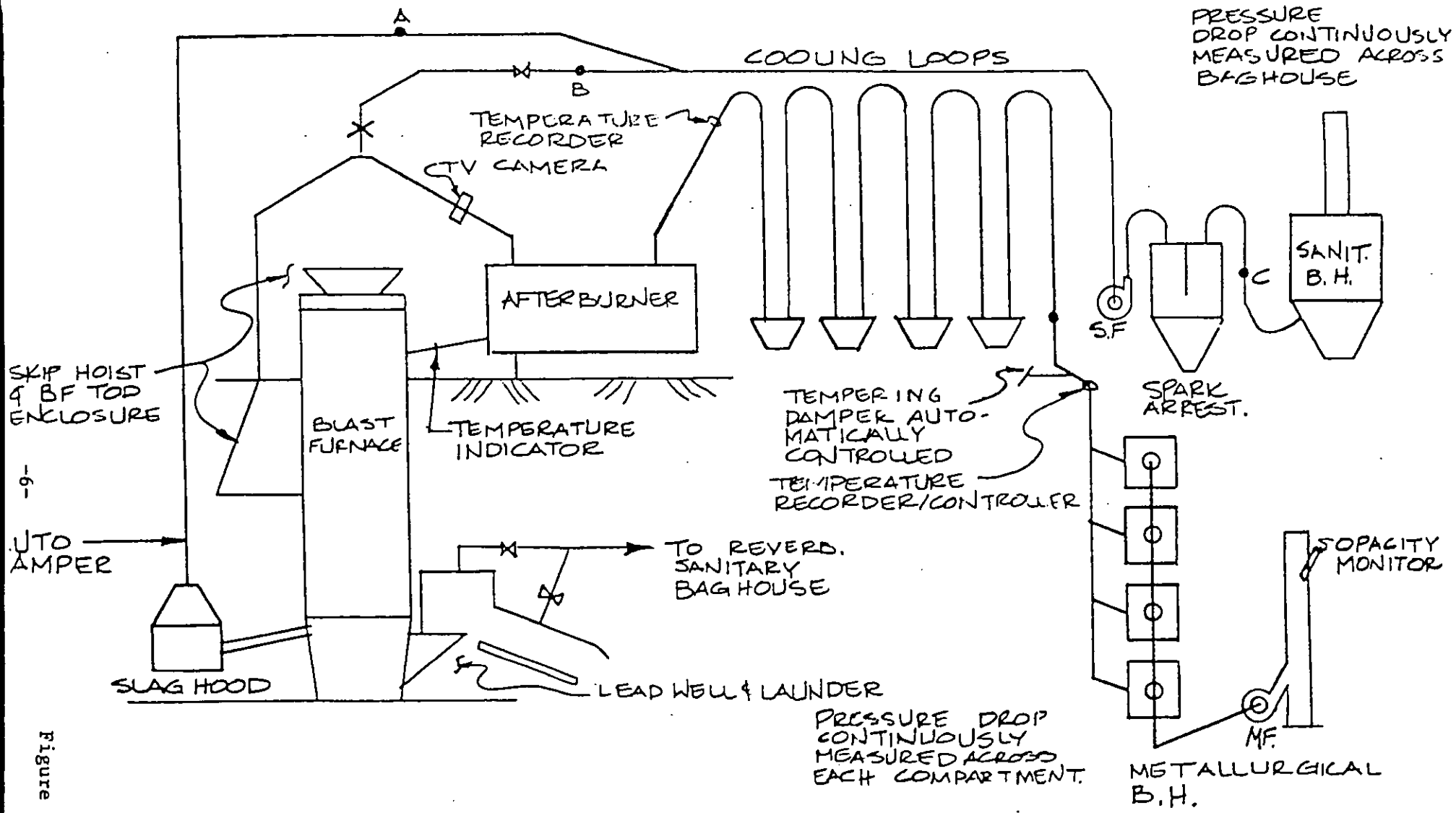

COOLING LOOPS
TEMPERATURE RECORDER MF
PRESSURE DROP CONTINUOUSLY MEASURED ACROSS EACH COMPARTMENT.
METALLURGICAL B.H.
E
TEMPERING DAMPER-AUTOMATIC CONTROL
SAN B.H.
PRESSURE DROP CONTINUOUSLY MEASURED ACROSS BAGHOUSE.
4
REVERBER. FURNACE
1
2
3
DAMPERS
A
B
C
STATIC PRESSURE TAPS
TEMPERATURE INDICATOR
SF
1-VIBRATOR FEEDER HOOD
2-FRONT HOOD
3-SLAG CARTS HOOD
4-B.F. LEAD WELL & LAUNDER
REVERBERATORY FURNACE VENTILATION SYSTEM

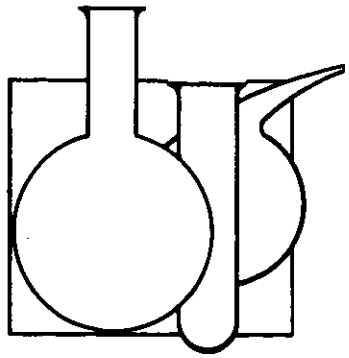
Figure 2



BLAST FURNANCE VENTILATION SYSTEM.

Figure 3

Test Results



II. SUMMARY OF TEST RESULTS

The following is a listing of the average emissions from each source. For complete information by source see the following pages.

Test Location	Metal.	Refining	Reverb S.	Blast S.
Date	6/22/87	6/22/87	6/23/87	6/23/87
Average Total Emissions, Gr/DSCF	0.007	0.004	0.003	0.002
Allowable Emissions Rate, Gr/DSCF	0.012	0.009	0.009	0.009
Allowables, %	58	44	33	22
Average Lead Emissions, Gr/DSCF x 10^5	8.06	1.54	18.2	2.86
SO_2 Emissions lbs/DSCF x 10^4	4.08	0.00	0.112	0.00244
SO_2 Mass Rate, lbs/hr	851	0.00	6.26	0.14

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

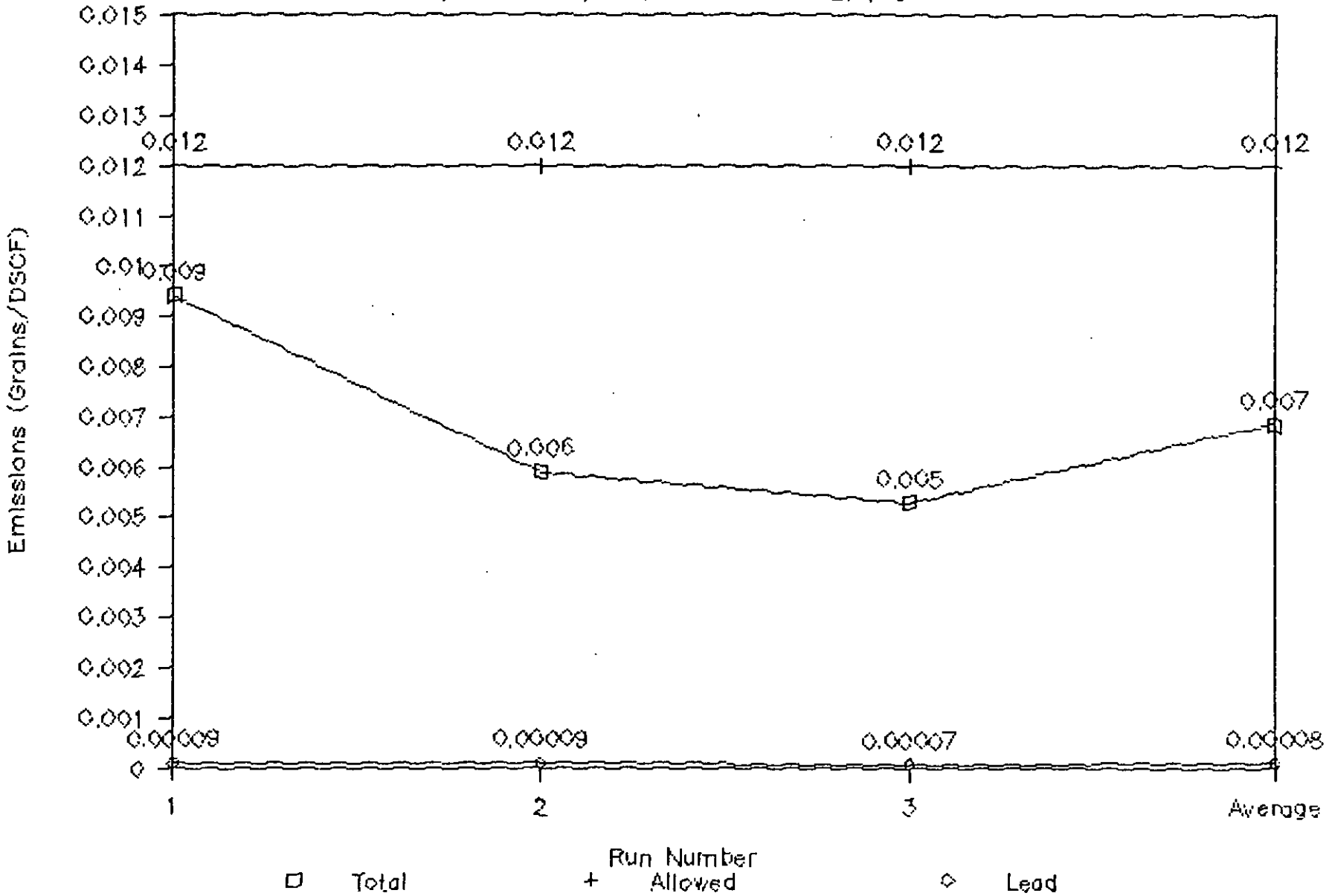
Summarized Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
Stack Gas Temperature, F	163	171	156	163
Moisture Content, % v/v	7.70	10.29	3.44	7.20
Oxygen Content, % v/v	18.00	18.00	18.00	18.00
Carbon Dioxide Content, % v/v	2.00	2.00	2.00	2.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	576.92	576.92	576.92	576.92
Stack Gas Velocity Feet per Second	26.02	26.50	25.84	26.12
Volumetric Flow Actual Cubic Feet per Minute	44,136	44,963	43,835	44,314
Volumetric Flow Dry Std Cubic Feet per Minute	34,477	33,707	36,231	34,786
Particulate Mass Rate, #/hr	2.78	1.70	1.64	2.04
Concentration Grains per Actual Cubic Foot	0.007	0.004	0.004	0.0050
Concentration Grains per Dry Std Cubic Ft	0.009	0.006	0.005	0.007
Allowable Concentration Grains per Dry Std Cubic Ft	0.012	0.012	0.012	0.012
Concentration of Lead Grains per Dry Std Cubic Ft	8.72E-05	8.71E-05	6.80E-05	8.06E-05
% Isokinetic	98.57	100.98	96.13	98.56

Table 1

ILCO METALLURGICAL BAGHOUSE STACK

Particulate Emissions on June 22, 1987



Graph 1

GUARDIAN SYSTEMS inc

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

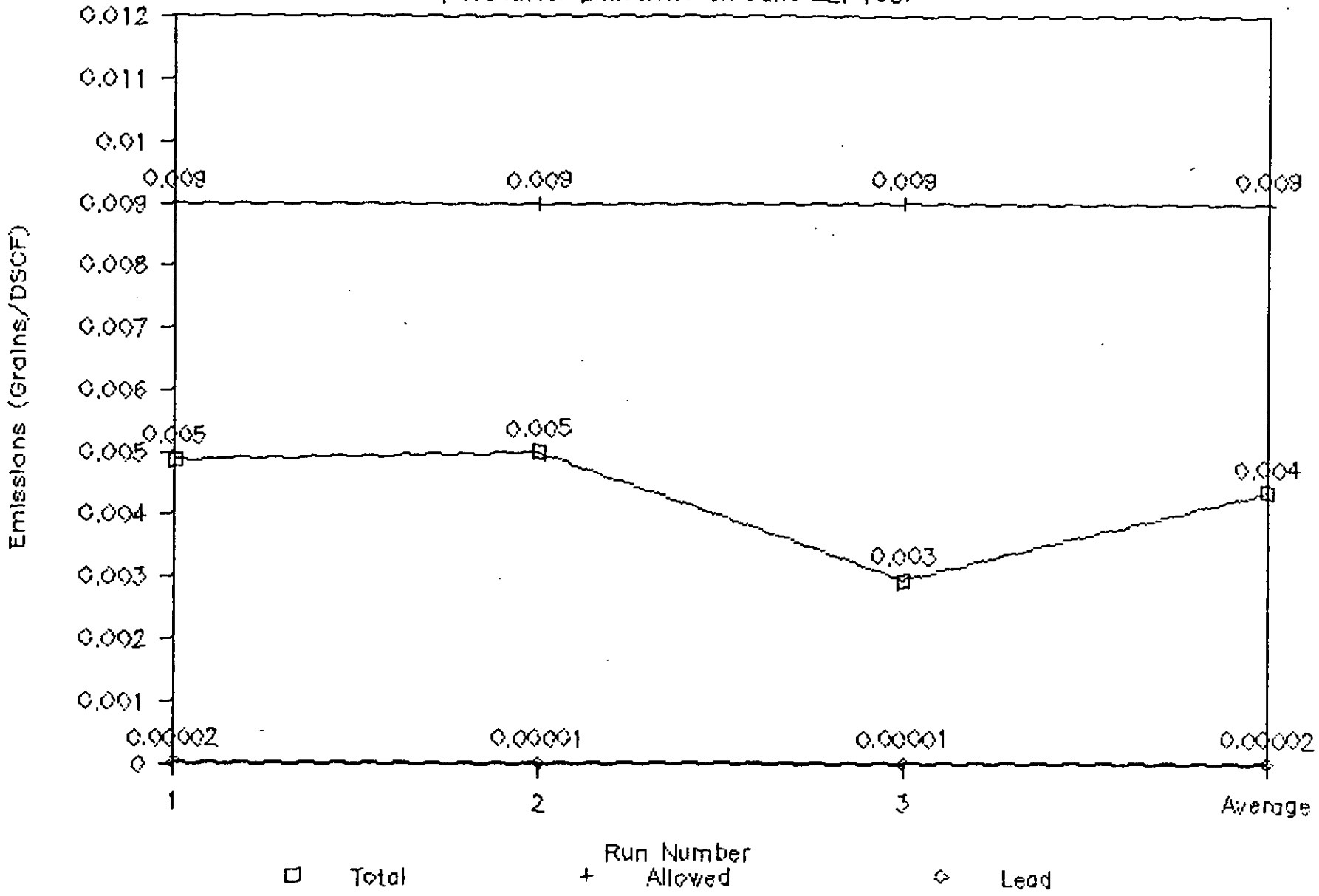
Summarized Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
Stack Gas Temperature, F	133	128	121	127
Moisture Content, % v/v	3.78	0.81	2.77	2.59
Oxygen Content, % v/v	20.00	20.00	20.00	20.00
Carbon Dioxide Content, % v/v	0.00	0.00	0.00	0.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	1785.71	1785.71	1785.71	1785.71
Stack Gas Velocity Feet per Second	35.19	25.41	24.46	28.34
Volumetric Flow Actual Cubic Feet per Minute	6,634	4,789	4,611	5,341
Volumetric Flow Dry Std Cubic Feet per Minute	5,672	4,257	4,066	4,668
Particulate Mass Rate, #/hr	0.24	0.18	0.10	0.18
Concentration Grains per Actual Cubic Foot	0.004	0.004	0.003	0.004
Concentration Grains per Dry Std Cubic Ft	0.005	0.005	0.003	0.004
Allowable Concentration Grains per Dry Std Cubic Ft	0.009	0.009	0.009	0.009
Concentration of Lead Grains per Dry Std Cubic Ft	1.61E-05	1.50E-05	1.48E-05	1.54E-05
% Isokinetic	104.38	105.99	100.80	103.67

Table 2

ILCO REFINERY BAGHOUSE STACK

Particulate Emissions on June 22, 1987



Graph 2

GUARDIAN SYSTEMS inc

SANITARY B.H.

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

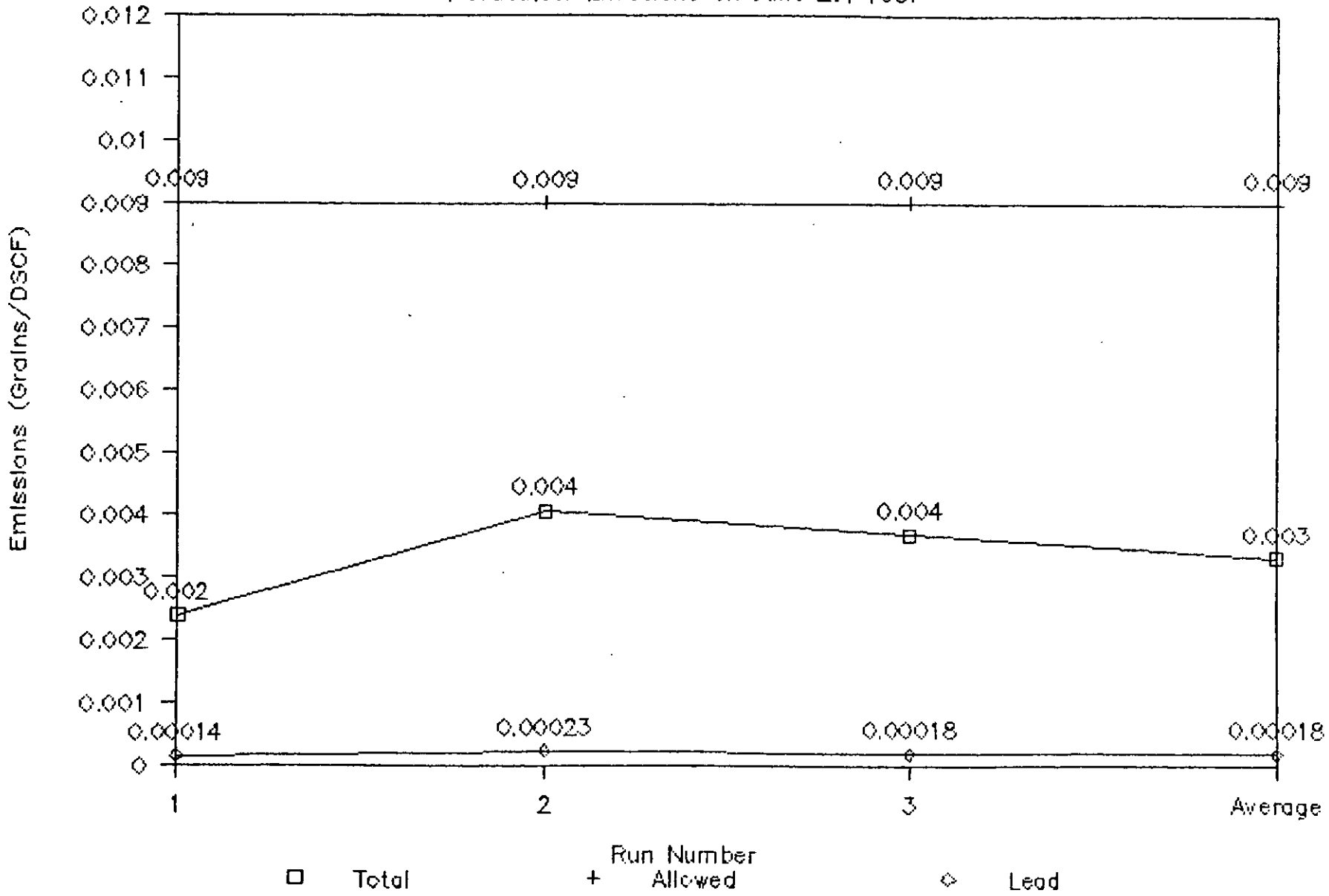
Summarized Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Reverb	Reverb	Reverb	Reverb
Time	0929-1031	1145-1247	1307-1443	0929-1443
Stack Gas Temperature, F	109	120	127	119
Moisture Content, % v/v	1.84	3.51	3.05	2.76
Oxygen Content, % v/v	21.00	21.00	21.00	21.00
Carbon Dioxide Content, % v/v	0.00	0.00	0.00	0.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	-14583.33	-14583.33	-14583.33	-14583.33
Stack Gas Velocity Feet per Second	60.20	54.82	52.19	55.76
Volumetric Flow Actual Cubic Feet per Minute	11,348	10,333	9,837	10,511
Volumetric Flow Dry Std Cubic Feet per Minute	10,323	9,064	8,567	9,313
Particulate Mass Rate, #/hr	0.21	0.32	0.27	0.27
Concentration Grains per Actual Cubic Foot	0.002	0.004	0.003	0.003
Concentration Grains per Dry Std Cubic Ft	0.002	0.004	0.004	0.003
Allowable Concentration Grains per Dry Std Cubic Ft	0.009	0.009	0.009	0.009
Concentration of Lead Grains per Dry Std Cubic Ft	1.39E-04	2.31E-04	1.82E-04	1.82E-04
% Isokinetic	99.62	100.47	100.15	100.04

Table 3

ILCO REVERB SANITARY BAGHOUSE STACK

Particulate Emissions on June 23, 1987



Graph 3

GUARDIAN SYSTEMS inc

SANITARY B.H.

GUARDIAN * SYSTEMS * INCORPORATED
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

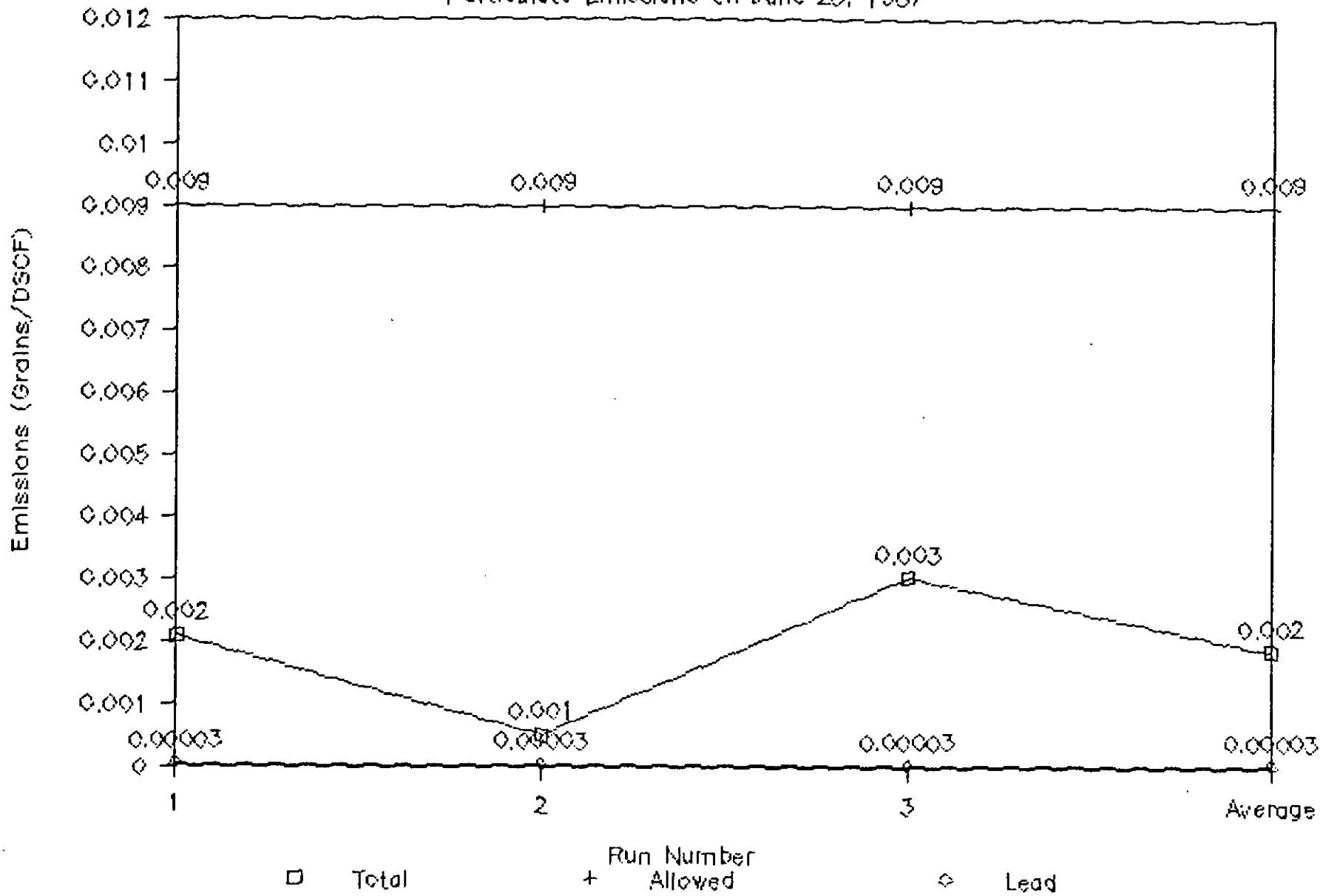
Summarized Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Blast	Blast	Blast	Blast
Time	0906-1028	1100-1220	1340-1454	0906-1454
Stack Gas Temperature, F	92	99	105	99
Moisture Content, % v/v	3.59	2.04	1.45	2.37
Oxygen Content, % v/v	20.00	20.00	20.00	20.00
Carbon Dioxide Content, % v/v	0.00	0.00	0.00	0.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	1785.71	1785.71	1785.71	1785.71
Stack Gas Velocity Feet per Second	53.32	54.08	53.84	53.75
Volumetric Flow Actual Cubic Feet per Minute	10,050	10,194	10,149	10,131
Volumetric Flow Dry Std Cubic Feet per Minute	9,262	9,426	9,341	9,342
Particulate Mass Rate, #/hr	0.17	0.04	0.24	0.15
Concentration Grains per Actual Cubic Foot	0.002	0.000	0.003	0.002
Concentration Grains per Dry Std Cubic Ft	0.002	0.001	0.003	0.002
Allowable Concentration Grains per Dry Std Cubic Ft	0.009	0.009	0.009	0.009
Concentration of Lead Grains per Dry Std Cubic Ft	2.81E-05	2.77E-05	3.01E-05	2.86E-05
% Isokinetic	96.45	96.02	94.75	95.74

Table 4

ILCO BLAST SANITARY BAGHOUSE STACK

Particulate Emissions on June 23, 1987



Graph 4

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Summarized Sulfur Dioxide Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
Stack Gas Temperature, F	163	171	156	163
Moisture Content, % v/v	7.70	10.29	3.44	7.20
Oxygen Content, % v/v	18.00	18.00	18.00	18.00
Carbon Dioxide Content, % v/v	2.00	2.00	2.00	2.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	576.92	576.92	576.92	576.92
Stack Gas Velocity Feet per Second	26.02	26.50	25.84	26.12
Volumetric Flow Actual Cubic Feet per Minute	44,136	44,963	43,835	44,314
Volumetric Flow Dry Std Cubic Feet per Minute	34,477	33,707	36,231	34,786
Concentration SO2 Pounds per Dry Std Cubic Ft	4.53E-04	4.57E-04	3.16E-04	4.08E-04
SO2 Emission Mass Rate, #/hr	936.19	923.26	687.94	851.02
% Isokinetic	98.57	100.98	96.13	98.56

Table 5

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Summarized Sulfur Dioxide Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
Stack Gas Temperature, F	133	128	121	127
Moisture Content, % v/v	3.78	0.81	2.77	2.59
Oxygen Content, % v/v	20.00	20.00	20.00	20.00
Carbon Dioxide Content, % v/v	0.00	0.00	0.00	0.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	1785.71	1785.71	1785.71	1785.71
Stack Gas Velocity Feet per Second	35.19	25.41	24.46	28.34
Volumetric Flow Actual Cubic Feet per Minute	6,634	4,789	4,611	5,341
Volumetric Flow Dry Std Cubic Feet per Minute	5,672	4,257	4,066	4,668
Concentration SO2 Pounds per Dry Std Cubic Ft	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SO2 Emission Mass Rate, #/hr	0.00	0.00	0.00	0.00
% Isokinetic	104.38	105.99	100.80	103.67

Table 6

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Summarized Sulfur Dioxide Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	6-23-87	6-23-87	6-23-87	6-23-87
Time	Reverb	Reverb	Reverb	Reverb
Stack Gas Temperature, F	0929-1031	1145-1247	1307-1443	0929-1443
Moisture Content, % v/v	1.84	3.51	3.05	2.76
Oxygen Content, % v/v	21.00	21.00	21.00	21.00
Carbon Dioxide Content, % v/v	0.00	0.00	0.00	0.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	-14583.33	-14583.33	-14583.33	-14583.33
Stack Gas Velocity Feet per Second	60.20	54.82	52.19	55.76
Volumetric Flow Actual Cubic Feet per Minute	11,348	10,333	9,837	10,511
Volumetric Flow Dry Std Cubic Feet per Minute	10,323	9,064	8,567	9,313
Concentration SO2 Pounds per Dry Std Cubic Ft	8.46E-06	1.10E-05	1.47E-05	1.12E-05
SO2 Emission Mass Rate, #/hr	5.24	5.99	7.54	6.26
% Isokinetic	99.62	100.47	100.15	100.04

Table 7

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Summarized Sulfur Dioxide Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	6-23-87	6-23-87	6-23-87	6-23-87
Time	Blast	Blast	Blast	Blast
Stack Gas Temperature, F	0906-1028	1100-1220	1340-1454	0906-1454
Moisture Content, % v/v	3.59	2.04	1.45	2.37
Oxygen Content, % v/v	20.00	20.00	20.00	20.00
Carbon Dioxide Content, % v/v	0.00	0.00	0.00	0.00
Carbon Monoxide Content, % v/v	0.00	0.00	0.00	0.00
Excess Air, %	1785.71	1785.71	1785.71	1785.71
Stack Gas Velocity Feet per Second	53.32	54.08	53.84	53.75
Volumetric Flow Actual Cubic Feet per Minute	10,050	10,194	10,149	10,131
Volumetrica Dry Std Cubic Feet per Minute	9,262	9,426	9,341	9,342
Concentration SO2 Pounds per Dry Std Cubic Ft	2.93E-07	3.85E-07	4.92E-08	2.44E-07
SO2 Emission Mass Rate, #/hr	0.16	0.22	0.03	0.14
% Isokinetic	96.45	96.02	94.75	95.74

Table 8

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
Barometric Pressure, in Hg	29.89	29.89	29.89	29.89
Static Pressure, in H20	-0.160	-0.160	-0.160	-0.160
Run Time, minutes	60.00	60.00	60.00	180.00
Meter Volume, CF	40.649	40.855	42.533	124.037
Meter Correction Factor, MCF	0.9988	0.9988	0.9988	
Meter Volume (Corrected)	40.600	40.806	42.482	123.888
Stack Temperature, F	163	171	156	163
Meter Temperature, F	109	111	121	114
Meter Pressure, in H20	1.72	1.73	1.81	1.75
Sqr Velocity Pressure	0.422	0.425	0.425	0.424
Mass of Particulate, mg	23.1	14.5	13.3	50.9
Mass of Lead in Part., ug	214.0	214.0	171.0	599.0
Ml of Water Collected	67.0	92.2	29.3	188.5
% Oxygen	18.00	18.00	18.00	18.00
% Carbon Dioxide	2.00	2.00	2.00	2.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	28.274	28.274	28.274	28.274
Pitot Correction Factor	0.839	0.839	0.839	0.839
Nozzle Diameter, in	0.310	0.310	0.310	0.310

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
1. Stack Pressure				
Inches Hg	29.88	29.88	29.88	29.88
Millimeters Hg	758.91	758.91	758.91	758.91
2. Meter Pressure				
Inches Hg	30.02	30.02	30.02	30.02
Millimeters Hg	762.42	762.44	762.59	762.48
3. Meter Volume				
Dry Std Cubic Feet	37.796	37.856	38.740	114.403
Dry Std Cubic Meters	1.070	1.072	1.097	3.240
4. Water Volume				
Std Cubic Feet	3.154	4.340	1.379	8.873
Std Cubic Meters	0.089	0.123	0.039	0.251
5. Moisture Content, %	7.70	10.29	3.44	7.20
6. Molecular Weight Dry	29.04	29.04	29.04	29.04
7. Molecular Weight Wet	28.19	27.90	28.66	28.25
8. Stack Velocity				
Feet per Second	26.02	26.50	25.84	26.12
Meters per Second	7.93	8.08	7.88	7.96
9. Volumetric Flow				
Actual Cubic Ft per minute	44,136	44,963	43,835	44,314
Actual Cubic M per second	20.83	21.22	20.69	20.92
10. Volumetric Flow				
Dry Std Cubic Ft per minute	34,477	33,707	36,231	34,786
Dry Std Cubic M per minute	16.27	15.91	17.10	16.42
11. Concentration				
Grains per Dry Std Cubic Ft	0.0094	0.0059	0.0053	0.0069
Grams per Dry Std Cubic M	0.0215	0.0135	0.0121	0.0157

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
11-A. Concentration Lead				
Grains per Dry Std Cubic Ft	0.00009	0.00009	0.00007	0.00008
Milligrams per Dry Std Cubic M	0.00566	0.00565	0.00441	0.00524
12. Excess Air, %	576.92	576.92	576.92	576.92
15. Particulate Mass Rate				
Pounds per Hour, #/hr	2.78	1.70	1.64	2.04
Lead, #/hr	0.03	0.03	0.02	0.02
16. Volume at Nozzle				
Actual Cubic Feet	48.388	50.501	46.872	145.744
Actual Cubic Meters	1.370	1.430	1.327	4.127
17. Concentration				
Grains per Actual Cubic Ft	0.0074	0.0044	0.0044	0.0054
Grams per Actual Cubic M	0.0168	0.0101	0.0100	0.0123
18. Isokinetic, %	98.57	100.98	96.13	98.56

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
Barometric Pressure, in Hg	29.89	29.89	29.89	29.89
Static Pressure, in H2O	-0.410	-0.410	-0.410	-0.410
Run Time, minutes	60.00	60.00	60.00	180.00
Meter Volume, CF	39.888	30.495	28.051	98.434
Meter Correction Factor, MCF	1.0356	1.0356	1.0356	~
Meter Volume (Corrected)	41.308	31.581	29.050	101.938
Stack Temperature, F	133	128	121	127
Meter Temperature, F	98	99	106	101
Meter Pressure, in H2O	1.15	0.67	0.59	0.80
Sqr Velocity Pressure	0.587	0.428	0.413	0.476
Mass of Particulate, mg	12.4	9.7	5.2	27.3
Mass of Lead in Part., ug	41.0	29.0	26.0	96.0
Ml of Water Collected	32.7	5.2	16.4	54.3
% Oxygen	20.00	20.00	20.00	20.00
% Carbon Dioxide	0.00	0.00	0.00	0.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	3.142	3.142	3.142	3.142
Pitot Correction Factor	0.839	0.839	0.839	0.839
Nozzle Diameter, in	0.252	0.252	0.252	0.252

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
1. Stack Pressure				
Inches Hg	29.86	29.86	29.86	29.86
Millimeters Hg	758.44	758.44	758.44	758.44
2. Meter Pressure				
Inches Hg	29.97	29.94	29.93	29.95
Millimeters Hg	761.35	760.46	760.31	760.71
3. Meter Volume				
Dry Std Cubic Feet	39.158	29.848	27.111	96.035
Dry Std Cubic Meters	1.109	0.845	0.768	2.720
4. Water Volume				
Std Cubic Feet	1.539	0.245	0.772	2.556
Std Cubic Meters	0.044	0.007	0.022	0.072
5. Moisture Content, %	3.78	0.81	2.77	2.59
6. Molecular Weight Dry	28.80	28.80	28.80	28.80
7. Molecular Weight Wet	28.39	28.71	28.50	28.52
8. Stack Velocity				
Feet per Second	35.19	25.41	24.46	28.34
Meters per Second	10.73	7.74	7.46	8.64
9. Volumetric Flow				
Actual Cubic Ft per minute	6,634	4,789	4,611	5,341
Actual Cubic M per second	3.13	2.26	2.18	2.52
10. Volumetric Flow				
Dry Std Cubic Ft per minute	5,672	4,257	4,066	4,668
Dry Std Cubic M per minute	2.68	2.01	1.92	2.20
11. Concentration				
Grains per Dry Std Cubic Ft	0.0049	0.0050	0.0030	0.0044
Grams per Dry Std Cubic M	0.0112	0.0115	0.0068	0.0100

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
11-A. Concentration Lead				
Grains per Dry Std Cubic Ft	0.00002	0.00001	0.00001	0.00002
Milligrams per Dry Std Cubic M	0.00105	0.00097	0.00096	0.00100
12. Excess Air, %	1785.71	1785.71	1785.71	1785.71
15. Particulate Mass Rate				
Pounds per Hour, #/hr	0.24	0.18	0.10	0.18
Lead, #/hr	0.001	0.001	0.001	0.001
16. Volume at Nozzle				
Actual Cubic Feet	45.801	33.581	30.745	109.893
Actual Cubic Meters	1.297	0.951	0.871	3.112
17. Concentration				
Grains per Actual Cubic Ft	0.0042	0.0044	0.0026	0.0038
Grams per Actual Cubic M	0.0095	0.0102	0.0060	0.0088
18. Isokinetic, %	104.38	105.99	100.80	103.67

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
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Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Reverb	Reverb	Reverb	Reverb
Time	0929-1031	1145-1247	1307-1443	0929-1443
Barometric Pressure, in Hg	29.94	29.94	29.94	29.94
Static Pressure, in H20	-0.810	-0.810	-0.810	-0.810
Run Time, minutes	60.00	60.00	60.00	180.00
Meter Volume, CF	35.580	31.924	30.351	97.855
Meter Correction Factor, MCF	1.0356	1.0356	1.0356	
Meter Volume (Corrected)	36.847	33.060	31.431	101.339
Stack Temperature, F	109	120	127	119
Meter Temperature, F	90	97	102	96
Meter Pressure, in H20	1.00	0.80	0.72	0.84
Sqr Velocity Pressure	1.030	0.926	0.877	0.944
Mass of Particulate, mg	5.5	8.3	7.1	20.9
Mass of Lead in Part., ug	321.0	471.0	350.0	1142.0
Ml of Water Collected	14.1	24.3	19.8	58.2
% Oxygen	21.00	21.00	21.00	21.00
% Carbon Dioxide	0.00	0.00	0.00	0.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	3.142	3.142	3.142	3.142
Pitot Correction Factor	0.839	0.839	0.839	0.839
Nozzle Diameter, in	0.182	0.182	0.182	0.182

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Reverb	Reverb	Reverb	Reverb
Time	0929-1031	1145-1247	1307-1443	0929-1443
1. Stack Pressure				
Inches Hg	29.88	29.88	29.88	29.88
Millimeters Hg	758.96	758.96	758.96	758.96
2. Meter Pressure				
Inches Hg	30.01	30.00	29.99	30.00
Millimeters Hg	762.34	761.97	761.82	762.04
3. Meter Volume				
Dry Std Cubic Feet	35.483	31.422	29.602	96.440
Dry Std Cubic Meters	1.005	0.890	0.838	2.731
4. Water Volume				
Std Cubic Feet	0.664	1.144	0.932	2.739
Std Cubic Meters	0.019	0.032	0.026	0.078
5. Moisture Content, %	1.84	3.51	3.05	2.76
6. Molecular Weight Dry	28.84	28.84	28.84	28.84
7. Molecular Weight Wet	28.64	28.46	28.51	28.54
8. Stack Velocity				
Feet per Second	60.20	54.82	52.19	55.76
Meters per Second	18.35	16.71	15.91	17.00
9. Volumetric Flow				
Actual Cubic Ft per minute	11,348	10,333	9,837	10,511
Actual Cubic M per second	5.36	4.88	4.64	4.96
10. Volumetric Flow				
Dry Std Cubic Ft per minute	10,323	9,064	8,567	9,313
Dry Std Cubic M per minute	4.87	4.28	4.04	4.40
11. Concentration				
Grains per Dry Std Cubic Ft	0.0024	0.0041	0.0037	0.0033
Grams per Dry Std Cubic M	0.0055	0.0093	0.0085	0.0076

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Reverb	Reverb	Reverb	Reverb
Time	0929-1031	1145-1247	1307-1443	0929-1443
11-A. Concentration Lead				
Grains per Dry Std Cubic Ft	0.00014	0.00023	0.00018	0.00018
Milligrams per Dry Std Cubic M	0.00905	0.01499	0.01182	0.01184
12. Excess Air, %	-14583.33	-14583.33	-14583.33	-14583.33
15. Particulate Mass Rate				
Pounds per Hour, #/hr	0.21	0.32	0.27	0.27
Lead, #/hr	0.012	0.018	0.013	0.015
16. Volume at Nozzle				
Actual Cubic Feet	39.006	35.821	33.991	108.843
Actual Cubic Meters	1.105	1.014	0.963	3.082
17. Concentration				
Grains per Actual Cubic Ft	0.0022	0.0036	0.0032	0.0030
Grams per Actual Cubic M	0.0050	0.0082	0.0074	0.0068
18. Isokinetic, %	99.62	100.47	100.15	100.04

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
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Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Blast	Blast	Blast	Blast
Time	0906-1028	1100-1220	1340-1454	0906-1454
Barometric Pressure, in Hg	29.94	29.94	29.94	29.94
Static Pressure, in H20	-0.550	-0.550	-0.550	-0.550
Run Time, minutes	72.00	72.00	72.00	216.00
Meter Volume, CF	37.839	38.609	38.294	114.742
Meter Correction Factor, MCF	1.0072	1.0072	1.0072	
Meter Volume (Corrected)	38.111	38.887	38.570	115.568
Stack Temperature, F	92	99	105	99
Meter Temperature, F	98	102	110	103
Meter Pressure, in H20	1.05	1.06	1.05	1.05
Sqr Velocity Pressure	0.920	0.930	0.922	0.924
Mass of Particulate, mg	4.9	1.2	7.1	13.2
Mass of Lead in Part., ug	66.0	66.0	70.0	202.0
Ml of Water Collected	28.6	16.2	11.2	56.0
% Oxygen	20.00	20.00	20.00	20.00
% Carbon Dioxide	0.00	0.00	0.00	0.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	3.142	3.142	3.142	3.142
Pitot Correction Factor	0.841	0.841	0.841	0.841
Nozzle Diameter, in	0.180	0.180	0.180	0.180

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Blast	Blast	Blast	Blast
Time	0906-1028	1100-1220	1340-1454	0906-1454
1. Stack Pressure				
Inches Hg	29.90	29.90	29.90	29.90
Millimeters Hg	759.45	759.45	759.45	759.45
2. Meter Pressure				
Inches Hg	30.02	30.02	30.02	30.02
Millimeters Hg	762.44	762.46	762.44	762.44
3. Meter Volume				
Dry Std Cubic Feet	36.180	36.654	35.844	108.672
Dry Std Cubic Meters	1.025	1.038	1.015	3.078
4. Water Volume				
Std Cubic Feet	1.346	0.763	0.527	2.636
Std Cubic Meters	0.038	0.022	0.015	0.075
5. Moisture Content, %	3.59	2.04	1.45	2.37
6. Molecular Weight Dry	28.80	28.80	28.80	28.80
7. Molecular Weight Wet	28.41	28.58	28.64	28.54
8. Stack Velocity				
Feet per Second	53.32	54.08	53.84	53.75
Meters per Second	16.25	16.48	16.41	16.38
9. Volumetric Flow				
Actual Cubic Ft per minute	10,050	10,194	10,149	10,131
Actual Cubic M per second	4.74	4.81	4.79	4.78
10. Volumetric Flow				
Dry Std Cubic Ft per minute	9,262	9,426	9,341	9,342
Dry Std Cubic M per minute	4.37	4.45	4.41	4.41
11. Concentration				
Grains per Dry Std Cubic Ft	0.0021	0.0005	0.0031	0.0019
Grams per Dry Std Cubic M	0.0048	0.0012	0.0070	0.0043

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Blast	Blast	Blast	Blast
Time	0906-1028	1100-1220	1340-1454	0906-1454
11-A. Concentration Lead				
Grains per Dry Std Cubic Ft	0.00003	0.00003	0.00003	0.00003
Milligrams per Dry Std Cubic M	0.00182	0.00180	0.00195	0.00186
12. Excess Air, %	1785.71	1785.71	1785.71	1785.71
15. Particulate Mass Rate				
Pounds per Hour, #/hr	0.17	0.04	0.24	0.15
Lead, #/hr	0.002	0.002	0.002	0.002
16. Volume at Nozzle				
Actual Cubic Feet	39.259	39.641	38.947	117.855
Actual Cubic Meters	1.112	1.123	1.103	3.338
17. Concentration				
Grains per Actual Cubic Ft	0.0019	0.0005	0.0028	0.0017
Grams per Actual Cubic M	0.0044	0.0011	0.0064	0.0039
18. Isokinetic, %	96.45	96.02	94.75	95.74

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
LEEDS, AL 35094
205-699-6647

Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
Barometric Pressure, in Hg	29.89	29.89	29.89	29.89
Static Pressure, in H2O	-0.160	-0.160	-0.160	-0.160
Run Time, minutes	60.00	60.00	60.00	180.00
Meter Volume, CF	40.649	40.855	42.533	124.037
Meter Correction Factor, MCF	0.9988	0.9988	0.9988	
Meter Volume (Corrected)	40.600	40.806	42.482	123.888
Stack Temperature, F	163	171	156	163
Meter Temperature, F	109	111	121	114
Meter Pressure, in H2O	1.72	1.73	1.81	1.75
Sqr Velocity Pressure	0.422	0.425	0.425	0.424
Barium perchlorate normality	0.0100	0.0100	0.0100	0.0100
Volume of sample titrated, ml	2	2	2	6
Total volume of sample, ml	500	500	500	1500
Volume of titrant, ml	97.25	98.25	69.80	265.30
Volume of blank, ml	0.35	0.35	0.35	1.05
Ml of Water Collected	67.0	92.2	29.3	188.5
% Oxygen	18.00	18.00	18.00	18.00
% Carbon Dioxide	2.00	2.00	2.00	2.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	28.274	28.274	28.274	28.274
Pitot Correction Factor	0.839	0.839	0.839	0.839
Nozzle Diameter, in	0.310	0.310	0.310	0.310

G U A R D I A N * S Y S T E M S * I N C O R P O R A T E D
P.O. BOX 300
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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
1. Stack Pressure				
Inches Hg	29.88	29.88	29.88	29.88
Millimeters Hg	758.91	758.91	758.91	758.91
2. Meter Pressure				
Inches Hg	30.02	30.02	30.02	30.02
Millimeters Hg	762.42	762.44	762.59	762.48
3. Meter Volume				
Dry Std Cubic Feet	37.796	37.856	38.740	114.403
Dry Std Cubic Meters	1.070	1.072	1.097	3.240
4. Water Volume				
Std Cubic Feet	3.154	4.340	1.379	8.873
Std Cubic Meters	0.089	0.123	0.039	0.251
5. Moisture Content, %	7.70	10.29	3.44	7.20
6. Molecular Weight Dry	29.04	29.04	29.04	29.04
7. Molecular Weight Wet	28.19	27.90	28.66	28.25
8. Stack Velocity				
Feet per Second	26.02	26.50	25.84	26.12
Meters per Second	7.93	8.08	7.88	7.96
9. Volumetric Flow				
Actual Cubic Ft per minute	44,136	44,963	43,835	44,314
Actual Cubic M per second	20.83	21.22	20.69	20.92
10. Volumetric Flow				
Dry Std Cubic Ft per minute	34,477	33,707	36,231	34,786
Dry Std Cubic M per minute	16.27	15.91	17.10	16.42
Concentration SO 2				
Pounds per Dry Std Cubic Ft	4.53E-04	4.57E-04	3.16E-04	4.08E-04
Grams per Dry Std Cubic M	7.2490	7.3123	5.0690	6.5310
12. Excess Air, %	576.92	576.92	576.92	576.92

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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Main Stk	Main Stk	Main Stk	Main Stk
Time	1020-1120	1220-1325	1410-1515	1020-1515
SO2 Emission Mass Rate Pounds per Hour, #/hr	936.19	923.26	687.94	851.02
16. Volume at Nozzle Actual Cubic Feet	48.388	50.501	46.872	145.744
Actual Cubic Meters	1.370	1.430	1.327	4.127
18. Isokinetic, %	98.57	100.98	96.13	98.56

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Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
Barometric Pressure, in Hg	29.89	29.89	29.89	29.89
Static Pressure, in H2O	-0.410	-0.410	-0.410	-0.410
Run Time, minutes	60.00	60.00	60.00	180.00
Meter Volume, CF	39.888	30.495	28.051	98.434
Meter Correction Factor, MCF	1.0356	1.0356	1.0356	
Meter Volume (Corrected)	41.308	31.581	29.050	101.938
Stack Temperature, F	133	128	121	127
Meter Temperature, F	98	99	106	101
Meter Pressure, in H2O	1.15	0.67	0.59	0.80
Sqr Velocity Pressure	0.587	0.428	0.413	0.476
Barium perchlorate normality	0.0100	0.0100	0.0100	0.0100
Volume of sample titrated, ml	5	5	5	15
Total volume of sample, ml	500	500	500	1500
Volume of titrant, ml	0.35	0.35	0.35	1.05
Volume of blank, ml	0.35	0.35	0.35	1.05
Ml of Water Collected	32.7	5.2	16.4	54.3
% Oxygen	20.00	20.00	20.00	20.00
% Carbon Dioxide	0.00	0.00	0.00	0.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	3.142	3.142	3.142	3.142
Pitot Correction Factor	0.839	0.839	0.839	0.839
Nozzle Diameter, in	0.252	0.252	0.252	0.252

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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
1. Stack Pressure				
Inches Hg	29.86	29.86	29.86	29.86
Millimeters Hg	758.44	758.44	758.44	758.44
2. Meter Pressure				
Inches Hg	29.97	29.94	29.93	29.95
Millimeters Hg	761.35	760.46	760.31	760.71
3. Meter Volume				
Dry Std Cubic Feet	39.158	29.848	27.111	96.035
Dry Std Cubic Meters	1.109	0.845	0.768	2.720
4. Water Volume				
Std Cubic Feet	1.539	0.245	0.772	2.556
Std Cubic Meters	0.044	0.007	0.022	0.072
5. Moisture Content, %	3.78	0.81	2.77	2.59
6. Molecular Weight Dry	28.80	28.80	28.80	28.80
7. Molecular Weight Wet	28.39	28.71	28.50	28.52
8. Stack Velocity				
Feet per Second	35.19	25.41	24.46	28.34
Meters per Second	10.73	7.74	7.46	8.64
9. Volumetric Flow				
Actual Cubic Ft per minute	6,634	4,789	4,611	5,341
Actual Cubic M per second	3.13	2.26	2.18	2.52
10. Volumetric Flow				
Dry Std Cubic Ft per minute	5,672	4,257	4,066	4,668
Dry Std Cubic M per minute	2.68	2.01	1.92	2.20
Concentration SO 2				
Founds per Dry Std Cubic Ft	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Grams per Dry Std Cubic M	0.0000	0.0000	0.0000	0.0000
12. Excess Air, %	1785.71	1785.71	1785.71	1785.71

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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-22-87	6-22-87	6-22-87	6-22-87
Location	Refin Stk	Refin Stk	Refin Stk	Refin Stk
Time	1042-1146	1258-1401	1444-1547	1042-1547
SO2 Emission Mass Rate Pounds per Hour, #/hr	0.00	0.00	0.00	0.00
16. Volume at Nozzle				
Actual Cubic Feet	45.801	33.581	30.745	109.893
Actual Cubic Meters	1.297	0.951	0.871	3.112
18. Isokinetic, %	104.38	105.99	100.80	103.67

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Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Reverb	Reverb	Reverb	Reverb
Time	0929-1031	1145-1247	1307-1443	0929-1443
Barometric Pressure, in Hg	29.94	29.94	29.94	29.94
Static Pressure, in H2O	-0.810	-0.810	-0.810	-0.810
Run Time, minutes	60.00	60.00	60.00	180.00
Meter Volume, CF	35.580	31.924	30.351	97.855
Meter Correction Factor, MCF	1.0356	1.0356	1.0356	
Meter Volume (Corrected)	36.847	33.060	31.431	101.339
Stack Temperature, F	109	120	127	119
Meter Temperature, F	90	97	102	96
Meter Pressure, in H2O	1.00	0.80	0.72	0.84
Sqr Velocity Pressure	1.030	0.926	0.877	0.944
Barium perchlorate normality	0.0100	0.0100	0.0100	0.0100
Volume of sample titrated, ml	5	5	5	15
Total volume of sample, ml	500	500	500	1500
Volume of titrant, ml	4.60	5.25	6.50	16.35
Volume of blank, ml	0.35	0.35	0.35	1.05
Ml of Water Collected	14.1	24.3	19.8	58.2
% Oxygen	21.00	21.00	21.00	21.00
% Carbon Dioxide	0.00	0.00	0.00	0.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	3.142	3.142	3.142	3.142
Pitot Correction Factor	0.839	0.839	0.839	0.839
Nozzle Diameter, in	0.182	0.182	0.182	0.182

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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Reverb	Reverb	Reverb	Reverb
Time	0929-1031	1145-1247	1307-1443	0929-1443
1. Stack Pressure				
Inches Hg	29.88	29.88	29.88	29.88
Millimeters Hg	758.96	758.96	758.96	758.96
2. Meter Pressure				
Inches Hg	30.01	30.00	29.99	30.00
Millimeters Hg	762.34	761.97	761.82	762.04
3. Meter Volume				
Dry Std Cubic Feet	35.483	31.422	29.602	96.440
Dry Std Cubic Meters	1.005	0.890	0.838	2.731
4. Water Volume				
Std Cubic Feet	0.664	1.144	0.932	2.739
Std Cubic Meters	0.019	0.032	0.026	0.078
5. Moisture Content, %	1.84	3.51	3.05	2.76
6. Molecular Weight Dry	28.84	28.84	28.84	28.84
7. Molecular Weight Wet	28.64	28.46	28.51	28.54
8. Stack Velocity				
Feet per Second	60.20	54.82	52.19	55.76
Meters per Second	18.35	16.71	15.91	17.00
9. Volumetric Flow				
Actual Cubic Ft per minute	11,348	10,333	9,837	10,511
Actual Cubic M per second	5.36	4.88	4.64	4.96
10. Volumetric Flow				
Dry Std Cubic Ft per minute	10,323	9,064	8,567	9,313
Dry Std Cubic M per minute	4.87	4.28	4.04	4.40
Concentration SO 2				
Pounds per Dry Std Cubic Ft	8.46E-06	1.10E-05	1.47E-05	1.12E-05
Grams per Dry Std Cubic M	0.1355	0.1764	0.2350	0.1794
12. Excess Air, %	-14583.33	-14583.33	-14583.33	-14583.33

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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Reverb	Reverb	Reverb	Reverb
Time	0929-1031	1145-1247	1307-1443	0929-1443
SO2 Emission Mass Rate Pounds per Hour, #/hr	5.24	5.99	7.54	6.26
16. Volume at Nozzle Actual Cubic Feet	39.006	35.821	33.991	108.843
Actual Cubic Meters	1.105	1.014	0.963	3.082
18. Isokinetic, %	99.62	100.47	100.15	100.04

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Computer Input Paramters for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Blast	Blast	Blast	Blast
Time	0906-1028	1100-1220	1340-1454	0906-1454
Barometric Pressure, in Hg	29.94	29.94	29.94	29.94
Static Pressure, in H2O	-0.550	-0.550	-0.550	-0.550
Run Time, minutes	72.00	72.00	72.00	216.00
Meter Volume, CF	37.839	38.609	38.294	114.742
Meter Correction Factor, MCF	1.0072	1.0072	1.0072	
Meter Volume (Corrected)	38.111	38.887	38.570	115.568
Stack Temperature, F	92	99	105	99
Meter Temperature, F	98	102	110	103
Meter Pressure, in H2O	1.05	1.06	1.05	1.05
Sqr Velocity Pressure	0.920	0.930	0.922	0.924
Barium perchlorate normality	0.0100	0.0100	0.0100	0.0100
Volume of sample titrated, ml	5	5	5	15
Total volume of sample, ml	500	500	500	1500
Volume of titrant, ml	0.50	0.55	0.38	1.43
Volume of blank, ml	0.35	0.35	0.35	1.05
Ml of Water Collected	28.6	16.2	11.2	56.0
% Oxygen	20.00	20.00	20.00	20.00
% Carbon Dioxide	0.00	0.00	0.00	0.00
% Carbon Monoxide	0.00	0.00	0.00	0.00
Stack Area, Sq ft	3.142	3.142	3.142	3.142
Pitot Correction Factor	0.841	0.841	0.841	0.841
Nozzle Diameter, in	0.180	0.180	0.180	0.180

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Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Blast	Blast	Blast	Blast
Time	0906-1028	1100-1220	1340-1454	0906-1454
1. Stack Pressure				
Inches Hg	29.90	29.90	29.90	29.90
Millimeters Hg	759.45	759.45	759.45	759.45
2. Meter Pressure				
Inches Hg	30.02	30.02	30.02	30.02
Millimeters Hg	762.44	762.46	762.44	762.44
3. Meter Volume				
Dry Std Cubic Feet	36.180	36.654	35.844	108.672
Dry Std Cubic Meters	1.025	1.038	1.015	3.078
4. Water Volume				
Std Cubic Feet	1.346	0.763	0.527	2.636
Std Cubic Meters	0.038	0.022	0.015	0.075
5. Moisture Content, %	3.59	2.04	1.45	2.37
6. Molecular Weight Dry	28.80	28.80	28.80	28.80
7. Molecular Weight Wet	28.41	28.58	28.64	28.54
8. Stack Velocity				
Feet per Second	53.32	54.08	53.84	53.75
Meters per Second	16.25	16.48	16.41	16.38
9. Volumetric Flow				
Actual Cubic Ft per minute	10,050	10,194	10,149	10,131
Actual Cubic M per second	4.74	4.81	4.79	4.78
10. Volumetric Flow				
Dry Std Cubic Ft per minute	9,262	9,426	9,341	9,342
Dry Std Cubic M per minute	4.37	4.45	4.41	4.41
Concentration SO 2				
Pounds per Dry Std Cubic Ft	2.93E-07	3.85E-07	4.92E-08	2.44E-07
Grams per Dry Std Cubic M	0.0047	0.0062	0.0008	0.0039
12. Excess Air, %	1785.71	1785.71	1785.71	1785.71

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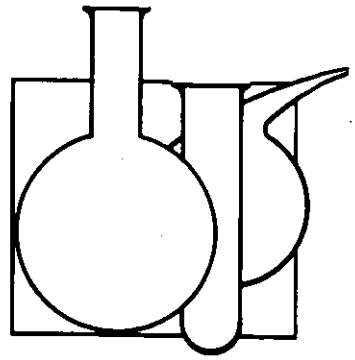
Computed Air Test Results for Interstate Lead Company

Run Number	1	2	3	Average
Date	6-23-87	6-23-87	6-23-87	6-23-87
Location	Blast	Blast	Blast	Blast
Time	0906-1028	1100-1220	1340-1454	0906-1454
SO2 Emission Mass Rate Pounds per Hour, #/hr	0.16	0.22	0.03	0.14
16. Volume at Nozzle Actual Cubic Feet	39.259	39.641	38.947	117.855
Actual Cubic Meters	1.112	1.123	1.103	3.338
18. Isokinetic, %	96.45	96.02	94.75	95.74

Sampling & Analytical Procedures



III. METHOD 8 & 12 SAMPLING AND ANALYTICAL PROCEDURES

General

All sampling and analytical procedures for determination of the particulate, lead, and sulfur dioxide emissions from this source were conducted in strict adherence with the Code of Federal Regulations, Title 40, Part 60, Appendix A, Methods 1-4, 8 & 12 as amended and discribed below. The equipment used in this test was manufactured by Research Appliance Corporation and was properly calibrated before these tests (See **Calibrations**). The particulate mass was determined gravimetrically after removal of uncombined water. The sulfur dioxide was determined by titrating the hydrogen peroxide with 0.0100 N Barium Perchlorate. The inorganic lead (particulate and gaseous) was determined on the particulate and liquid samples by acid digestion and analyzed by atomic absorption spectroscopy using an air acetylene flame.

METHOD 1

This method was used to determine the number of sampling points and the required matrix. The dimensions of the stacks (see **Figure 4, 5, 6 & 7**) indicated that 24 points would be required to sample these stacks for particulate, lead and SO_2. We sampled 24 points (12 per diameter) for two and a half minutes at each point on the Metallurgical Baghouse, Refining Baghouse, and Reverberatory Sanitary Baghouse Stacks and three minutes at the Blast Furnace Sanitary Baghouse Stack. Verification of absence of cyclonic flow was not determined because cyclonic flow did not seem to exist from the stack exhaust.

METHOD 2

Velocity meaurements were taken at all locations using a properly calibrated S type pitot tube and a 0-10 inch inclined manometer.

METHOD 3

Gas analysis for CO_2, O_2, and N_2 by difference was performed by using the grab sample technique twice during each test and analyzed with a Fyrite Gas Analyzer (0-20% scale with 0.5% divisions).

METHOD 4

Moisture content of the stack gases was determined in conjunction with Method 8-12 for each test by weighing the amount of water collected in the impingers and the increase in weight of the silica gel. These weights were combined to give the total amount of water collected.

METHOD 8

Sampling Techniques

Preliminary data was used to determine stack temperature, pressure, range of velocity heads, moisture content and stack gas dry molecular weight prior to sampling. A Radio Shack PC-4 computer and a TI55 was used to calculate the sampling rate for isokinetic sampling. The particulate determinations were made by utilizing the sample train in **Figure 8.** The meter box was leak checked from the pump to the orifice and initial and final leak checks of the sampling system and pitot lines were performed as outlined in Method 5 and were recorded on the data sheets **(See Field Data).** The nozzle (stainless steel 316 with an angle of taper of 30° and of button hook design) was calibrated before and after each test using a micrometer and was also recorded on the data sheets.

The sampling probe was placed at each sampling point for two and a half minutes to provide a total sampling time of 60 minutes. The only exception was the Blast Stack which was sampled for 3 minutes a point for a total sampling time of 72 minutes. The gases were drawn through a stainless steel nozzle attached to a heated glass lined probe. The probe was maintained at the proper setting to obtain an exit temperature of 248 $\pm$ 25 °F (See **Calibrations).** The gases then pass through a glass fiber filter (Reeve Angel 934 AH) of 0.3 micron retention to remove particulate matter. The filter was maintained at a temperature of 248 $\pm$ 25 °F. These temperatures were recorded at each point on the data sheets.

The gases were then scrubbed through a series of four impingers to capture SO_3, SO_2, condensed lead and moisture. The first impinger contained approximately 100 ml of an 80% isopropanol solution, the second and third impingers contained approximately 100 ml of a 3% solution of hydrogen peroxide (H_2O_2), the fourth contained approximately 100ml of a 0.1 N nitric acid solution.

A silica gel tube was placed in line before the meter for final moisture collection. These impingers were placed in an ice bath to maintain a maxium exit temperature of 68 °F. This temperature was also recorded on the data sheets. The clean and cool gases then entered the meter box where the gas flow and temperature were measured and recorded.

Upon completion of the sampling, the sampling probe was removed from the stack and the post-test meter and pitot leakage rates were determined and recorded on the Data Sheets. The complete sampling train was transferred to the clean-up area making sure no sample was lost.

The clean-up data was recorded on **Combined Methods 8 & 12 Sample Recovery and Intergrity Sheet** for the particulate and **Method 8 Sample recovery and Integrity Data** for the sulfur dioxide. These sheets are located in the Field Data Section. Particulate catches were placed in sealed petri dishes. Each acetone rinse from the nozzle, probe, cyclone, dropout bottle and filter holder was combined and placed in a sealed container. For the group of tests an acetone blank of approximately 200 milliliters was placed in a sealed container. The contents of the four impingers were transferred to their respective tared bottles and reweighed. Then the rinsings from the connecting pieces and the impinger were added to the respective bottles, labeled and sealed. Field blanks of the IPA, hydrogen peroxide, and nitric acid were also taken and place in a bottle, labeled and sealed. These containers were clearly marked and transported to our laboratory for analysis.

Analysis

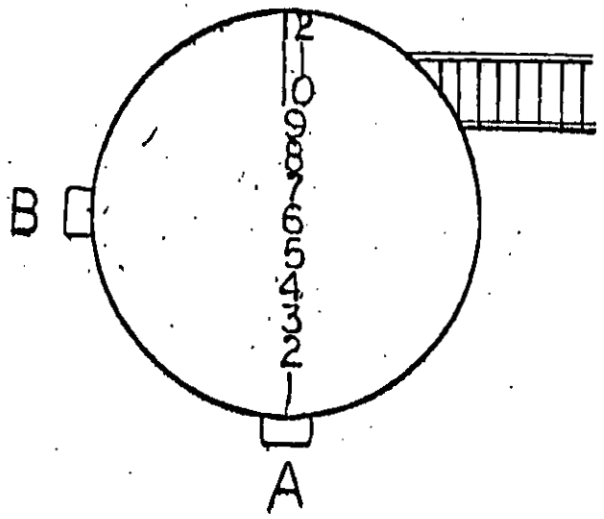
The Filters (Reeve Angel 934 AH, without organic binder, minimum 99.95% retention for particules of 0.3 microns as determined by DOP tests) were prepared for the field test by desiccating at 68 ± 10 °F at ambient pressure for 24 hours and weighing at intervals of at least six (6) hours to a constant weight to the nearest 0.1 milligrams (less than 0.5 milligrams change from previous reading). Upon return to the laboratory, the filters were subjected to the same procedures as outlined above. The weights were recorded in a bound laboratory book and transferred to the sheets in this report (**Method 5 Train Analytical Particulate Data**). During each weighing the filter was not exposed to laboratory atmosphere for more than two (2) minutes and a relative humidity of less than fifty percent (50%).

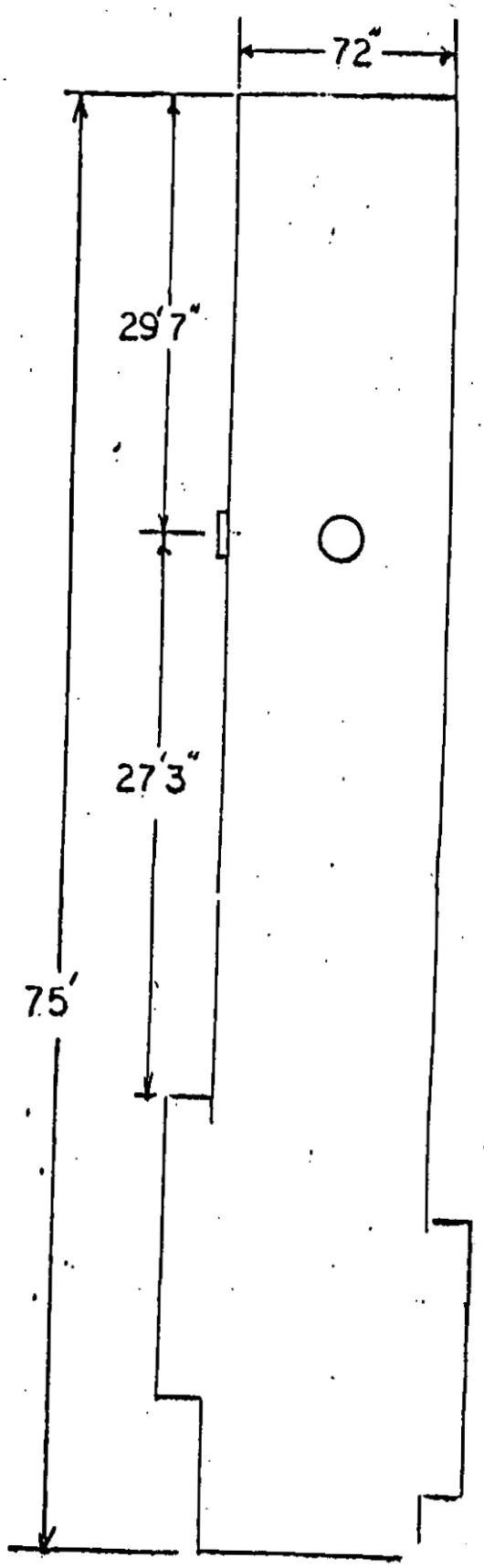
The acetone (reagent grade, 0.001 % residue, in glass bottles) blank (**Blank Analytical Data**) for the group of tests and the acetone rinses for each test were evaporated to dryness in tared acid rinsed glass beakers on a water bath. They were then desiccated for twenty-four (24) hour and weighed to a constant weight as described above.

For each test the contents of the second and third impingers were titrated for SO_2 content using a 0.0100N barium perchlorate as the titrant as outlined in Method 8. For quality control EPA check sample 4404 and 8558 were titrated and the results are reported at the bottom of the SO_2 equation sheet.

The filters and the acetone washes, the IPA solution, the hydrogen peroxide solution, and the nitric acid solution for each test were analyzed for total lead by Atomic Absorption Spectrophotometric methods as specified in Method 12.

Metallurgical Baghouse Stack

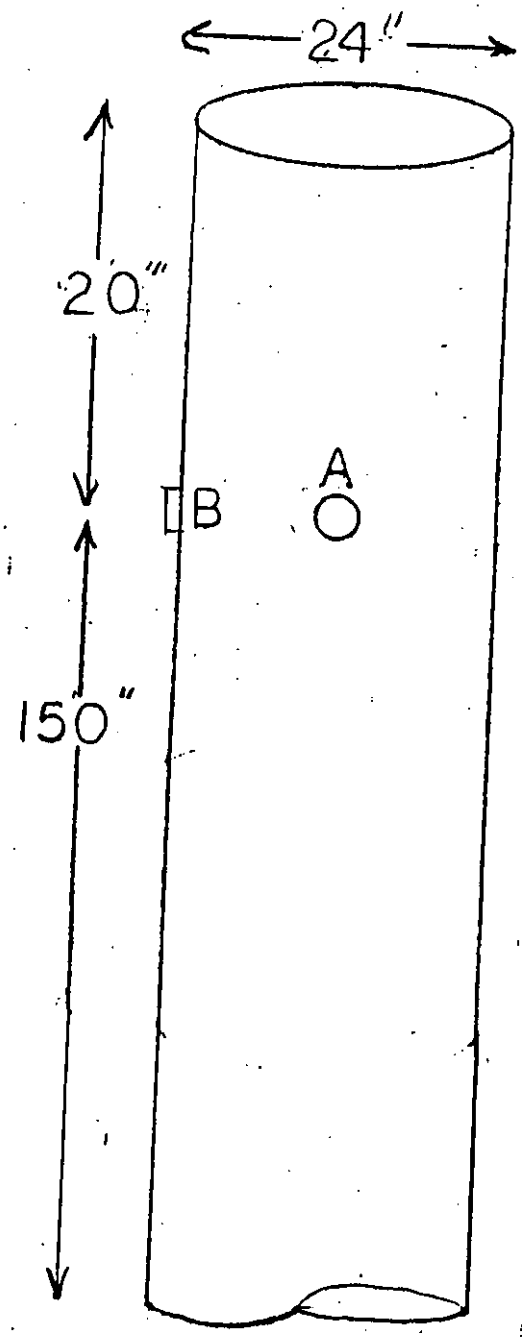




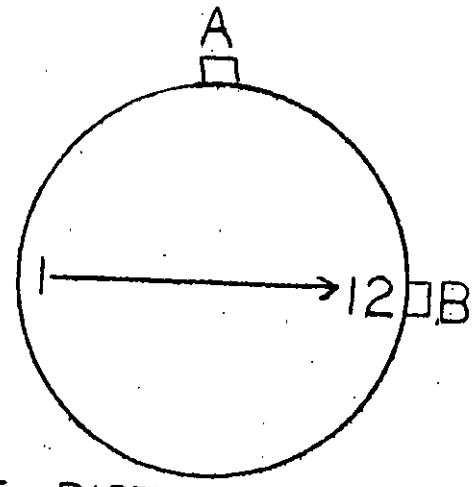
Point #	Distance from wall (in)
12	1.5
11	4.8
10	8.5
9	12.8
8	18.0
7	25.6
6	46.4
5	54.0
4	59.2
3	63.5
2	67.2
1	70.5

Figure 5

Refining Baghouse Stack



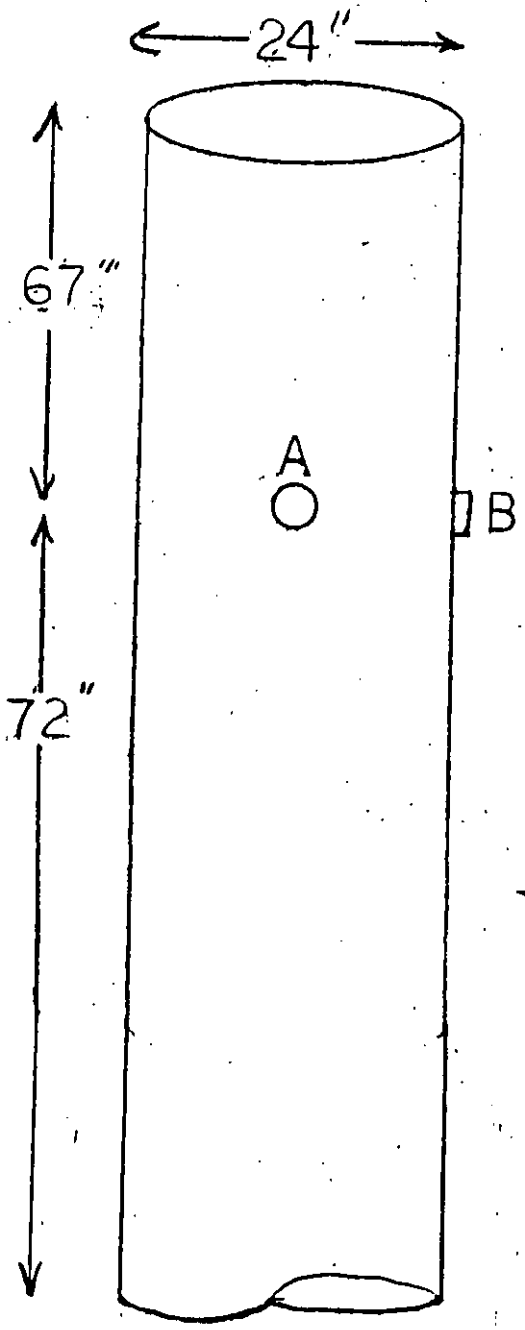
STACK BREECHING & SAMPLING LOCATION



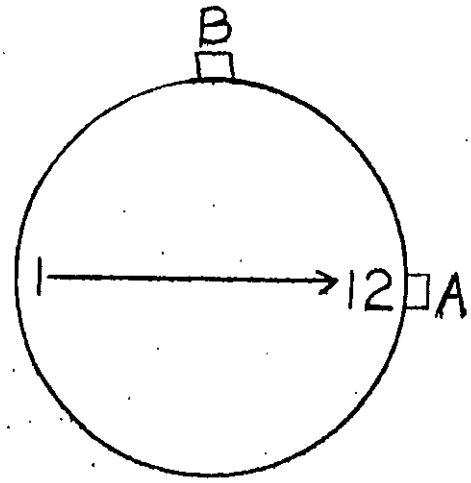
POINT	DISTANCE TO WALL
1	1.0"
2	1.6"
3	2.8"
4	4.3"
5	6.0"
6	8.5"
7	15.5"
8	18.0"
9	19.7"
10	21.2"
11	22.4"
12	23.0"

Figure 6

Reverberatory Furnace Sanitary Baghouse Stack



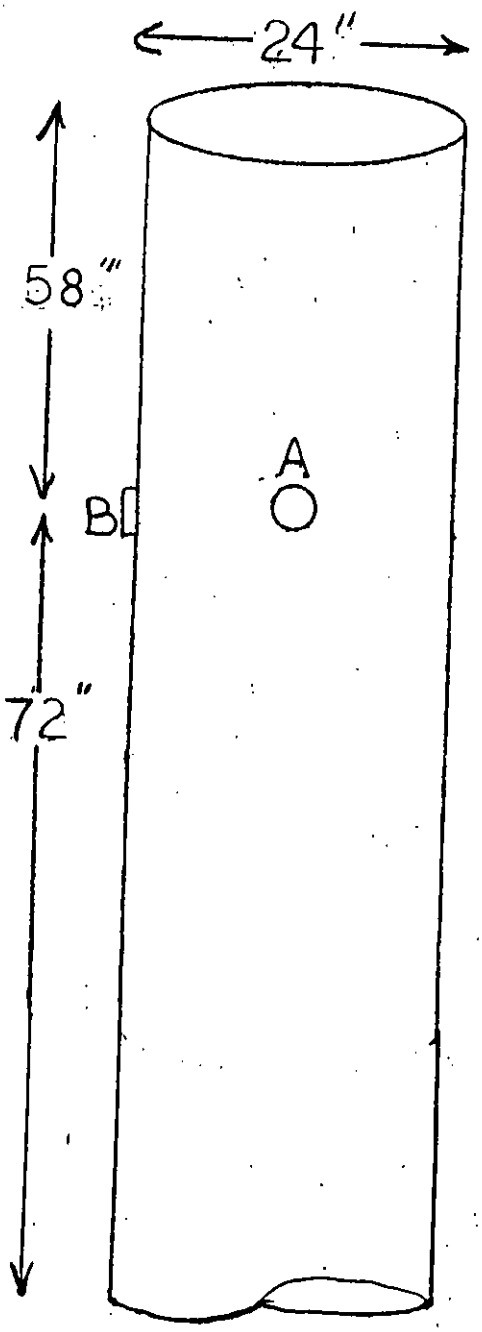
STACK BREECHING & SAMPLING LOCATION



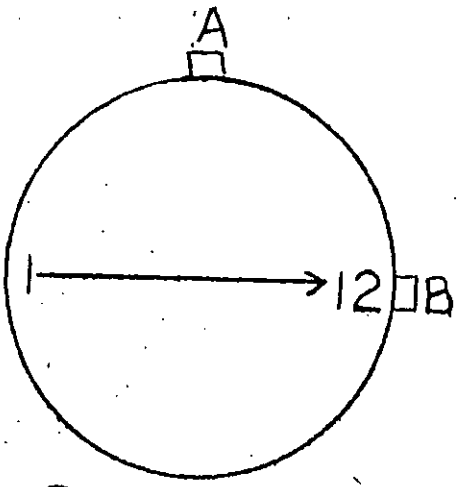
POINT	DISTANCE TO WALL
1	1.0"
2	1.6"
3	2.8"
4	4.3"
5	6.0"
6	8.5"
7	15.5"
8	18.0"
9	19.7"
10	21.2"
11	22.4"
12	23.0"

Figure 7

Blast Furnace Sanitary Baghouse Stack

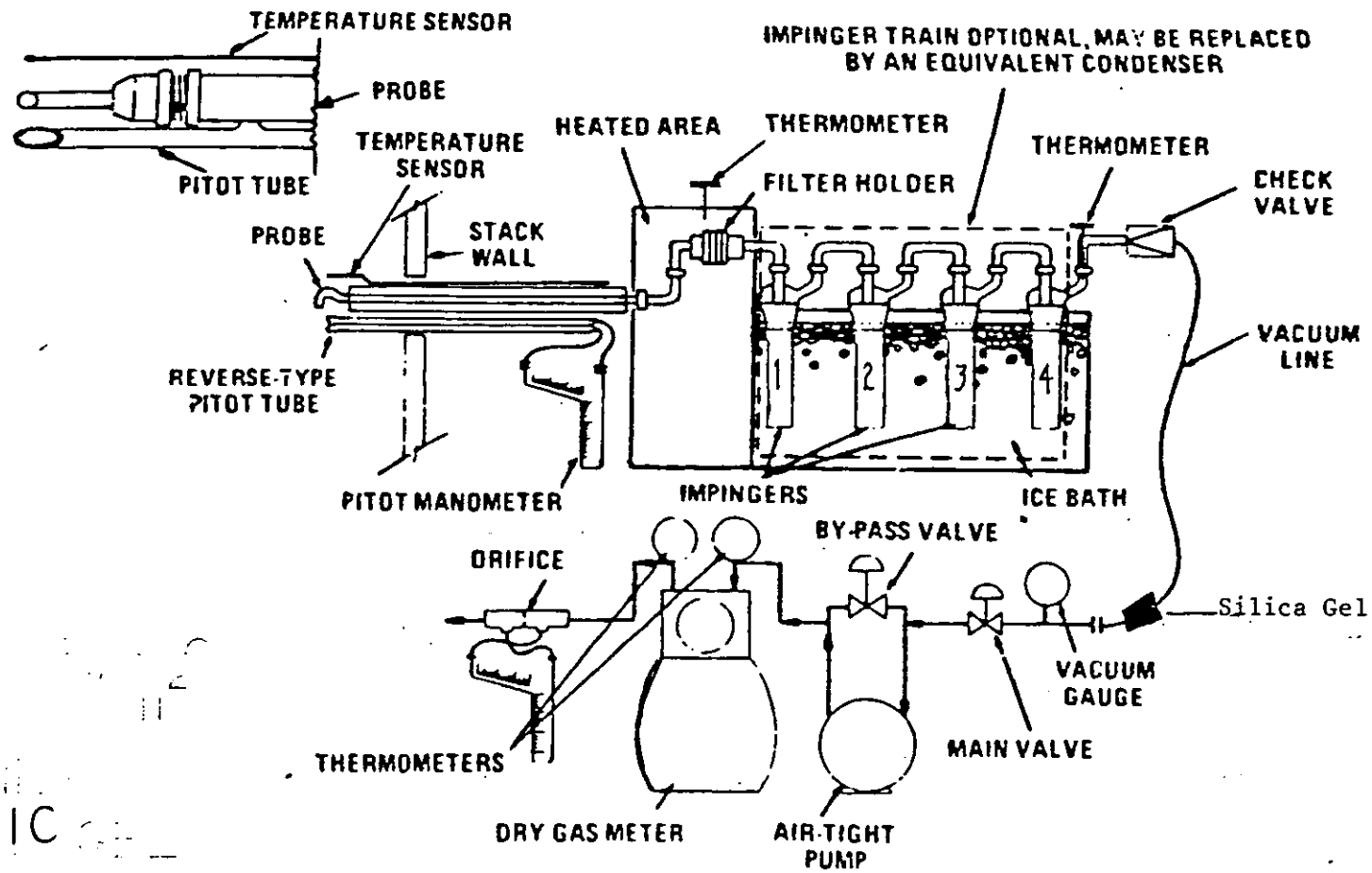


STACK BREECHING & SAMPLING LOCATION



POINT	DISTANCE TO WALL
1	1.0"
2	1.6"
3	2.8"
4	4.3"
5	6.0"
6	8.5"
7	15.5"
8	18.0"
9	19.7"
10	21.2"
11	22.4"
12	23.0"

Figure 8



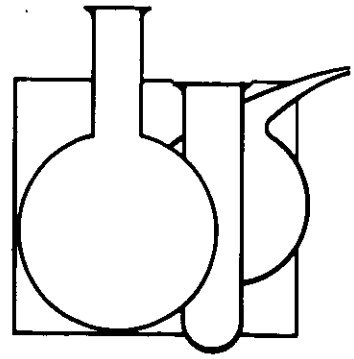
1 IPA
2 H_2O_2
3 H_2O_2
4 NITRIC

Particulate Sampling Train

Figure 8

GUARDIAN SYSTEMS inc

Field Data



NOMENCLATURE

ACF - Actual Cubic Feet

ACFM - Actual Cubic Feet per minute

ACM - Actual Cubic Meters

ACMS - Actual Cubic Meters per second

An - Cross sectional area of nozzle, (ft^2)

As - Area of Stack, (ft^2)

Bws - Water vapor in the gas stream, proportion by volume (dimensionless)

Ca - Acetone blank residue concentration, mg/g

c_a - Particulate Concentration, ACF

CFM - Cubic feet per minute

Cp - Pitot tube coefficient, (dimensionless)

c_s - Particulate Concentration, grains/DSCF

Cso_2 - Concentration of sulfur dioxide (dry basis) corrected to standard conditions, lb/DSCF

C_{12} - Particulate concentration (c_s adjusted to 12% excess air), grains/DSCF

C_{50} - Particulate concentration (c_s adjusted to 50% excess air), grains/DSCF

DSCF - Dry Standard Cubic Feet

DSCFM - Dry Standard Cubic Feet per minute

DSCM - Dry Standard Cubic Meters

DSCMS - Dry Standard Cubic Meters per second

EA - Excess Air, %

I - Isokinetic Sampling, %

Km - Orifice Correction Factor, (dimensionless)

Kp - Pitot tube constant, 85.49 $\left[\frac{(lb/lb\text{-}mole)(in.\ Hg)}{(^{o}R)\ (in.\ H_2O)}\right]^{1/2}$

La - Maximum acceptable leakage rate for either a pretest leak check or for a leak check following a component change; equal to 0.02 CFM or 4 percent of the average sampling rate, whichever is less.

Li - Individual leakage rate observed during the leak check conducted prior to the "i^{th}" component change ($i = 1,2,3,...n$), CFM.

Lp - Leakage rate observed during the post test leak check, ft^3/min. (cfm).

Ma - Mass of residue of acetone after evaporation, mg.

Md - Molecular weight of stack gas; dry basis, lb/lb-mole.

Mn - Total amount of particulate matter collected, mg.

Ms - Molecular weight of stack gas; wet basis, lb/lb-mole.

Mw - Molecular weight of water, 18.0 g/g-mole (18.01 lb/lb-mole)

ΔP - Velocity head of stack gas, in. H_2O

Pa - Density of acetone, mg/ml

Pbar - Barometric pressure at the sampling site, in. Hg

Pg - Stack static pressure, in. H_2O

Pm - Meter pressure, in. Hg

PMR - Particulate Mass Rate, lbs per hour

Ps - Absolute stack pressure, in. Hg

Pstd - Standard absolute pressure, 29.92 in. Hg

Pw - Density of water, 0.9982 g/ml (0.002201 lb/ml)

Qa - Volumetric flow rate, ACFM

Qs - Volumetric flow rate, DSCFM

R - Ideal gas constant, 0.06236 mm Hg - $m^3/^oK$-g-mole (21.85 in. Hg-$ft^3/^oR$-lb-mole)

SCF - Standard Cubic Foot

ta - Ambient Temperature, ^oF

tm - Average Temperature of meter, ^oF

t_s - Average Temperature of stack, ^oF

tstd - Standard Temperature, 68°F

NOTE: Capital "T" denotes degrees Rankin

Va - Volume of acetone blank, ml

Vaw - Volume of acetone used in wash, ml

Vlc - Total volume of liquid collected in condenser and silica gel, ml

Vm - Volume of gas sample, as measured by the dry gas meter, ACF

Vmc - Volume of gas sample, corrected for leak, ACF

Vm(std) - Volume of gas sample measured by the dry gas meter, corrected to standard conditions, DSCF

Vn - Volume collected at stack conditions through nozzle, ACF

Vs - Average stack gas velocity, ft/sec.

Vw(std) - Volume of water in the gas sample, corrected to standard conditions, SCF

Wa - Weight of residue in acetone wash, mg

Y - Dry gas meter calibration factor, (dimensionless)

ΔH - Average pressure differential across the calibrated orifice, in. H_2O

ΔH_a - Value of ΔH measured for a specific orifice when operated under the following conditions: 0.75 cfm of dry air (M.W. = 29) at 68°F, 29.92 in. Hg.

$\sqrt{\Delta P}$ - Average of the square roots of the velocity pressure, in. H_2O

Θ - Total sampling time, min.

Θ_1 - Sampling time interval from the beginning of a run until the first component change, min.

Θ_i - Sampling time interval between two successive component changes, beginning with the interval between the first and second changes, min.

Θp - Sampling time interval from the final (n^{th}) component change until the end of the sampling run, min.

$\%CO_2$, $\%O_2$, $\%N_2$, %CO - Number percent (%) by volume (dry basis) of each compound in the stack gas.

EQUATIONS

1. $P_s = P_{bar} + \frac{P_g}{13.6}$

2. $P_m = P_{bar} + \frac{\overline{\Delta H}}{13.6}$

3. $V_{m(std)} = V_m Y \left(\frac{Tstd}{Tm}\right) \left[\frac{Pbar + \frac{\overline{\Delta H}}{13.6}}{Pstd}\right]$

4. $V_w(std) = 0.04707\ V_{lc}$

5. $B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}}$

6. $M_d = 0.44\ (\%CO_2) + 0.32\ (\%O_2) + 0.28\ (\%N_2 + \%CO)$

7. $M_s = M_d\ (1 - B_{ws}) + 18(B_{ws})$

8. $v_s = K_p C_p\ (\sqrt{\Delta p})\ avg. \sqrt{\frac{T_s}{M_s P_s}}$

9. $Q_a = (v_s)\ (A_s)\ (60)$

10. $Q_s = Q_a\ (1 - B_{ws})\ \left(\frac{528}{T_s}\right)\ \left(\frac{P_s}{29.92}\right)$

11. $c_s = \left[0.0154\ (Mn/Vmstd)\right]$

12. $EA = \left[\frac{\%O_2 - 0.5\ \%CO}{0.264\ \%N_2\ (\%O_2 - 0.5\ \%CO)}\right] 100$

13. $c_{50} = \frac{c_s}{1 - \left[\frac{(1.5)(\%O_2) - 0.133(\%N_2) - 0.75\ (\%CO)}{21}\right]}$

14. $c_{12} = c_s\ \frac{12}{\%\ CO_2}$

15. $PMR = (c_s)(Q_s)\left(\frac{60}{7000}\right)$

16. $V_n = \frac{T_s}{P_s}\left[(0.002669)(V_{1c}) + \frac{V_m}{T_m}\left(P_{bar} + \frac{\overline{\Delta H}}{13.6}\right)\right]$

17. $C_a = (0.0154)(M_n)/V_n$

18. $I = \frac{100\ V_n}{60\ \Theta\ v_s\ An}$

19. $V_{mc} = V_m - (L_p - L_a)\ \Theta$

20. $W_a = Ca\ Vaw\ p_a$

FIELD DATA SHEET

PLANT ILCO RUN # #1
LOCATION MAIN DATE 6-22-87
BARO. PRES. 29.89 TIME 1020-1120

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	OUT	AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
A			788.542	(1)	(2)	(3)		(4)	(5)			
1	2.5	2.5	789.9	163	93	90	92	32	235	1.22	.13	2.0
2		5	791.7	162	107	96	102	35	225	1.81	.19	2.3
3		7.5	793.4	162	112	95	103	38	235	1.82	.19	2.3
4		10	795.1	163	114	97	106	38	249	1.73	.18	2.2
5		12.5	797.0	163	118	98	108	39	260	1.83	.19	2.4
6		15	799.1	163	120	100	110	40	267	1.84	.19	2.4
7		17.5	800.2	163	120	100	110	40	244	1.74	.18	2.4
8		20	801.9	163	121	100	110	40	234	1.74	.18	2.5
9		22.5	804.0	163	120	100	110	43	254	1.55	.16	2.6
10		25	805.3	164	119	102	111	42	251	1.64	.17	2.7
11		27.5	806.8	166	119	102	111	40	233	1.64	.17	2.7
12		30	808.5	166	120	103	112	40	249	1.54	.16	2.6
B												
1	2.5	32.5	809.9	160	112	100	106	34	265	1.45	.15	2.6
2		35	811.7	163	117	103	110	40	239	1.64	.17	2.8
3		37.5	813.3	160	114	100	107	42	256	1.64	.17	2.8
4		40	815.2	160	114	99	106	42	267	1.73	.18	3.0
5		42.5	817.0	160	117	101	109	44	268	1.74	.18	3.0
6		45	818.6	160	117	100	110	44	237	1.75	.18	3.0
7		47.5	820.3	161	118	100	109	44	254	1.74	.18	3.0
8		50	822.1	163	120	103	111	47	271	1.94	.20	3.3
9		52.5	823.9	162	122	103	113	50	269	2.04	.21	3.5
10		55	825.9	165	123	104	114	51	266	2.04	.21	3.5
11		57.5	827.5	165	125	106	116	51	258	1.94	.20	3.5
12		60	829.241	163	125	106	116	52	247	1.65	.17	3.3
			40.649									
		60		163			109			1.72	.422	3.5

STATIC PRESSURE "H2O — .16

PROBE TIP SIZE

BEFORE	AFTER
.310	.310
.310	.310
.310	.310

WATER #8
ml.
gram
Total

OPERATOR
TURNER
KARSTENS

Sample Box No. 5
Meter Box No. 400
Meter ΔH@ 1.98
Pitot, CP .84
Temp. Device 5244
Probe No. 8'
Probe Liner GLASS
Probe Htr. Set 600
Ambient Temp. 85°
% O_2 19 | 18
% CO_2 2 | 2

NOTES
Orifice ✓
Pitot ✓ R ✓ S ✓
Meter ✓ at 22" Hg
FINAL LEAK CHECK AT 4" Hg
.006
R 5.0 ✓
S 6.2 ✓

FIELD DATA SHEET

PLANT: ILCO RUN #: #2
LOCATION: MAIN DATE: 6-22-87
BARO. PRES.: 29.89 TIME: 1220-1325

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP °F IN	METER TEMP °F OUT	METER TEMP °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
A			829.380	(4)	(2)	(3)		(4)	(5)			
1	2.5	2.5	831.1	170	93	92	93	33	240	1.48	.16	1.0
2		5	832.6	170	99	92	95	33	240	1.86	.20	1.1
3		7.5	834.0	170	105	95	100	33	241	1.88	.20	1.1
4		10	836.2	170	110	96	103	34	241	1.70	.18	1.0
5		12.5	838.3	170	110	96	103	34	241	1.70	.18	1.0
6		15	840.4	168	115	100	107	34	243	1.72	.18	1.1
7		17.5	841.6	168	115	100	107	35	242	1.72	.18	1.1
8		20	842.8	168	116	99	107	35	243	1.62	.17	1.2
9		22.5	844.8	167	116	100	108	35	244	1.63	.17	1.2
10		25	846.0	167	118	100	109	35	245	1.65	.17	1.2
11		27.5	847.6	167	118	100	109	36	246	1.82	.19	1.3
12		30	849.4	167	120 ~~118~~	102	111	36	250	1.83	.19	1.3
B												
1	2.5	32.5	851.4	176	117	102	109	36	243	1.42	.15	1.4
2		35	853.0	170	122	104	113	36	243	1.34	.14	1.4
3		37.5	854.5	167	122	104	113	37	244	1.74	.18	2.0
4		40	856.1	175	125	105	115	37	244	1.82	.19	2.0
5		42.5	858.3	174	127	107	117	38	245	1.83	.19	2.1
6		45	859.9	176	130	110	120	38	247	1.83	.19	2.1
7		47.5	861.4	174	128	108	118	38	248	1.83	.19	2.2
8		50	863.1	174	128	108	118	39	248	1.83	.19	2.2
9		52.5	865.5	174	130	110	120	39	248	1.84	.19	2.3
10		55	867.7	172	131	111	121	40	249	1.75	.18	2.5
11		57.5	868.9	170	130	112	121	40	250	1.85	.19	2.5
12		60	870.235	170	130	110	120	41	256	1.85	.19	2.8
			40.855									
		60		170			111			1.73	.425	2.8

STATIC PRESSURE "H2O: -.16

PROBE TIP SIZE BEFORE	AFTER
.310	.310
.310	.310
.310	.310

WATER
#~~20~~ 7
ml.
gram
Total

OPERATOR
TURNER
FARSTENS

Sample Box No. 5
Meter Box No. 4
Meter ΔH@ 1.98
Pitot, CP .84
Temp. Device STII
Probe No. 8'
Probe Liner GLASS
Probe Htr. Set 600
Ambient Temp. 88°

% O_2	18	18
% CO_2	2	2

NOTES
Orifice
Pitot ✓
Meter ✓

Final Leak ✓ at 5" Hg .004

R - 6.4
S - 7.2

G-1

JCAD 6/22/87

FIELD DATA SHEET

PLANT ILCO RUN # #3
LOCATION MAIN DATE 6-22-87
BARO. PRES. 29.89 TIME 1410-1515

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	METER TEMP. °F OUT	METER TEMP. °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2o	VELOCITY PRESSURE "H2o	VACUUM PRESSURE "Hg
A			870.375	(1)	(2)	(3)		(4)	(5)			
1	2.5	2.5	872.0	159	101	101	101	34	231	1.63	.17	1.6
2		5	873.7	157	109	101	105	36	244	1.74	.18	1.8
3		7.5	875.4	156	114	102	108	41	228	1.75	.18	1.8
4		10	877.0	156	118	104	111	42	231	1.57	.16	1.8
5		12.5	878.8	156	120	105	113	44	253	1.67	.17	2.0
6		15	880.7	155	124	107	115	45	261	1.78	.18	2.0
7		17.5	882.3	158	128	109	118	45	271	1.88	.19	2.2
8		20	884.1	158	129	109	119	46	272	1.78	.18	2.1
9		22.5	885.8	155	130	109	119	47	237	1.58	.16	2.0
10		25	887.3	153	131	111	121	50	242	1.60	.16	2.0
11		27.5	888.8	154	132	112	122	51	249	1.51	.15	2.1
12		30	890.6	154	132	112	122	48	247	1.60	.16	2.2
B												
1	2.5	32.5	892.2	154	124	114	119	41	239	1.60	.16	2.1
2		35	894.0	153	131	115	123	41	229	1.81	.18	2.3
3		37.5	895.8	155	135	116	124	43	236	2.11	.21	3.5
4		40	897.8	155	137	117	127	45	249	2.02	.20	2.4
5		42.5	900.0	155	138	118	128	45	229	2.02	.20	2.4
6		45	901.6	156	138	118	128	45	234	2.02	.20	2.4
7		47.5	903.5	156	138	118	128	45	235	2.02	.20	2.4
8		50	905.4	156	138	118	128	46	240	2.02	.20	2.5
9		52.5	907.5	156	138	118	128	47	247	2.02	.20	2.5
10		55	910.3	156	138	118	128	47	251	1.91	.19	2.5
11		57.5	911.4	155	140	120	130	48	256	1.92	.19	2.6
12		60	912.908	154	140	121	130	48	254	1.83	.18	2.7
			42.533									
		60		156			121			1.81	.425	

STATIC PRESSURE "H2o: -.16

PROBE TIP SIZE

BEFORE	AFTER
.310	.310
.310	.310
.310	.310

WATER
#10
ml.
gram
Total

OPERATOR
TURNER
KARSTENS

Sample Box No. 5
Meter Box No. 4
Meter ΔH@ 1.98
Pitot, CP .84
Temp. Device STIII
Probe No. 8
Probe Liner GLASS
Probe Htr. Set 60%
Ambient Temp 90°
% O_2 18 | 18
% CO_2 2 | 2

NOTES
Orifice
Pitot ✓
Meter ✓
Final Leak ✓ at 5" Hg .012

R - 3.00
S - 640

3-1

FIELD DATA SHEET

PLANT ICCO RUN # 1
LOCATION Potstack DATE 6-22-87
BARO. PRES. 29.87 TIME 10:42-1146

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

STATIC PRESSURE "H2o: -.41

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	OUT	AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2o	VELOCITY PRESSURE "H2o	VACUUM PRESSURE "Hg
BOB			59.640									
1	2.5	2.5	61.2	134	85	85	85	42	227	1.19	.37	3.0
2		5.0	63.0	133	87	85	86	47	244	1.19	.37	3.0
3		7.5	64.6	134	92	86	89	49	263	1.17	.36	3.0
4		10.0	66.3	135	96	87	92	50	220	1.23	.38	3.1
5		12.5	68.0	135	98	88	93	55	270	1.23	.38	3.1
6		15.0	69.8	135	100	89	94	45	252	1.34	.41	3.1
7		17.5	71.9	135	101	90	92	55	254	1.24	.38	3.1
8		20.0	72.8	135	102	90	96	56	247	1.02	.31	2.8
9		22.5	74.5	134	103	91	97	54	269	.95	.29	2.5
10		25.0	76.0	133	103	92	98	56	265	.89	.27	2.3
11		27.5	77.4	130	103	92	98	57	232	.73	.22	2.2
12		30.0	78.618	130	104	94	99	58	254	.60	.18	2.0
Port A												
1	2.5	32.5	80.1	131	99	94	96	47	229	1.42	.43	3.1
2		35.0	82.3	134	102	96	99	56	255	1.42	.43	3.1
3		37.5	84.2	133	104	95	100	57	262	1.32	.40	3.0
4		40.0	85.8	134	106	96	101	58	233	1.39	.42	3.1
5		42.5	87.7	133	106	96	101	59	239	1.39	.42	3.1
6		45.0	89.8	134	108	97	102	60	262	1.73	.52	3.3
7		47.5	92.0	136	109	97	103	59	259	1.59	.48	3.2
8		50.0	93.5	138	110	98	104	60	245	1.06	.32	2.7
9		52.5	95.2	133	108	98	103	60	255	1.16	.35	2.9
10		55.0	97.0	132	108	98	103	62	252	1.06	.32	2.5
11		57.5	98.2	130	109	99	104	62	260	0.66	.20	2.1
12		60.0	99.528	130	108	100	104	64	256	0.66	.20	2.1
			39.888									
		60		133		99.558 / 99.552				1.15	.587	

.006 @ 4.1" Hg
98
5-7.2

PROBE TIP SIZE

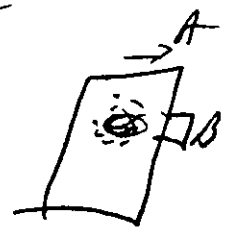
BEFORE	AFTER
.252	.252
.252	.252
.252	.252

WATER
#3 ml.
gram
Total
#1 BOTTLES

OPERATOR
LOTZ / Mashburn

Sample Box No. 5
Meter Box No. 700
Meter ΔH@ 1.48
Pitot, CP .84
Temp. Device R II
Probe No. 31
Probe Liner GLASS
Probe Htr. Set 65
Ambient Temp. 80
% O_2 20 / 20
% CO_2 0 / 0

NOTES
Orifice @ 6.5"
Pitot [illegible]
Meter @ 20 [illegible]



Box

G-1

FIELD DATA SHEET

PLANT LCO RUN # 2

LOCATION Pit Stack DATE 6-22-87

BARO. PRES. 29.FT TIME 12:58 - 14[illegible]

GUARDIAN SYSTEMS INC.

BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	METER TEMP. °F OUT	METER TEMP. °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2o	VELOCITY PRESSURE "H2o	VACUUM PRESSURE "Hg
Prf B			99.690									
1	2.5	2.5	101.5	134	92	92	92	42	235	1.11	.34	2.5
2		5.0	103.4	133	93	92	92	44	240	1.14	.35	2.5
3		7.5	104.9	133	96	92	94	45	232	1.18	.36	3.0
4		10.0	106.3	134	98	92	95	46	252	1.18	.36	3.0
5		12.5	108.0	133	99	92	96	45	261	1.15	.35	3.0
6		15.0	109.9	132	100	92	96	47	267	1.25	.38	3.1
7		17.5	111.5	131	101	93	97	50	262	1.09	.33	2.8
8		20.0	113.2	131	102	93	98	52	266	1.06	.32	2.8
9		22.5	114.6	132	103	94	98	48	235	0.96	.29	2.5
10		25.0	116.2	131	103	94	98	47	241	.73	.22	2.5
11		27.5	117.3	130	104	94	99	48	265	.60	.18	2.2
12		30.0	118.475	130	105	95	100	50	245	.50	.15	2.0
Prf A												
1	2.5	32.5	119.6	125	103	97	100	48	255	.40	.12	2.0
2		35.0	120.6	127	104	97	100	49	242	.43	.13	2.0
3		37.5	121.9	126	105	97	101	48	253	.43	.13	2.0
4		40.0	122.9	124	106	98	102	50	255	.47	.14	2.0
5		42.5	124.0	124	107	98	102	50	245	.47	.14	2.0
6		45.0	125.1	124	107	99	103	51	232	.47	.14	2.0
7		47.5	126.0	123	108	100	104	52	258	.27	.08	—
8		50.0	126.8	123	108	100	104	55	264	.27	.08	—
9		52.5	127.6	121	109	101	105	57	252	.17	.05	—
10		55.0	128.4	117	109	101	105	54	247	.17	.05	—
11		57.5	129.2	117	107	99	103	52	252	.14	.04	—
12		60.0	130.185	117	107	99	103	50	249	.34	.10	2.0
			30.495				99.9			.67	.428	
		60		128		130.2	99.2					
						130.2	98					

.004 @ 4" Hg

Run 6.2

St 7.4

STATIC PRESSURE "H2o -.41

PROBE TIP SIZE

BEFORE	AFTER
.252	.252
.252	.252
.252	.252

WATER

#6

ml.

gram

Total

OPERATOR

LOTZ / [illegible]

Sample Box No. 5

Meter Box No. 700

Meter ΔH@ 1.48

Pitot, CP .84

Temp. Device NH

Probe No. 3'

Probe Liner GLASS

Probe Htr. Set 65

Ambient Temp. 85

% O_2 20 / 20

% CO_2 0 / 0

NOTES

Orifice

Pitot @ 7.2 65

Meter @ 25" Hg

G-1

FIELD DATA SHEET

PLANT ILCO RUN # 3

LOCATION POT STACK DATE 6-22-87

BARO. PRES. 29.89 TIME 1444-1547

GUARDIAN SYSTEMS INC.

BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	METER TEMP. °F OUT	METER TEMP. °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2o	VELOCITY PRESSURE "H2o	VACUUM PRESSURE "Hg
Pt B			130.274									
1	2.5	2.5	131.5	116	96	96	96	40	225	.61	.18	2.0
2		5.0	132.6	120	96	97	96	41	227	.67	.20	2.0
3		7.5	133.9	120	97	97	97	41	232	.67	.20	2.0
4		10.0	135.1	121	100	97	98	42	256	.68	.20	2.0
5		12.5	136.3	121	100	97	98	44	248	.68	.20	2.0
6		15.0	137.7	121	105	98	102	45	249	.75	.22	2.1
7		17.5	139.0	123	109	101	105	44	237	.54	.16	2.0
8		20.0	140.1	123	111	102	106	47	233	.61	.18	2.1
9		22.5	141.2	124	111	102	106	45	255	.54	.16	2.0
10		25.0	142.3	122	111	102	106	48	268	.48	.14	2.0
11		27.5	143.3	122	110	102	106	48	247	.41	.12	2.0
		30.0	144.183	121	110	101	106	54	237	.34	.10	—
Pt A												
1	2.5	32.5	146.0	119	108	102	105	52	236	.65	.19	2.1
2		35.0	146.7	123	111	105	108	50	220	.72	.21	2.5
3		37.5	148.2	121	110	104	108	47	260	.82	.24	2.5
4		40.0	149.4	122	112	104	108	48	264	.82	.24	2.5
5		42.5	150.8	122	113	105	109	54	231	.79	.23	2.5
6		45.0	152.0	122	114	105	110	50	254	.58	.17	2.0
7		47.5	153.2	122	115	106	111	50	257	.58	.17	2.0
8		50.0	154.3	122	115	107	111	48	268	.58	.17	2.0
9		52.5	155.5	121	116	107	111	48	231	.55	.16	2.0
10		55.0	156.4	117	116	107	111	50	247	.41	.12	2.0
11		57.5	157.4	116	116	107	111	54	234	.34	.10	2.0
12		60.0	158.325	116	116	109	112	56	268	.35	.10	
			28.051									
		60		121			106			.59	.413	2.5

STATIC PRESSURE "H2o: -.41

PROBE TIP SIZE

BEFORE	AFTER
.252	.252
.252	.252
.252	.252

WATER

#1 col. 4 _____

gram _____

Total _____

OPERATOR

LOTZ / [illegible]

Sample Box No. 5

Meter Box No. 700

Meter ΔH@ 1.48

Pitot, CP .84

Temp. Device RIT

Probe No. 3'

Probe Liner Glass

Probe Htr. Set 65

Ambient Temp. 85

% O_2 20 / 20

% CO_2 0 / 0

NOTES

Orifice _____

Pitot ✓

Meter ✓

Re - 6.7 ✓

Sh 7.4 ✓

158.368

158.360

.008 @ 5" [illegible]

[illegible]

6/23/87
VMA JCHB

FIELD DATA SHEET

PLANT ILCO RUN # 1
LOCATION Reverb Bag DATE 6-23-87
BARO. PRES. 29.94 TIME 929-1031

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	METER TEMP. °F OUT	METER TEMP. °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2o	VELOCITY PRESSURE "H2o	VACUUM PRESSURE "Hg
Port B			158.490	(1)	(2)	(3)		(4)	(5)			
1	2.5	2.5	159.8	100	80	80	80	60	256	.95	1.00	2.5
2		5.0	161.4	106	81	80	80	56	237	1.13	1.20	2.7
3		7.5	163.2	106	84	81	82	58	261	1.19	1.30	3.0
4		10.0	164.9	106	86	86	84	54	263	1.24	1.35	3.0
5		12.5	166.5	106	88	82	85	56	238	1.19	1.30	2.8
6		15.0	167.9	107	91	83	87	57	261	1.06	1.15	2.5
7		17.5	169.3	108	91	83	87	58	269	0.86	.94	2.5
8		20.0	171.1	106	92	83	88	54	265	0.92	1.00	2.5
9		22.5	172.3	110	94	85	90	55	267	1.02	1.10	2.5
10		25.0	173.7	111	94	85	90	54	270	1.01	1.10	2.5
11		27.5	175.2	112	96	86	91	55	267	.83	.90	2.2
12		30.0	176.380	110	96	87	92	56	251	.67	.73	2.1
Port A												
1	2.5	32.5	177.6	109	93	87	90	60	260	.57	.62	2.0
2		35.0	178.7	112	95	89	92	57	263	.59	.64	2.0
3		37.5	179.8	110	95	88	92	58	254	.63	.68	2.1
4		40.0	181.1	110	96	89	92	58	232	.65	.70	2.1
5		42.5	182.5	111	98	90	94	58	265	.76	.82	2.2
6		45.0	183.8	110	98	90	94	59	256	.97	1.05	2.5
7		47.5	185.6	112	100	91	96	58	242	1.49	1.60	3.0
8		50.0	187.6	112	101	92	96	57	263	1.58 ~~1.44~~	1.70 ~~1.55~~	3.1
9		52.5	189.3	112	102	92	97	57	264	1.48	1.60	3.0
10		55.0	191.2	112	103	93	98	59	239	1.30	1.40	2.9
11		57.5	192.5	112	103	93	98	58	242	1.02	1.10	2.5
12		60.0	194.070	112	101	91	96	58	265	.90	1.00	2.2
			35.580				90			1.00	1.030	
		60		109			194.117 / 194.100					
							.017 @5" H2o					

STATIC PRESSURE "H2o: -.86

PROBE TIP SIZE

BEFORE	AFTER
.182	.182
.182	.182
.182	.182

WATER
ml.
#3 gram
Total

OPERATOR
Lotz / Armstrong

Sample Box No. 6
Meter Box No. 700
Meter ΔH@ 1.48
Pitot, CP .84
Temp. Device ~II
Probe No. 3'
Probe Liner Glass
Probe Htr. Set 95
Ambient Temp. 80
% O_2 21 / 21
% CO_2 0 / 0

NOTES
Orifice @6.5
Pitot 7.2 6.5
Meter @25

BLOST Row
B O A

R-5.8
S-5.9

FIELD DATA SHEET

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

PLANT LLCO RUN # 2
LOCATION Reverb S. Blue DATE 6-23-87
BARO. PRES. 25.94 TIME 1145-1240

STATIC PRESSURE "H2O -.81

PROBE TIP SIZE: BEFORE .182 / AFTER .182

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	OUT	AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
Port A			194.250	(1)	(2)	(3)		(4)	(5)			
1	2.5	2.5	195.1	116	85	85	85	64	227	.49	.54	1.9
2		5.0	196.4	116	89	87	88	65	239	.49	.54	1.9
3		7.5	197.5	115	87	87	87	64	235	.50	.55	1.9
4		10.0	198.5	115	89	86	88	64	258	.54	.59	2.0
5		12.5	199.6	116	89	86	88	64	247	.56	.62	2.1
6		15.0	201.1	120	95	90	92	63	248	.86	.95	2.5
7		17.5	202.7	121	99	93	96	61	245	1.28	1.4	2.9
8		20.0	204.4	120	99	92	96	66	268	1.32	1.45	2.9
9		22.5	206.0	117	99	91	95	63	254	1.14	1.25	2.8
10		25.0	207.4	119	101	91	96	64	237	1.01	1.10	2.5
11		27.5	208.8	119	102	93	98	65	252	.79	.86	2.1
12	✓	30.0	210.122	119	104	95	100	65	254	.70	.76	2.1
Port B												
1	2.5	32.5	211.6	120	101	99	100	67	227	0.83	.90	2.2
2		35.0	212.8	123	104	96	101	67	254	0.90	.98	2.3
3		37.5	~~214.4~~ 214.3	126	107	99	103	67	264	1.01	1.10	2.5
4		40.0	215.9	123	105	98	102	64	237	1.01	1.10	2.5
5		42.5	217.3	123	106	100	104	65	252	0.97	1.05	2.5
6		45.0	218.6	119	107	99	103	64	264	0.82	.88	2.2
7		47.5	220.3	117	105	97	101	62	238	.64	.69	2.0
8		50.0	221.1	122	107	98	102	64	231	.68	.74	2.1
9		52.5	222.3	120	107	99	103	65	254	~~.88~~ .83	.90	2.1
10		55.0	223.7	122	108	100	104	66	238	.79	.86	2.1
11		57.5	225.1	123	108	101	104	67	247	.65	.70	2.0
12	✓	60.0	226.174	124	108	100	104	67	253	.50	.54	2.0
			31.924			97 226.195				.80	.9263	
		60		120		226.190						

R 6.7
55.5

-65- .005 @ 45 in. H2O

WATER
ml. ____
#6 gram ____
Total ____

OPERATOR
LOTZ / [illegible]

Sample Box No. 6
Meter Box No. 700
Meter ΔH@ 1.48
Pitot, CP .84
Temp. Device 544
Probe No. 3
Probe Liner SG055
Probe Htr. Set 35
Ambient Temp. 85
% O_2 20 / 20
% CO_2 0 / 0

NOTES
Orifice ____
Pitot ✓
Meter ✓ @25

3-1

6/23/87
VMA JCHD

FIELD DATA SHEET

PLANT ILCO RUN # 3
LOCATION Reserve Blvd DATE 6-23-87
BARO. PRES. 29.54 TIME 1340 - 1493

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	OUT	AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2o	VELOCITY PRESSURE "H2o	VACUUM PRESSURE "Hg
PNA B			226.313									
1	2.5	2.5	227.5	123	94	94	94	52	229	.72	.80	2.1
2		5.0	228.9	122	95	96	96	66	232	.85	.93	2.5
3		7.5	230.3	130	97	96	96	63	242	.85	.95	2.5
4		10.0	231.7	132	101	98	100	66	258	.89	.99	2.2
5		12.5	233.0	130	101	97	99	66	251	.80	.89	2.5
6		15.0	234.3	126	100	96	98	63	231	.75	.83	2.0
7		17.5	235.8	127	101	95	98	63	237	.58	.64	2.0
8		20.0	236.8	130	103	97	100	64	238	.63	.69	2.0
9		22.5	238.1	130	104	97	100	66	235	.71	.79	2.1
10		25.0	239.3	130	105	98	102	67	232	~~.77~~ .70	.77	2.1
11		27.5	240.4	128	106	99	102	66	243	.62	.68	2.0
12		30.0	241.375	122	105	98	102	63	265	.41	.45	2.0
PNA												
1	2.5	32.5	242.6	127	104	101	102	67	227	.41	.45	2.0
2		35.0	243.6	126	103	101	102	66	253	.41	.45	2.0
3		37.5	244.4	127	104	101	102	67	230	.41	.45	2.0
4		40.0	245.4	129	106	103	104	65	230	.43	.47	2.0
5		42.5	246.7	127	107	103	105	64	248	.53	.58	2.0
6		45.0	248.0	128	107	103	105	65	241	.60	.65	2.0
7		47.5	249.5	124	108	103	106	64	236	1.19	1.30	2.9
8		50.0	250.9	122	107	101	104	67	236	1.20	1.30	2.9
9		52.5	252.5	123	109	103	106	64	239	1.11	1.20	2.5
10		55.0	254.0	126	110	103	106	66	243	.92	.99	2.3
11		57.5	255.3	125	109	103	106	65	237	.83	.90	2.1
12		60.0	256.664	122	110	104	107	67	235	.74	.80	
			30.351	127						.72		
		60					102				.8773	

STATIC PRESSURE "H2o ~.81

PROBE TIP SIZE

BEFORE	AFTER
.182	.182
.182	.182
.182	.182

WATER

ml. _____
#4 gram _____
Total _____

OPERATOR
Lotz / Armstrong

Sample Box No. 6
Meter Box No. 700
Meter ΔH@ 1.48
Pitot, CP .84
Temp. Device RTT
Probe No. 31
Probe Liner SLABS
Probe Htr. Set 25
Ambient Temp. 85
% O_2 21 / 21
% CO_2 0 / 0

NOTES

Orifice _____
Pitot ✓
Meter _____

256.685
256.680
.005 @ 5 ml

Ra 6.4
Sy. 4-5

G-1

FIELD DATA SHEET

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

PLANT: ICCO
RUN #: #1
LOCATION: BLAST
DATE: 6-23-87
BARO. PRES.: 29.94
TIME: 0906-1028

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP °F IN	METER TEMP °F OUT	METER TEMP °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
A			912.994	(1)	(2)	(3)		(4)	(5)			
1	3	3	914.9	92	79	79	79	32	254	1.52	1.30	1.5
2		6	916.7	91	89	82	85	36	236	1.52	1.28	1.5
3		9	918.6	92	93	83	88	36	253	1.57	1.32	1.6
4		12	920.6	90	97	84	90	36	275	1.62	1.35	1.8
5		15	922.5	90	100	85	92	39	237	1.66	1.38	1.8
6		18	925.0	90	103	87	95	40	266	1.60	1.32	1.8
7		21	926.4	91	107	91	99	46	253	1.01	.82	1.3
8		24	927.6	91	106	91	99	53	254	.80	.66	1.1
9		27	928.8	90	103	90	96	52	257	.67	.55	1.0
10		30	930.0	95	104	93	101	45	261	.58	.48	1.0
11		33	931.1	95	104	93	98	44	258	.53	.44	1.0
12		36	932.4	95	105	95	100	47	251	.48	.40	1.0
B												
1	3	39	933.7	94	101	96	98	35	249	.97	.80	1.2
2		42	935.3	93	104	96	100	57	247	1.01	.83	1.4
3		45	937.1	92	103	95	99	59	254	.98	.81	1.4
4		48	938.5	93	107	97	102	61	261	1.00	.82	1.4
5		51	939.9	94	107	98	102	62	268	1.05	.86	1.4
6		54	941.6	92	107	97	102	62	258	1.10	.90	1.5
7		57	943.4	92	107	98	102	62	247	1.12	.92	1.5
8		60	945.0	92	108	99	104	62	251	.98	.80	1.4
9		63	946.4	92	109	99	104	61	238	.96	.78	1.3
10		66	947.9	92	110	100	105	62	237	.92	.75	1.3
11		69	949.5	97	111	101	106	64	228	.83	.68	1.2
12		72	950.833	93	106	98	102	62	224	.80	.66	1.1
			37.839									
		72		92			98			1.05	.9200	

STATIC PRESSURE "H2O: -.55

PROBE TIP SIZE

BEFORE	AFTER
.180	.180
.180	.180
.180	.180

WATER
#7
ml.
gram
Total

OPERATOR
TURNER
KARSTENS

Sample Box No. 5
Meter Box No. 4
Meter ΔH@ 1.98
Pitot, CP .84
Temp. Device STTT
Probe No. 3' NEW
Probe Liner GLASS
Probe Htr. Set 500
Ambient Temp. 80°
% O_2 20
% CO_2 0

NOTES
Orifice ✓
Pitot ✓
Meter ✓
FINAL AT 2" Hg
950.842
950.842
0.0
54.8
R 1.0

G-1

6/23/87
VMH JCH

FIELD DATA SHEET

PLANT ILCO RUN # 2
LOCATION BLAST DATE 6-23-87
BARO. PRES. 29.94 TIME 1100-1220

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

	TIME MIN	TIME DUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	METER TEMP. °F OUT	METER TEMP. °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2o	VELOCITY PRESSURE "H2o	VACUUM PRESSURE "Hg
A			950.853									
1	3	3	952.1	101	95	95	95	37	230	1.14	.96	1.1
2		6	954.3	101	97	95	96	38	231	1.18	.99	1.1
3		9	956.2	99	99	94	96	40	232	1.29	1.08	1.1
4		12	958.1	99	99	92	95	40	234	1.37	1.15	1.1
5		15	960.0	95	106	94	100	42	235	1.45	1.20	1.2
6		18	962.1	96	107	97	102	42	237	1.60	1.32	1.4
7		21	963.4	97	110	101	105	43	240	1.09	.90	1.4
8		24	965.2	99	110	100	105	45	250	.98	.81	1.3
9		27	967.1	99	110	100	105	46	261	.75	.62	1.2
10		30	968.1	99	110	100	105	45	264	.76	.63	1.2
11		33	969.0	94	102	94	98	44	265	.65	.54	1.0
12		36	970.7	100	106	100	103	45	261	.60	.50	1.0
B												
1	3	39	972.1	97	103	99	101	45	254	1.03	.85	1.4
2		42	973.4	100	106	96	101	45	251	1.01	.84	1.5
3		45	975.1	100	106	96	101	46	250	1.11	.92	1.5
4		48	976.8	97	107	97	102	47	245	1.15	.95	1.5
5		51	978.7	96	106	97	102	48	260	1.15	.95	1.5
6		54	980.3	102	110	102	106	48	251	1.27	1.05	1.6
7		57	982.1	99	108	100	104	49	256	1.19	.98	1.7
8		60	983.9	96	109	99	104	50	261	1.06	.87	1.6
9		63	985.4	99	113	103	108	50	261	.97	.80	1.5
10		66	986.8	99	113	103	108	51	258	.90	.74	1.4
11		69	988.0	100	110	100	105	54	254	.85	.70	1.3
12		72	989.462	100	110	101	105	55	256	.82	.68	1.3
			38.609	99			102					
		72								1.04	.9297	

STATIC PRESSURE "H2o: -.55

PROBE TIP SIZE

BEFORE	AFTER
.180	.180
.180	.180
.180	.180

WATER: 10
ml.
gram
Total

OPERATOR: TURNER/KAMSTEN

Sample Box No. 5
Meter Box No. 4
Meter ΔH@ 1.48
Pitot, CP .84
Temp. Device STII
Probe No. 3' NEW
Probe Liner GLASS
Probe Htr. Set 50%
Ambient Temp. 82°
% O_2 20 | 20
% CO_2 0 | 0

NOTES
Orifice
Pitot ✓
Meter ✓
Final Leak at 3" Hg
989.474
989.475
.001
R - 4.6
S - 5.1

G-1

FIELD DATA SHEET

JCM 6/23/87

GUARDIAN SYSTEMS INC.
BOX 300
LEEDS, ALABAMA 35094

PLANT: ICCO
LOCATION: BLAST
BARO. PRES.: 29.97
RUN #: #3
DATE: 6-23-87
TIME: 1340-1454

	TIME MIN	TIME HOUR	METER VOL FT 3	STACK TEMP °F	METER TEMP. °F IN	METER TEMP. °F OUT	METER TEMP. °F AVG	IMP TEMP °F	BOX TEMP °F	METER PRESSURE "H2O	VELOCITY PRESSURE "H2O	VACUUM PRESSURE "Hg
A			989.502	(1)	(2)	(3)		(4)	(5)			
1	3	3	991.0	107	94	94	94	33	227	1.18	1.01	1.8
2		6	993.0	106	98	95	97	37	250	1.36	1.15	2.0
3		9	994.8	106	99	95	97	39	245	1.43	1.21	2.3
4		12	996.7	106	103	96	100	42	261	1.57	1.32	2.6
5		15	998.6	107	107	98	103	42	271	1.52	1.28	2.6
6		18	1000.4	104	110	97	103	45	235	1.34	1.12	2.4
7		21	1001.9	106	113	100	106	46	258	1.02	.85	2.0
8		24	1003.5	106	115	101	108	46	261	.95	.79	1.9
9		27	1005.1	105	117	103	110	48	238	.70	.58	1.5
10		30	1006.2	104	117	103	110	55	265	.48	.40	1.2
11		33	1007.4	104	116	105	111	55	246	.46	.38	1.1
12		36	1008.1	103	115	106	110	57	249	.46	.38	1.0
B												
1	3	39	1009.8	103	114	107	111	55	261	1.09	.90	1.0
2		42	1011.4	104	120	110	~~10~~ 115	55	241	1.09	.89	1.1
3		45	1013.6	104	120	110	115	56	257	1.08	.88	1.2
4		48	1015.0	103	118	110	114	57	254	1.11	.91	1.2
5		51	1016.5	107	120	110	115	53	246	1.16	.95	1.3
6		54	1018.3	107	122	112	117	53	246	1.23	1.01	1.3
7		57	1020.2	107	122	112	117	52	245	1.11	.91	1.2
8		60	1021.7	105	122	112	117	51	261	.99	.81	1.1
9		63	1022.9	104	120	110	115	50	264	.97	.79	1.2
10		66	1024.6	105	120	111	115	50	261	.97	.79	1.1
11		69	1025.1	104	120	110	115	54	264	.97	.79	1.2
12		72	1027.796	105	122	112	117	56	249	.99	.81	1.4
			38.294									
		72		105			110			1.05	.9224	

STATIC PRESSURE "H2O: -.55

PROBE TIP SIZE BEFORE	AFTER
.180	.180
.180	.180
.180	.180

WATER #8
ml.
gram
Total

OPERATOR: TURNER KARSTENS

Sample Box No. 5
Meter Box No. 4
Meter ΔH@ 1.98
Pitot, CP .84
Temp. Device RTD
Probe No. 3 New
Probe Liner glass
Probe Htr. Set 50%
Ambient Temp. 82°
% O_2 21 | 20
% CO_2 0 | 0

NOTES

Orifice
Pitot ✓
Meter ✓

Final Leak ✓ at 3" Hg
1027.810
1027.812
.002

R - ✓ 4.9
S - ✓ 5.6

BLANK ANALYTICAL DATA

Plant ILCO

Sample location POT, MAIN, BLAST, REVERB

Relative humidity 20%

Type of blank ACETONE

Liquid level at mark and container sealed ✓

Density of blank (ρa) .7857 g/ml

Blank volume (Va) 200 ml

Date and time of wt. 0800 6-25-87 Gross wt. 1000422 mg

Date and time of wt. 1400 6-25-87 Gross wt. 1000422 mg

Average gross wt. 1000422 mg

Tare wt. 1000420 mg

Weight of blank (ma) .2 mg

$$Ca = \frac{ma}{Va\ \rho a} = \frac{(.2)}{(200)(.7857)} = .001273 \text{ mg/g}$$

Note: In no case shall a blank residue greater than (0.01 mg/g) or 0.001% of the weight of blank used be subtracted from the sample weight.

Remarks:

Signature of analyst D Karstens

Signature of reviewer LA

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/22/87

Sample location: Main Stack Run no.: 1

Sample recovery person: Turner Recovery date: 6/22/87

Filter(s) no.: T-3

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	350.6	566.5	399.1	958.8
Initial volume (wt)	372.9	499.0	390.5	945.6
Net volume (wt)	-22.3	67.5	8.6	13.2
Total Moisture	67.0			

Color of silica gel 1/4 pink

Description of impinger water IPA-rusty orange

H_2O_2 AND HNO_3 - clear

RECOVERED SAMPLE

Filter container no MS #1 sealed ✓

Description of particulate on filter Light Grey

Acetone rinse container no MS #1 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #1

Sample location MAIN

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 11

Acetone rinse volume (Vaw) 172 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(172)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 97907.8 mg

Date and time of wt 1400 6-25-87 Gross wt 97908.5 mg

Average gross wt 97908.7 mg

Tare wt 97885.4 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 23.1 mg

Filter(s) container no. T-3

Date and time of wt 0800 6-25-87 Gross wt 239.5 mg

Date and time of wt 1400 6-25-87 Gross wt 239.3 mg

Average gross wt 239.4 mg

Tare wt 239.4 mg

Weight of particulate on filter(s) 0 mg

Weight of particulate in acetone rinse 23.1 mg

Total weight of particulate 23.1 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst D Kanstein

Signature of reviewer [illegible]

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/22/87

Sample location: Main Stack Run no.: #2

Sample recovery person: Turner Recovery date: 6/22/87

Filter(s) no.: T-5

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	353.0	662.6	369.2	976.7
Initial volume (wt)	390.1	526.8	396.4	956.0
Net volume (wt)	-37.1	135.8	-27.2	20.7
Total Moisture	92.2			

Color of silica gel 1/4 pink

Description of impinger water IPA - rusty orange

H_2O_2 and HNO_3 - clear

RECOVERED SAMPLE

Filter container no MS #2 sealed ✓

Description of particulate on filter Light Yellow

Acetone rinse container no MS #2 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #2

Sample location MAIN

Relative humidity 28%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 1

Acetone rinse volume (Vaw) 125 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(125)(.7857) = .1 mg

Date and time of wt 0800 6-25-87 Gross wt 989184 mg

Date and time of wt 1400 6-25-87 Gross wt 989185 mg

Average gross wt 989185 mg

Tare wt 98905.2 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 13.2 mg

Filter(s) container no. T-5

Date and time of wt 0800 6-25-87 Gross wt 240.8 mg

Date and time of wt 1400 6-25-87 Gross wt 240.7 mg

Average gross wt 240.8 mg

Tare wt 239.5 mg

Weight of particulate on filter(s) 1.3 mg

Weight of particulate in acetone rinse 13.2 mg

Total weight of particulate 14.5 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst S Kaufman

Signature of reviewer [signature]

G-6

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/22/87

Sample location: Main Stack Run no.: #3

Sample recovery person: Turner Recovery date: 6/22/87

Filter(s) no.: T-7

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	354.3	555.0	400.0	1007.8
Initial volume (wt)	396.1	501.9	393.1	996.6
Net volume (wt)	-41.9	53.1	6.9	11.2
Total Moisture	29.3			

Color of silica gel 1/4 pink

Description of impinger water IPA - rusty orange

H_2O_2 AND HNO_3 - clear

RECOVERED SAMPLE

Filter container no MS #3 sealed ✓

Description of particulate on filter Light Grey

Acetone rinse container no MS #3 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

G6

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. 3

Sample location MAN

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	

Acetone rinse container no. 2

Acetone rinse volume (Vaw) 105 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(105)(.7857) = .1 mg

Date and time of wt 0800 6-25-87 Gross wt 97655.4 mg

Date and time of wt 1400 6-25-87 Gross wt 97655.0 mg

Average gross wt 97655.2 mg

Tare wt 97641.3 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 13.8 mg

Filter(s) container no. T-7

Date and time of wt 0800 6-25-87 Gross wt 239.2 mg

Date and time of wt 1400 6-25-87 Gross wt 239.2 mg

Average gross wt 239.2 mg

Tare wt 235.7 mg

Weight of particulate on filter(s) -.5 mg

Weight of particulate in acetone rinse 13.8 mg

Total weight of particulate 13.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst G Kajtenas

Signature of reviewer

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/22/87

Sample location: Pot Stack Run no.: 1

Sample recovery person: Turner Recovery date: 6/22/87

Filter(s) no.: T-2

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	341.4	445.5	445.0	993.3
Initial volume (wt)	374.8	453.6	388.5	975.6
Net volume (wt)	-33.4	-8.1	56.5	17.7

Total Moisture 32.7

Color of silica gel 1/4 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no P.S. #1 sealed ✓

Description of particulate on filter white

Acetone rinse container no P.S. #1 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #1

Sample location POT

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 8

Acetone rinse volume (Vaw) 195 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(195)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 1064930 mg

Date and time of wt 1400 6-25-87 Gross wt 1064826 mg

Average gross wt 1064828 mg

Tare wt 1064584 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 24.2 mg

Filter(s) container no. T-2

Date and time of wt 0800 6-25-87 Gross wt 227.2 mg

Date and time of wt 1400 6-25-87 Gross wt 226.8 mg

Average gross wt 227.0 mg

Tare wt 238.8 mg

Weight of particulate on filter(s) -11.8 mg

Weight of particulate in acetone rinse 24.2 mg

Total weight of particulate 12.4 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst G Karstens

Signature of reviewer [illegible]

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/22/87

Sample location: Pot Stack Run no.: 2

Sample recovery person: Turner Recovery date: 6/22/87

Filter(s) no.: T-6

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	326.0	510.2	355.1	966.1
Initial volume (wt)	349.8	486.0	353.3	963.1
Net volume (wt)	-23.8	24.2	1.8	3.0

Total Moisture 5.2

Color of silica gel 1/5 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no PS #2 sealed ✓

Description of particulate on filter white

Acetone rinse container no PS #2 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87 John Sutherland

Laboratory personnel taking custody

Remarks

GUARDIAN SYSTEMS inc

G-6

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #2

Sample location POT

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 7

Acetone rinse volume (Vaw) 125 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(125)(.7857) = .1 mg

Date and time of wt 0800 6-25-87 Gross wt 1019739 mg

Date and time of wt 1400 6-25-87 Gross wt 1019738 mg

Average gross wt 1019735 mg

Tare wt 1019646 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 19.2 mg

Filter(s) container no. T-6

Date and time of wt 0800 6-25-87 Gross wt 229.5 mg

Date and time of wt 1400 6-25-87 Gross wt 229.3 mg

Average gross wt 229.4 mg

Tare wt 238.9 mg

Weight of particulate on filter(s) -9.5 mg

Weight of particulate in acetone rinse 19.2 mg

Total weight of particulate 9.7 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst S Karstens

Signature of reviewer [illegible]

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/22/87

Sample location: Pot Stack Run no.: 3

Sample recovery person: Turner Recovery date: 6/22/87

Filter(s) no.: T-1

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	356.3	535.9	395.0	984.2
Initial volume (wt)	377.2	507.3	392.4	978.1
Net volume (wt)	-20.9	28.6	2.6	6.1

Total Moisture 16.4

Color of silica gel 1/5 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no PS #3 sealed ✓

Description of particulate on filter white

Acetone rinse container no PS #3 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

G-5

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ICO Run No. #3

Sample location POT

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. #10

Acetone rinse volume (Vaw) 162 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(162)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 1045440 mg

Date and time of wt 1400 6-25-87 Gross wt 1045439 mg

Average gross wt 1045440 mg

Tare wt 1045380 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 5.8 mg 5.8

Filter(s) container no. T-1

Date and time of wt 0800 6-25-87 Gross wt 232.8 mg

Date and time of wt 1400 6-25-87 Gross wt 232.8 mg

Average gross wt 232.8 mg

Tare wt 233.4 mg

Weight of particulate on filter(s) -.6 mg

Weight of particulate in acetone rinse 5.8 mg

Total weight of particulate 5.2 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst D Karstens

Signature of reviewer

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/23/87

Sample location: Reverb Run no.: 1

Sample recovery person: Turner Recovery date: 6/23/87

Filter(s) no.: T-4

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	355.2	528.0	399.1	996.0
Initial volume (wt)	381.9	494.9	394.1	993.3
Net volume (wt)	-26.7	33.1	5.0	2.7
Total Moisture	14.1			

Color of silica gel 1/5 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no Reverb #1 sealed ✓

Description of particulate on filter white

Acetone rinse container no Reverb #1 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #1

Sample location REVGAB

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 6

Acetone rinse volume (Vaw) 165 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(165)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 98269.0 mg

Date and time of wt 1400 6-25-87 Gross wt 98268.7 mg

Average gross wt 98268.9 mg

Tare wt 98259.4 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 9.3 mg

Filter(s) container no. T-4

Date and time of wt 0800 6-25-87 Gross wt 236.1 mg

Date and time of wt 1400 6-25-87 Gross wt 235.8 mg

Average gross wt 236.0 mg

Tare wt 239.8 mg

Weight of particulate on filter(s) -3.8 mg

Weight of particulate in acetone rinse 9.3 mg

Total weight of particulate 5.5 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst G Karatzas

Signature of reviewer [illegible]

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/23/87

Sample location: Reverb Run no.: 2

Sample recovery person: Turner Recovery date: 6/23/87

Filter(s) no.: T-12

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	351.9	527.2	400.5	971.0
Initial volume (wt)	375.6	488.9	395.7	966.1
Net volume (wt)	-23.7	38.3	4.8	4.9
Total Moisture	24.3			

Color of silica gel 1/5 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no Reverb #2 sealed ✓

Description of particulate on filter white

Acetone rinse container no Reverb #2 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

G-5

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #2

Sample location REVERB

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 3

Acetone rinse volume (Vaw) 175 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(175)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 980224 mg

Date and time of wt 1400 6-25-87 Gross wt 980223 mg

Average gross wt 980224 mg

Tare wt 980113 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 10.9 mg

Filter(s) container no. T-12

Date and time of wt 0800 6-25-87 Gross wt 234.2 mg

Date and time of wt 1400 6-25-87 Gross wt 233.9 mg

Average gross wt 234.1 mg

Tare wt 236.7 mg

Weight of particulate on filter(s) -2.6 mg

Weight of particulate in acetone rinse 10.9 mg

Total weight of particulate 8.3 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst G Karstens

Signature of reviewer

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/23/87

Sample location: Reverb Run no.: #3

Sample recovery person: Turner Recovery date: 6/23/87

Filter(s) no.: T-14

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	385.4	522.0	396.1	989.7
Initial volume (wt)	403.8	491.7	393.7	984.2
Net volume (wt)	-18.4	30.3	2.4	5.5
Total Moisture	19.8			

Color of silica gel 1/5 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no Reverb #3 sealed ✓

Description of particulate on filter white

Acetone rinse container no Reverb #3 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

G-5

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #3

Sample location REVORB

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)		

Acetone rinse container no. 9

Acetone rinse volume (Vaw) 130 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(130)(.7857) = .1 mg

Date and time of wt 0800 6-25-87 Gross wt 995844 mg

Date and time of wt 1400 6-25-87 Gross wt 995848 mg

Average gross wt 995846 mg

Tare wt 995769 mg

Less acetone blank wt (Wa) .1 mg

Weight of particulate in acetone rinse 7.6 mg

Filter(s) container no. T-14

Date and time of wt 0800 6-25-87 Gross wt 235.0 mg

Date and time of wt 1400 6-25-87 Gross wt 235.0 mg

Average gross wt 235.0 mg

Tare wt 235.5 mg

Weight of particulate on filter(s) -.5 mg

Weight of particulate in acetone rinse 7.6 mg

Total weight of particulate 7.1 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst [signature]

Signature of reviewer [signature]

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/23/87

Sample location: Blast Run no.: 1

Sample recovery person: Turner Recovery date: 6/23/87

Filter(s) no.: T-8

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	349.8	525.9	393.5	986.9
Initial volume (wt)	371.8	489.2	389.8	976.7
Net volume (wt)	-22.0	36.7	3.7	10.2

Total Moisture 28.6

Color of silica gel 1/4 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no Blast #1 sealed ✓

Description of particulate on filter white

Acetone rinse container no Blast #1 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #1

Sample location BLAST

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 28

Acetone rinse volume (Vaw) 180 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(180)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 1101085 mg

Date and time of wt 1400 6-25-87 Gross wt 1101080 mg

Average gross wt 1101083 mg

Tare wt 1101021 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 5.0 mg

Filter(s) container no. T-8

Date and time of wt 0800 6-25-87 Gross wt 238.4 mg

Date and time of wt 1400 6-25-87 Gross wt 238.0 mg

Average gross wt 238.2 mg

Tare wt 238.3 mg

Weight of particulate on filter(s) -.1 mg

Weight of particulate in acetone rinse 5.0 mg

Total weight of particulate 4.9 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst D Karstens

Signature of reviewer

GUARDIAN SYSTEMS inc

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/23/87

Sample location: Blast Run no.: #2

Sample recovery person: Turner Recovery date: 6/23/87

Filter(s) no.: T-11

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	306.5	524.1	398.8	1010.9
Initial volume (wt)	334.6	487.4	394.3	1007.8
Net volume (wt)	-28.1	36.7	4.5	3.1

Total Moisture 16.2

Color of silica gel 1/5 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no Blast #2 sealed ✓

Description of particulate on filter white

Acetone rinse container no Blast #2 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

GUARDIAN SYSTEMS inc

G-5

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #2

Sample location BLAST

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 4

Acetone rinse volume (Vaw) 150 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(150)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 986788 mg

Date and time of wt 1400 6-25-87 Gross wt 986792 mg

Average gross wt 986790 mg

Tare wt 986777.4 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 1.4 mg

Filter(s) container no. T-11

Date and time of wt 0800 6-25-87 Gross wt 237.4 mg

Date and time of wt 1400 6-25-87 Gross wt 237.0 mg

Average gross wt 237.2 mg

Tare wt 237.4 mg

Weight of particulate on filter(s) -.2 mg

Weight of particulate in acetone rinse 1.4 mg

Total weight of particulate 1.2 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst G Kurstenas

Signature of reviewer

COMBINED METHODS 8 & 12

SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: ILCO Sample date: 6/23/87

Sample location: Blast Run no.: #3

Sample recovery person: Turner Recovery date: 6/23/87

Filter(s) no.: T-13

MOISTURE

Impingers	IPA	H_2O_2	HNO_3	Silica gel
Final volume (wt)	349.0	514.2	400.8	959.9
Initial volume (wt)	379.4	477.3	397.2	958.8
Net volume (wt)	-30.4	36.9	3.6	1.1

Total Moisture 11.2

Color of silica gel 1/6 pink

Description of impinger water clear

RECOVERED SAMPLE

Filter container no Blast #1 sealed ✓

Description of particulate on filter white

Acetone rinse container no Blast #1 Liquid level marked ✓

Acetone blank conainer no BLK Liquid level marked ✓

Samples stored and locked ✓

Remarks:

Date of laboratory custody 6/26/87

Laboratory personnel taking custody John Sutherland

Remarks

G5

METHOD 5 TRAIN ANALYTICAL PARTICULATE DATA

Plant ILCO Run No. #3

Sample location BLAST

Relative humidity 20%

Density of acetone (ρa) .7857 g/ml

Sample type	Sample identifiable	Liquid level marked and/or container sealed
Acetone rinse	✓	✓
filter(s)	✓	✓

Acetone rinse container no. 5

Acetone rinse volume (Vaw) 150 ml

Acetone blank residue concentration (Ca) .001273 mg/g

Wa = Ca Vaw ρa = (.001273)(150)(.7857) = .2 mg

Date and time of wt 0800 6-25-87 Gross wt 989428 mg

Date and time of wt 1400 6-25-87 Gross wt 989425 mg

Average gross wt 989427 mg

Tare wt 989356 mg

Less acetone blank wt (Wa) .2 mg

Weight of particulate in acetone rinse 6.9 mg

Filter(s) container no. T-13

Date and time of wt 0800 6-25-87 Gross wt 237.2 mg

Date and time of wt 1400 6-25-87 Gross wt 236.9 mg

Average gross wt 237.1 mg

Tare wt 236.9 mg

Weight of particulate on filter(s) .2 mg

Weight of particulate in acetone rinse 6.9 mg

Total weight of particulate 7.1 mg

Note: In no case shall a blank residue greater than (.01 mg/g) or .001% of the weight of acetone used be subtracted from the sample weight.

Remarks:

Signature of analyst D Karstens

Signature of reviewer

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name Interstate Lead Company V.E.E. No. [ ]

Source ([illegible]) Main Stack Permit No. 0 0 0 1 7 0 8 7 0 2

Start/Stop Time 10:15/10:45 Sky Condition Overcast Date 0 6 2 2 8 7

Observation Point East of the Stack Distance from Source 5[illegible] feet

Stack Height 75 Feet Background Sky Plume Color

Method of Evaluation 1 Wind Direction East

Minutes Exceeding:

Total Minutes Observed 3 0 10% Opacity = [ ]

Highest 6 Minute Average 0 0 20% Opacity = [ ]

Violation Observed N 60% Opacity = [ ]

Notice Number [ ] % Opacity = [ ]

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer [illegible] 4 7 Time Analysis 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: (Reverberatory Furnace) Main Stack Permit No.: 0 0 0 1 7 0 8 7 0 2

Start/Stop Time: 11:17/11:32 Sky Condition: Overcast Date: 0 6 2 2 8 7

Observation Point: East of the Stack Distance from Source: 500 feet

Stack Height: 75 feet Background: Sky Plume Color:

Method of Evaluation: 1 Wind Direction: East Minutes Exceeding:

Total Minutes Observed: 1 5 10% Opacity =

Highest 6 Minute Average: 0 0 20% Opacity =

Violation Observed: N 60% Opacity =

Notice Number: % Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15					30					45				
1	0	0	0	0	16					31					46				
2	0	0	0	0	17					32					47				
3	0	0	0	0	18					33					48				
4	0	0	0	0	19					34					49				
5	0	0	0	0	20					35					50				
6	0	0	0	0	21					36					51				
7	0	0	0	0	22					37					52				
8	0	0	0	0	23					38					53				
9	0	0	0	0	24					39					54				
10	0	0	0	0	25					40					55				
11	0	0	0	0	26					41					56				
12	0	0	0	0	27					42					57				
13	0	0	0	0	28					43					58				
14	0	0	0	0	29					44					59				

Results and Recommendations:

Observer: Brian Kelsow 4 7 Time Analysis: 0 1

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name Interstate Lead Company V.E.E. No. [ ]

Source (1 [illegible] Furnace) [illegible] Permit No. 0 0 0 1 7 0 8 7 0 2

Start/Stop Time 12:43/1614 Sky Condition Broken Date 0 6 2 2 8 7

Observation Point S.E of Stack Distance from Source 850 feet

Stack Height 75 feet Background Sky Plume Color

Method of Evaluation 1 Wind Direction East

Total Minutes Observed 3 1

Highest 6 Minute Average 0 0

Violation Observed N

Notice Number [ ]

Minutes Exceeding:

10% Opacity = [ ]

20% Opacity = [ ]

60% Opacity = [ ]

[ ] % Opacity = [ ]

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer Brian Debrow 4 7

Time Analysis 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: (Reverberatory Furnace) Main Stack Permit No.: 0 0 0 1 7 0 8 7 0 2

Start/Stop Time: 2:11/2:41 Sky Condition: Broken Date: 0 6 2 2 8 7

Observation Point: South East of the Stack Distance from Source: 550 feet

Stack Height: 75 feet Background: Sky Plume Color:

Method of Evaluation: 1 Wind Direction: East

Total Minutes Observed: 3 0

Highest 6 Minute Average: 0 0

Violation Observed: N

Notice Number:

Minutes Exceeding:

10% Opacity =

20% Opacity =

60% Opacity =

% Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer: Brian Dobrow 4 7

Time Analysis: 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: Refining Ventilation System Permit No.: 0 0 0 1 7 0 8 7 0 1

Start/Stop Time: 10:47/11:17 Sky Condition: Overcast Date: 0 6 2 2 8 7

Observation Point: East of the Stack Distance from Source: 850 feet

Stack Height: 45 Background: Sky and Trees Plume Color:

Method of Evaluation: 1 Wind Direction: East

Minutes Exceeding:

Total Minutes Observed: 3 0 10% Opacity =

Highest 6 Minute Average: 0 0 20% Opacity =

Violation Observed: N 60% Opacity =

Notice Number: % Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min	Seconds 0	15	30	45	Min	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer: Brian Brown 4 7 Time Analysis: 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: Refinery Ventilation System Permit No.: 0 0 0 1 7 0 8 7 0 1

Start/Stop Time: 1:29/2:05 Sky Condition: Overcast Date: 0 6 2 2 8 7

Observation Point: West of the Stack Distance from Source: 900 feet

Stack Height: 45 feet Background: Sky Plume Color:

Method of Evaluation: 1 Wind Direction: East

Total Minutes Observed: 4 5

Highest 6 Minute Average: 0 0

Violation Observed: N

Notice Number:

Minutes Exceeding:

10% Opacity =

20% Opacity =

60% Opacity =

% Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30	0	0	0	0	45				
1	0	0	0	0	16	0	0	0	0	31	0	0	0	0	46				
2	0	0	0	0	17	0	0	0	0	32	0	0	0	0	47				
3	0	0	0	0	18	0	0	0	0	33	0	0	0	0	48				
4	0	0	0	0	19	0	0	0	0	34	0	0	0	0	49				
5	0	0	0	0	20	0	0	0	0	35	0	0	0	0	50				
6	0	0	0	0	21	0	0	0	0	36	0	0	0	0	51				
7	0	0	0	0	22	0	0	0	0	37	0	0	0	0	52				
8	0	0	0	0	23	0	0	0	0	38	0	0	0	0	53				
9	0	0	0	0	24	0	0	0	0	39	0	0	0	0	54				
10	0	0	0	0	25	0	0	0	0	40	0	0	0	0	55				
11	0	0	0	0	26	0	0	0	0	41	0	0	0	0	56				
12	0	0	0	0	27	0	0	0	0	42	0	0	0	0	57				
13	0	0	0	0	28	0	0	0	0	43	0	0	0	0	58				
14	0	0	0	0	29	0	0	0	0	44	0	0	0	0	59				

Results and Recommendations:

Observer: Brian Dekrow 47

Time Analysis: 0 3

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name Interstate Lead Company V.E.E. No. [ ]

Source Refinery Ventilation System Permit No. 0 0 0 1 7 0 8 7 0 1

Start/Stop Time 3:07/3:37 Sky Condition Broken Date 0 6 2 2 8 7

Observation Point West of the Stack Distance from Source 850 feet

Stack Height 45 Feet Background Sky Plume Color

Method of Evaluation 1 Wind Direction East

Total Minutes Observed 30

Highest 6 Minute Average 0 0

Violation Observed N

Notice Number

Minutes Exceeding:

10% Opacity =

20% Opacity =

60% Opacity =

% Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer [illegible] 4 7

Time Analysis 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: Reverberatory Furnace Baghouse Sanitary Stack Permit No.: 0 0 0 1 7 0 8 7 0 2

Start/Stop Time: 1:08/1:38 Sky Condition: Broken Date: 0 6 2 3 8 7

Observation Point: South East of the baghouse stack Distance from Source: 450 feet

Stack Height: 5[illegible] feet Background: Trees Plume Color:

Method of Evaluation: 7 Wind Direction: South Minutes Exceeding:

Total Minutes Observed: 3 0 10% Opacity =

Highest 6 Minute Average: 0 0 20% Opacity =

Violation Observed: N 60% Opacity =

Notice Number: % Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer: [illegible] 4 7 Time Analysis: 0 2

ENV-AP-008-12/84 Revised

VMH
JCHD

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: Reverberatory Furnace Baghouse Stack Permit No.: 0 0 0 1 7 0 8 7 0 2

Start/Stop Time: 10:01/10:27 Sky Condition: Broken Date: 0 6 2 3 5 7

Observation Point: Southeast of the baghouse stack Distance from Source: 450 feet

Stack Height: 50 feet Background: Trees Plume Color:

Method of Evaluation: 1 Wind Direction: South

Total Minutes Observed: 1 9

Highest 6 Minute Average: 0 0

Violation Observed: N

Notice Number:

Minutes Exceeding:

10% Opacity =

20% Opacity =

60% Opacity =

% Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19					34					49				
5	0	0	0	0	20					35					50				
6	0	0	0	0	21					36					51				
7	0	0	0	0	22					37					52				
8	0	0	0	0	23					38					53				
9	0	0	0	0	24					39					54				
0	0	0	0	0	25					40					55				
11	0	0	0	0	26					41					56				
2	0	0	0	0	27					42					57				
3	0	0	0	0	28					43					58				
14	0	0	0	0	29					44					59				

Results and Recommendations:

Observer: Brian Dellrow 4 7 Time Analysis: 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: Reverberatory Furnace Sanitary Baghouse Permit No.:

Start/Stop Time: 11:48/12:18 Sky Condition: Broken Date: 06 23 87

Observation Point: [illegible] Distance from Source: 800 feet

Stack Height: 50 feet Background: Trees Plume Color:

Method of Evaluation: 7 Wind Direction: Minutes Exceeding:

Total Minutes Observed: 30 10% Opacity =

Highest 6 Minute Average: 00 20% Opacity =

Violation Observed: N 60% Opacity =

Notice Number: % Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer: [illegible] 47 Time Analysis: 02

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: Reverberatory Sanitary Furnace (Baghouse Stack) Permit No.: 0 0 0 1 7 0 8 7 0 2

Start/Stop Time: 1:49/2:19 Sky Condition: Broken Date: 0 6 2 3 8 7

Observation Point: S.W. Side of the Stack Distance from Source: 800 feet

Stack Height: 50 Feet Background: Sky and Building Plume Color:

Method of Evaluation: 1 Wind Direction: South

Total Minutes Observed: 3 0

Highest 6 Minute Average: 0 0

Violation Observed: N

Notice Number:

Minutes Exceeding:

10% Opacity =

20% Opacity =

60% Opacity =

% Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer: Brian Dickson 4 7

Time Analysis: 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name: Interstate Lead Company V.E.E. No.:

Source: Blast Furnace Sanitary Baghouse Permit No.: 0 0 0 1 7 0 8 4 0 1

Start/Stop Time: 9:39/10:09 Sky Condition: Broken Date: 0 6 2 3 8 7

Observation Point: South East of the baghouse Distance from Source: 445 feet

Stack Height: 50 feet Background: Trees Plume Color:

Method of Evaluation: 1 Wind Direction: South Minutes Exceeding:

Total Minutes Observed: 3 0 10% Opacity =

Highest 6 Minute Average: 0 0 20% Opacity =

Violation Observed: N 60% Opacity =

Notice Number: % Opacity =

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer: [illegible] 4 7 Time Analysis: 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name Interstate Lead Company V.E.E. No. [ ]

Source Blast Furnace's Sanitary Baghouse Permit No. 9 0 0 1 7 0 8 4 0 1

Start/Stop Time 12:18/12:48 Sky Condition Broken Date 0 6 2 3 5 7

Observation Point South East of Stack Distance from Source 800 feet

Stack Height 50 feet Background Trees Plume Color

Method of Evaluation 1 Wind Direction South Minutes Exceeding:

Total Minutes Observed 3 0 10% Opacity = [ ]

Highest 6 Minute Average 0 0 20% Opacity = [ ]

Violation Observed N 60% Opacity = [ ]

Notice Number [ ] % Opacity = [ ]

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23	0	0	0	0	38					53				
9	0	0	0	0	24	0	0	0	0	39					54				
10	0	0	0	0	25	0	0	0	0	40					55				
11	0	0	0	0	26	0	0	0	0	41					56				
12	0	0	0	0	27	0	0	0	0	42					57				
13	0	0	0	0	28	0	0	0	0	43					58				
14	0	0	0	0	29	0	0	0	0	44					59				

Results and Recommendations:

Observer Brian Dalrow 4 7 Time Analysis 0 2

ENV-AP-008-12/84 Revised

JEFFERSON COUNTY DEPARTMENT OF HEALTH
BUREAU OF ENVIRONMENTAL HEALTH
AIR POLLUTION CONTROL PROGRAM

VISIBLE EMISSIONS OBSERVATION REPORT

Company Name Interstate Lead Company V.E.E. No. [ ]

Source Blast Furnace Smelting Baghouse Stack Permit No. 0 0 0 1 7 0 8 4 0 1

Start/Stop Time 2:20/2:42 Sky Condition Broken Date 0 6 2 3 8 7

Observation Point South West of the Stack Distance from Source 800 feet

Stack Height [illegible] Background Sky and Building Plume Color

Method of Evaluation 1 Wind Direction South

Minutes Exceeding:

Total Minutes Observed 2 3 10% Opacity = [ ]

Highest 6 Minute Average 0 0 20% Opacity = [ ]

Violation Observed N 60% Opacity = [ ]

Notice Number [ ] % Opacity = [ ]

Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45	Min.	Seconds 0	15	30	45
0	0	0	0	0	15	0	0	0	0	30					45				
1	0	0	0	0	16	0	0	0	0	31					46				
2	0	0	0	0	17	0	0	0	0	32					47				
3	0	0	0	0	18	0	0	0	0	33					48				
4	0	0	0	0	19	0	0	0	0	34					49				
5	0	0	0	0	20	0	0	0	0	35					50				
6	0	0	0	0	21	0	0	0	0	36					51				
7	0	0	0	0	22	0	0	0	0	37					52				
8	0	0	0	0	23					38					53				
9	0	0	0	0	24					39					54				
10	0	0	0	0	25					40					55				
11	0	0	0	0	26					41					56				
12	0	0	0	0	27					42					57				
13	0	0	0	0	28					43					58				
14	0	0	0	0	29					44					59				

Results and Recommendations:

Observer [illegible] 4 7 Time Analysis 0 2

ENV-AP-008-12/84 Revised

GUARDIAN SYSTEMS, INC.
P.O. Box 300
Leeds, Alabama 35094

July 1, 1987

INTERSTATE LEAD COMPANY, INC.
P.O. Box 276
Leeds, Alabama 35094

Acetone Rinse & Filters
Lead Analysis
Analyzed By Charles Johnson, on 06/29/87
Concentration, ug

Sample ID	Results	Control Number
Run #1 Pot Stack	42.0	67826
Run #1 Main Stack	166.0	67827
Run #2 Pot Stack	30.0	67828
Run #2 Main Stack	152.0	67829
Run #3 Pot Stack	27.0	67830
Run #3 Main Stack	100.0	67831
Run #1 Reverb Stack	281.0	67832
Run #1 Blast Stack	36.0	67833
Run #2 Reverb Stack	276.0	67834
Run #2 Blast Stack	34.0	67835
Run #3 Reverb Stack	175.0	67836
Run #3 Blast Stack	57.0	67837
Blank	<1.0	67838

IPA Impingers
Lead Analysis
Analyzed By Charles Johnson on 06/29/87
Concentration ug

Sample ID	Results	Control Number
Run #1 Pot Stack	<10.0	67839
Run #1 Main Stack	<10.0	67840
Run #2 Pot Stack	<10.0	67841
Run #2 Main Stack	<10.0	67842
Run #3 Pot Stack	<10.0	67843
Run #3 Main Stack	<10.0	67844
Run #1 Reverb Stack	<10.0	67845
Run #1 Blast Stack	<10.0	67846
Run #2 Reverb Stack	<10.0	67847
Run #2 Blast Stack	<10.0	67848
Run #3 Reverb Stack	<10.0	67849
Run #3 Blast Stack	<10.0	67850
Blank	<10.0	67851

Hydrogen Peroxide Impinger
Lead Analysis
Analyzed By Charles Johnson 06/29/87
Concentration ug

Sample ID	Results	Control Number
Run #1 Pot Stack	<25.0	67852
Run #1 Main Stack	74.0	67853
Run #2 Pot Stack	<25.0	67854
Run #2 Main Stack	88.0	67855
Run #3 Pot Stack	<25.0	67856
Run #3 Main Stack	97.0	67857
Run #1 Reverb Stack	<25.0	67858
Run #1 Blast Stack	<25.0	67859
Run #2 Reverb Stack	130.0	67860
Run #2 Blast Stack	<25.0	67861
Run #3 Reverb Stack	106.0	67862
Run #3 Blast Stack	<25.0	67863
Blank	<25.0	67864

Nitric Acid Impinger
Lead Analysis
Analyzed By Charles Johnson 06/29/87
Concentration ug

Sample ID	Results	Control Number
Run #1 Pot Stack	<10.0	67865
Run #1 Main Stack	<10.0	67866
Run #2 Pot Stack	<10.0	67867
Run #2 Main Stack	<10.0	67868
Run #3 Pot Stack	<10.0	67869
Run #3 Main Stack	<10.0	67870
Run #1 Reverb Stack	51.0	67871
Run #1 Blast Stack	41.0	67872
Run #2 Reverb Stack	101.0	67873
Run #2 Blast Stack	43.0	67874
Run #3 Reverb Stack	105.0	67875
Run #3 Blast Stack	24.0	67876
Blank	<10.0	67877

Approved by: John Sutherland

NOMENCLATURE FOR SO_2

C_{so2}	=	Concentration of sulfur dioxide, dry basis corrected to standard conditions, mg/dscm (lb/dscf)
C_{ppm}	=	Concentration of sulfur dioxide, dry std. conditions, ppm
N	=	Normality of barium perchlorate titrant, milliequivalents/ml
P_{bar}	=	Barometric pressure at the exit orifice of the dry gas meter, mm Hg (in. Hg).
P_{std}	=	Standard absolute pressure, 760 mm Hg (29.92 in Hg)
T_m	=	Average dry gas meter absolute temperature, °K (°R).
T_{std}	=	Standard absolute temperature, 293 °K (528 °R)
V_a	=	Volume of sample aliquot titrated, ml.
V_m	=	Dry gas volume measured by the dry gas meter, dcm (dcf)
$V_{m(std)}$	=	Sample volume at standard conditions (dry basis), ml.
V_{soln}	=	Total volume in which the sulfur dioxide sample is contained, 100ml.
V_t	=	Volume of barium perchlorate titrant used for the sample, ml. (average or replicate titrations)
V_{tb}	=	Volume of barium perchlorate titrant used for the blank, ml.
Y	=	Dry gas meter calibration factor
32.03	=	Equivalent weight of sulfur dioxide

EQUATIONS FOR SO_2

$$V_{m(std)} = V_m \times Y \times (T_{std}/T_m) \times (P_{bar}/P_{std})$$
$$= K_1 \times Y \times (V_m) \times (P_{bar}/T_m)$$

$$C_{so2} = K_2 \times (V_t - V_{tb}) \times (N) \times (V_{soln}/V_a) \; / \; V_{m(std)}$$

If C_{so2} is in Metric units then:

$$C_{ppm} = C_{so2} \times 0.37$$

Where: $K_1 = 17.64 \; \frac{°R}{in\ Hg}$ for English units

$K_2 = 7.061 \times 10^{-5}$ lb/meq. for English units

EPA CHECKS

Using a V_a of 5ml, a V_{soln} of 100ml, a V_{mstd} of 0.021, and a V_{tb} of 0.35 the following values were measured.

EPA Number	V_t	Measured mg/DSCM	Actual mg/DSCM	% Difference
4404	1.00	198.3	198.3	0.00
4404	1.00	198.3	198.3	0.00
Average % Difference				0.00
8558	4.70	1327.0	1326.9	0.01
4404	4.75	1342.2	1326.9	1.15
Average % Difference				0.58

PLANT ILCO SAMPLE LOCATION Main Stack

FIELD DATA CHECKS

SAMPLE RECOVERY PERSONNEL Turner

PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

Sample no.	Sample identification no.		Date of recovery	Liquid level marked	Stored in locked container
	H_2SO_4	SO_2			
1		MS-1	6/22/87	✓	✓
2		MS-2	6/22/87	✓	✓
3		MS-3	6/22/87	✓	✓
BLANKS		BLK	6/22/87	✓	✓

REMARKS

SIGNATURE OF FIELD SAMPLE TRUSTEE C Turner

LABORATORY DATA CHECKS

LAB PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

DATE RECOVERED SAMPLES RECEIVED 6/26/87

ANALYST Turner

Sample no.	Sample identification no.		Date of analysis	Liquid at marked level	Sample identified
	H_2SO_4	SO_2			
1		MS-1	6/26/87	✓	✓
2		MS-2	6/26/87	✓	✓
3		MS-3	6/26/87	✓	✓
BLANKS		BLK	6/26/87	✓	✓

REMARKS

SIGNATURE OF LAB SAMPLE TRUSTEE C Turner

METHOD 8 Sample recovery and integrity data.

PLANT ILCO DATE 6/22/87

SAMPLE LOCATION Main Stack ANALYST Turner

NORMALITY OF BARIUM PERCHLORATE

1. 10.0 ml $Ba(ClO_4)_2$
2. 10.1 ml $Ba(ClO_4)_2$ N(Avg.) =
3. 9.9 ml $Ba(ClO_4)_2$ .0100

~~SULFURIC ACID MIST (INCLUDING SULFUR TRIOXIDE) ANALYSIS~~

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfuric acid sample is contained, ml				
V_a - Volume of sample aliquot, ml				
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration			
	2nd titration			
	Average			
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration			
	2nd titration			
	Average			

$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SULFUR DIOXIDE ANALYSIS

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfur dioxide sample is contained, ml		500	500	500
V_a - Volume of sample aliquot, ml		2	2	2
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration	97.0	98.5	69.9
	2nd titration	97.5	98.0	69.7
	Average	97.25	98.25	69.8
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration	.35		
	2nd titration	.35		
	Average	.35		

$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SIGNATURE OF ANALYST C Turner

SIGNATURE OF REVIEWER OR SUPERVISOR [illegible]

Method 8 analytical data sheet.

GUARDIAN SYSTEMS inc

PLANT TLCO SAMPLE LOCATION Pot Stack

FIELD DATA CHECKS

SAMPLE RECOVERY PERSONNEL Turner

PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

Sample no.	Sample identification no.		Date of recovery	Liquid level marked	Stored in locked container
	H_2SO_4	SO_2			
1		PS-1	6/22/87	✓	✓
2		PS-2	6/22/87	✓	✓
3		PS-3	6/22/87	✓	✓
BLANKS		BLK	6/22/87	✓	✓

REMARKS

SIGNATURE OF FIELD SAMPLE TRUSTEE C Turner

LABORATORY DATA CHECKS

LAB PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

DATE RECOVERED SAMPLES RECEIVED 6/26/87

ANALYST Turner

Sample no.	Sample identification no.		Date of analysis	Liquid at marked level	Sample identified
	H_2SO_4	SO_2			
1		PS-1	6/26/87	✓	✓
2		PS-2	6/26/87	✓	✓
3		PS-3	6/26/87	✓	✓
BLANKS		BLK	6/26/87	✓	✓

REMARKS

SIGNATURE OF LAB SAMPLE TRUSTEE C Turner

METHOD 8 Sample recovery and integrity data.

II-23

GUARDIAN SYSTEMS INC

PLANT ILCO DATE 6/22/87

SAMPLE LOCATION Pot Stack ANALYST Turner

NORMALITY OF BARIUM PERCHLORATE

1. 10.0 ml $Ba(ClO_4)_2$
2. 10.1 ml $Ba(ClO_4)_2$ N(Avg.) =
3. 9.9 ml $Ba(ClO_4)_2$ .0100

~~SULFURIC ACID MIST (INCLUDING SULFUR TRIOXIDE) ANALYSIS~~

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfuric acid sample is contained, ml				
V_a - Volume of sample aliquot, ml				
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration			
	2nd titration			
	Average			
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration			
	2nd titration			
	Average			

$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SULFUR DIOXIDE ANALYSIS

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfur dioxide sample is contained, ml		500	500	500
V_a - Volume of sample aliquot, ml		5	5	5
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration	.35	.35	.40
	2nd titration	.35	.35	.30
	Average	.35	.35	.35
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration	.35		
	2nd titration	.35		
	Average	.35		

$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SIGNATURE OF ANALYST C Turner

SIGNATURE OF REVIEWER OR SUPERVISOR [illegible]

Method 8 analytical data sheet.

PLANT ILCO SAMPLE LOCATION Reverb

FIELD DATA CHECKS

SAMPLE RECOVERY PERSONNEL Turner

PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

Sample no.	Sample identification no.		Date of recovery	Liquid level marked	Stored in locked container
	H_2SO_4	SO_2			
1		Rev-1	6/23/87	✓	✓
2		Rev-2	6/23/87	✓	✓
3		Rev-3	6/23/87	✓	✓
BLANKS		BLK	6/23/87	✓	✓

REMARKS

SIGNATURE OF FIELD SAMPLE TRUSTEE C Turner

LABORATORY DATA CHECKS

LAB PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

DATE RECOVERED SAMPLES RECEIVED 6/26/87

ANALYST Turner

Sample no.	Sample identification no.		Date of analysis	Liquid at marked level	Sample identified
	H_2SO_4	SO_2			
1		Rev-1	6/26/87	✓	✓
2		Rev-2	6/26/87	✓	✓
3		Rev-3	6/26/87	✓	✓
BLANKS		BLK	6/26/87	✓	✓

REMARKS

SIGNATURE OF LAB SAMPLE TRUSTEE C Turner

METHOD 8 Sample recovery and integrity data.

II-23

GUARDIAN SYSTEMS inc

PLANT ILCO DATE 6/23/87

SAMPLE LOCATION Reverb ANALYST Turner

NORMALITY OF BARIUM PERCHLORATE
1. 10.0 ml $Ba(ClO_4)_2$
2. 10.1 ml $Ba(ClO_4)_2$ N(Avg.) =
3. 9.9 ml $Ba(ClO_4)_2$ .0100

~~SULFURIC ACID MIST (INCLUDING SULFUR TRIOXIDE) ANALYSIS~~

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfuric acid sample is contained, ml				
V_a - Volume of sample aliquot, ml				
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration			
	2nd titration			
	Average			
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration			
	2nd titration			
	Average			

$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SULFUR DIOXIDE ANALYSIS

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfur dioxide sample is contained, ml		500	500	500
V_a - Volume of sample aliquot, ml		5	5	5
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration	4.7	5.3	6.5
	2nd titration	4.5	5.2	6.5
	Average	4.6	5.25	6.5
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration	.35		
	2nd titration	.35		
	Average	.35		

$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SIGNATURE OF ANALYST C Turner

SIGNATURE OF REVIEWER OR SUPERVISOR [illegible]

Method 8 analytical data sheet.

GUARDIAN SYSTEMS inc

PLANT ILCO SAMPLE LOCATION Blast

FIELD DATA CHECKS

SAMPLE RECOVERY PERSONNEL Turner

PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

Sample no.	Sample identification no.		Date of recovery	Liquid level marked	Stored in locked container
	H_2SO_4	SO_2			
1		Blast-1	6/23/87	✓	✓
2		Blast-2	6/23/87	✓	✓
3		Blast-3	6/23/87	✓	✓
BLANKS		BLK	6/23/87	✓	✓

REMARKS

SIGNATURE OF FIELD SAMPLE TRUSTEE C Turner

LABORATORY DATA CHECKS

LAB PERSON WITH DIRECT RESPONSIBILITY FOR RECOVERED SAMPLES Turner

DATE RECOVERED SAMPLES RECEIVED 6/26/87

ANALYST Turner

Sample no.	Sample identification no.		Date of analysis	Liquid at marked level	Sample identified
	H_2SO_4	SO_2			
1		Blast-1	6/26/87	✓	✓
2		Blast-2	6/26/87	✓	✓
3		Blast-3	6/26/87	✓	✓
BLANKS		BLK	6/26/87	✓	✓

REMARKS

SIGNATURE OF LAB SAMPLE TRUSTEE C Turner

METHOD 8 Sample recovery and integrity data.

II-23

GUARDIAN SYSTEMS inc

PLANT ILCO DATE 6/23/87

SAMPLE LOCATION Blast ANALYST Turner

NORMALITY OF BARIUM PERCHLORATE
1. 10.0 ml $Ba(ClO_4)_2$
2. 10.1 ml $Ba(ClO_4)_2$ N(Avg.) =
3. 9.9 ml $Ba(ClO_4)_2$ .0100

~~SULFURIC ACID MIST (INCLUDING SULFUR TRIOXIDE) ANALYSIS~~

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfuric acid sample is contained, ml				
V_a - Volume of sample aliquot, ml				
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration			
	2nd titration			
	Average			
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration			
	2nd titration			
	Average			

$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SULFUR DIOXIDE ANALYSIS

		Run 1	Run 2	Run 3
V_{soln} - Total volume of solution in which the sulfur dioxide sample is contained, ml		500	500	500
V_a - Volume of sample aliquot, ml		5	5	5
V_t - Volume of barium perchlorate titrant used for sample, ml	1st titration	.50	.50	.40
	2nd titration	.50	.60	.35
	Average	.50	.55	.375
V_{tb} - Volume of barium perchlorate titrant used for blank, ml	1st titration	.35		
	2nd titration	.35		
	Average	.35		

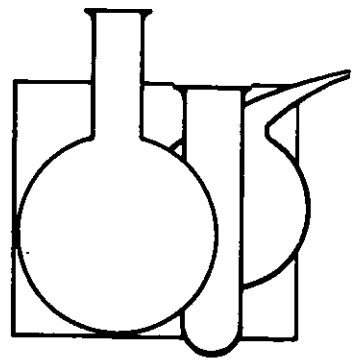
$\frac{\text{1st titration}}{\text{2nd titration}}$ = 0.99 to 1.01 or |1st titration - 2nd titration| ≤ 0.2 ml

SIGNATURE OF ANALYST C Turner

SIGNATURE OF REVIEWER OR SUPERVISOR [illegible]

Method 8 analytical data sheet.

Plant Operation Data



6/22/87 METALLURGICAL TESTS

1st RUN START 10:15 AM

REVERB

13 CHARGES FED | METAL PROD. 2 SLAG 6

BLAST

START CHARGE PLATE END PLATE — 1 FULL CHARGE

PRODUCE — 1 METAL | SLAG FURNACE 2 TIMES

2ND RUN START 12:15

REVERB

11 CHARGES FED | METAL PROD - 1 SLAG FURN. 1

BLAST

START CHARGE PLATE END COKE - 1 FULL CHARGE COKE

PRODUCE 1 METAL | SLAG FURNACE — 1 TIME

3RD RUN START 2:15 PM

REVERB

8 CHARGES FED | METAL PROD - 1 SLAG 2

BLAST

START CHARGE COKE END COKE - 1 FULL CHARGE

PRODUCE — 1 METAL | SLAG FURNACE — 1 TIME

6/23/87 BLASE SANITARY

1ST RUN – 9:05 AM	START COKE END COKE
FED 1 CHARGE	– PRODUCE 1 METAL + 1 SLAG
2ND RUN – 11:10 AM	START ON IRON END SLAG
1 1/2 CHARGES FED	PRODUCE – 1 METAL + 1 SLAG
3RD RUN – 1:40 PM	START ON COKE END ON COKE
2 CHARGES FED	PRODUCE – 2 METAL + 2 SLAG

REVERB SANITARY

1st RUN – 9:33 AM	
CHARGES FED – 13	METAL PROD. 0 – SLAG 6
2ND RUN – 11:45 AM	
15 CHARGES FED	METAL PROD. 2 – SLAG 4
3RD RUN 1:40 PM	
15 CHARGES FED	METAL PROD. 4 – SLAG 6

JUNE 87 DATE	RUN #	STACK TEST TIME (S) (START / STOP + TOTAL TIME) MAIN	POTS	SOURCE(S) OF EMISSIONS	NO. OF CHARGES +/ OR BUCKETS DURING TESTS MAIN	NO. OF SLAG POTS PER TEST MAIN	NO. OF METAL HOGS PER TEST MAIN	LEAD PRODUCT. TONS/R Blast-1.9 To Reub.-2.2
22	1	10:15 AM	10:30 AM	MAIN STACK-2/MET.	BLAST- 1 complete	2	1	1.9 Tons
		11:20 AM	11:45 AM	BAGHOUSES + CBM	Charge + 1 bucket plates			
		1.08 hrs	1.25 hrs	Ref. Kettle B.H.	REVERB-13 + Flue Dust	6	2	4.4 Ton
2	2	12:13 PM	12:43 PM	"	BLAST- 1 complete start Plates	1	1	1.9 Ton
		1:20 PM	1:50 PM		Charge + End Coke			
		1.12 hrs	1.12 hrs		REVERB- 11 + Flue Dust	4	1	2.2 Ton
22	3	2:15	2:44 PM	"	BLAST- 1 complete start Plates	1	1	1.9 Tons
		3:20	3:50 PM		Charge + END Coke			
		1.08 hrs 24 points 2.5 min/Point 60 min/Run	1.10 hrs 24 points 2.5 min/Point 60 min/Run		REVERB- 8 + FLUE DUST * REVERB Cut Back to Clean Loops	2	0 *	
		B. Sanitary	R. Sanitary					
23	1	9:06 AM	9:29 AM	Blast + Reverb. Sanitary Baghouses (Sonic Cleaning)	BLAST - 1 complete	1	1	1.9 Tons
		10:28 AM	10:31 AM		Charge +			
		1.37 hrs	1.03 hrs		REVERB-13 + Flue Dust	6	0	0
3	2	11:00 AM	11:45 AM	"	BLAST- 1½ Complete charges	1	1	1.9 Tons
		12:20 PM	12:47 PM		start Iron End Slag			
		1.33 hrs	1.03 hrs		REVERB- 15 + Flue Dust	4	2	4.4 Ton
23	3	1:40 PM	1:40 PM	"	BLAST-2 complete Charges	2	2	3.8 Ton
		2:54 PM	2:43 PM		Start coke - end coke			
		1.23 hrs 24 points 1.2 hrs/RUN 3 min/Point	1.05 hrs 24 points 1.0 hr/RUN 2.5 min/Point		REVERB-15 + FLUE DUST	6	4	8.8 Ton

RCF 6/26/87

EACH Blast Furnace Charge formulation ADDED DURING START TEST:
Consisted of:

1. 2 Buckets of Forked Coke (Coke is loaded into buck
2. 1 Bucket of Iron with 2 crushed iron drums
3. 3 pcs. Return Blast Slag
4. 26 shovels of Limestone Rock + 4 shovels of Sand
5. 1 Bucket of Battery Plates
6. 2-½ Buckets each of Reverb. Slag

Start over on No. 1 above

Run #1 — 6/22/87

START TIME: 10:15AM / 10:30AM MAIN POTS END TIME: 11:20AM / 11:45AM MAIN POTS

BLAST FURNACE

Per Blast Furnace Operator — Start Test with battery plate Charge

and End Test with battery plate charge — 1 Complete Charge

+ 1 bucket b. plates during Test and 1 Metall Hog + 1 Slag Tap pot

10:14AM — Blast Furnace Charge — 1 Bucket of Battery Plates

10:20AM — Blast Furnace Slag Tap — 1 Pot of Slag

10:23AM — Blast Furnace Charge — 1 Bucket of Battery Plates

10:28AM — " " " — ½ " of Reverb. Slag

10:40AM — " " " — ½ " of " Slag

10:55AM " " " — 1 Bucket of Coke

11:20AM " " " — 1 Bucket of Battery Plates

ILCO STACK TEST NOTES

E	RUN	TIME	MANOMETER (ΔP) inches of water BLAST SANITARY	REVERB SANITARY	AFTERBURNER TEMP. (°F)	REFINING POT BH ΔP in. of water	COMMENTS
/22	1	10:05 AM	6.6-6.8	7.25			Blast Lead Tap Hood is Very good.
		10:30	6.8-6.9	7.35	550-600		55gal drum under
		10:45	6.9-7.0	7.40			Ref. BH - not enclosed
		11:00	6.7-6.9	7.4			hole in fabric ~~noted~~
		11:15	6.8-6.9	7.5			Alley not kept wet at Outer Sides
-2	2	12:15 PM	6.9-7.0	7.6			Whole Mine Batteries with ACID added to REVERB FEED - SIZE 20"H x 7.5"W x 7.5"L
		12:25				0.7	
		12:26					Good NH_3 Smell in Alley
		1:10	7.0-7.1	7.7			Hot Slag Pots are
		1:15			503-498		Cooled in non enclosed Area
-2	3	2:15 PM	7.1-7.2	7.75	498		6 Non Enclosed Hoppers were in Limited Use during the Stack Test
		2:48	7.05-7.2	7.8			Blast Slag Tap Hood worked Very good
							Curtain between Reverb Feed Room Reverb Furnace is open at the bottom.
							#4 Kettle - Full of Pb but no Hood or Cover
							Reverb Slag Tap - Good
							No Installation of Clarification Modification
							BLAST Furnace Feed was changed from Side-To to Center with Funnel on Top

ILCO STACK TEST

E	RUN	TIME	ΔP in H_2O BAGHOUSE FOR BLAST MET	ΔP in H_2O - BAGHOUSE FOR REVERB MET.	ΔP in H_2O BAGHOUSE BLAST SAN	ΔP in. H_2O BAGHOUSE REVERB. SAN.	COMMENTS
1/23	No.		TEMP. (°F)	TEMP (°F)			Bags are Cleaned
3	1	10:28	#1 2.4-2.6	#1 1.6-1.8			By Sonic Horn
			#2 4.9-5.1	#2 2.8-2.9			in B.&S Sanitary Bi
			#3 5.1-5.3	#3 3.1-3.4			Samples Collected for
			#4 5.8-6.2	#4 3.8-3.9			Lead Analysis by ILC
			220°F	210°F			or Guardian:
							1. BLAST MET. Baghous.
1/23	2	12:30	#1 3.3-3.5	#1 2.9-3.0			2. REVERB. MET. "
			#2 5.3-5.7	# 2.7-2.8			3. REFINING POTS "
			#3 5.6-5.7	# 3.6-3.8			4. BLAST SAN. "
			#4 6.2-6.7	# 4.4-4.5			5 REVERB. SAN. "
			215-220°F	210-220°F			Very Slight Fugitive
							from leaks in top of the
1/23	3	1:40			5.9-6.0	7.6	Reverb Furnace
		2:35			6.0-6.1	7.75	10 Bags in Top of Each
							of Blaster Reverb. San
							Bff must be removed ASA
							CRM Recorder has
							(1) wrong Paper (not 1/2 Res
							(2) Not 6 min. Average
							Plastic Curtain Cut
							to be 6" from Bottom
							of Floor - 1 piece
							missing - not a wall
							at the Bottom of
							Opening.

Date 6/22/87 Shift H Supervisor [illegible]

BLAST FURNACE CHECK LIST

ITEM	FREQ	TIME	DATA	TIME	DATA	TIME	DATA	TIME	DATA	DETAILS
Mobile Equip. Check List	SC	10AM	✓	NOON	✓	2PM	✓	4PM	✓	
# Personnel	SC		3		✓		✓		✓	
Proper Charge Posted	SC				✓		✓		✓	
Top Temperature Reading	4		400		340		440		340	
Back Pressure Reading	4		7		10		14		10	
Air Flow Reading	4		1200		1200		1200		1200	
Incinerator Working	4		✓		✓		✓		✓	
Condition Lead Moulds	4		✓		✓		✓		✓	
Condition Lead Well	4		✓		✓		✓		✓	
Condition of Lead	4		✓		✓		✓		✓	
# Tuyrees Open	4		8		8		8		8	
Jackett Blown Down S.C.	*		—		—		—		—	
Condition & # Punch Bars	4		✓		✓		✓		✓	
Skip Hoist Bucket Condition	4		✓		✓		✓		✓	
Skip Hoist Rail Condition	4		✓		✓		✓		✓	
Skip Hoist Cable Condition	4		✓		✓		✓		✓	
Slag Tap Condition	4		✓		✓		✓		✓	
Condition Slag Moulds	4		✓		✓		✓		✓	
Condition of Slag	4		✓		✓		✓		✓	
Quantity of Slag/Tap	4		3/4		Full		3/4		3/4	
Condition Jack Hammer & Bit	4		✓		✓		✓		✓	
Cond. Cooling Tank & Valve	4		✓		✓		✓		✓	
Reading on O_2 Barton Guage	4		2300		2300		2300		2300	
Condition Blast Blower	4		✓		✓		✓		✓	
Blast Bed Level	4		Full		Full		Full		Full	
Skip Hoist Upper Condition	4		✓		✓		✓		✓	
# Mud Balls for Slag Tap	4		0		0		0		✓	
Lime used for Moulds	4		✓		✓		✓		✓	
Bag House Dust Incinerated	4		✓		✓		✓		✓	
Cooling Loops & Screw Cond.	4		✓		✓		✓		✓	
Bag House Screw Cond.	4		✓		✓		✓		✓	
Fan Bearing Oil Level	4		✓		✓		✓		✓	
Fan Bearing Temper.	4		✓		✓		✓		✓	
Check Draft on Furnace	4		✓		✓		✓		✓	
Check Baghouse Stack	4		Clear		Clear		Clear		Clear	
Check Baghouse Temp.	4		225		220		225°		220	
Check Fan Amps	4		150		150		150		150	
Manometer Reading #5	4		6		5½		4½		7	
#6	4		6½		6		5½		6½	
#7	4		4½		4		6		6½	
#8	4		4		6		6½		5½	
Oxygen Tank Reading	SC		95							
# Charges Fed	SC								7	
Amount Slag Produced	SC								11	
Amount Lead Produced	SC								7	13
Housekeeping Acceptable	SC									N
Furnace Alley Scraped	SC									

Problems or Comments: Down 30 min. to clean lines

operate - 100% day

LEAD - 5 TINS - 882

SC - Shift Change 4 - Four Times Per Shift * - First Shift Only

BOBCAT FEED REPORT: BLAST FURNACE Shift: A Date: 6/22

	8-10	10-12	12-2	2-4
	TIME	TIME	TIME	TIME
SLAG	III	III	II	III - II
METAL	I	II	II	II - I
CHARGES	I	II	II	II - I
WATER LEVEL CHECKED (INITIAL)	M.M. 8:OK	D.C. 10:OK	W.C. 12:OK	D.C. 2:OK

CHARGE FROM POSTED CHARGE

TYPE	TIME	NUMBER OF LOADS

COMMENTS: 1 SLAG + 1 Plate

(FEED CRUSHED DRUMS)

Started ON Plates AT 10:15 & 1 SLAG 2 coke & IRON

II Slag Ended 11:15 ON plates. 2nd RUN Start Plates - Ended

1 Block 2nd Test 1 Block - 1 Slag - 1 Charge

Operator: Macon Moore

REVERB CHECK LIST

Date 6/22/87
Shift A
Supervisor [illegible]

ITEM	FREQ	TIME	DATA	TIME	DATA	TIME	DATA	TIME	DATA
1. Mobile Equipment Check List	S.C.	10AM	✓	Noon	✓	2PM	✓	4PM	✓
2. Number of Personnel	S.C.		2		✓		✓		✓
3. Burner Settings - #1 Gas	4		1.8		1.8				1.8
Air	4		4.0		4.0		D		4.0
Atomized Air	4		—		—				—
#2 Gas	4		1.8		1.8		O		1.8
Air	4		4.0		4.0		W		4.0
O2 FUEL GAS ~~Atomized Air~~	4		62%		62%				62%
4. Oxygen - Barton Guage ~~reading~~ O2 FUEL	4		57%		57%		N		57%
5. Shaker	4		✓		✓		✓		—
6. Stoker	4		✓		✓		✓		✓
7. Furnace Jacket	4		✓		✓		✓		✓
8. Slag Trough	4		✓		✓		✓		✓
9. Slag Cart and Cable	4		✓		✓		✓		✓
10. Slag Hood Door closed	4		✓		✓		✓		✓
11. Furnace Draft	4		✓		✓		✓		✓
12. Lead Mold Condition	S.C.		✓		✓		✓		✓
13. Furnace Refractory - Gen. Condition	S.C.		✓		✓		✓		✓
14. Water Circulation Manifold Pressure	4		✓		✓		✓		✓
15. Cooling Tank	4		✓		✓		✓		✓
16. Cooling Loops cleaned and Condition	S.C.		✓		✓		✓		✓
17. Bag House Screw Conveyors	4		✓		✓		✓		✓
18. Bag House Manometer readings - #1	4		3		3		3		4
#2	4		2		2		2½		4
#3	4		3		4½		3½		2½
#4	4		4		4½		4		3½
19. Bag house Fan Bearings Oil Level	4		✓		✓		✓		
and Temperature	4								—
20. Bag House Fan Amperage	4		150		150		150		150
21. Bag House Inlet Temperature	4		250		245		200		210
22. Stack smoking	4		CLEAR		CLEAR		CLEAR		CLEAR
23. Oxygen Tank reading	S.C.		95#						70#
24. Number of Slag Molds	S.C.								22 17
25. Number of Lead Molds	S.C.								8 18
26. Lead Antimony Content	4								
27. Gas Analysis - Carbon Monoxide	4								
Carbon Dioxide	4								
Oxygen	4								
28. Number of Charges	S.C.								90
29. Housekeeping Acceptable	S.C.								
30. Furnace Alley Scraped	S.C.								

FREQ: S.C. = Complete at shift change only
4 = Complete four times per shift

PROBLEMS OR COMMENTS: Down 30 min. to clean lines.
Down to clean lines for stack test purposes 45 min.

OPERATE - 88.00% PAY

LEAD - 57 TNS - 139
SLAG - 41 TNS - 81

BOBCAT FEED REPORT: REVERB FURNACE Shift: A Date: 6/22

	8-10am	10-12	12-2	2-4pm
	TIME	TIME	TIME	TIME
SLAG	~~IIII~~ II	~~IIII~~ II	IIII	IIII-22
METAL	II	II	II	II-8
CHARGES	—	—	—	— 90
WATER LEVEL CHECKED (INITIAL)	F.C. ok 8:00	R.S. 10:15-OK	F.C. 12-2-OK	R.S. 2-4-OK

CHARGE FROM POSTED CHARGE

TYPE	TIME	NUMBER OF LOADS
mix	8-4	

COMMENTS: (FEED MIX)

Operator: Hale

Date 6/23/87 Shift A Supervisor [illegible]

BLAST FURNACE CHECK LIST

	ITEM	FREQ	TIME	DATA	TIME	DATA	TIME	DATA	TIME	DATA	DETAILS
	Mobile Equip. Check List	SC	10AM	✓	Noon	✓	2PM	✓	4PM	✓	
	# Personnel	SC		3		✓		✓		✓	
3	Proper Charge Posted	SC		✓		✓		✓		✓	
	Top Temperature Reading	4		350		360°		320			
	Back Pressure Reading	4		5 PSI		7 PSI		9			
6	Air Flow Reading	4		1200		1200		1200			
7	Incinerator Working	4		✓		✓		✓		✓	
	Condition Lead Moulds	4		✓		✓		✓		✓	
	Condition Lead Well	4		✓		✓		✓		✓	
10	Condition of Lead	4		✓		✓		✓		✓	
	# Tuyrees Open	4		8		8		8		8	
	Jackett Blown Down S.C.	*		✓		✓		✓		✓	
13	Condition & # Punch Bars	4		✓		✓		✓		✓	
	Skip Hoist Bucket Condition	4		✓		✓		✓		✓	
	Skip Hoist Rail Condition	4		✓		✓		✓		✓	
16	Skip Hoist Cable Condition	4		✓		✓		✓		✓	
17	Slag Tap Condition	4		✓		✓		✓		✓	
	Condition Slag Moulds	4		✓		✓		✓		✓	
	Condition of Slag	4		✓		✓		✓		✓	
20	Quantity of Slag/Tap	4		Full		Full		Full		Full	
	Condition Jack Hammer & Bit	4		✓		✓		✓		✓	
	Cond. Cooling Tank & Valve	4		✓		✓		✓		✓	
23	Reading on O_2 Barton Guage	4		2300		2300		2300		2300	
	Condition Blast Blower	4		✓		✓		✓		✓	
	Blast Bed Level	4		Full		Full		Full		Full	
26	Skip Hoist Upper Condition	4		✓		✓		✓		✓	
27	# Mud Balls for Slag Tap	4		0		0		1		0	
	Lime used for Moulds	4		✓		✓		✓		✓	
	Bag House Dust Incinerated	4		✓		✓		✓		✓	
30	Cooling Loops & Screw Cond.	4		✓		✓		✓		✓	
	Bag House Screw Cond.	4		✓		✓		✓		✓	
	Fan Bearing Oil Level	4		✓		✓		✓		✓	
33	Fan Bearing Temper.	4		✓		✓		✓		✓	
	Check Draft on Furnace	4		✓		✓		✓		✓	
	Check Baghouse Stack	4		Clear		Clear		Clear		Clear	
36	Check Baghouse Temp.	4		225		220		220			
37	Check Fan Amps	4		150		150		150			
	Manometer Reading #5	4		4½		5		5½		4	
	#6	4		5		6		6		4½	
	#7	4		5		6		6		4½	
	#8	4		5		7		6½		5	
	Oxygen Tank Reading	SC		105						80	
40	# Charges Fed	SC								8	
41	Amount Slag Produced	SC								10	
	Amount Lead Produced	SC								8	15
43											
44											
47											
	Housekeeping Acceptable	SC								✓	
	Furnace Alley Scraped	SC									

Problems or Comments: Down 30 min to clean lines

Operate - 100% Day

LEAD - 61 Tns - 94.3

SC - Shift Change 4 - Four Times Per Shift * - First Shift Only

BOBCAT FEED REPORT: BLAST FURNACE Shift: A Date: 6/23

	8-10	10-12	12-2	2-4 pm
	TIME	TIME	TIME	TIME
SLAG	//	//	///	///-10
METAL	//	//	//	//-8
CHARGES	//	//	//	//-8
WATER LEVEL CHECKED (INITIAL)	D.C. 8:OK	M.M. 10:OK	D.C. 12:OK	M.M. 2:OK

CHARGE FROM POSTED CHARGE

TYPE	TIME	NUMBER OF LOADS

COMMENTS: START 1st RUN 9:05AM START COKE END COKE (TOP of CHARGE) = 1 SLAG — 1 METAL — 1 CHAR
START 2ND RUN 11:10AM — IRON START - END SLAG = 1 SLAG — 1 METAL — 1½ CH
START 3RD RUN @ 1:40PM — START COKE END COKE // SLAG — // metal 2 CHAR

Operator: Macon Moore

REVERB CHECK LIST

Date 6/23/87
Shift A
Supervisor [illegible]

ITEM	FREQ	TIME	DATA	TIME	DATA	TIME	DATA	TIME	DATA
1. Mobile Equipment Check List	S.C.	12AM	✓	Noon	✓	2PM	✓	4PM	✓
2. Number of Personnel	S.C.		2		2		2		2
3. Burner Settings - #1 Gas	4		1.8		1.8		1.8		1.8
Air	4		4.0		4.0		4.0		4.0
Atomized Air	4								
#2 Gas	4		1.8		1.8		1.8		1.8
Air	4		4.0		4.0		4.0		4.0
O_2 FUEL GAS ~~Atomized Air~~	4		62		62		62		62
4. Oxygen - Barton Guage reading O_2 FUEL	4		57		57		57		57
5. Shaker	4		✓		✓		✓		✓
6. Stoker	4		✓		✓		✓		✓
7. Furnace Jacket	4		✓		✓		✓		✓
8. Slag Trough	4		✓		✓		✓		✓
9. Slag Cart and Cable	4		✓		✓		✓		✓
10. Slag Hood Door closed	4		✓		✓		✓		✓
11. Furnace Draft	4		✓		✓		✓		✓
12. Lead Mold Condition	S.C.		✓		✓		✓		✓
13. Furnace Refractory - Gen. Condition	S.C.		✓		✓		✓		✓
14. Water Circulation Manifold Pressure	4		✓		✓		✓		✓
15. Cooling Tank	4		✓		✓		✓		✓
16. Cooling Loops cleaned and Condition	S.C.		✓		✓		✓		✓
17. Bag House Screw Conveyors	4		✓		✓		✓		✓
18. Bag House Manometer readings - #1	4		2½		3		3½		2
#2	4		2½		3		3		2½
#3	4		2½		3		3½		2
#4	4		4		4½		4		3
19. Bag house Fan Bearings Oil Level	4								
and Temperature	4		✓		✓		✓		✓
20. Bag House Fan Amperage	4		120		120		120		120
21. Bag House Inlet Temperature	4		210		235		210		
22. Stack smoking	4		CLEAR		CLEAR		CLEAR		CLEAR
23. Oxygen Tank reading	S.C.		105						80
24. Number of Slag Molds	S.C.								26 20
25. Number of Lead Molds	S.C.								8 18
26. Lead Antimony Content	4								
27. Gas Analysis - Carbon Monoxide	4								
Carbon Dioxide	4								
Oxygen	4								
28. Number of Charges	S.C.								109
29. Housekeeping Acceptable	S.C.								
30. Furnace Alley Scraped	S.C.								

FREQ: S.C. = Complete at shift change only
4 = Complete four times per shift

PROBLEMS OR COMMENTS: Down 1 hr clean lines & Patch hole in Apex

OPERATE 100% DAY

LEAD — 70 TNS - 1461
SLAG — 51 TNS - 862

BOBCAT FEED REPORT: REVERB FURNACE Shift: A Date: 6/23

	8-10AM	10-12	12-2	2-4pm
	TIME	TIME	TIME	TIME
SLAG	///	~~////~~ ////	~~////~~ //	~~////~~ // 26
METAL		//	///	/// - 8
CHARGES	—	—	—	- 109
WATER LEVEL CHECKED (INITIAL)	F.C. 8-10 - OK	R.S. 10-12 ok	F.C. 12-2 OK	R.S. 2-4-ok

CHARGE FROM POSTED CHARGE

TYPE	TIME	NUMBER OF LOADS
MIX	8-4	

COMMENTS: Furnace down At 8:00 until 8-55, patch hole on a patch on cooling loop.

1st ~~Test~~ - 9:33 - 10:38 AM ~~FEED~~ 13 CHARGES - PRODUCED 8 METAL & 6 SLAG

Operator: Campbell

JCHD

8401 BF
8701 refining pots
8702 reverb

Manometer readings ILCO Stack Test
Stack Test 6-22-87
operating range metallurgical B.H.

		4-8 normal (up to 10" ΔP) Blast Furnace				4-8 normal (up to 10" ΔP) Reverb Furnace				Refinery BH		
compartment # →		1	2	3	4	1	2	3	4	1		
Time	run #	ΔP	ΔP	ΔP	ΔP	ΔP	ΔP	ΔP	ΔP	Time	ΔP	run #
[illegible]:15	1	6	6.6	6.6	7.3	3.1	2.3	3.7	4.4	10:33	0.6	1
[illegible]:34	1	6.2	6.6	6.6	6.8	2.9	1.9	3.6	4.3	10:52	0.6	1
[illegible]:49	1	2.9	5.3	5.5	6.0	2.9	2.1	2.2	4.0	11:14	0.6	1
1:03	1	4.7	6.1	6.2	6.8	3.0	2.3	3.1	4.3	11:24	0.6	1
[illegible]:17	1	5.0	6.0	6.1	6.7	3.1	2.3	3.3	4.0			
										1:04	0.6	2
2:12	2	5.9	6.4	6.4	6.8	2.9	2.3	2.7	4.2	1:15	0.6	2
[illegible]:43	2	4.4	5.0	5.6	6.4	3.3	2.4	3.6	4.3	1:54	0.5	2
[illegible]:56	2	4.9	5.8	6.0	6.6	3.2	2.5	3.7	4.2	2:01	0.5	2
[illegible]:08	2	5.0	5.7	5.6	6.5	3.3	2.8	3.8	4.5			
[illegible]:2	2	5.3	6.0	6.0	6.2	3.4	2.8	3.9	4.5	2:44	0.5	3
										3:01	0.5	3
[illegible]:07	3	4.2	5.6	5.9	6.4	3.0	2.5	3.2	3.8	3:16	0.5	3
[illegible]:3	3	4.8	5.8	6.0	6.7	2.9	2.6	3.5	3.7	3:36	0.5	3
[illegible]37	3	5.0	5.9	6.0	6.5	3.3	2.8	3.8	4.5			
[illegible]-2	3	5.2	6.0	6.0	7.1	3.1	2.4	3.8	4.5			
[illegible]8	3	5.8	6.4	6.3	6.8	3.1	2.6	3.1	4.5			

ICCO STACK Test

Temperature + Fan motor Amperage readings
Stack test 6-22-87

Time	Run #	Blast Furnace (180-220°F)		Reverb furnace (225-250°F)		
:15	1	+5 225°F	145 Amps	245°F	150 Amps	
:36	1	220°	142	245°	150	
:49	1	215°	145	225°	150	
:03	1	220°	145	230°	150	
11:17	1	+5 225°	145	235°	150	
:12	2	220°	145	230°	150	
:43	2	+10 230°	145	240°	145	
12:56	2	220°	142	245°	149	
:08	2	220°	143	240°	150	
:12	2	220	145	235°	149	
:07	3	220°	145	210°	150	cleaning loop
2:23	3	220°	145	185°	150	
:57	3	+5 225°	145	195°	150	
:52	3	220°	145	200°	150	
3:08	3	+5 225°	145	215°	150	

Blast Test
9:05 start
11:30 #2
1:40 #3

6-23-87 Alco Stack Test

9:28 run #1
start @ 11:45
1:40

Blast Sanitary BH			REVERB Sanitary BH		
Time	ΔP	Run #	Time	ΔP	Run #
9:05	5.1	1	9:28	6.5	1
1:20	5.1	1	9:42	6.5	1
9:35	5.2	1	9:57	6.7	1
9:50	5.2	1	10:13	6.7	1
10:04	5.3	1	10:25	6.8	1
10:20	5.5	1	10:35	69	1
11:16	5.5	2	11:55	7.2	2
11:30	5.5	2	12:07	7.3	2
11:45	5.6	2	12:20	7.3	2
12:00	5.7	2	12:32	7.3	2
12:13	5.7	2	12:47	7.4	2
end 12:23	5.7	2			
1:40	5.9	3	1:40	7.6	3
1:55	5.9	3	1:55	7.6	3
2:10	5.9	3	2:10	7.7	3
2:19	5.9	3	2:19	7.7	3
2:34	6.0	3	2:34	7.8	3
2:49	6.0	3			

6-23-87

Theo Stack Test

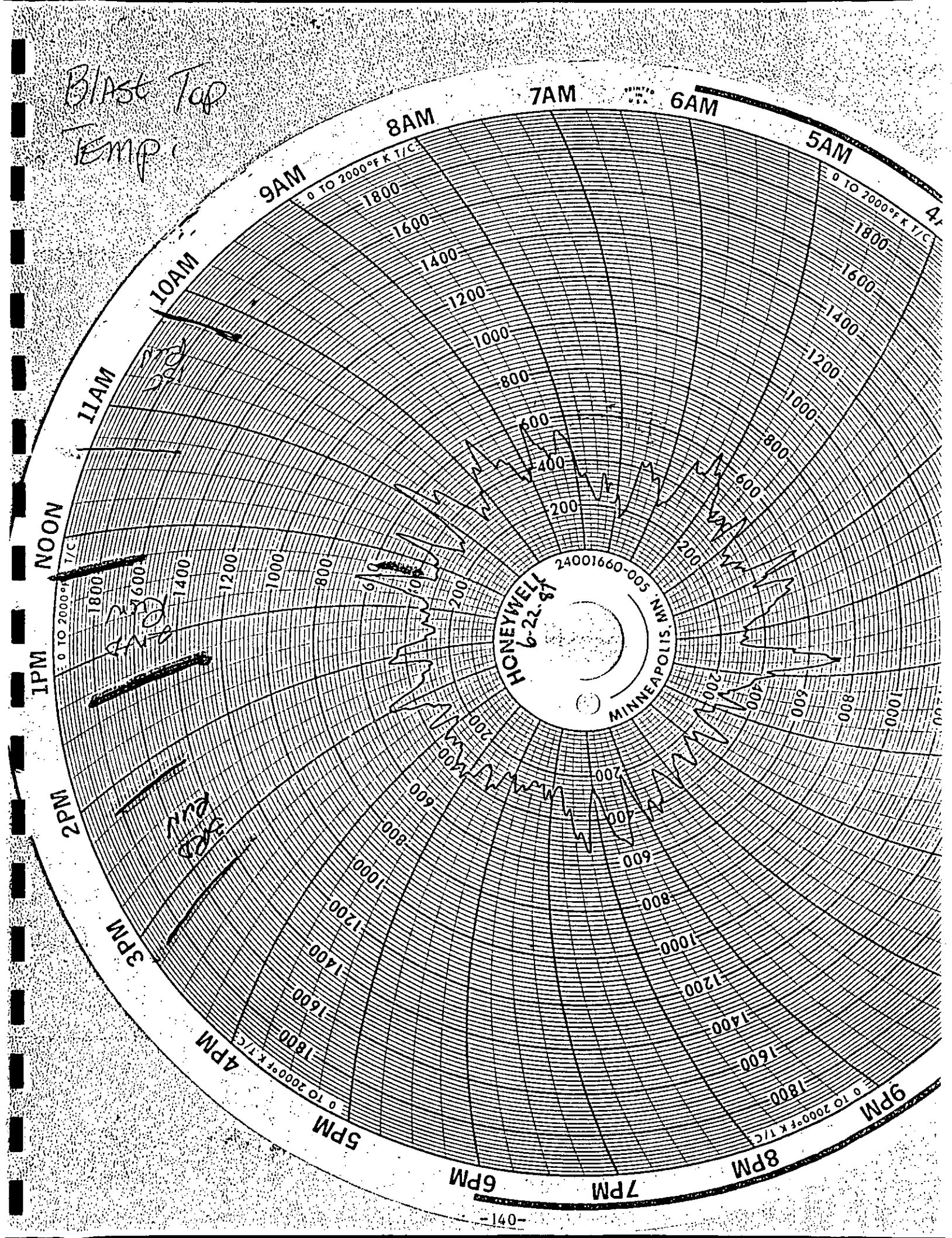
Blast Furnace

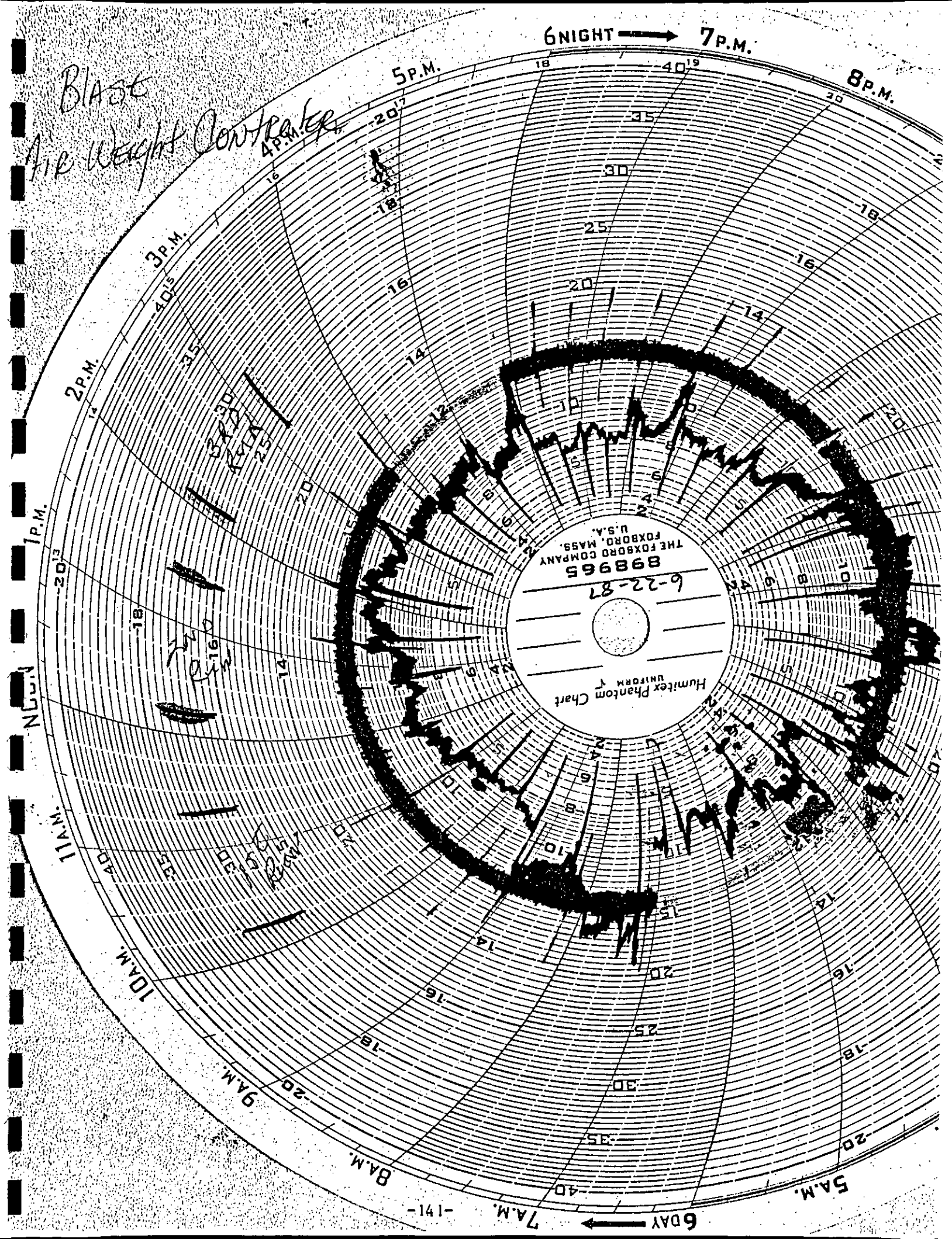
Time	Run #	Slag Tap emissions	Metal Tap emissions	Charging
1:05	1	—	OK	coke 9:10
1:20	1	9:30 OK	OK	iron 9:27
9:35	1	—	OK	drums 9:29
1:50	1	—	OK	groups 9:34
1:05	1	10:11 OK	OK	slag 9:48
10:20	1	—	OK	coke 9:50
				coke 9:55
				iron 10:09
				drums 10:18
:16	2	—	OK	slag 11:16
1:30	2	—	OK	slag 11:35
11:45	2	11:47 OK	OK	coke 11:38
:00	2	—	OK	coke 11:58
12:13	2	—	OK	iron 11:59
23	2	—	OK	drums 12:07
				group 12:14
				slag 12:17
1:40	3	—	OK	iron 1:42
1:55	3	—	OK	drums 1:49
:10	3	—	OK	group 1:54
2:19	3	—	OK	slag 2:00
1:34	3	2:26 OK	OK	slag 2:07
	3	—	OK	coke 2:20
				iron 2:25
				drums 2:40

Reverb Furnace

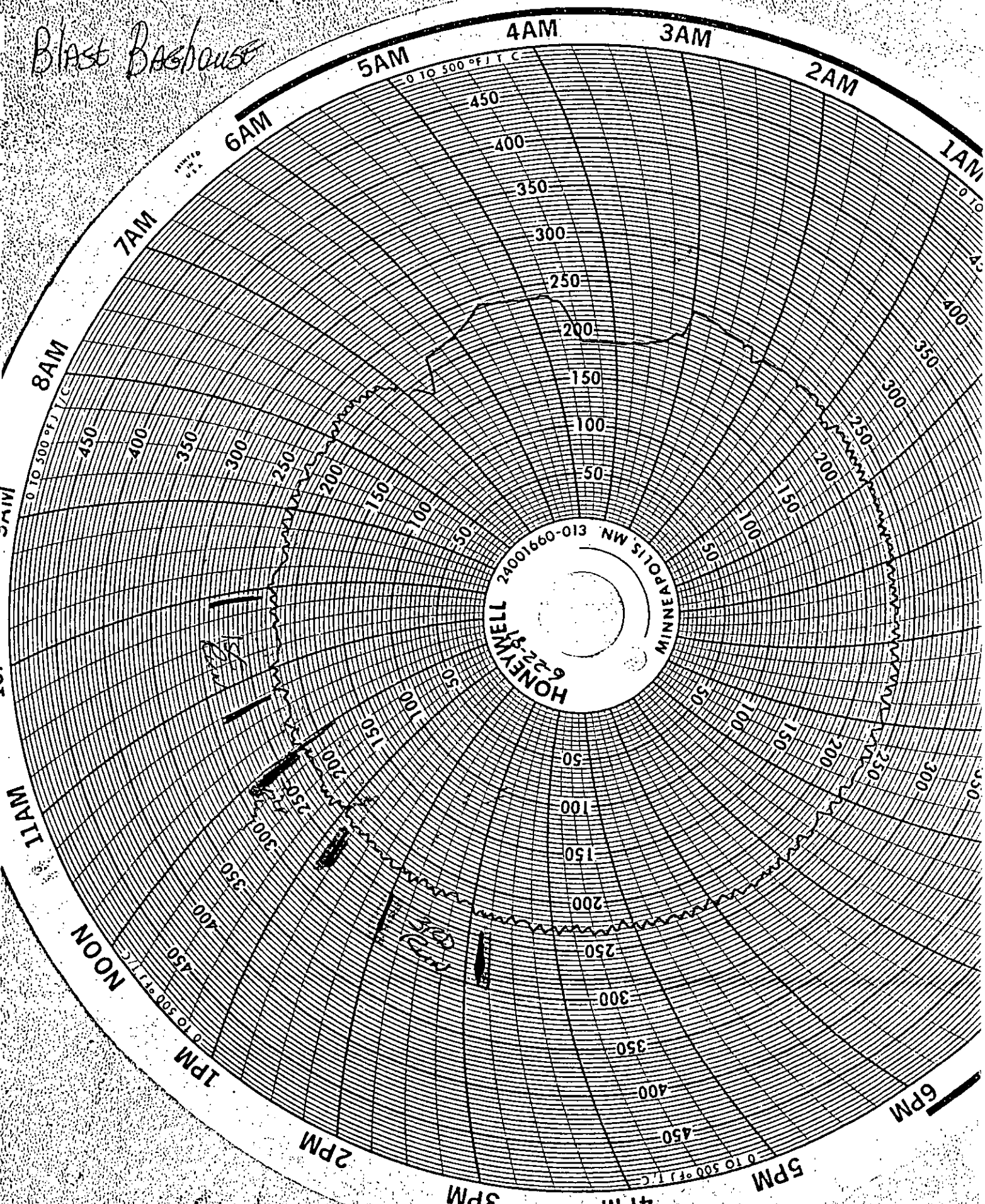
Time	Run #	Slag emissions	Metal Tap	Charge emissions
9:28	1	OK	—	OK
9:42	1	OK	—	groups OK
9:44	1	OK	—	group OK
9:50	1	OK	—	" OK
9:57	1	OK	—	" OK
10:04	1	OK	—	" OK
10:25	1	OK	—	" OK
10:34	1	OK	—	" OK
11:55	2	OK	—	OK
12:09	2	OK	—	OK
12:07	2	OK	—	OK
12:10	2	OK	—	OK
12:17	2	OK	OK 12:17	OK
12:28	2	OK	—	OK
12:32	2	OK	—	OK
12:38	2	OK	—	OK
1:40	3	OK	—	OK
1:43	3	OK	—	OK
1:55	3	OK	—	OK
2:10	3	OK	—	OK
2:19	3	OK	—	OK
2:34	3	OK	2:30 OK	OK

Blast Top Temp.

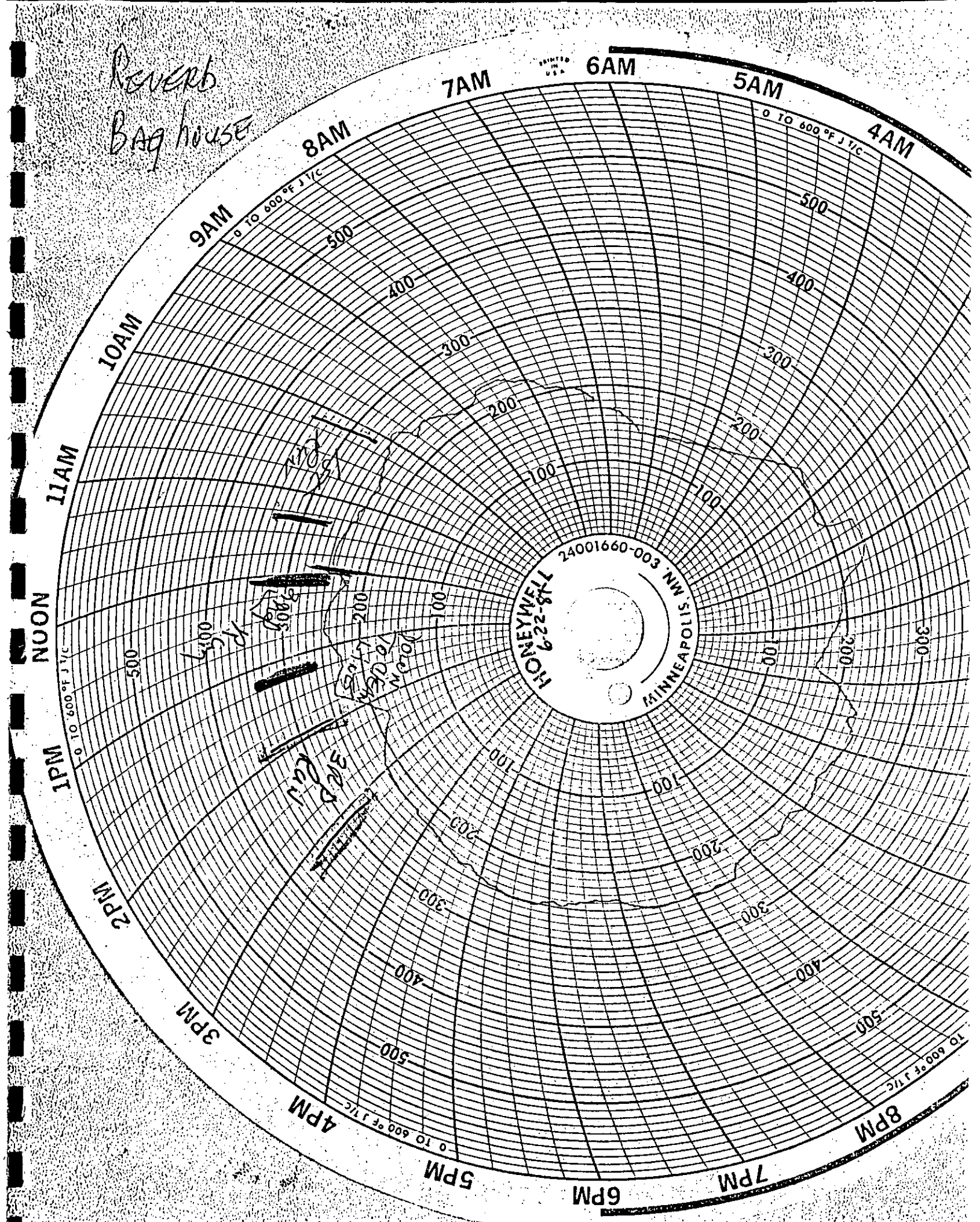


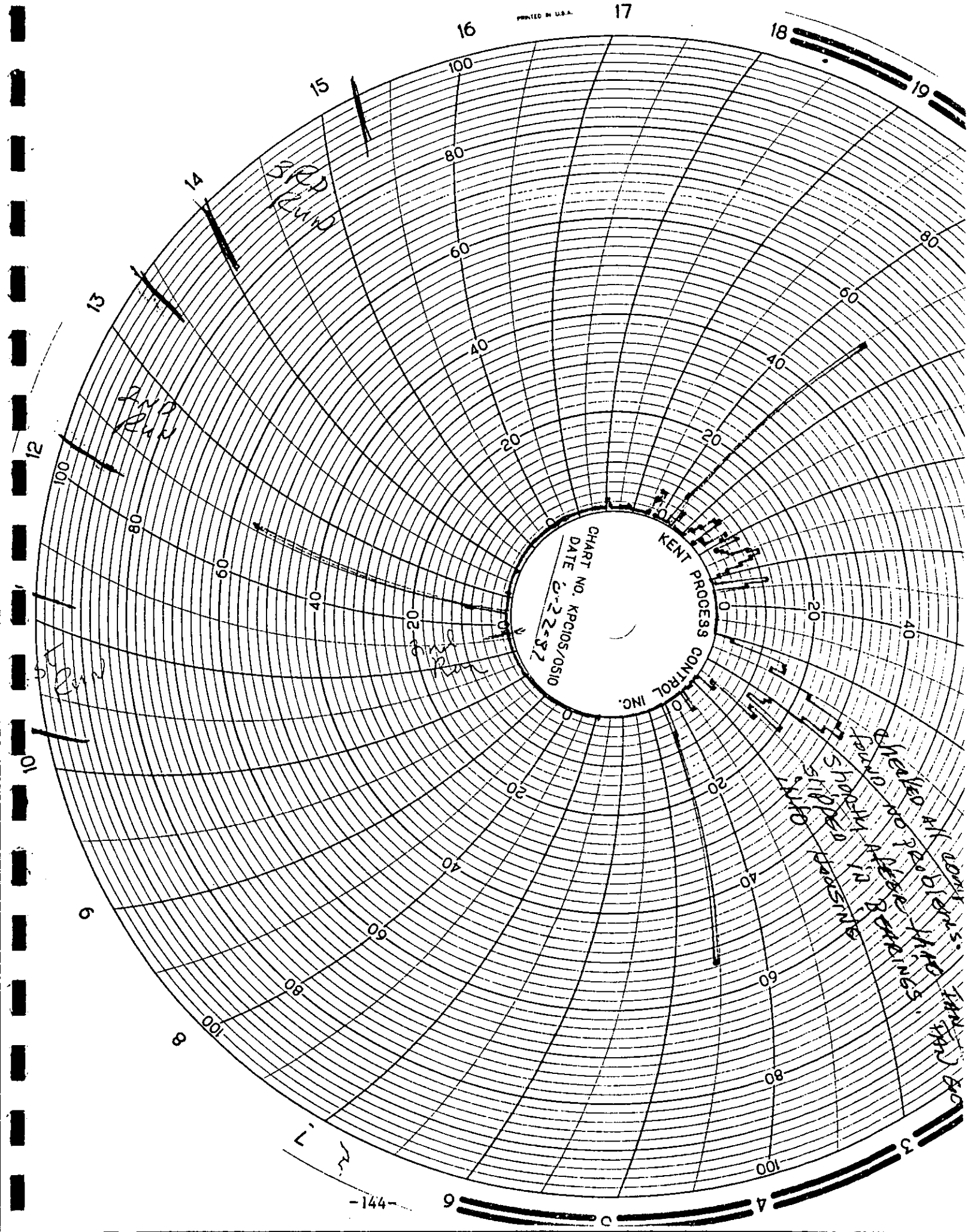

Blast
Fire Weight Computer
6 NIGHT
7 P.M.
8 P.M.
5 P.M.
4 P.M.
3 P.M.
2 P.M.
1 P.M.
NOON
11 A.M.
10 A.M.
9 A.M.
8 A.M.
7 A.M.
6 DAY
5 A.M.
Humitex Phantom Chart
UNIFORM
THE FOXBORO COMPANY
FOXBORO, MASS.
U.S.A.
6-22-87
898965

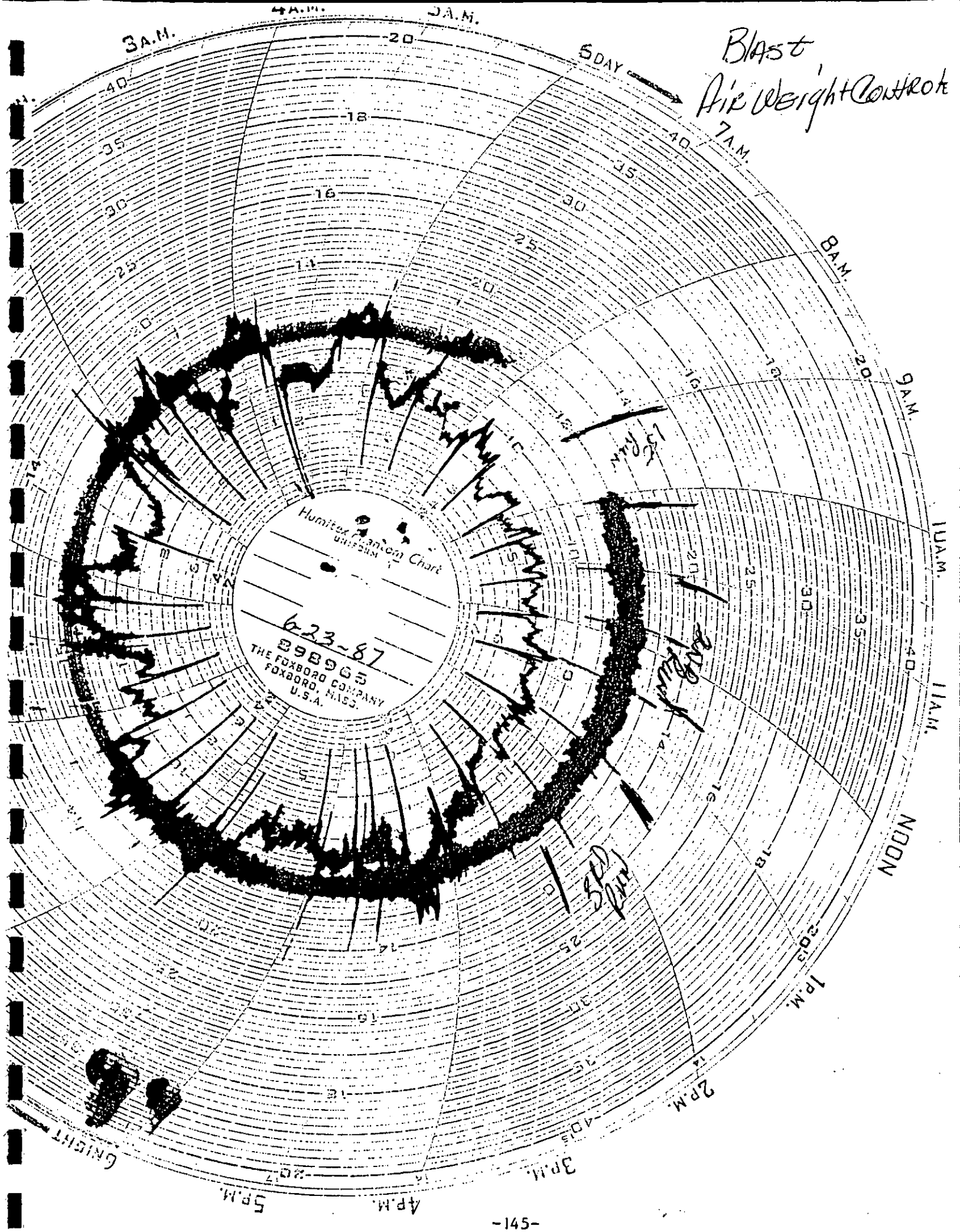
Blast Baghouse



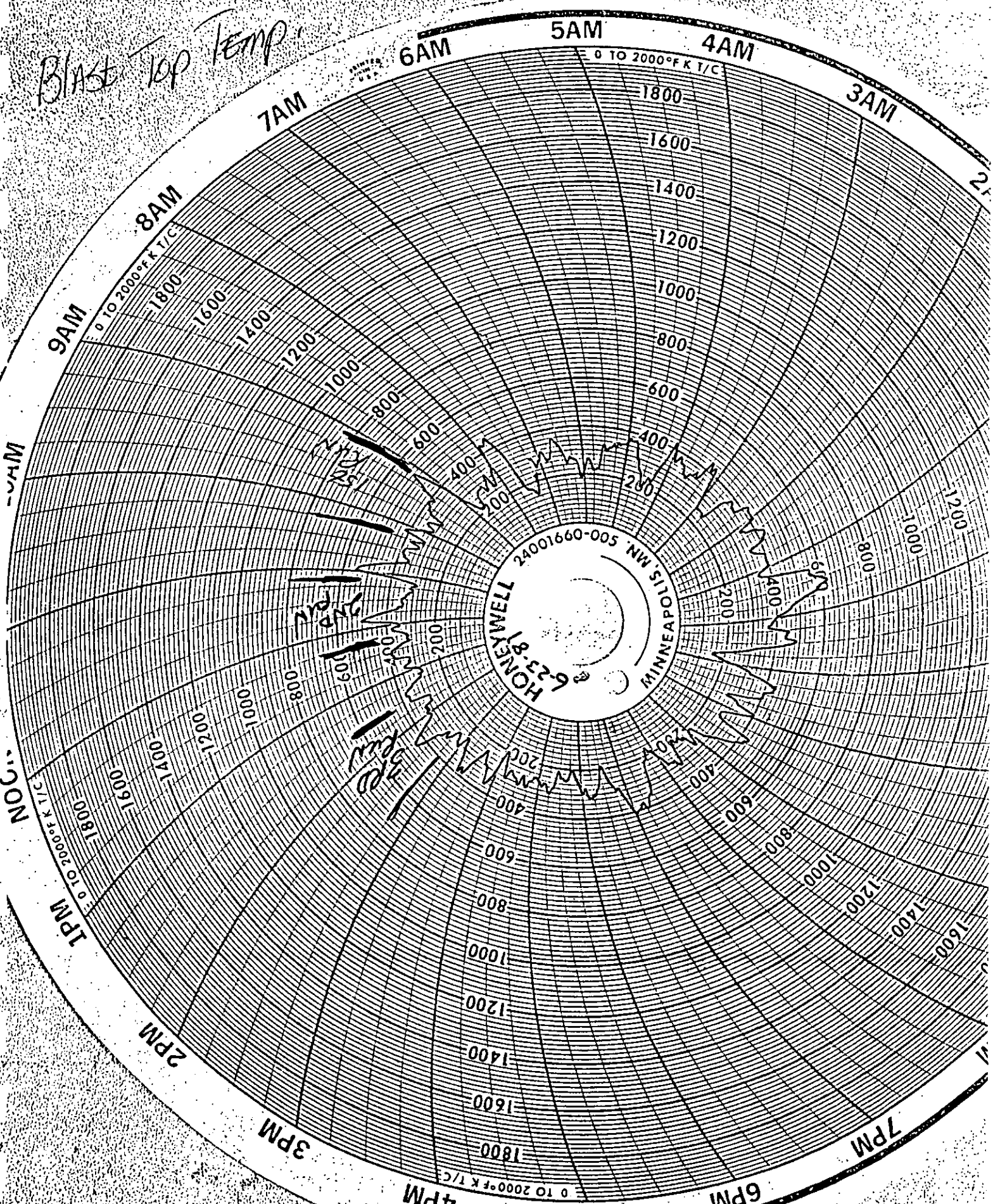
Reverb
Bag house

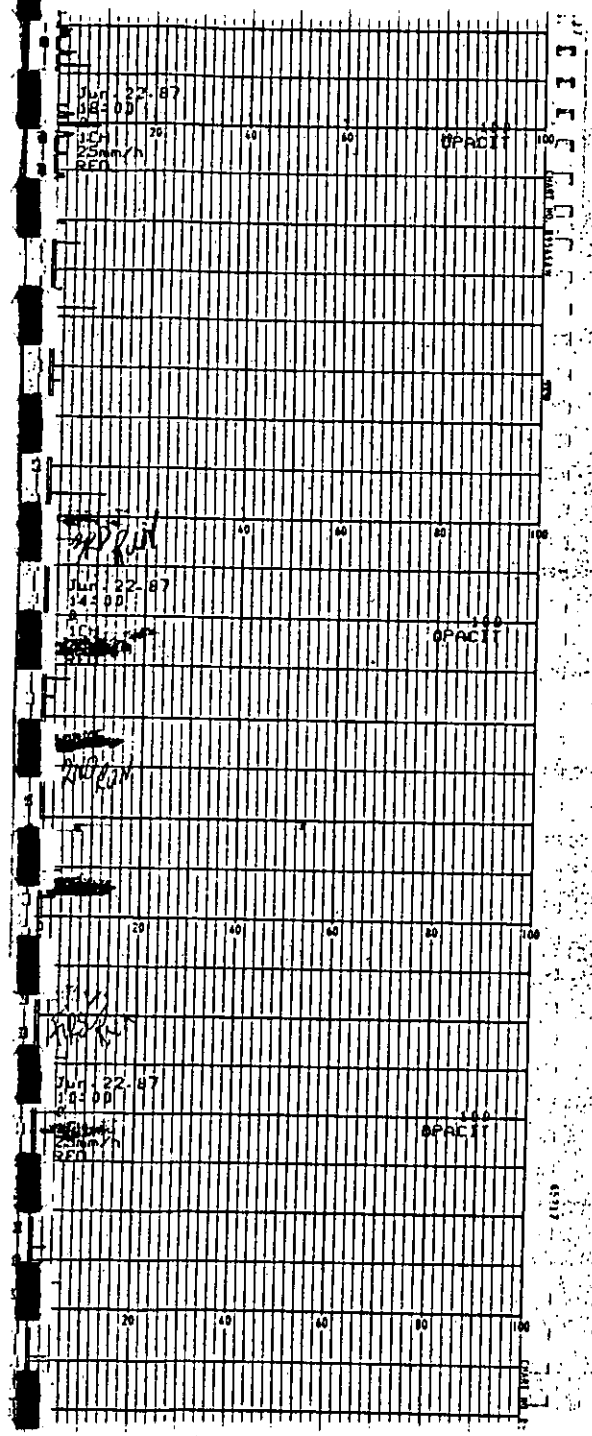



PRINTED IN U.S.A.
KENT PROCESS CONTROL INC.
CHART NO. KPC105/0510
DATE 6-22-82
3RD RUN
2ND RUN
1ST RUN
2nd RUN
checked all coor
found no problems.
Shortly after the fan
stopped in bearings
into housing


Blast,
Air Weight Control
3A.M.
4A.M.
5A.M.
6 DAY
7A.M.
8A.M.
9A.M.
10A.M.
11A.M.
NOON
1P.M.
2P.M.
3P.M.
4P.M.
5P.M.
Humitex Phantom Chart
UNIFORM
6-23-87
898965
THE FOXBORO COMPANY
FOXBORO, MASS.
U.S.A.

Blast Top Temp.




Jun 22 87
OPACIT
Jun 22 87
OPACIT
Jun 22 87
OPACIT

Harry Skelton

Date 6/22

Baghouse Daily Check List

Blast Furnace Baghouse

	Cell I		Cell II		Cell III		Cell IV	
	A B C D E F	G H J K L M	A B C D E F	G H J K L M	A B C D E F	G H J K L M	A B C D E F	G H J K L M
1								
2								
3								
4								
5								
6								
7								
8								
9								OK
10	OK		OK		OK			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Reverb Furnace Baghouse

1								
2								
3								
4								
5								
6								
7								
8								
9								OK
10	OK		OK		OK			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Hygiene Baghouse

1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Description of checks to be made	BLAST FURNACE BAGHOUSE						REVERB FURNACE BAGHOUSE						HYGIENE BAGHOUSE					
	Cell Number				General		Cell Number				General		Cell Number				General	
	I	II	III	IV	O.K.	Not O.K.	I	II	III	IV	O.K.	Not O.K.	I	II	III	IV	O.K.	Not O.K.
Manometer Readings*					✓						✓							
Inlet Dampers					✓						✓							
Outlet Dampers**					✓						✓							
Shaker Mechanism**					✓						✓							
Inlet Header					✓						✓							
Outlet Header					✓						✓							
Bags Replaced*					✓						✓							
Inlet Temperature					225						200							
Fan Bearings: a. Temperature																		
b. Lubrication					✓						✓							
c. Vibration					✓						✓							
d. Amperage*					140						150							
Cell Walls					✓						✓							
Screw Conveyor					✓						✓							
Roll Feed					✓						✓							
Dust Hopper Covers					✓						✓							
Dust Hoppers					✓						✓							
Vacuum Cells					✓						✓							
Doors					✓						✓							

Details of maintenance required: washed + cleaned up under B/H's + Furnace
OK so Far.

opacity 00

*Record **4 days/week Stack Smoking NO Housekeeping Checked ✓ Bag inventory ✓

Special Instructions:

Date 6-23-8

Baghouse Daily Check List

Blast Furnace Baghouse

	Cell I		Cell II		Cell III		Cell IV	
	A B C D E F	G H J K L M	A B C D E F	G H J K L M	A B C D E F	G H J K L M	A B C D E F	G H J K L M
1								
2								
3								
4								
5								
6								
7								
8	OK		OK		OK		OK	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Reverb Furnace Baghouse

1								
2								
3								
4								
5								
6								
7								
8			OK		OK		OK	
9	OK							
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Hygiene Baghouse

1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Description of checks to be made	BLAST FURNACE BAGHOUSE						REVERB FURNACE BAGHOUSE						HYGIENE BAGHOUSE					
	Cell Number				General		Cell Number				General		Cell Number				General	
	I	II	III	IV	O.K.	Not O.K.	I	II	III	IV	O.K.	Not O.K.	I	II	III	IV	O.K.	Not O.K.
Manometer Readings*																		
Inlet Dampers																		
Outlet Dampers**																		
Shaker Mechanism**																		
Inlet Header																		
Outlet Header																		
Bags Replaced*																		
Inlet Temperature																		
Fan Bearings: a. Temperature					230						230							
b. Lubrication																		
c. Vibration																		
d. Amperage*																		
Cell Walls					125						150							
Screw Conveyor																		
Roll Feed																		
Dust Hopper Covers																		
Dust Hoppers																		
Vacuum Cells																		
Doors																		

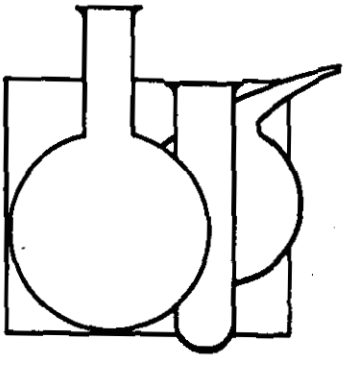
Details of maintenance required: Washed down work area Back alley around Furnaces helped out on Furnace's

opacity 00

*Record **4 days/week Stack Smoking N/U Housekeeping Checked ✓ Bag inventory ✓

Special Instructions: Need blast bags

Calibrations



VI. METHOD 8 CALIBRATIONS

Meter Box

The meter box shall be initially calibrated every 6 months at the fixed settings of 0.5, 1.0, 1.5, 2.0, and 2.5 inches of water. Upon return to the laboratory from this test the meter box will be recalibrated using the average meter pressure for the test series. The recalibration point shall be the closest point to the initial calibration. These recalibrations produced a single point MCF and a H@ which shall be compared to the original calibration to see if they are within the 5% allowed at the highest vacuum seen. These recalibration sheets are located behind the original calibration sheets.

Pitot Tubes

The S type tubes shall be calibrated against a standard pitot tube (C_p = 0.99) in a wind tunnel with a capacity to generate a test section velocity of approximately 3000 feet/ minute every 6 months. Additionally, the pitot tube shall be measured as to its specifications and alignment. Upon return, the intercomponent spacings and the face opening alignment of the pitot tube assembly shall be rechecked and if no changes are noticed, it shall be assumed that the coefficient of the assembly had not changed.

Temperature measurments

All temperature devices (impinger, meter box, hot box and stack) shall be calibrated every 6 months against an ASTM mercury-in-glass reference thermometer or a reference thermocouple and potentiometer calibrated by fixed points, e.g., ice bath and boiling water (corrected to barometric pressure). Upon return the stack temperature device was recalibrated within 10% of the average absolute stack temperature. If the device being tested agrees within 1.5% of the reference device, the temperature data taken in the field shall be considered valid.

VI. METHOD 8 CALIBRATIONS CONTINUED

Barometric Pressure

An aneroid barometer capable of measuring atmospheric pressure to within 0.1 inches Hg shall be used. If this device is defective, the following alternate method shall be used. The barometric reading may be obtained from a nearby national weather service station, in which case, the station value (which is the absolute barometric pressure) shall be requested and an adjustment for elevation differences between the weather station and sampling point shall be applied at a rate of minus 0.1 inches Hg per 100 feet elevation increase or vice versa for elevation decrease.

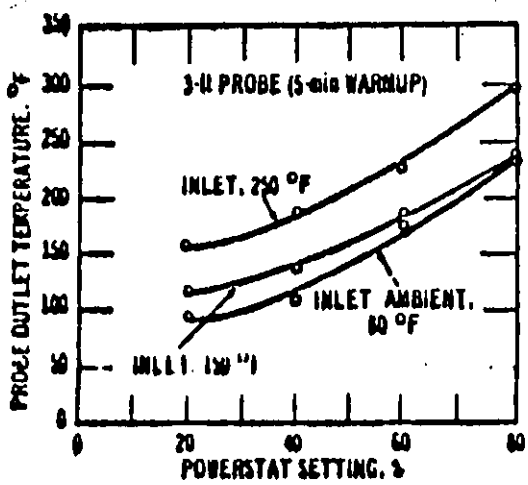
Specific Test equipment and measurements

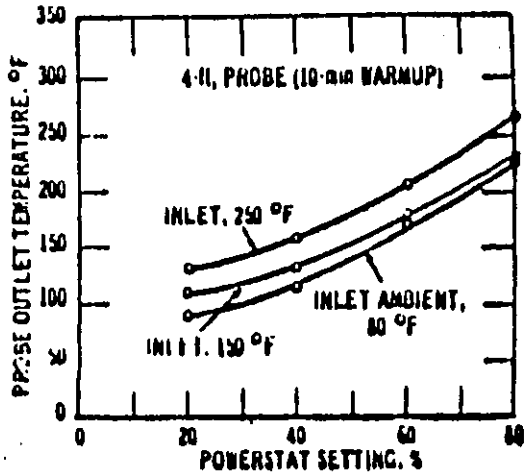
These calibration sheets are located behind the original calibration sheets.

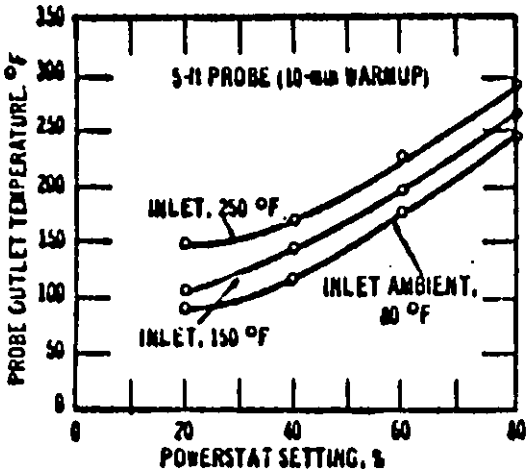
The equipment used was as follows:

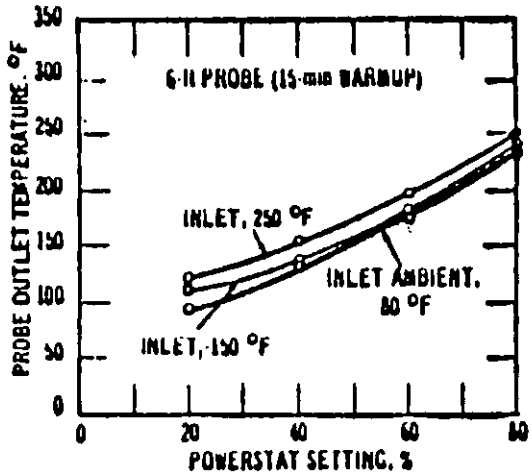
Location:	Metal.	Refining	Reverb	Blast
Probe #:	8.1	3'	3'	3'-New
Meter Box #:	400	700	700	400
Hot Box #:	5	6	6	5
Impinger #:	5	6	5	6
Temperature:	Omega III	Omega II	Omege II	Omega III
Avg. Stk Temp:	163	127	119	99
Recal. Temp:	165	130	120	100
% Diff	0	0	0	0

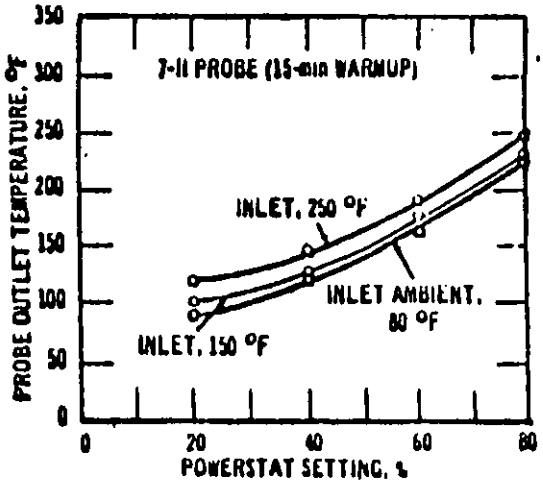
The intercomponent spacings and the face opening alignment of the pitot tube assemblies were rechecked and no changes were noticed; therefore, it was assumed that the coefficient of the assembly had not changed.











NOTE: Flow rate held constant at 0.75; 50% change in flow rate has little effect on probe temperature.

GUARDIAN SYSTEMS INC
Initial Meter Calibration Box 400
on 3/23/87

Run Number	1	2	3	4	5
Barometric Pres, in Hg	30.18	30.18	30.18	30.18	30.18
Orifice pres drop, in H20	0.5	1.0	1.5	2.0	2.5
Pres Wet Test Meter, in H20	-0.39	-0.59	-0.82	-0.98	-1.20
Gas Volume Wet Init, CF	0.000	0.000	0.000	0.000	0.000
Gas Volume Wet Final, CF	5.496	7.917	11.634	10.833	12.312
Gas Volume Dry Init, CF	180.000	185.760	194.013	206.386	217.861
Gas Volume Dry Final, CF	185.760	194.013	206.386	217.861	230.818
Temp Wet Init, C	17.0	17.0	17.0	17.0	17.0
Temp Wet Final, C	17.0	17.0	17.0	17.0	17.0
Vapor Pressure, mm Hg	14.530	14.530	14.530	14.530	14.530
Dry Gas Temp Init In, F	110	93	110	114	116
Dry Gas Temp Final In, F	109	110	114	116	120
Dry Gas Temp Init Out, F	102	102	101	101	100
Dry Gas Temp Final Out, F	102	101	101	100	100
Run Time, sec	900	900	1080	900	900
Meter Calibration Factor, Y	1.0111	1.0072	0.9943	0.9988	1.0058
Average Y	1.0035				
Qm	0.3857	0.5542	0.6768	0.7544	0.8551
Km	0.6811	0.6927	0.6915	0.6682	0.6781
Average Km	0.6823				
Delta H@	1.99	1.92	1.93	2.06	2.00
Average H@	1.98				

SIGNATURE

GUARDIAN SYSTEMS INC
Meter Recalibration Box 400
on 6/25/87

Run Number	1	2	3	Average
Barometric Pres, in Hg	30.02	30.02	30.02	30.02
Orifice pres drop, in H20	2.0	2.0	2.0	2.00
Pres Wet Test Meter, in H20	-0.96	-0.96	-0.96	-0.96
Gas Volume Wet Init, CF	0.000	0.000	0.000	0.000
Gas Volume Wet Final, CF	11.243	11.084	11.105	33.432
Gas Volume Dry Init, CF	169.841	180.900	191.980	542.721
Gas Volume Dry Final, CF	180.900	191.980	203.199	576.079
Temp Wet Init, C	24.0	24.0	23.6	23.9
Temp Wet Final, C	24.0	23.6	23.5	23.7
Vapor Pressure, mm Hg	22.377	22.110	21.780	22.089
Dry Gas Temp Init In, F	79	98	107	95
Dry Gas Temp Final In, F	98	107	112	106
Dry Gas Temp Init Out, F	78	80	87	82
Dry Gas Temp Final Out, F	82	87	92	87
Run Time, sec	900	900	900	2700
Meter Calibration Factor, Y	0.9961	0.9970	0.9994	0.9976
Qm	0.7287	0.7238	0.7341	0.7289
Km	0.6558	0.6493	0.6550	0.6534
Delta H@	2.14	2.18	2.15	2.16

Previous Y	0.9988	% Difference	0.12%
Previous H@	2.06	% Difference	-4.72%

Project ILCO Stack Main Stack

SIGNATURE Don Roff

GUARDIAN SYSTEMS INC
Meter Recalibration Box 400
on 6/25/87

Run Number	1	2	3	Average
Barometric Pres, in Hg	30.02	30.02	30.02	30.02
Orifice pres drop, in H20	1.0	1.0	1.0	1.00
Pres Wet Test Meter, in H20	-0.55	-0.55	-0.55	-0.55
Gas Volume Wet Init, CF	0.000	0.000	0.000	0.000
Gas Volume Wet Final, CF	8.300	8.316	8.322	24.939
Gas Volume Dry Init, CF	146.323	153.317	161.546	461.186
Gas Volume Dry Final, CF	154.475	161.546	169.841	485.862
Temp Wet Init, C	24.3	24.5	24.6	24.5
Temp Wet Final, C	24.5	24.6	24.6	24.6
Vapor Pressure, mm Hg	22.922	23.129	23.198	23.083
Dry Gas Temp Init In, F	94	101	98	98
Dry Gas Temp Final In, F	101	98	101	100
Dry Gas Temp Init Out, F	80	80	90	83
Dry Gas Temp Final Out, F	88	90	91	90
Run Time, sec	900	900	900	2700
Meter Calibration Factor, Y	1.0110	1.0054	1.0029	1.0064
Qm	0.5427	0.5443	0.5501	0.5457
Km	0.6874	0.6888	0.6926	0.6896
Delta H@	1.95	1.94	1.92	1.94

Previous Y	1.0072	% Difference	0.08%
Previous H@	1.92	% Difference	-0.87%

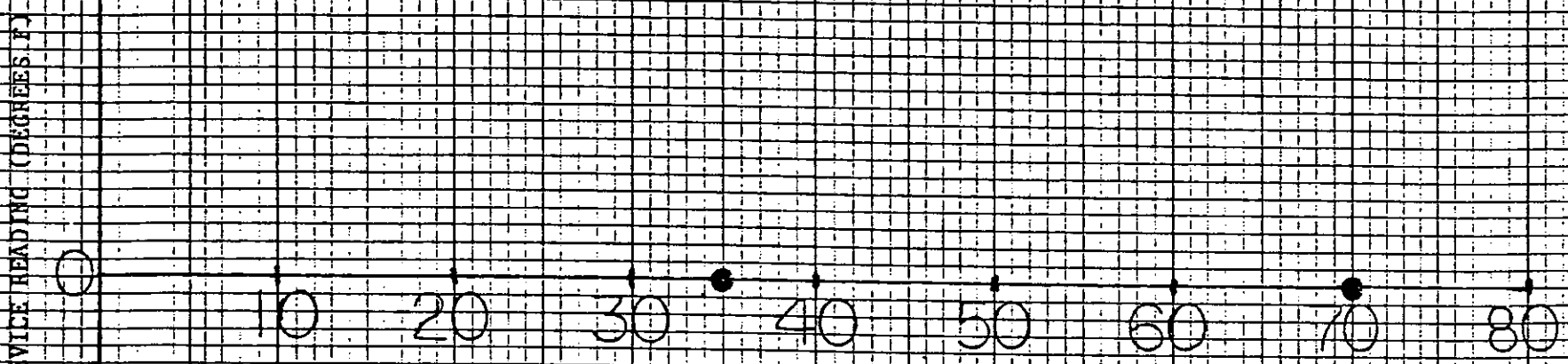
Project ILCO Stack BLAST

SIGNATURE Lon Lott

TEMPERATURE CALIBRATION

FOR OMEGA 3

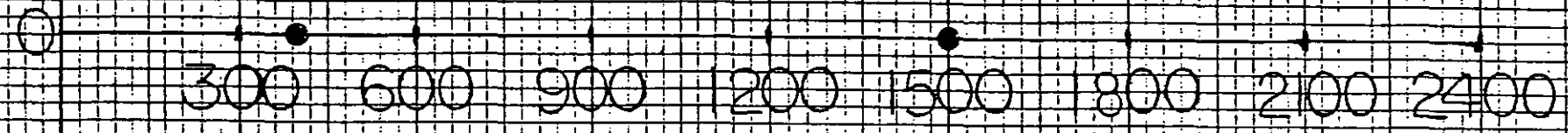
DATE INITIAL 4-11-87 DATE FINAL



GUARDIAN SYSTEMS INC

TEMPERATURE CALIBRATION
FOR OMEGA 3

DATE INITIAL 4-1-87 DATE FINAL



GUARDIAN SYSTEMS inc

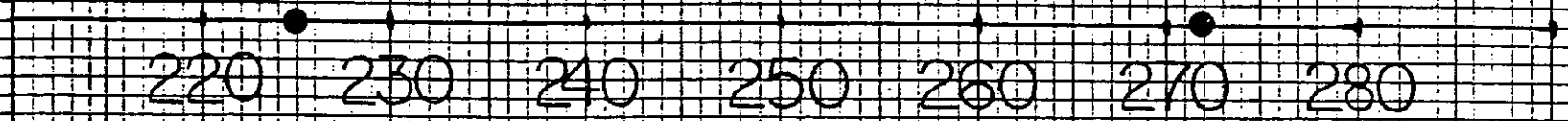
TEMPERATURE CALIBRATION

FOR IMPINGER 5

DATE INITIAL 4-1-87 DATE FINAL

TEMPERATURE CALIBRATION
FOR HOT BOX 5

DATE INITIAL 4-1-87 DATE FINAL



DEVICE READING (DEGREES F)

ACTUAL TEMPERATURE (DEGREES F)

GUARDIAN SYSTEMS inc

PITOT CALIBRATION FORM

Date 4-1-87 Probe # 8'-1

Calibrated By G KARSTENS

Nozzle Size

SIDE A

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(A)$
1	.45	.62	.843	+.001
2	.44	.61	.841	-.001
3	.44	.61	.841	-.001
		$\bar{C}_p(A)$	.842	

.84

SIDE B

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(B)$
1	.40	.56	.837	+.002
2	.40	.56	.837	+.002
3	.41	.58	.832	-.003
		$\bar{C}_p(B)$	.835	

CALCULATIONS

.84

$$C_p(s) = C_{p(std)} \text{ (or 0.99)} \sqrt{\frac{\Delta P_{std}}{\Delta P(s)}}$$

$$\text{Average Deviation} = \frac{\Sigma \left| C_p(s) - \bar{C}_p(A \text{ or } B) \right|}{3}$$ ← Must be ≤ 0.01

$$\left| \bar{C}_p(A) - \bar{C}_p(B) \right|$$ ← Must be ≤ 0.01

GUARDIAN SYSTEMS inc

PITOT CALIBRATION FORM

Date 6-19-87 Probe # 3' NEW

Calibrated By G KARSTENS

Nozzle Size NA

SIDE A

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \overline{C}_p(A)$
1	.45	.62	.843	-.002
2	.46	.63	.846	+.001
3	.46	.63	.846	+.001
		$\overline{C}_p(A)$	.845	

.84

SIDE B

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \overline{C}_p(B)$
1	.44	.62	.834	-.003
2	.44	.62	.834	-.003
3	.45	.62	.843	+.006
		$\overline{C}_p(B)$	.837	

CALCULATIONS

$$C_p(s) = C_{p(std)} \text{ (or 0.99)} \sqrt{\frac{\Delta P_{std}}{\Delta P(s)}}$$

.84

$$\text{Average Deviation} = \frac{\Sigma \left| C_p(s) - \overline{C}_p(A \text{ or } B) \right|}{3}$$ ← Must be ≤ 0.01

$$\left| \overline{C}_p(A) - \overline{C}_p(B) \right|$$ ← Must be ≤ 0.01

GUARDIAN SYSTEMS INC
Meter Recalibration Box 700
on 6/25/87

Run Number	1	2	3	Average
Barometric Pres, in Hg	30.02	30.02	30.02	30.02
Orifice pres drop, in H20	1.0	1.0	1.0	1.00
Pres Wet Test Meter, in H20	-0.68	-0.68	-0.68	-0.68
Gas Volume Wet Init, CF	0.000	0.000	0.000	0.000
Gas Volume Wet Final, CF	9.517	9.625	9.558	28.700
Gas Volume Dry Init, CF	258.042	267.026	276.410	801.478
Gas Volume Dry Final, CF	267.026	276.410	285.802	829.238
Temp Wet Init, C	23.5	23.3	23.1	23.3
Temp Wet Final, C	23.3	23.1	23.0	23.1
Vapor Pressure, mm Hg	21.584	21.325	21.132	21.347
Dry Gas Temp Init In, F	72	86	96	85
Dry Gas Temp Final In, F	86	96	100	94
Dry Gas Temp Init Out, F	70	74	82	75
Dry Gas Temp Final Out, F	74	82	88	81
Run Time, sec	900	880	900	2680
Meter Calibration Factor, Y	1.0277	1.0128	1.0186	1.0196
Qm	0.6115	0.6403	0.6303	0.6272
Km	0.7832	0.8155	0.7976	0.7986
Delta H@	1.50	1.38	1.45	1.44

Previous Y	1.0356	% Difference	1.55%
Previous H@	1.45	% Difference	0.41%

Project ILCO Stack Rewel + Pot Stacks

SIGNATURE Lon Loft

G-5

GUARDIAN SYSTEMS INC
Initial Meter Calibration Box 700
on 4/14/87

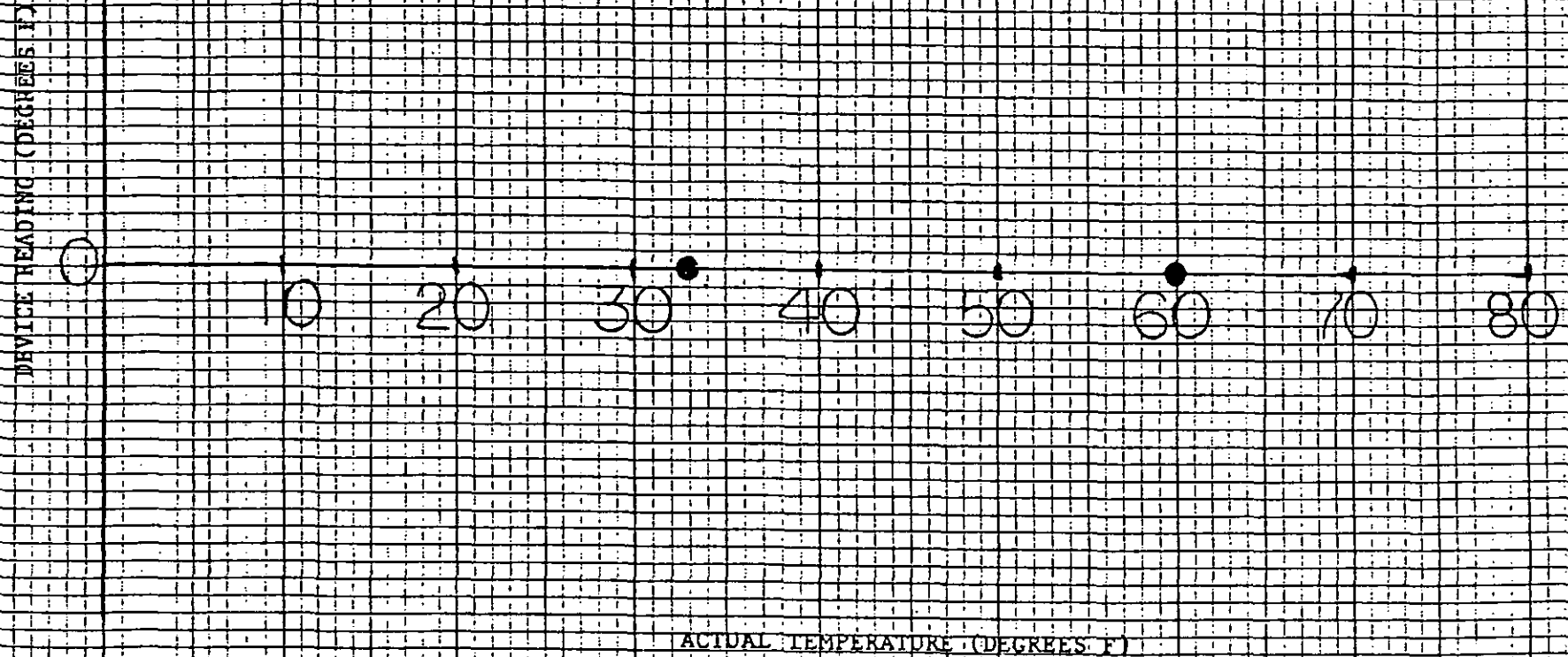
Run Number	1	2	3	4	5
Barometric Pres, in Hg	29.87	29.87	29.87	29.87	29.87
Orifice pres drop, in H20	0.5	1.0	1.5	2.0	2.5
Pres Wet Test Meter, in H20	-0.48	-0.73	-1.05	-1.25	-1.50
Gas Volume Wet Init, CF	0.000	6.753	16.796	36.082	49.334
Gas Volume Wet Final, CF	6.753	16.796	36.082	49.334	63.783
Gas Volume Dry Init, CF	469.053	475.658	485.514	504.675	518.031
Gas Volume Dry Final, CF	475.658	485.514	504.675	518.031	532.653
Temp Wet Init, C	19.5	19.5	19.6	19.6	19.6
Temp Wet Final, C	19.5	19.6	19.6	19.6	19.8
Vapor Pressure, mm Hg	16.999	17.052	17.105	17.105	17.212
Dry Gas Temp Init In, F	85	92	101	106	109
Dry Gas Temp Final In, F	92	101	106	109	111
Dry Gas Temp Init Out, F	75	81	88	94	96
Dry Gas Temp Final Out, F	81	88	94	96	98
Run Time, sec	900	960	1500	900	900
Meter Calibration Factor, Y	1.0276	1.0356	1.0332	1.0240	1.0215
Average Y	1.0284				
Qm	0.4481	0.6310	0.7830	0.9016	0.9843
Km	0.8046	0.7969	0.8031	0.7985	0.7787
Average Km	0.7963				
Delta H@	1.42	1.45	1.43	1.44	1.52
Average H@	1.45				

SIGNATURE _____

TEMPERATURE CALIBRATION

FOR OMEGA 2

DATE INITIAL 4-1-87 DATE FINAL

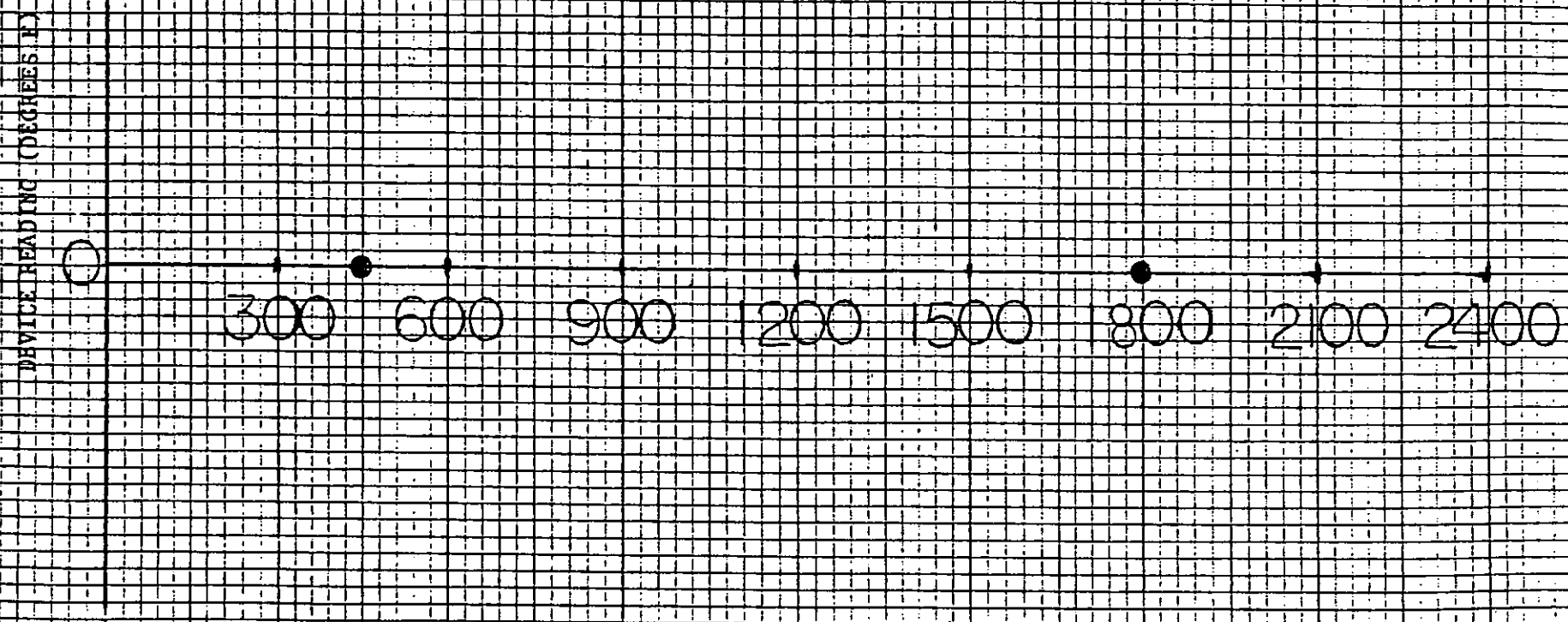


GUARDIAN SYSTEMS inc

TEMPERATURE CALIBRATION

FOR OMEGA 2

DATE INITIAL 4-1-87 DATE FINAL

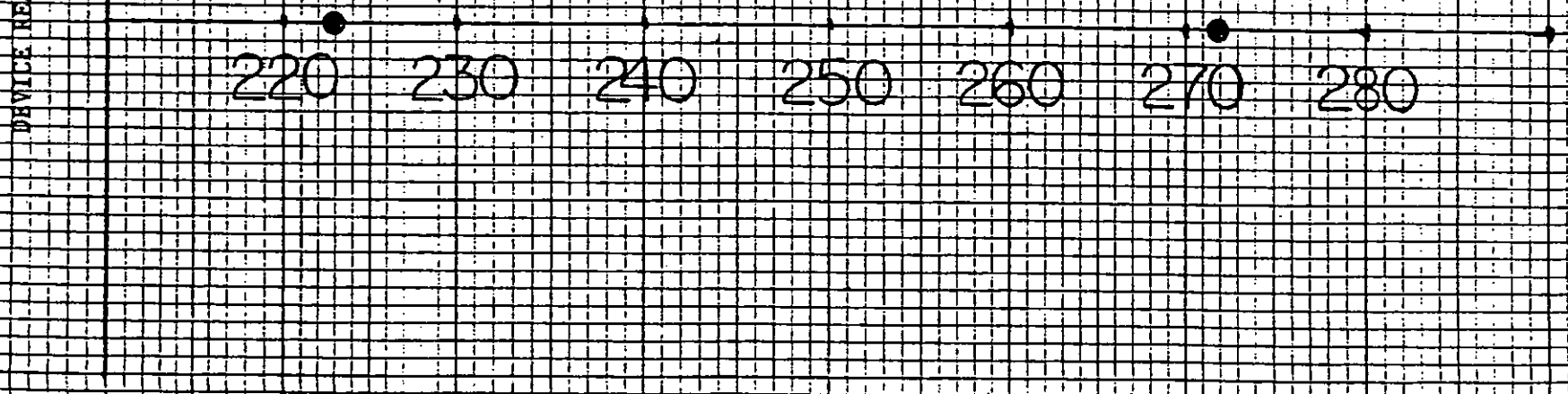


GUARDIAN SYSTEMS inc

TEMPERATURE CALIBRATION

FOR HOT BOX 6

DATE INITIAL 4-1-87 DATE FINAL

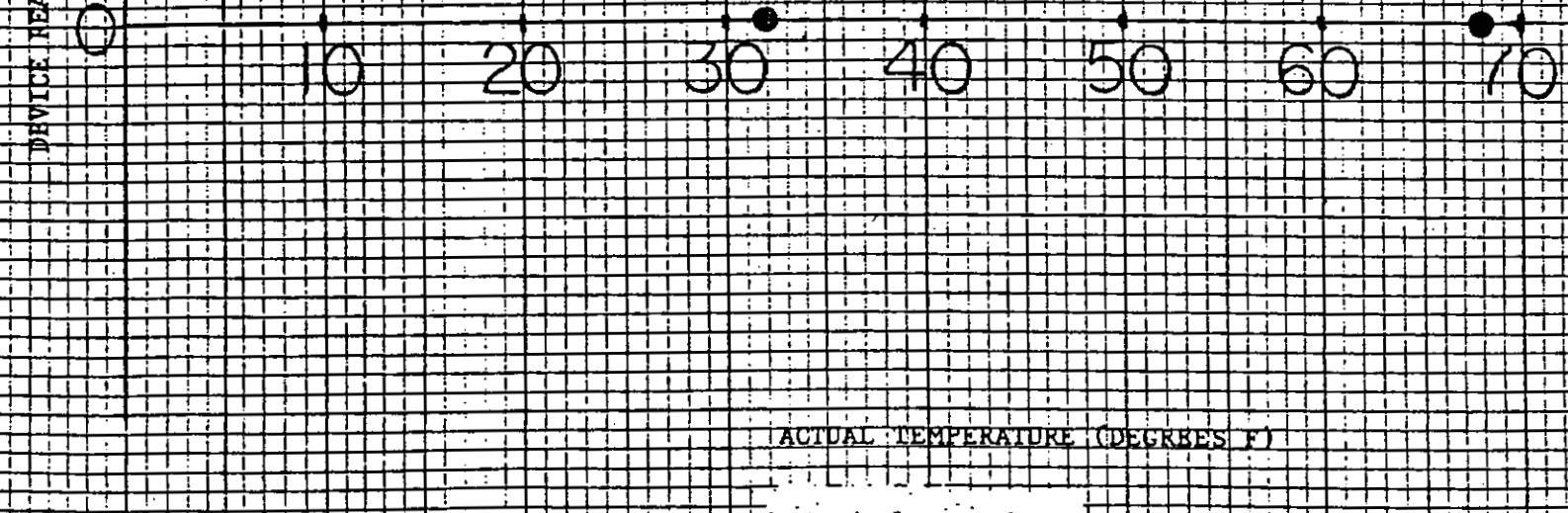


GUARDIAN SYSTEMS inc

TEMPERATURE CALIBRATION

FOR IMPINGER 6

DATE INITIAL 4-1-87 DATE FINAL



GUARDIAN SYSTEMS INC

PITOT CALIBRATION FORM

Date 4-1-87 Probe # 3'

Calibrated By G KARSTENS

Nozzle Size

SIDE A

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(A)$
1	.42	.58	.842	+.006
2	.41	.58	.832	-.004
3	.42	.59	.835	-.001
		$\bar{C}_p(A)$	.836	

.84

SIDE B

Run #	ΔP_{std} (in. H_2O) Standard	$\Delta P(s)$ (in. H_2O) Type "s"	$C_p(s)$	Deviation $C_p(s) - \bar{C}_p(B)$
1	.39	.53	.841	—
2	.39	.53	.841	—
3	.39	.54	.841	—
		$\bar{C}_p(B)$	.841	

.84

CALCULATIONS

$$C_p(s) = C_{p(std)} \text{ (or 0.99)} \sqrt{\frac{\Delta P_{std}}{\Delta P(s)}}$$

$$\text{Average Deviation} = \frac{\Sigma \left| C_p(s) - \bar{C}_p(A \text{ or } B) \right|}{3}$$ ← Must be ≤ 0.01

$$\left| \bar{C}_p(A) - \bar{C}_p(B) \right|$$ ← Must be ≤ 0.01

GUARDIAN SYSTEMS Inc