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: 26

Title: Report of Particulate/Lead/SO2 Emission Tests for Refined Metals-Corporation

Environmental Monitoring

July 1991

Shelby Conley

#26

a

AP-42 section: AP-42 7.11 2nd Batt Storage Ref #: 3

Date: 6/18/92 Rating: A

Firm/company: Refined Metals Corp.

Tested by: Environmental Monitoring Labs.

Test date: July 29 91

Special Process: Blast furnace baghouse

(Can determine which process (Smelting))

Test conditions: Usual ☑, unusual ☐

Sampling method: 12

Sampling location and Velocity Method: 1—6

Calibration Info: Yes ☑, No ☐

PARAMETER:		Run #1	Run #2	Run #3	Avg.
Lead	lb/hr	0.13	0.09	0.06	0.09
Particulate	lb/hr	0.83	0.25	0.43	0.503
Sulfur Dioxide	lb/hr	201	162	190	184
Bs/K.		97	95	94	95
% CO_2		.5	.5	.5	1
	dscfm	59701	60105	56566	58791

Production Data: 10,225 lb/hr (input)

Prod. Report letter. (normal operation)

Emission Factors: Lead: $\frac{0.09 \text{ lb/hr}}{10225 \frac{\text{lb}}{\text{hr}} \times 5\times10^{-4} \frac{\text{ton}}{\text{lb}}}$ = 0.07 lb/ton

Particl: $\frac{0.503}{10225 \times 5\times10^{-4}}$ = 0.0984 lb/ton

SO_2: $\frac{184}{10225 \times 5\times10^{-4}}$ = 35.99 lb/ton

AP-42 section: 7.11 2nd lead Ref #: 3b

Date: 6/18/92 Rating:

Firm/company: Refined Metals Corp

Tested by: Environmental Monitoring Labs

Test date: July 19/91

Special Process: Refinery baghouse (sanitary)

Test conditions: Usual ☐, unusual ☐

Sampling method:

Sampling location and Velocity Method:

Calibration Info: Yes ☐, No ☐

PARAMETER:		Run #1	Run #2	Run #3	Avg.
Lead	lb/hr	0.04	0.02	0.03	0.03
Particulate	lb/hr	0.08	0.18	0.19	0.15
Sulfur Dioxide	lb/hr	3.34	3.59	3.91	3.61
CO_2	0 %				
ISOK		100	98	99	99

Production Data:

None

Emission Factors:

Reference 3 a+b

This tests were performed to quantify particulate, lead and SO_2 emissions from the refinery sanitary baghouse and the blast furnace baghouse. ~~The refinery sanitary baghouse is equipped with a vertical exhaust~~ No unusual conditions were recorded during the test. The blast furnace baghouse was tested twice, once ~~[illegible]~~ under normal operation and another ~~under~~ during an accelerated mode. For the purpose of this report, only the normal mode data were used. The tests were conducted using EPA Reference Methods 1 through 5, ~~[illegible]~~ methods ~~[illegible]~~ 12 ~~[illegible]~~ particulate and lead concentrations were determined according to Method 12. Sulfur dioxide concentrations were determined by Method 6. The Data developed from this reference is thus rated "A".

(3)

REPORT OF
PARTICULATE/LEAD/SO_2 EMISSIONS TESTS
FOR
REFINED METALS CORPORATION

Memphis, Tennessee
July 25, 26, and 29, 1991

Shelby County

NEW

Performed By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi
(601-856-3092)

SEP 13 1991

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 * 224-B Hwy 51 North
Ridgeland, Mississippi 39158

(601)856-3092

September 9, 1991

Subject: Refined Metals Corporation
Memphis, Tennessee

On July 25, 26, and 29, 1991, Environmental Monitoring Laboratories conducted air emissions tests for Refined Metals' secondary lead smelter in Memphis, Tennessee. The tests were performed to quantify particulate, lead and SO_2 emissions from the refinery sanitary baghouse and the blast furnace baghouse in accordance with requirements of the Memphis-Shelby County Health Department. One test of the blast furnace emissions was made under normal operation and another test was made during an accelerated mode.

The following table shows measured emission rates in pounds per hour.

	PM	Pb	SO_2
Refinery Sanitary Baghouse	0.15	0.03	3.61
Blast Furnace Baghouse (normal).....	0.50	0.10	185
Blast Furnace Baghouse (accelerated)	0.56	0.08	662

The testing project was coordinated by Mr. Bill Freudiger, Vice President of Refined Metals Corporation. Mr. Efe Agho of the Memphis-Shelby County Health Department was present to witness the testing. Danny Russell of Environmental Monitoring Laboratories was responsible for the collection and analysis of all but the lead samples. Following their use for determining particulate sample weight, the lead samples were shipped to E.F. Williams and Associates in Memphis for analysis.

Following is a report of the test.

SEP 13 1991

REPORT OF PARTICULATE/LEAD/SO_2 EMISSIONS TESTING
FOR REFINED METALS CORPORATION
MEMPHIS, TENNESSEE
JULY 25, 26, AND 29, 1991

CONTENTS

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4.0	Data Reduction	4
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6.0	Calibration	14
7.0	Appendices:	15

a. Sampling and Analytical Data
b. Calibration Data
c. Lead Analysis Report
d. Blast Furnace Production Record

REPORT CERTIFICATION

I certify that I have examined the information submitted herein, and based upon my inquiries of those directly responsible for obtaining the data or upon my direct acquisition of the data, I believe the submitted information is true, accurate and complete.

Signed _____

Daniel G. Russell

SEP 13 1991

1.0 Test Results: The following tables present the measured flow parameters and test results for three separate particulate, lead, and SO_2 emissions samples for the refinery sanitary baghouse and twice for the blast furnace baghouse Refined Metals Corporation in Memphis, Tennessee on July 25, 26, and 29, 1991.

1.1 Refinery sanitary baghouse:

Run. No.		1	2	3	avg.
Date		07-25-91	07-25-91	07-25-91	------
Time start		1112	1247	1449	------
Time end		1220	1407	1608	------
PARTICULATE EMISSIONS	#/hr.	0.08	0.18	0.19	0.15
PARTICULATE EMISSIONS	gr/dscf	.0002	.0005	.0006	.0004
LEAD EMISSIONS	#/hr.	0.04	0.02	0.03	0.03
SO2 EMISSIONS	#/hr.	3.34	3.59	3.91	3.61
SO2 EMISSIONS	ppm	7.5	8.4	9.8	8.5
VOLUMETRIC FLOWRATE	acfm	50755	48594	45626	48325
VOLUMETRIC FLOWRATE	dscfm	44601	43008	40234	42614
VELOCITY	ft./sec.	44.6	42.7	40.1	42.4
STACK TEMPERATURE	degrees F	119	116	117	118
MOISTURE	%	2.83	2.51	2.70	2.68
SAMPLE RATE	%isokinetic	100	98	99	99

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1.2 Blast furnace baghouse - normal mode

Run. No.		1	2	3	avg.
Date		07-26-91	07-26-91	07-26-91	------
Time start		0858	1037	1211	------
Time end		1006	1144	1317	------
PARTICULATE EMISSIONS	#/hr.	0.83	0.25	0.43	0.50
PARTICULATE EMISSIONS	gr/dscf	.0016	.0005	.0009	.0009
LEAD EMISSIONS	#/hr.	0.13	0.09	0.06	0.10
SO2 EMISSIONS	#/hr.	201	162	190	185
SO2 EMISSIONS	ppm	338	271	337	315
VOLUMETRIC FLOWRATE	acfm	67930	67264	63843	66345
VOLUMETRIC FLOWRATE	dscfm	59701	60105	56566	58791
VELOCITY	ft./sec.	59.6	59.1	56.0	58.2
STACK TEMPERATURE	degrees F	123	116	118	119
MOISTURE	%	2.41	1.99	2.55	2.32
SAMPLE RATE	%isokinetic	97	95	94	95

E_{POT} 810 T/Y

1.3 Blast furnace baghouse - accelerated mode

Run. No.		1	2	3	avg.
Date		07-29-91	07-29-91	07-29-91	------
Time start		1117	1243	1415	------
Time end		1227	1357	1522	------
PARTICULATE EMISSIONS	#/hr.	0.37	0.70	0.62	0.56
PARTICULATE EMISSIONS	gr/dscf	.0009	.0016	.0015	.0013
LEAD EMISSIONS	#/hr.	0.08	0.07	0.08	0.08
SO2 EMISSIONS	#/hr.	742	722	523	662
SO2 EMISSIONS	ppm	1539	1420	1075	1345
VOLUMETRIC FLOWRATE	acfm	57384	60781	58165	58777
VOLUMETRIC FLOWRATE	dscfm	48365	50973	48822	49387
VELOCITY	ft./sec.	50.4	53.4	51.1	51.6
STACK TEMPERATURE	degrees F	138	140	139	139
MOISTURE	%	3.86	3.95	4.02	3.94
SAMPLE RATE	%isokinetic	98	97	97	97

2.0 Source Description: Refined Metals in Memphis is a secondary lead smelter. Source operation descriptions and process rates are reported under separate cover. Process description here is limited to a description of the sampling locations. The blast furnace baghouse was tested twice. On July 26, the blast furnace baghouse was operated in a normal mode. On July 29, the blast furnace was operated at an accelerated mode.

2.1 Refinery Sanitary Baghouse: The refinery sanitary baghouse is equipped with a vertical exhaust stack which is 59.0 inches in diameter and extends about 42 feet above the system blower duct to stack. Two sample ports at 90° are provided at a location which is 24 feet (4.9 diameters) below the stack exit and 18 feet (3.7 diameters) above the blower inlet duct.

2.2 Blast Furnace Baghouse: The blast furnace baghouse exhausts to the atmosphere by way of a 59.0 inch diameter stack which extends approximately 125 feet above grade. Two sample ports at 90° are provided at a location which is about 65 feet (13.2 diameters) below the stack exit and 55 feet (11.2 diameters) above the blower inlet to the stack.

3.0 Test Procedures: Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically those procedures used were Method 1 to determine the number of sample points, Method 3 (Fyrite kit) to determine carbon dioxide and oxygen content of the stack gas, and Methods 5 and 12 to determine flow rates, moisture content, and particulate and lead concentrations. The sampling train used is identical to that described in Method 5 and Method 12. Sulfur dioxide concentrations were determined by Method 6. Two 20 minute samples constituted a single sample run. Testing was performed in triplicate. Duration of each sample was 60 minutes.

Particulate filters were recovered by rinsing the front half of the filter holder into the probe wash and securing the filters in glass petri dishes. Part of the sample filter normally adheres to the filter gasket, and some of the adhering material is recovered into the probe wash. Therefore some of the filter weight is attributed to the probe wash weight.

Filters were heated in an oven for 2 hours at 105° C, desiccated at least 24 hours and weighed to constant weight. Probe wash samples in acetone were evaporated to dryness over low heat in tarred beakers, desiccated for at least 24 hours and weighed to constant weight. Weighings are made at 6 hour or greater intervals (samples stored in desiccator). Final weights are considered valid and are recorded if there is no more than 0.5 milligrams difference from the previous weighing.

Refined Metals - Memphis
Refinery Sanitary Baghouse
Particulate/Lead/SO2 Emissions Test, July 25, 1991

Collected test data	RUN 1	RUN 2	RUN 3	
1. As : sq ft	18.98591	18.98591	18.98591	
2. Dn : in.	.26	.26	.26	
3. Cp : dimensionless	.84	.84	.84	
4. Theta : minutes	60	60	60	
5. Y : dimensionless	1.00	1.00	1.00	
6. Pbar : in. Hg	29.67	29.67	29.67	
7. Pg : in. H2O	-.18	-.18	-.18	
8. Vm : cf (dry gas)	55.068	53.158	51.086	
9. sqr(DP),avg: in.H2O^.5	.75	.7199	.6751	
10. DH : in. H2O	2.8208	2.5771	2.3562	
11. ts : degrees F	118.71	116.46	117.46	117.54
12. tm : degrees F	101.42	108.67	116.94	
13. Vlc : ml	32	27	27.5	
14. CO2 : percent	.00	.00	.00	
15. O2 : percent	20.50	20.50	20.50	
16. Mn : milligrams	.7	1.6	1.7	
17. M,Pb : milligrams	.3625	.205	.2675	
18. C,SO2 : ppm	7.51	8.36	9.76	8.54

Refined Metals - Memphis
Refinery Sanitary Baghouse
Particulate/Lead/SO2 Emissions Test, July 25, 1991

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.88	29.86	29.84	N/A
2. Ps : in. Hg (Pg/13.6)+Pbar	29.66	29.66	29.66	N/A
3. An : sq ft ((Dn/24)^2)(3.1416)	3.687e-4	3.687e-4	3.687e-4	N/A
4. Vmstd: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	51.71621	49.25645	46.63261	N/A
5. Vwstd: scf (.04707cf/ml)(Vlc)	1.50624	1.27089	1.294425	N/A
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	.0283008	.0251525	.0270082	.0268205
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	28.82	28.82	28.82	N/A
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.51	28.55	28.53	N/A
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	44.56	42.66	40.05	42.42
10. Q : cfm Vs As(60 sec/min)	50755	48594	45626	48325
11. Qstd : dscfm Q(1-Bws)(Ps/Pstd)(Tstd/Ts)	44601	43008	40234	42614
12. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/ (60 Theta Vs Ps An)	99.52	98.29	99.47	99.09
13. E : pounds/hr ((Mn/Vmstd)(Qstd)(60))/453590 mg/#	.08	.18	.19	.15
14. C's : grains/dscf (Mn/Vmstd)(.0154 grains/mg)	.0002084	.0005002	.0005614	.0004234
15. E,Pb : pounds/hr ((M,Pb/Vmstd)(Qstd)(60))/453590	.04	.02	.03	.03
16. E,SO2: pounds/hr ((C,SO2)*(1.6619e-7))(Qstd)(60)	3.34	3.59	3.91	3.61

Refined Metals - Memphis
Blast Furnace Baghouse - Mode 1
Particulate/Lead/SO2 Emissions Test, July 26, 1991

Collected test data	RUN 1	RUN 2	RUN 3	
1. As : sq ft	18.98591	18.98591	18.98591	
2. Dn : in.	.235	.235	.235	
3. Cp : dimensionless	.84	.84	.84	
4. Theta : minutes	60	60	60	
5. Y : dimensionless	1.00	1.00	1.00	
6. Pbar : in. Hg	29.79	29.79	29.79	
7. Pg : in. H2O	-.31	-.31	-.31	
8. Vm : cf (dry gas)	58.145	58.431	54.492	
9. sqr(DP),avg: in.H2O^.5	1.0035	1.0006	.9474	
10. DH : in. H2O	3.1833	3.0833	2.8042	
11. ts : degrees F	123.33	116.17	117.75	119.08
12. tm : degrees F	96.50	108.29	112.92	
13. Vlc : ml	29	23.5	28	
14. CO2 : percent	.50	.50	.50	
15. O2 : percent	20.00	20.00	20.00	
16. Mn : milligrams	5.8	1.7	2.9	
17. M,Pb : milligrams	.94	.615	.435	
18. C,SO2 : ppm	338.46	271.12	336.64	315.41

Refined Metals - Memphis
Blast Furnace Baghouse - Mode 1
Particulate/Lead/SO2 Emissions Test, July 26, 1991

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	30.02	30.02	30.00	N/A
2. Ps : in. Hg (Pg/13.6)+Pbar	29.77	29.77	29.77	N/A
3. An : sq ft ((Dn/24)^2)(3.1416)	3.012e-4	3.012e-4	3.012e-4	N/A
4. Vmstd: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	55.35910	54.46390	50.34742	N/A
5. Vwstd: scf (.04707cf/ml)(Vlc)	1.36503	1.106145	1.31796	N/A
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	.0240644	.0199054	.0255095	.0231598
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	28.88	28.88	28.88	N/A
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.62	28.66	28.60	N/A
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	59.63	59.05	56.04	58.24
10. Q : cfm Vs As(60 sec/min)	67930	67264	63843	66345
11. Qstd : dscfm Q(1-Bws)(Ps/Pstd)(Tstd/Ts)	59701	60105	56566	58791
12. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/ (60 Theta Vs Ps An)	97.42	95.20	93.51	95.37
13. E : pounds/hr ((Mn/Vmstd)(Qstd)(60))/453590 mg/#	.83	.25	.43	.50
14. C's : grains/dscf (Mn/Vmstd)(.0154 grains/mg)	.0016135	.0004807	.0008870	.0009937
15. E,Pb : pounds/hr ((M,Pb/Vmstd)(Qstd)(60))/453590	.13	.09	.06	.10
16. E,SO2: pounds/hr ((C,SO2)*(1.6619e-7))(Qstd)(60)	201.48	162.49	189.88	184.62

Refined Metals - Memphis
Blast Furnace Baghouse - Mode 2
Particulate/Lead/SO2 Emissions Test, July 29, 1991

Collected test data	RUN 1	RUN 2	RUN 3	
1. As : sq ft	18.98591	18.98591	18.98591	
2. Dn : in.	.235	.235	.235	
3. Cp : dimensionless	.84	.84	.84	
4. Theta : minutes	60	60	60	
5. Y : dimensionless	1.00	1.00	1.00	
6. Pbar : in. Hg	29.71	29.71	29.71	
7. Pg : in. H2O	-.34	-.34	-.34	
8. Vm : cf (dry gas)	48.501	51.651	49.646	
9. sqr(DP),avg: in.H2O^.5	.8352	.8827	.8453	
10. DH : in. H2O	2.2125	2.4625	2.2125	
11. ts : degrees F	137.58	140.00	139.00	138.86
12. tm : degrees F	105.71	120.04	122.58	
13. Vlc : ml	38.5	41	40	
14. CO2 : percent	1.00	1.00	1.00	
15. O2 : percent	20.00	20.00	20.00	
16. Mn : milligrams	2.6	4.9	4.3	
17. M,Pb : milligrams	.5575	.4675	.5725	
18. C,SO2 : ppm	1539.15	1420.05	1074.79	1344.66

Refined Metals - Memphis
Blast Furnace Baghouse - Mode 2
Particulate/Lead/SO2 Emissions Test, July 29, 1991

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.87	29.89	29.87	N/A
2. Ps : in. Hg (Pg/13.6)+Pbar	29.69	29.69	29.69	N/A
3. An : sq ft ((Dn/24)^2)(3.1416)	3.012e-4	3.012e-4	3.012e-4	N/A
4. Vmstd: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	45.19636	46.97151	44.92367	N/A
5. Vwstd: scf (.04707cf/ml)(Vlc)	1.812195	1.92987	1.8828	N/A
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	.0385503	.0394645	.0402252	.0394134
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	28.96	28.96	28.96	N/A
8. Ms : mol.wt. wet basis Md(1-Bws)+18 Bws	28.54	28.53	28.52	N/A
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	50.37	53.36	51.06	51.60
10. Q : cfm Vs As(60 sec/min)	57384	60781	58165	58777
11. Qstd : dscfm Q(1-Bws)(Ps/Pstd)(Tstd/Ts)	48365	50973	48822	49387
12. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/ (60 Theta Vs Ps An)	98.18	96.81	96.67	97.22
13. E : pounds/hr ((Mn/Vmstd)(Qstd)(60))/453590 mg/#	.37	.70	.62	.56
14. C's : grains/dscf (Mn/Vmstd)(.0154 grains/mg)	.0008859	.0016065	.0014741	.0013222
15. E,Pb : pounds/hr ((M,Pb/Vmstd)(Qstd)(60))/453590	.08	.07	.08	.08
16. E,SO2: pounds/hr ((C,SO2)*(1.6619e-7))(Qstd)(60)	742.28	721.77	523.23	662.43

SO2 sample weight determination

Refined Metals - Memphis

Particulate/Lead/SO2 emissions tests - July 25,26,29,

Collected data

Sample	Vt ml	N meq/ml	Vsoln ml	Va ml	M,SO2 mg
RSB R1A	.2	.0114	100	10.00	.73
RSB R1B	.20	.0114	100	10.00	.73
RSB R2A	.2	.0114	100	10.00	.73
RSB R2B	.2	.0114	100	10.00	.73
RSB R3A	.8	.0114	100	30.00	.97
RSB R3B	.6	.0114	100	30.00	.73
BFB R1A	3.5	.0114	100	4.00	31.94
BFB R1B	2	.0114	100	4.00	18.25
BFB R1A	2.9	.0114	100	10.00	10.59
BFB R1B	7.9	.0114	100	10.00	28.84
BFB R1A	3.5	.0114	100	10.00	12.78
BFB R1B	10.5	.0114	100	10.00	38.33
BFB2R1A	13.9	.0114	100	4.00	126.85
BFB2R1B	11.3	.0114	100	4.00	103.12
BFB2R1A	15.1	.0114	100	4.00	137.80
BFB2R1B	2.8	.0114	100	4.00	25.55
BFB2R1A	9	.0114	100	4.00	82.13
BFB2R1B	11.3	.0114	100	4.00	103.12

Refined Metals - Memphis
Sulfur dioxide sample concentrations
Samples collected July 25, 26, and 29, 1991

Sample ID	Initial Meter	Final Meter	Pbar in. Hg	tm Deg F	Volume dscf	Sample wt. mg	SO2 ppm
RSB R1A	599.7	601.058	29.67	79.25	1.319	.73	7.3443
RSB R1B	601.765	603.064	29.67	79.63	1.260	.73	7.6833
RSB R2A	604.075	605.291	29.67	80.00	1.179	.73	8.2134
RSB R2B	606	607.174	29.67	80.00	1.138	.73	8.5072
RSB R3A	607.991	609.21	29.67	80.88	1.180	.97	10.905
RSB R3B	609.866	611.038	29.67	84.88	1.126	.73	8.5987

BFB R1A	611.729	612.745	29.79	78.88	.9912	31.94	427.48
BFB R1B	613.409	614.406	29.79	80.00	.9706	18.25	249.43
BFB R2A	614.837	616.015	29.78	80.63	1.145	10.59	122.68
RSB R2B	616.706	617.647	29.79	82.50	.9119	28.84	419.56
RSB R3A	618.418	619.594	29.79	84.13	1.136	12.78	149.21
RSB R3B	620.262	621.266	29.79	84.00	.9702	38.33	524.07

BFB R1A	622.051	623.227	29.71	84.50	1.132	126.9	1486.1
BFB R1B	623.886	624.784	29.71	88.00	.8592	103.1	1592.2
BFB R2A	625.456	626.568	29.71	85.00	1.070	137.8	1708.8
RSB R2B	627.287	627.599	29.71	86.00	.2996	25.55	1131.3
RSB R3A	627.729	628.932	29.71	93.25	1.140	82.13	955.68
RSB R3B	629.435	630.655	29.71	98.25	1.146	103.1	1193.9

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
An	ft^2	Nozzle area
As	ft^2	Stack area
Bws	dimensionless	Proportion of water vapor
CO2	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
C,PM	grains/dscf	Particulate concentration
C'PM	gr/dscf@12% CO2	Particulate emissions corrected to 12% excess air
C,[X]	ppm	Concentration of X
Dn	inches	Nozzle diameter
delta H	in. H2O	Pressure drop across meter orifice (also DH)
delta P	in. H2O	Stack velocity pressure head (also DP)
E,PM	#/hr	Particulate emission rate
E,[X]	#/hr	Emission rate of [X]
I	per cent	Per cent isokinetic sampling
Kp	consistent	Pitot tube constant = 85.49
M,PB	milligrams	Particulate sample weight
M,[X]	milligrams	Sample weight of X
Md	#/# mole	Dry molecular wt. of stack gas
Ms	#/# mole	Wet molecular wt. of stack gas
N2	percent	Nitrogen content by volume
O2	percent	Oxygen content by volume
Pbar	in. Hg	Barometric pressure
Pg	in. H2O	Static pressure
Pm	in. Hg	Meter pressure = Pbar+(delta H/13.6)
Ps	in. Hg	Stack pressure = Pbar+(Pg/13.6)
Pstd	in. Hg	Standard pressure = 29.92
Q	ft^3/min	Volumetric flow rate at stack conditions
Qstd	dscf/min	Volumetric flow rate at dry, std. conditions
Theta	minutes	Sampling time per run
tm	^oF	Meter temperature (Tm denotes ^oR)
ts	^oF	Stack temperature (Ts denotes ^oR)
Tstd	^oR	Standard temperature = 528°
Vlc	ml	Volume of water collected
Vm	ft^3	Volume of dry gas sampled
Vmstd	dscf	Sample volume at standard conditions
Vwstd	scf	Sample volume of water vapor
Y	dimensionless	Meter correction factor
Xsair	percent	Excess air

6.0 CALIBRATIONS:
Measurement devices used by Environmental Monitoring Laboratories and subject to changes in measurement precision are initially calibrated prior to use. Those instruments for which calibration factors are subject to change or for which calibration checks are required, are calibrated following each field use or as otherwise directed and noted. Calibration procedures for specific equipment are as follows.

Dry Gas Meter:
Dry gas meters are periodically removed from the sampling consoles and cleaned and repaired (new gaskets etc. as required). Following the overhaul of a meter, the measuring precision is checked by the Bell Prover Method and adjusted when necessary to read to within 2% of 100% accuracy. This service is provided by Big Three Meter Company in Jackson, Mississippi. Overhaul service or any six month period is followed by a five point calibration described in APTD-0576 using either a wet test meter or calibrated dry gas meter (used exclusively for calibrations) as a standard reference. Following field use, a gas meter calibration is checked in one of two ways. [1] Three calibration checks at intermediate orifice settings are performed or [2] orifice meter coefficients are used.

If a meter coefficient obtained from pre-test and post-test checks differs by more than 5%, the coefficient (Y) giving the lower sample volume is used in the calculations.

Orifice:
The orifice coefficient is initially determined and is rechecked following a major gas meter repair and calibration.

Nozzles:
Nozzles are checked before each field use with a precision (.001 in.) dial caliper. Three measurements on different axes are made; an average of those three readings is used in calculations. If the tolerance among measurements exceeds 0.004 inches (highest to lowest reading) the nozzle is repaired and recalibrated or discarded.

Pitot Tubes:
Pitot tubes meeting EPA geometry standards are assigned a coefficient of 0.84. Pitot tubes are visually inspected for damage before, during and after use. Those pitot tubes not meeting the geometry standards are assigned a coefficient from the manufacturer's calibration which it retains unless damaged. All pitot tubes used by Environmental Monitoring Laboratories are manufactured by NAPP, Inc.

Temperature Measuring Instruments:
Most temperature measurements are made with a type K thermocouple and an Omega digital thermocouple thermometer which has an initial calibration traceable to NBS. Other measurements are made using bimetallic dial thermometers. The thermocouples and dial thermometers are checked following or during a test series against an ASTM mercury in glass thermometer.

Barometer:
Aneroid field barometers are checked against and adjusted to readings from a mercury barometer or readings obtained from local weather authorities.

Differential Pressure Gauges:
Velocity head (delta P) and orifice pressure differential (delta H) measurements are made using water manometers of the appropriate range unless otherwise noted in the test data. Manometers do not require calibration.

7.0 Appendices

a. Sampling and Analytical Data

b. Calibration Data

c. Lead Analysis Report

d. Blast Furnace Production Record

SAMPLING AND ANALYTICAL DATA

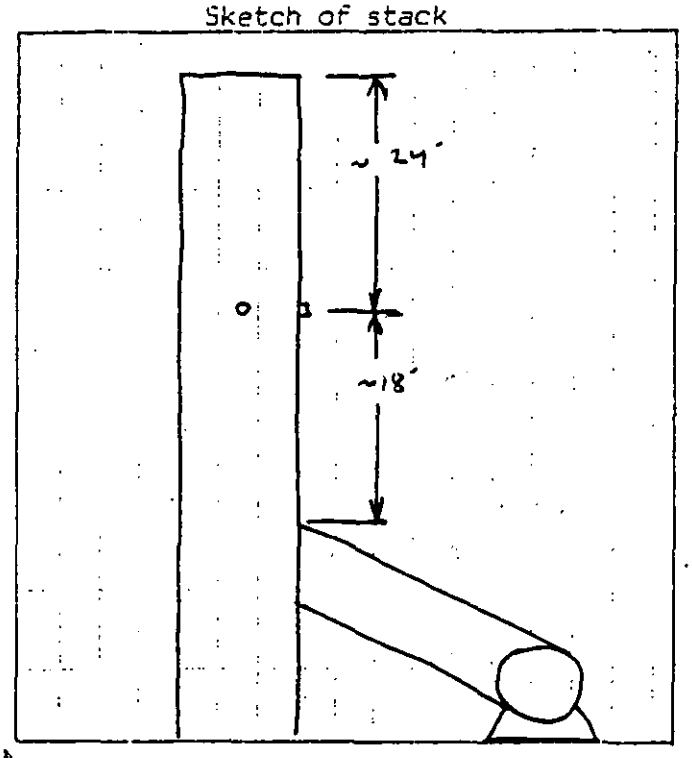
REFINERY SANITARY BAGHOUSE

STACK CONFIGURATION / SAMPLE AND VELOCITY POINTS

Plant Name Refined Metals Source Refinery Sanitary Baghouse

Data For: _____ Date _____

Sketch of stack



PERCENT OF DIAMETER

Point No	Points on a Diameter 2	4	6	8	10	12	14	16
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	5.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

Stack diameter 59.0"

Distance from ports to disturbance:

distance to upstream disturbance ~ 18'

distance to downstream disturbance ~ 24'

upstream diameters 3.7

downstream diameters 4.9

Minimum No. points required 24

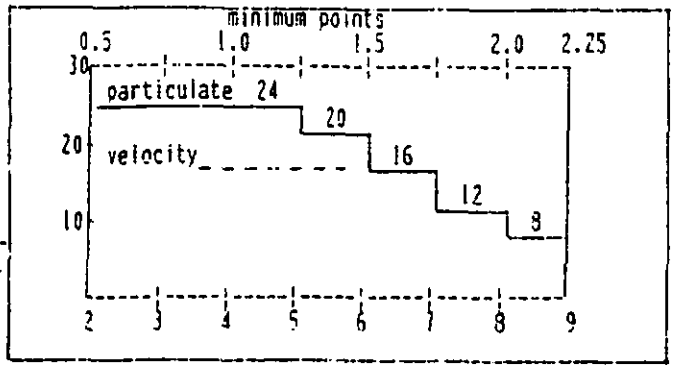
No. points selected 12 x 2

Nipple length 5.0" 3"PN

Point	inches from wall	velocity head
1	1.2	.31
2	4.0	.31
3	7.0	.31
4	10.9	.28
5	14.8	.27
6	21.0	.21
7	38.0	.18
8	44.3	.17
9	48.6	.18
10	52.0	.17
11	55.1	.17
12	57.8	.17
13		
14		
15		
16		

Pg = -.12 Ts =

Pitot ID Cp =



REMARKS _____

Plant: Refined Petroleum Memphis
Sampling Location: Refinery Emitting Baghouse
Test For: PM/Pb/SO2
Test Operators: Russell/Moore

RUN No. 1
Date 7-25-91
Time start 1112 end 1220

Meter Box	RA591379	No. Sample Pts.	12x2	Gas Analysis	Air
Sample Box	#1	Minutes/Pt.	2.5	CO_2	0
Probe/Pitot	5' Teflon			O_2	20.5
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.260	ΔH@	1.55	Time	
Filter No.		Meter Temp.	100		
		% H_2O	6.0	Condensate: 1N HNO_3	
Amb. Temp. °F	80	C-Factor	1.0	tare 200	fin 216
Bar. Press. "Hg	29.67	Stack Temp.	100	Silica gel:	
Static Press. "H_2O	-.18	Ref. ΔP	.38	tare 674	fin 690

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0:00	856.932	0.80	1.90	118	78	78	265	68	6
2	230	859.8	0.81	4.00	120	86	76	260	65	6
3	500	862.3	0.66	3.25	121	98	79	250	65	6
4	730	865.6	0.66	3.25	120	98	80	250	70	5
5	1000	868.0	0.54	2.60	118	99	80	250	68	5
6	1230	870.1	0.46	2.25	118	105	82	255	68	3
7	1500	872.2	0.51	2.45	118	110	83	260	67	3
8	1730	874.3	0.56	2.80	118	110	84	265	68	3
9	2000	876.2	0.56	2.80	118	112	85	260	67	3
10	2230	878.2	0.59	2.90	120	114	87	260	67	3
11	2500	880.1	0.47	2.25	119	116	89	260	67	3
12	2730	882.4	0.39	1.90	120	118	91	260	67	3
13										
14	1 30/00	884.732	0.86	4.25	117	104	93	260	67	5
15	2 230	887.8	0.86	4.30	116	110	92	270	65	6
16	3 500	890.7	0.87	4.30	115	118	93	260	65	6
17	4 730	893.5	0.77	3.80	119	123	92	245	61	5
18	5 1000	896.2	0.66	3.25	120	126	96	245	60	7
19	6 1230	899.0	0.53	2.60	120	126	97	250	60	3
20	7 1500	901.0	0.38	1.85	121	127	98	250	60	3
21	8 1730	902.8	0.38	1.85	120	127	99	260	62	3
22	9 2000	904.8	0.41	2.00	117	126	100	260	64	3
23	10 2230	906.8	0.40	1.90	118	126	100	260	65	3
24	11 2500	908.5	0.37	1.80	119	125	100	260	65	3
25	12 2730	910.5	0.30	1.45	119	126	104	250	65	3
26	end 60	912.000								
27										
28										
29										
30		leak check	.029 →	.096 =	.017 cfm	@ 10				
31										
32										
33										
34		55.0680	1.7500	2.8208	118.71	101.42				
35										

Plant Refined Metals
Sampling Location Refinery Sintering Baghouse
Test For PM/Pb & SO2
Test Operators Russell / Moore

RUN No. 2
Date 7-25-91
Time start 1247 end 1407

Meter Box	RAC591249	No. Sample Pts.	12x2	Gas Analysis	Air	Remarks:	
Sample Box	No.	Minutes/Pt.	2.5	CO_2			
Probe/Pitot	5' Teflon	NOMOGRAPH		O_2			
Pitot Cp	.84	ΔH@	1.95	CO			
Nozzle Dia.	.260	Meter Temp.		Time			
Filter No.		% H_2O		Condensate:			
Amb. Temp. °F	80	C-Factor		tare 200 fin 215			
Bar. Press. "Hg	29.67	Stack Temp.		Silica gel:			
Static Press. "H_2O	-.18	Ref. ΔP	.38	tare 682.0 fin 694.0			

	Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	1	0.00	912.322	0.75	3.60	119	99	96	220	70	6
2	2	230	914.9	0.73	3.50	120	102	97	230	60	6
3	3	500	917.5	0.70	3.40	121	106	98	230	60	6
4	4	730	920.7	0.69	3.35	120	109	98	230	62	6
5	5	1000	923.4	0.52	2.55	118	118	96	235	59	6
6	6	1230	925.3	0.40	1.95	121	122	100	240	59	4
7	7	1500	927.0	0.38	1.90	120	122	99	250	58	3
8	8	1730	928.9	0.42	2.00	120	123	101	250	58	3
9	9	2000	931.0	0.47	2.25	121	124	100	250	60	3
10	10	2230	933.0	0.45	2.20	120	124	101	255	61	4
11	11	2500	935.0	0.40	1.90	117	125	102	250	62	4
12	12	2730	936.7	0.35	1.75	117	125	102	245	63	3
13											
14	1	30/00	938.583	0.81	4.00	117	102	97	235	66	6
15	2	230	941.3	0.80	3.90	118	106	100	240	65	7
16	3	500	944.5	0.76	3.70	113	113	100	250	65	7
17	4	730	946.8	0.67	3.25	113	117	97	250	66	6
18	5	1000	949.3	0.55	2.75	113	122	97	240	65	6
19	6	1230	952.5	0.51	2.45	113	124	98	250	65	5
20	7	1500	954.3	0.51	2.45	113	125	99	250	65	4
21	8	1730	956.7	0.39	1.90	113	126	98	250	64	4
22	9	2000	958.5	0.71	2.00	113	125	100	250	65	4
23	10	2230	960.1	0.39	1.90	113	126	100	240	65	3
24	11	2500	962.1	0.35	1.70	112	125	101	250	65	3
25	12	2730	963.9	0.31	1.50	112	126	103	250	65	3
26	end	66	965.480								
27											
28											
29			leak check .063 →	.071 =	.008 cfm		10" Hg				
30											
31											
32											
33											
34											
35			53.1580	.7199	2.5771	116.46	108.67				

Plant Refined Metals
Sampling Location Refinery Sanitary Baghouse
Test For PM/SO2/Pb
Test Operators Rinnell / Moore

RUN No. 3
Date 7-25-91
Time start 1449 end 1608

Meter Box	RAC91349	No. Sample Pts.	12x2	Gas Analysis	Air	Remarks:	
Sample Box	No. 1	Minutes/Pt.	2.5	CO_2			
Probe/Pitot	S' Teflon	NOMOGRAPH		O_2			
Pitot Cp	.84	ΔH@	1.95	CO			
Nozzle Dia.	.260	Meter Temp.		Time			
Filter No.		% H_2O		Condensate:			
Amb. Temp. °F	84	C-Factor		tare 200 HNO_3 fin 211		15" ΔP Baghouse	
Bar. Press. "Hg	29.67	Stack Temp.		Silica gel:			
Static Press. "H_2O	-.18	Ref. ΔP	.38	tare 650 fin 666.5			

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0.00	966.046	0.67	3.40	116	99	95	240	68	5
2	2.30	968.0	0.67	3.40	117	100	96	250	67	5
3	5.00	971.7	0.62	3.20	116	111	96	235	64	5
4	7.30	973.2	0.58	3.00	116	116	98	225	65	4
5	10.00	975.7	0.46	2.35	116	120	98	225	65	4
6	12.30	977.8	0.38	1.95	116	124	99	225	65	4
7	15.00	980.1	0.32	1.60	118	125	100	225	63	3
8	17.30	981.7	0.35	1.75	117	126	101	240	64	3
9	20.00	983.3	0.35	1.75	117	126	101	250	65	3
10	22.30	985.3	0.41	2.10	116	127	103	250	65	3
11	25.00	987.3	0.40	2.00	121	128	104	250	65	3
12	27.30	989.0	0.33	1.65	120	129	103	260	65	3
13										
14	30.00	991.063	0.72	3.60	118	107	103	250	68	5
15	2.30	995.0	0.70	3.60	119	111	103	250	67	5
16	5.00	998.7	0.60	3.05	115	122	104	265	60	5
17	7.30	000.8	0.49	2.50	113	127	104	235	60	5
18	10.00	002.6	0.45	2.30	115	129	104	220	60	5
19	12.30	004.1	0.43	2.30	116	130	105	225	60	5
20	15.00	006.5	0.34	1.70	120	131	106	235	62	3
21	17.30	007.4	0.40	2.00	121	130	106	240	63	3
22	20.00	009.8	0.37	1.85	120	131	108	250	64	3
23	22.30	011.5	0.40	2.00	118	132	109	245	63	3
24	25.00	013.9	0.35	1.75	119	133	109	250	65	3
25	27.30	015.1	0.35	1.75	119	133	109	250	65	3
26	60	017.132								
27										
28		leak check: .008 → .020 = .012 cfm @ 9" Hg								
29										
30										
31										
32										
33										
34										
35		51.0860	.6751	2.3562	117.46	116.94				

PARTICULATE CATCH ANALYSIS:

SAMPLES: Refined Metals - Refinery Sanitary Bay Lower

DATE TAKEN: 7-25-91 DATE ANALYZED: 7-30-91

SAMPLES DELIVERED BY: DGR RECEIVED BY: DGR

ANALYZED BY: DGR

Filter treatment: Filters oven dried 2 hours at 105° C, desiccated at least 24 hours, weighed to constant weight

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	654	663	662	
FILTER TARE, gms	.4093	.4134	.4120	
1st weighing	.4099	.4129	.4118	
2nd weighing	.4098	.4129	.4118	
3rd weighing				
FINAL WEIGHT, gms.	.4098	.4129	.4118	
NET GAIN, gms.	.0005	-.0005	-.0002	

Probe wash treatment: Transferred to a tared beaker, acetone evaporated over low heat, desiccated at least 24 hours, weighed to constant weight.

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER ID	RSB R1	RSB R2	RSB R3	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	150	110	100	
TARE WT., gms.	(50) 103.8821	(56) 105.8218	(72) 111.3456	
1st weighing	103.8833	105.8244	111.3482	
2nd weighing	103.8829	105.8243	111.3479	
3rd weighing				
FINAL WEIGHT, gms.	103.8829	105.8243	111.3479	
NET GAIN, gms.	.0008	.0025	.0023	
LESS BLANK, gms.	-.0006	-.0004	-.0004	

PARTICULATE SAMPLE WEIGHT, mg.

RUN NO.	1	2	3	
filter + probe	0.7	1.6	1.7	

SO_2

Plant Refined Metals
Sampling Location Refinery Scrubber Exhaust
Test For SO_2
Test Operators

RUN No. 1 A+B
Date 7-25-91
Time start 1100 end

Meter Box	Andersen	No. Sample Pts.	1	Gas Analysis	Fyrite		Remarks:
Sample Box		Minutes/Pt.	20	CO_2			
Probe/Pitot				O_2			
Pitot Cp		NOMOGRAPH		CO			
Nozzle Dia.		ΔH@		Time			
Filter No.		Meter Temp.					
		% H_2O		Condensate:			
Amb. Temp. °F		C-Factor		tare	fin		
Bar. Press. "Hg		Stack Temp.		Silica gel:			
Static Press. "H_2O		Ref. ΔP		tare	fin		

	Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	~~Orifice ΔH in. H_2O~~ kpa	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in. Hg
1	A	0	599.700	NA	2.0	NA	79	79	NA	70	
2		5	600.065		2.0		79	79		68	
3		10	600.490		2.0		79	79		68	
4		15	600.725		2.0		80	80		68	
5	end	20	601.058								
6											
7			Purge 15 min								
8											
9											
10											
11											
12	B	0	601.765	NA	2.0	NA	79	80	NA	67	
13		5	602.180		2.0		79	80		66	
14		10	602.405		2.0		79	80		67	
15		15	602.723		2.0		80	80		67	
16	end	20	603.064								
17											
18											
19			Purge 15 min								
20											
21											
22											
23											
24		A	1,358				79.25				
25		B	1.299				79.63				
26											
27											
28											
29											
30											
31											
32											
33											
34											
35			3.364		2.0		79.44				

SO2

Plant: Refined Metals - Memphis
Sampling Location: Refinery
Test For: SO2
Test Operators: Russ / Moore

RUN No. 2 A + B
Date 7-25-91
Time start 1247 end

Meter Box	No. Sample Pts.	Gas Analysis	Remarks:
Sample Box	Minutes/Pt.	CO_2	
Probe/Pitot	NOMOGRAPH	O_2	
Pitot Cp	ΔH@	CO	
Nozzle Dia.	Meter Temp.	Time	
Filter No.	% H_2O	Condensate:	
Amb. Temp. °F	C-Factor	tare fin	
Bar. Press. "Hg	Stack Temp.	Silica gel:	
Static Press. "H_2O	Ref. ΔP	tare fin	

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice Rpm ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg	
A	0	604.075	NA	2.0	NA	80	80	NA	67		1247
	5	604.364		2.0		80	80		67		
	10	604.670		2.0		80	80		68		
	15	604.979		2.0		80	80		68		
	20	605.291									
		purge 15 min									
B	0	606.000	NA	2.0	NA	80	80	NA			1317
	5	606.288		2.0		80	80				
	10	606.596		2.0		80	80				
	15	606.889		2.0		80	80				
	20	607.174									
		purge 15 min									
	A	1.216				80.00					
	B	1.174				80.00					
		3.0990		2.0		80	80				

HCAPK

Plant: Refined Metals - Memphis
Sampling Location: Refining Baghouse
Test For: SO2
Test Operators: Russ / Aaron

RUN No. 3 A + B
Date: 7-25-91
Time start: 1449 end:

Meter Box	Anderson	No. Sample Pts.		Gas Analysis		Remarks:	
Sample Box		Minutes/Pt.		CO_2			
Probe/Pitot		NOMOGRAPH		O_2			
Pitot Cp		ΔH@		CO			
Nozzle Dia.		Meter Temp.		Time			
Filter No.		% H_2O		Condensate:			
Amb. Temp. °F		C-Factor		tare	fin		
Bar. Press. "Hg		Stack Temp.		Silica gel:			
Static Press. "H_2O		Ref. ΔP		tare	fin		

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg	
A	0	607.991	NA	2.0	NA	82	81		70		1449
	5	608.300				80	80		68		
	10	608.600				80	80		68		
	15	608.910				82	82		68		
end	20	609.210									
B	0	609.866	NA	2.0		84	85		68		1540
	5	610.159		2.0		85	85		68		
	10	610.470		2.0		85	85		67		
	15	610.775		2.0		85	85		67		
end	20	611.038									
	A	1.219				80.88					
	B	1.172				84.88					
		3.047		2.0		82.88					

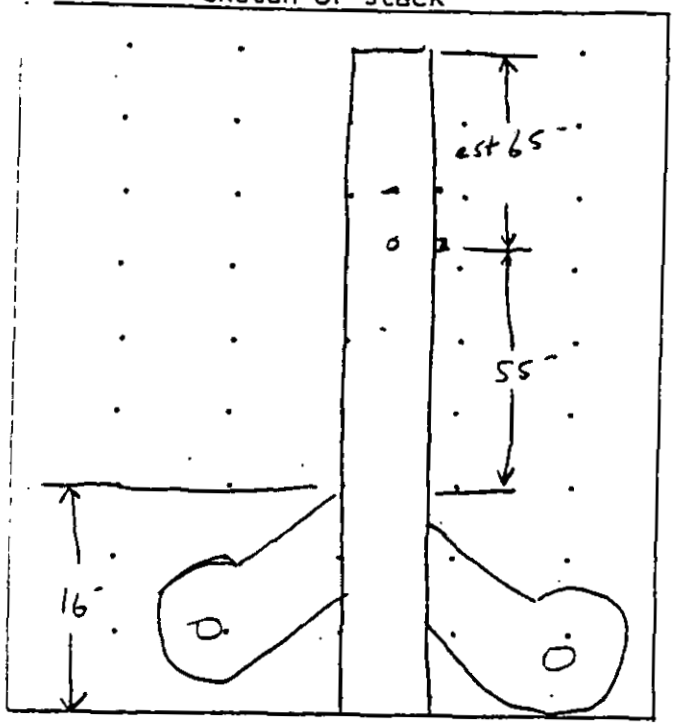
BLAST FURNACE (NORMAL MODE)

STACK CONFIGURATION / SAMPLE AND VELOCITY POINTS

Plant Name Refined Metals Source Blast Furnace Baghouse

Data For: Prob. Particulate Date 3-8-88

Sketch of stack



PERCENT OF DIAMETER

Point No	Points on a Diameter 2	4	6	8	10	12	14	16
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

Stack diameter 59.0 ~~60.0~~

Distance from ports to disturbance:

distance to upstream disturbance 55"

distance to downstream disturbance ~ 65"

upstream diameters 11.2

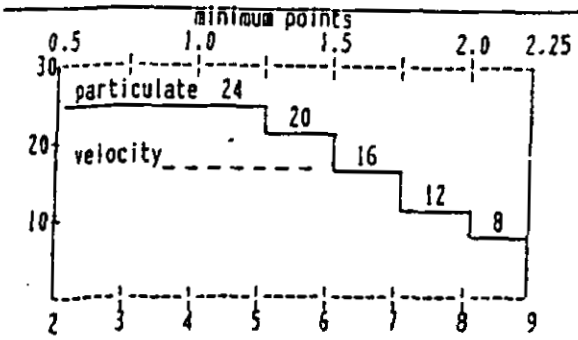
downstream diameters 13.2

Minimum No. points required 12

No. points selected 12

Nipple length 8" long 3" p.N. m'rail

minimum points



Point	Inches from wall	velocity head
1	2.6	
2	8.6	
3	17.5	
4	41.5	
5	50.4	
6	56.4	
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

Pg = Ts =

Pitot ID Cp =

REMARKS

Plant: Refined Metals
Sampling Location: Blast Furnace Baghouse
Test For: PM/Pb/SO2
Test Operators: Russell/Moore

RUN No. 1
Date 7-26-91
Time start 0858 end 1006

Meter Box	RAC591349	No. Sample Pts.	6x2	Gas Analysis	Fyrite		Remarks:
Sample Box	No. 1	Minutes/Pt.	5.0	CO_2	0.5		
Probe/Pitot	5' Teflon			O_2	20.0		
Pitot Cp	.64	NOMOGRAPH		CO			
Nozzle Dia.	.235	ΔH@	1.95	Time			
Filter No.		Meter Temp.	100				
		% H_2O	<10	Condensate:			
Amb. Temp. °F	78	C-Factor	1.0	tare 200 HNO3	fin 212		
Bar. Press. "Hg	29.79	Stack Temp.	120	Silica gel:			
Static Press. "H_2O	-.31	Ref. ΔP	.6	tare 671	fin 688		

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0	017.862	1.20	3.75	118	74	72	260	66	6
2	5	023.3	1.20	3.75	121	85	74	260	64	5
3	10	028.3	1.20	3.75	123	99	77	260	65	5
4	15	034.1	1.10	3.40	124	112	78	240	65	4
5	20	038.8	0.92	2.90	122	117	81	225	64	4
6	25	043.4	0.50	1.55	121	119	83	230	65	4
1	30/0	046.952	1.15	3.60	122	103	86	225	62	4
2	5	053.3	1.10	3.40	126	110	88	230	63	4
3	10	057.0	1.15	3.60	130	118	89	240	63	4
4	15	062.1	1.10	3.40	128	123	91	250	64	4
5	20	067.9	0.96	3.00	126	126	93	250	65	4
6	25	072.1	0.67	2.10	125	127	94	240	65	4
end	60	076.002								
		leak check: .074 → .077 = .003 @ 8" Hg								
		pitot + ve 5.0								
		pitot - ve 3.6								
		58.1450	1.0035	3.1833	123.83	96.50				

Plant: Refined Metals - Memphis
Sampling Location: Blast Furnace Baghouse
Test For: PM / Pb / SO2
Test Operators: Russell / Moore

RUN No. 2
Date 7-26-91
Time start 1037 end 1144

Meter Box	RAC 59139	No. Sample Pts.	6x2	Gas Analysis	Fyrite		Remarks:
Sample Box	No. 3	Minutes/Pt.	5.0	CO_2	.5		
Probe/Pitot	5' Teflon			O_2	20.0		
Pitot Cp	.84	NOMOGRAPH		CO			
Nozzle Dia.	.235	ΔH@	1.95	Time			
Filter No.		Meter Temp.	105				
		% H_2O	<10	Condensate:			
Amb. Temp. °F	82	C-Factor	1.0	tare 200	fin 207		
Bar. Press. "Hg	29.79	Stack Temp.	110	Silica gel:			
Static Press. "H_2O	-.31	Ref. ΔP	.6	tare 701	fin 717.5		

	Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	1	0	076.229	1.20	3.70	113	93	89	250	69	8
2	2	5	081.9	1.20	3.70	113	108	89	250	65	8
3	3	10	087.1	1.20	3.70	114	121	90	250	65	8
4	4	15	092.4	1.15	3.25	113	126	92	255	65	7
5	5	20	097.8	0.95	2.90	118	129	94	250	64	7
6	6	25	102.2	0.50	1.55	117	130	95	260	65	3
7											
8	1	30/0	105.644	1.05	3.30	116	114	97	270	67	6
9	2	5	109.9	1.10	3.30	122	119	97	260	65	6
10	3	10	116.3	1.15	3.35	120	127	97	250	66	6
11	4	15	121.5	1.15	3.35	117	130	98	250	65	6
12	5	20	126.1	1.00	3.10	117	130	99	260	64	6
13	6	25	130.4	0.56	2.70	114	134	101	260	64	5
14	end	60	134.660								
15											
16											
17											
18			leak check: .028 → .035 = .007 cfm								
19											
20			pitot + va. 4.5								
21			pitot − va 3.0								
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34			58.4310	1.0006	3.0833	116.17	108.29				
35											

Plant Refined Metals - Memphis
Sampling Location Blast Furnace / Baghouse
Test For PM / PA / SO2
Test Operators Russell / Moore Efe Agho

RUN No. 7
Date 7-26-91
Time start 1211 end 1317

Meter Box	RAC591345	No. Sample Pts.	6 x 2	Gas Analysis	Epite
Sample Box	No. 1	Minutes/Pt.	5.0	CO_2	
Probe/Pitot	5' teflon			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.235	ΔH@	1.95	Time	
Filter No.		Meter Temp.			
		% H_2O		Condensate:	
Amb. Temp. °F	85	C-Factor		tare 200 HNO3 fin 215	
Bar. Press. "Hg	29.79	Stack Temp.		Silica gel:	
Static Press. "H_2O	-.31	Ref. ΔP	6	tare 701 fin 714	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0	134.900	1.00	3.10	114	100	95	220	69	4
2	5	139.4	1.10	3.40	115	112	95	230	67	4
3	10	144.4	1.05	3.30	118	122	94	240	67	4
4	15	149.8	1.00	3.10	115	128	97	260	68	4
5	20	154.3	0.84	2.60	117	131	97	260	67	4
6	25	158.7	0.46	1.40	120	132	100	265	65	4
1	30/0	162.087	0.94	2.90	115	119	100	260	68	4
2	5	166.7	0.98	3.00	119	124	104	250	68	4
3	10	172.0	1.00	3.10	119	134	104	265	65	4
4	15	176.9	1.00	3.10	121	135	105	260	64	4
5	20	181.8	0.85	2.60	120	136	105	260	63	4
6	25	185.8	0.67	2.05	120	136	105	250	64	3
end	60	189.392								

leak check: ~~[illegible]~~ .036 → .040 = .004 cfm @ 9 "Hg
pitot + ve
pitot - ve

54.4927 19474 2.8042 117.75 112.92

PARTICULATE CATCH ANALYSIS:

SAMPLES: Refined Metals - Blast Furnace Baghouse

DATE TAKEN: 7-26-91 DATE ANALYZED: 7-30-91

SAMPLES DELIVERED BY: DGR RECEIVED BY: DGR

ANALYZED BY: DGR

Filter treatment: Filters oven dried 2 hours at 105° C, desiccated at least 24 hours, weighed to constant weight

FILTERS:

RUN NO.	1	2	3	
FILTER NO.	666	665	667	
FILTER TARE, gms	.4067	.4171	.4131	
1st weighing	.4102	.4185	.4140	
2nd weighing	.4103	.4184	.4138	
3rd weighing				
FINAL WEIGHT, gms.	.4103	.4184	.4138	
NET GAIN, gms.	.0036	.0013	.0007	

Probe wash treatment: Transferred to a tared beaker, acetone evaporated over low heat, desiccated at least 24 hours, weighed to constant weight.

PROBE WASH:

RUN NO.	1	2	3	
CONTAINER ID	BFB R1	BFB R2	BFB R3	
VOLUME INTACT?	✓	✓	✓	
VOLUME, ml	110	110	105	200
TARE WT., gms.	(2) 104.7541	(41) 103.0359	(67) 111.4704	114.9016
1st weighing	104.7567	103.0371	111.4726	114.9026
2nd weighing	104.7567	103.0367	111.4730	114.9024
3rd weighing				
FINAL WEIGHT, gms.	104.7567	103.0367	111.4730	114.9024
NET GAIN, gms.	.0026	.0008	.0026	.0008
LESS BLANK, gms.	-.0004	-.0004	-.0004	—

PARTICULATE SAMPLE WEIGHT, mg.

RUN NO.	1	2	3	
filter + probe	5.8	~~0.4~~ 1.7	2.9	

Plant Refined Metals
Sampling Location Blast Furnace Baghouse
Test For PM/Pb/SO2
Test Operators Russell / Moore

RUN No. 1 A + B
Date 7-26-91
Time start 0858 end

Meter Box	No. Sample Pts.	Gas Analysis	Remarks:
Sample Box	Minutes/Pt.	CO_2	
Probe/Pitot	NOMOGRAPH	O_2	
Pitot Cp	ΔH@	CO	
Nozzle Dia.	Meter Temp.	Time	
Filter No.	% H_2O	Condensate:	
Amb. Temp. °F	C-Factor	tare fin	
Bar. Press. "Hg	Stack Temp.	Silica gel:	
Static Press. "H_2O	Ref. ΔP	tare fin	

	Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	A	0	611.729	NA	2.0	NA	79	79	NA	67	
2		5	611.927		2.0		79	79		69	
3		10	612.207		2.0		79	79		68	
4		15	612.495		2.0		79	78		68	
5	end	20	612.745								
6											
7											
8											
9											
10											
11											
12											
13	B	0	613.409		2.0		80	80		68	
14		5	613.665		2.0		80	80		68	
15		10	613.933		2.0		80	80		68	
16		15	614.150		2.0		80	80		68	
17	end	20	614.406								
18											
19											
20											
21											
22											
23		A	1.016				78.88				
24		B	.997				80.00				
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35			2.770		2.0		79.44				

Plant
Sampling Location: Blast Furnace Baghouse
Test For
Test Operators

RUN No. 2 A+B
Date 7-26-91
Time start 1027 end

Meter Box		No. Sample Pts.		Gas Analysis		Remarks:	
Sample Box		Minutes/Pt.		CO_2			
Probe/Pitot		NOMOGRAPH		O_2			
Pitot Cp		ΔH@		CO			
Nozzle Dia.		Meter Temp.		Time			
Filter No.		% H_2O		Condensate:			
Amb. Temp. °F		C-Factor		tare	fin		
Bar. Press. "Hg		Stack Temp.		Silica gel:			
Static Press. "H_2O		Ref. ΔP		tare	fin		

	Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	~~Orifice ΔH in. H_2O~~ lpm	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	A	0	614.837	NA	2.0		80	80		68	10
2		5	615.144		2.0		80	81		68	
3		10	615.430		2.0		80	80		68	
4		15	615.735		2.0		82	82		67	
5		20	616.015								
6											
7			purge 15 min								
8											
9											
10											
11											
12											
13	B	0	616.706		2.0		84	84		68	11
14		5	616.940		2.0		82	82		67	
15		10	617.225		2.0		82	82		68	
16		15	617.430		2.0		82	82		68	
17		20	617.647								
18											
19											
20											
21											
22		A	1.178				80.63				
23		B	.941				82.50				
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34					2.0		81.56				
35			2.8100								

Plant Refined Metals
Sampling Location Blast Furnace Baghouse
Test For B SO2
Test Operators Runner / Moore

RUN No. 3 A + B
Date 7-26-91
Time start ____ end ____

Meter Box	Anderson	No. Sample Pts.	1	Gas Analysis	~~Fyrite~~ NA
Sample Box		Minutes/Pt.	20	CO_2	
Probe/Pitot		NOMOGRAPH		O_2	
Pitot Cp		ΔH@	NA	CO	
Nozzle Dia.		Meter Temp.		Time	
Filter No.		% H_2O		Condensate:	
Amb. Temp. °F		C-Factor		tare NA	fin
Bar. Press. "Hg		Stack Temp.		Silica gel:	
Static Press. "H_2O		Ref. ΔP		tare	fin

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
A	0	618.418	NA	2.0	NA	84	84	NA	69	
	5	618.740		2.0		84	84		68	
	10	619.005		2.0		84	85		68	
	15	619.300		2.0		84	84		68	
	20	619.594								
		purge 15 min								
B	0	620.262	NA	2.0		84	84		68	
	5	620.509		2.0		84	84		68	
	10	620.777		2.0		84	84		68	
	15	621.019		2.0		84	84		68	
	20	621.266								
		purge 15 min								
	A	1.176				84.13				
	B	1.004				84.00				
		2.8480		2.0		84.06				

BLAST FURNACE (ACCELERATED MODE)

Plant Refined Metals
Sampling Location Blast Furnace Baghouse
Test For PM/Pb/SO2
Test Operators Russell / Moore

RUN No. 1
Date 7·29·91
Time start 1117 end 1227

Meter Box	RAC 591349	No. Sample Pts.	6x2	Gas Analysis	Fyrite
Sample Box	No. 1	Minutes/Pt.	5.0	CO_2	~~21.0~~ 1.0
Probe/Pitot	5' Teflon	NOMOGRAPH		O_2	~~1.0~~ 20.0
Pitot Cp	.84	ΔH@	1.95	CO	
Nozzle Dia.	.235	Meter Temp.		Time	
Filter No.		% H_2O		Condensate:	
Amb. Temp. °F	88	C-Factor		tare 200	fin 223
Bar. Press. "Hg	29.71	Stack Temp.		Silica gel:	
Static Press. "H_2O	-.34	Ref. ΔP	.6	tare 632	fin 647.5

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0	189.566	0.86	2.65	133	85	82	260	68	3
2	5	194.6	0.92	2.85	140	95	83	230	68	3
3	10	198.4	0.90	2.80	142	106	85	225	68	3
4	15	203.2	0.83	2.55	142	115	88	230	67	2
5	20	207.9	0.65	2.00	136	122	90	250	66	-2
6	25	211.3	0.39	1.20	133	124	93	260	65	2
1	30/0	214.482	0.80	2.50	132	112	93	250	64	2
2	5	218.8	0.80	2.50	137	120	99	260	65	2
3	10	223.0	0.85	2.65	138	127	101	260	64	2
4	15	227.7	0.79	2.40	140	133	102	235	65	2
5	20	232.0	0.45	1.40	140	134	105	240	65	2
6	25	235.0	0.33	1.05	138	136	107	250	67	2
end	60	238.067								

leak check: .025 → .027 = .002 cfm 8" Hg
pitot +ve 7.5
pitot -ve 3.0

48.501 .8352 2.2125 137.58 105.71

Plant Refined Metals
Sampling Location Blast Furnace Baghouse (mode 2)
Test For PM/Pb/SO2
Test Operators Russell/Moore

RUN No. 2
Date 7-29-91
Time start 1243 end 1357

Meter Box	RAC 591349	No. Sample Pts.	6	Gas Analysis	Fyrite
Sample Box	No 3	Minutes/Pt.	5	CO_2	
Probe/Pitot	~~.84~~ 5'Tf			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.235	ΔH@	1.95	Time	
Filter No.		Meter Temp.	120		
		% H_2O	10	Condensate:	
Amb. Temp. °F	88	C-Factor	1.05	tare 200 HNO2 fin 230	
Bar. Press. "Hg	29.71	Stack Temp.	140	Silica gel:	
Static Press. "H_2O	-.34	Ref. ΔP	.6	tare 700 fin 711	

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0	238.375	0.77	2.40	140	114	106	225	68	3
2	5	242.4	0.75	2.30	142	120	105	265	68	3
3	10	246.8	0.77	2.40	142	128	107	250	60	3
4	15	251.2	0.77	2.40	142	135	108	255	61	3
5	20	255.3	0.63	1.95	139	136	109	260	62	3
6	25	259.1	0.35	1.10	136	137	110	260	62	2
1	30/0	261.073	1.05	3.25	137	122	110	250	64	5
2	5	269.6	1.00	3.10	144	134	112	250	65	5
3	10	272.7	1.00	3.10	144	133	108	225	63	5
4	15	276.0	1.00	3.10	140	136	110	230	65	4
5	20	281.6	0.90	2.80	138	139	111	245	65	4
6	25	286.6	0.54	1.65	136	139	112	255	66	4
end	60	290.026								

leak check .088 → .091 = .003 fpm @ 8" Hg
pitot +ve 6.5
pitot -ve 3.3

51.651 .8827 2.4625 140.00 120.04

Plant: Refined Metals
Sampling Location: Blast Furnace Baghouse (Mode 2)
Test For: PM / Pb / SO2
Test Operators: Russell / Moore

RUN No. 3
Date 7-29-91
Time start 1415 end 1522

Meter Box	RAC591349	No. Sample Pts.	6x2	Gas Analysis	Fyrite
Sample Box	No	Minutes/Pt.	5	CO_2	1.0
Probe/Pitot	5' Glass			O_2	20.0
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.235	ΔH@	1.95	Time	
Filter No.		Meter Temp.			
		% H_2O		Condensate:	
Amb. Temp. °F	88	C-Factor		tare 2020	fin 226
Bar. Press. "Hg	29.71	Stack Temp.		Silica gel:	
Static Press. "H_2O	-.34	Ref. ΔP	.6	tare 693	fin 707

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0	290.298	0.91	2.80	142	114	106	235	66	2
2	5	295.2	0.89	2.75	147	125	109	195	67	2
3	10	300.6	0.90	2.75	147	132	108	235	65	2
4	15	304.3	0.85	2.60	151	136	110	250	64	2
5	20	309.3	0.69	2.10	151	140	110	250	65	2
6	25	312.8	0.34	1.00	151	139	112	250	64	2
1	30/0	315.672	0.80	2.45	145	129	112	260	65	2
2	5	320.2	0.77	2.30	145	132	111	250	63	2
3	10	324.2	0.74	2.20	144	140	113	235	60	2
4	15	328.9	0.72	2.20	144	139	113	265	63	2
5	20	336.	0.72	2.20	141	142	117	260	65	2
6	25	336.8	0.40	1.20	140	140	113	250	64	2
end	60	339.944								
			leak check: .008 →		.013 =	.005	cfm @ 6 in Hg			
			pitot + ve 7.8							
			pitot - ve 3.2							
		49.646	.18453	2.2125	139.00		122.58			

PARTICULATE CATCH ANALYSIS:

SAMPLES: Refined Metals - Blast Furnace Baghouse (Mode 2)

DATE TAKEN: 7-29-91 DATE ANALYZED: 7-29-91

SAMPLES DELIVERED BY: DGR RECEIVED BY: DGR

ANALYZED BY: DGR

Filter treatment: Filters oven dried 2 hours at 105° C, desiccated at least 24 hours, weighed to constant weight

FILTERS:	RUN 1	Run 2	Run 3
Filter No.	669	668	670
Tare wt., g	.4069	.4154	.4144
	.4088	.4170	.4170
	.4090	.4170	.4173
Final wt., g	.4090	.4170	.4173
Net gain, g	.0021	.0016	.0029

Probe wash treatment: Transferred to tared beaker, acetone evaporated over low heat, desiccated at least 24 hours, weighed to constant weight.

PROBE WASH:	Run 1	Run 2	Run 3	Blank
Container ID	BFB(2)R1	BFB(2) R2	BFB(2) R3	
Volume intact?	✓	✓	✓	
Volume, ml	150	140	160	200
Tare wt., g	(66) 109.8928	(44) 107.9100	(62) 113.2260	
	109.8935	107.9112	113.2275	
	109.8933	107.9113	113.2274	
Final wt., g	109.8933	107.9113	113.2274	
Net gain, g	.0005	.0033	.0014	-0-
Less blank, g	-0-	-0-	-0-	

PARTICULATE	Run 1	Run 2	Run 3
filter+probe, mg	2.6	4.9	4.3

Plant Refined Metals
Sampling Location Blast Furnace Baghouse
Test For SO2
Test Operators Russell / [redacted] Moore

RUN No. 1
Date 7-29-91
Time start 1117 end

Meter Box	No. Sample Pts.	Gas Analysis	Remarks:
Sample Box	Minutes/Pt.	CO_2	
Probe/Pitot	NOMOGRAPH	O_2	
Pitot Cp	ΔH@	CO	
Nozzle Dia.	Meter Temp.	Time	
Filter No.	% H_2O	Condensate:	
Amb. Temp. °F	C-Factor	tare fin	
Bar. Press. "Hg	Stack Temp.	Silica gel:	
Static Press. "H_2O	Ref. ΔP	tare fin	

	Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg	
1	A	0	622.051	NA	2.0	NA	84	84		69		1117
2		5	622.349		2.0		84	84		69		
3		10	622.643		2.0		84	84		68		
4		15	622.965		2.0		86	86		68		
5		20	623.227									
6												
7			purge 15 min									
8												
9												
10												
11												
12	B	0	623.886		2.00		86	86		70		1157
13		5	624.113		2.00		88	88		67		
14		10	624.343		2.00		89	89		67		
15		15	624.564		2.00		89	89		67		
16		20	624.784									
17												
18												
19												
20												
21												
22												
23		A	1.176				84.50					
24												
25		B	0.898				88.00					
26												
27												
28												
29												
30												
31												
32												
33												
34												
35												

Plant: Refined metals
Sampling Location: Blast Furnace Baghouse
Test For: SO_2
Test Operators: [illegible]

RUN No. 2
Date 7-29-91
Time start 1243 end

Meter Box	No. Sample Pts.	Gas Analysis	Remarks:
Sample Box	Minutes/Pt.	CO_2	
Probe/Pitot		O_2	
Pitot Cp	NOMOGRAPH	CO	
Nozzle Dia.	ΔH@	Time	
Filter No.	Meter Temp.		
	% H_2O	Condensate:	
Amb. Temp. °F	C-Factor	tare fin	
Bar. Press. "Hg	Stack Temp.	Silica gel:	
Static Press. "H_2O	Ref. Δ P	tare fin	

	Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head Δ P, in. H_2O	Orifice Δ H in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in. Hg
1	A	0	625.456	NA	2.0	NA	85	85	NA	68	-
2		5	625.725		2.0		85	85		67	
3		10	626.011		2.0		85	85		67	
4		15	626.290		2.0		85	85		67	
5		20	626.568								
6											
7											
8											
9											
10											
11											
12											
13											
14											
15	B	0	627.287	NA	2.0		86	86		67	
16		5	627.367		2.0		86	86		67	
17		10	627.459		2.0		86	86		68	
18		15	627.490		2.0		86	86		68	
19		20	627.579								
20											
21											
22											
23											
24											
25		A	1.112				85.00				
26		B	.312				86.00				
27											
28											
29											
30											
31											
32											
33											
34											
35											

Plant: Refined Metals - Memphis
Sampling Location: Blast Furnace
Test For: SO2
Test Operators: Russell / Moore

RUN No. 3 A+B
Date 7-29-91
Time start 1415 end

Meter Box: Andersen	No. Sample Pts.: 1	Gas Analysis: NA	Remarks:
Sample Box:	Minutes/Pt.: 20	CO_2	
Probe/Pitot:	NOMOGRAPH	O_2	
Pitot Cp:	ΔH@: NA	CO	
Nozzle Dia.:	Meter Temp.:	Time	
Filter No.:	% H_2O:	Condensate:	
Amb. Temp. °F:	C-Factor:	tare: NA fin:	
Bar. Press. "Hg:	Stack Temp.:	Silica gel:	
Static Press. "H_2O:	Ref. ΔP:	tare: fin:	

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg	
A	0	627.729	NA	2.0	NA	88	88	NA	68	2	1415
	5	628.090		2.0		88	90		68	2	
	10	628.345		2.0		98	96		67	2	
	15	628.635		2.0		99	99		70	2	
	20	628.932									
B	0	629.435	NA	2.0		97	97		68	2	
	5	629.725		2.0		98	98		68	2	
	10	630.005		2.0		98	98		68	2	
	15	630.295		2.0		100	100		69		
	20	630.655									
	A	1.203				93.25					
	B	1.209				98.25					

Refined Metals - SO_2 Sampler Analysis
Samples collected 7-25, 26, 29 - 91

Sample ID	Sample Vol., ml	Aliquot ml	$BaCl_2$ ml
RSB 1A	100	10	.2
RSB 1B	100	10	.2
RSB 2A	100	10	.2
RSB 2B	100	10	.2
RSB 3A	100	30	.8
RSB 3B	100	30	.6
BFB 1A	100	4	3.5
BFB 1B	100	4	2.0
BFB 2A	100	10	2.9
BFB 2B	100	10	7.9
BFB 3A	100	10	3.5
BFB 3B	100	10	10.5
BFB2 1A	100	4	13.9
BFB2 1B	100	4	11.3
BFB2 2A	100	4	15.1
BFB2 2B	100	4	2.4
BFB2 3A	100	4	9.0
BFB2 3B	100	4	11.3
.020 N H_2SO_4	—	10	17.5

N = .0114

CALIBRATION DATA

DRY GAS METER CALIBRATION

Meter I.D.	RAC	Date	8-10-91
Calibration Method	DGM/DGM Bell Prove	By	DGR
Calibration Meter I.D.	651729		
Barometric Pressure	29.75		

Vac in. H2O	DH in. H2O	Time min.	Calibrating Meter Vi cf	Vf cf	Temp F	Field Meter Vi cf	Vf cf	Temp F initial		Temp F final		Y	Q	K	DH@
10	4	9.75	632.119	642.452	70	727.109	737.642	74	73	98	76	.990	1.06	.676	2.02
10	2.5	13	642.452	653.242	70	737.642	748.73	97	75	113	84	1.01	.840	.674	2.03
10	2	13.8	653.342	663.448	70	748.73	759.355	109	85	118	90	1.00	.756	.672	2.04
												1.00			2.03

$$Y = [(Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$$

Where:

Y = Meter Correction Factor

Vcal = Volume of gas through calibrating meter, ft.3

Vdgm = Volume of gas through field dry gas meter, ft.3

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar-DH/13.6), in. Hg

Tdgm = Average dry gas meter temp., degrees R

Tcal = Temperature of gas through calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter I.D.	Anderson 26715	Date	08-11-91
Calibration Method	DGM/DGM Bell Prove	By	DGR
Calibration Meter I.D.	651729		
Barometric Pressure	29.85		

Vac in. H2O	DH in. H2O	Time min.	Calibrating Meter Vi cf	Vf cf	Temp F	Field Meter Vi cf	Vf cf	Temp F initial		Temp F final		Y	Q	K	DH@
1	4	10.8	686.644	698.193	73	379.053	390.541	73	73	105	77	1.01	1.07	.682	1.98
1	3	11	698.193	708.516	73	390.541	400.949	100	76	118	84	1.02	.944	.692	1.92
1	2	14.5	708.516	719.387	73	400.949	412.124	112	84	118	91	1.02	.766	.683	1.97
1	1.5	15.3	719.387	729.074	73	412.124	422.224	112	91	118	97	1.01	.658	.673	2.04
1	1	19	729.074	739.141	73	422.224	432.786	112	97	116	101	1.01	.554	.691	1.93
												1.02			1.97

$$Y = [(Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$$

Where:

Y = Meter Correction Factor

Vcal = Volume of gas through calibrating meter, ft.3

Vdgm = Volume of gas through field dry gas meter, ft.3

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar=DH/13.6), in. Hg

Tdgm = Average dry gas meter temp., degrees R

Tcal = Temperature of gas through calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter I.D.	RAC 591349	Date	08-10-91
Calibration Method	DGM/DGM Bell Prove	By	DGR
Calibration Meter I.D.	651729		
Barometric Pressure	29.75		

Vac in. H2O	DH in. H2O	Time min.	Calibrating Meter Vi cf	Calibrating Meter Vf cf	Calibrating Meter Temp F	Field Meter Vi cf	Field Meter Vf cf	Temp F initial	Temp F initial	Temp F final	Temp F final	Y	Q	K	DH@
1	4	9.75	632.119	642.452	70	727.109	737.642	74	73	98	76	.990	1.06	.676	2.02
1	2.5	13	642.452	653.242	70	737.642	748.73	97	75	113	84	1.01	.840	.674	2.03
1	2	13.8	653.242	663.448	70	748.73	759.355	109	85	118	90	1.01	.763	.679	2.00
1	1.5	17.3	663.553	674.732	73	759.462	770.937	73	73	100	78	.985	.649	.674	2.03
1	1	20.8	674.732	686.078	73	770.937	782.686	99	79	112	89	1.00	.557	.702	1.87
												.999			1.99

$$Y = [(Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]$$

Where:

Y = Meter Correction Factor

Vcal = Volume of gas through calibrating meter, ft.3

Vdgm = Volume of gas through field dry gas meter, ft.3

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar=DH/13.6), in. Hg

Tdgm = Average dry gas meter temp., degrees R

Tcal = Temperature of gas through calibrating meter, degrees R

PITOT TUBE GEOMETRY CALIBRATION

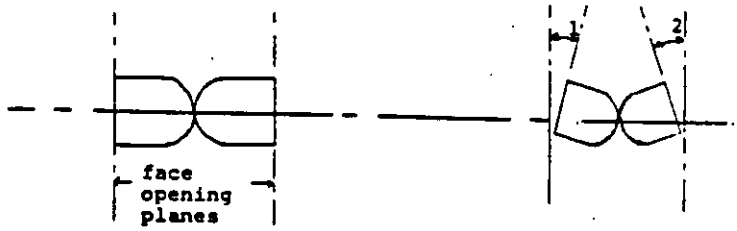
Pitot tube/probe identification: 5' Date Checked: 7-25-91 By: [illegible]

. Pitot tubes having the following geometric characteristics are assigned a pitot tube coefficient of 0.84.

1. Face openings perpendicular to transverse axis: ($\alpha 1$ and $\alpha 2 < 10^{o}$)

$\alpha 1$ = 0

$\alpha 2$ = 0

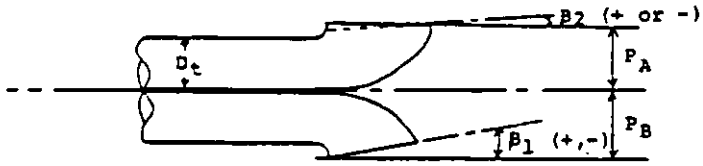


2. Face openings parallel to longitudinal axis: (β_1 and β_2 5°; P = 1.05 D_t to 1.50 D_t; $P_A = P_B$)

D_t = .375 β_1 = 0

P_A = .75 β_2 = 0

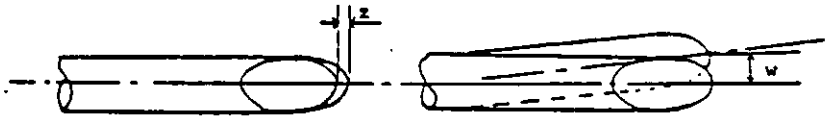
P_B = .75



3. Both legs equal length and centerline coincident (z < .125 inch; w < .031 inch)

z = 0

w = 0



PITOT/PROBE CLEARANCE CHECK:

Nozzle ID: .260 / .235 Nozzle dia: .260 / .235 Date: 7-25-91 / 7-26-91

II. Pitot/probe/nozzle assemblies have the same Cp as the isolated Pitot tube when the following conditions exist.

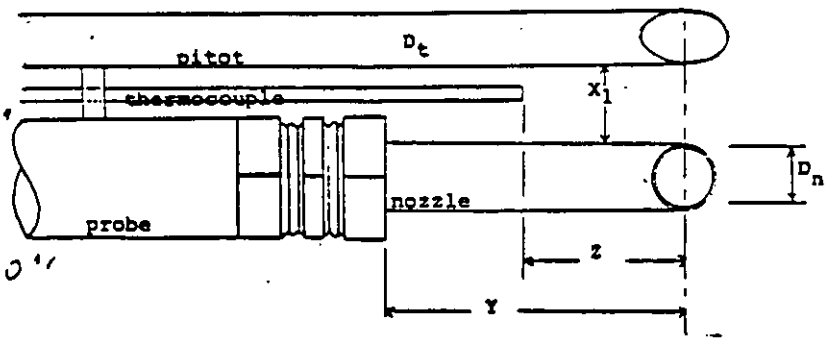
1. D_t > .188 & < .375 inch D_t = .375

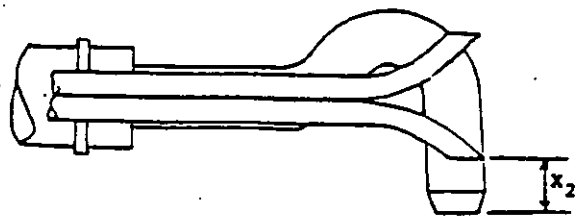
2. $X_1 \geq$ .75 inch X_1 = .79" / .82"

3. $X_2 \geq$ 0 inch X_2 = .25" / .10"

4. Y ≥ 3.0 inch Y = 6.25" / 6.25"

5. z ≥ 2.0 inch z = 2.25"





THERMOMETER/THERMOCOUPLE CALIBRATION

Date: 9-25-91 By: DGR

Reference Thermometer ASTM Hg/glass 20° - 760°F

Last Service

Field Thermometer	Temp. Source	Reference Temperature	Field Therm. Temperature	% error, absolute
5' T'couple Omega 650	RSB Stack	120	120	—
Meter In Omega 650	Room	78	78	—
Meter Out Omega 650	Room	78	78	—
Impinger out Bimetal-dial	Room	78	79	<1
Sample Box Bimetal-dial	Box No. 1	262	~~125~~ 265	<1

ENVIRONMENTAL TESTING & CONSULTING INC.
2924 WALNUT GROVE RD. · MEMPHIS, TN 38111 · PHONE (901) 327-2750 FAX (901) 327-6334

August 16, 1991

Mr. Bill Freudiger
Refined Metals Corporation
257 Mallory Avenue, West
Memphis, TN 38109

REF: ANALYTICAL TESTING
SAMPLE DATE: 7/25-7/26/91
SAMPLE ID: Water Collected During Stack Testing AT
257 Mallory By Environmental Monitoring Labs

Dear Mr. Freudiger:

The above referenced samples have been analyzed per your instructions. The tests were performed in our laboratory (38103-103) in accordance with EPA Method 12. The results are shown below.

Sample ID	Lead Results mg/sample
Blank No. 2	0.013
BFB (-2) R3	0.5725
RSB R1	0.3625
BFB (-2) R2	0.4675
BFB R1	0.9400
BFB (-2) R1	0.5575
BFB R3	0.4350
RSB R3	0.2675
BFB R2	0.6150
Blank No. 1	<0.005
RSB R2	0.2050

Date Analyzed: 8/16/91
Analyzed By: BB

If you have any questions, please call our office.

Very truly yours,

MJC by EPW

Michael J. Cimbalo
President

BLAST FURNACE PRODUCTION RATES

Refined Metals Corporation

August 23, 1991

Mr. Danny Russell
E. F. Williams and Associates, Inc.
751 East Brookhaven Circle
Memphis, Tennessee 38117

Dear Mr. Russell:

Enclosed is the production data from our stack tests that were done on July 26, 1991 and July 29, 1991. The test on July 26 was for compliance with our current permit. The test done on July 29 was done to demonstrate emissions at higher production levels. Please include this information with the stack test results.

Feel free to contact me if you have any questions.

Sincerely,

R S Freudiger

R. S. Freudiger
Plant Manager

Enclosures

RSF/fs

CC: Mike Cimbalo, ETC
John Yeganeh, Memphis Shelby County Health Dept

257 West Mallory Avenue • Memphis, TN 38109 • (901) 775-3770 • Fax (901) 946-4422
Mailing Address: P.O. Box 9009 • Memphis, Tennessee 38109

STACK TEST
JULY 26, 1991
NORMAL PRODUCTION

INTO BLAST FURNACE	POUNDS/HOUR
COKE	500
BATTERY PLATES	6,000
BATTERY PLANT SCRAP	884
LIMESTONE	70
SCRAP IRON	420
RE-RUN SLAG	841
REFINERY DROSS	772
DUST FURNACE SLAG	738
TOTAL.....	10,225

OUT OF BLAST FURNACE	POUNDS/HOUR
LEAD ALLOYS	4,333
DROSS	700
SLAG	1,765
DUST SLAG	785
MOISTURE	300
GASES	2,342
TOTAL OUT.....	10,225

STACK TEST
JULY 29, 1991
HIGH PRODUCTION

INTO BLAST FURNACE	POUNDS/HOUR
COKE	575
BATTERY PLATES	8,300
BATTERY PLANT SCRAP	1,000
LIMESTONE	100
SCRAP IRON	500
RE-RUN SLAG	1,100
REFINERY DROSS	1,449
DUST FURNACE SLAG	1,100
TOTAL.....	14,124

OUT OF BLAST FURNACE	POUNDS/HOUR
LEAD ALLOYS	8,000
DROSS	1,086
SLAG	971
DUST SLAG	914
MOISTURE	353
GASES	2,800
TOTAL OUT.....	14,124

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 5

To Colin Campbell	From David Jordan
Co. PES	Co. Indpls APC
Dept.	Phone # (317) 327-2266
Fax # (919) 493-7779	Fax # (317) 327-2274

Refined Metals

P.O. BOX 188, BEECH GROVE, INDI.

64

RECEIVED

JUN 20 1989

Air Pollution Control Division

June 26, 1989

Mr. Mark Caraher
Air Pollution Control Division
2700 South Belmont Avenue
Indianapolis, Indiana 46221

SUBJECT: Blast Furnace Operation, Material Charging, Slag Tapping and Dust Furnace Operation during the Testing of the Blast Furnace Sanitary Baghouse

TIME OF TEST: 2:21 P.M. - 5:49 P.M., June 20, 1989

Dear Mark:

1. Total number of charges from 7:30 A.M. June 20, 1989 to 7:30 A.M. June 21, 1989 was twenty-four (24).

2. Total number of charges during the stack test was five (5).

3. Number of slag taps during the twenty-four (24) hour period was forty-six (46).

4. Number of slag taps during the stack test was eight (8).

5. Amount of dust slag produced during the stack test was 1.8 tons.

6. Description and weight of material charged during the stack test:

A.	Battery Plates	27,000 Lbs.
B.	Plant Scrap	9,000 Lbs.
C.	Dust Slag	4,000 Lbs.
D.	Foundry Coke	2,450 Lbs.
E.	Cast Iron	5,500 Lbs.
F.	Limestone	700 Lbs.
G.	Sand	280 Lbs.

7. Description and weight of material charged during the twenty-four (24) hour period:

A.	Battery Plates	129,600 Lbs.
B.	Plant Scrap	43,200 Lbs.
C.	Dust Slag	19,200 Lbs.
D.	Foundry Coke	12,600 Lbs.
E.	Cast Iron	17,400 Lbs.
F.	Limestone	2,400 Lbs.
G.	Sand	960 Lbs.

Sincerely,

REFINED METALS CORPORATION

R. Widner

Ronald E. Widner
Plant Manager

REW/be

Refined Metals

P.O. BOX 188, BEECH GROVE, INDIANA 46107 (317)-787-6364

June 26, 1989

RECEIVED
JUN 29 1989
Air Pollution Control Division

Mr. Mark Caraher
Air Pollution Control Division
2700 South Belmont Avenue
Indianapolis, Indiana 46221

SUBJECT: Blast Furnace Operation and Material Charges during Testing of the Metallurgical Baghouse Stack

TIME OF TEST: 8:27 A.M. - 12:07 P.M., June 20, 1989

Dear Mark:

1. Total number of charges from 7:30 A.M. June 20, 1989 to 7:30 A.M. June 21, 1989 was twenty-four (24).

2. Total number of charges during the stack test was five (5).

3. Production from the blast furnace during the test was twelve (12).

4. Description and weight of material charged during the stack test:

A.	Battery Plates	27,000 Lbs.
B.	Plant Scrap	9,000 Lbs.
C.	Dust Slag	4,000 Lbs.
D.	Foundry Coke	2,450 Lbs.
E.	Cast Iron	4,900 Lbs.
F.	Limestone	700 Lbs.
G.	Sand	280 Lbs.

5. Description and weight of material charged during the twenty-four (24) hour period:

A.	Battery Plates	129,600 Lbs.
B.	Plant Scrap	43,200 Lbs.
C.	Dust Slag	19,200 Lbs.
D.	Foundry Coke	12,600 Lbs.
E.	Cast Iron	17,400 Lbs.
F.	Limestone	2,400 Lbs.
G.	Sand	960 Lbs.

Normal operation of the blast furnace was maintained during the twenty-four (24) hour period.

Sincerely,

REFINED METALS CORPORATION

R. Widner

Ronald E. Widner
Plant Manager

REW/be

Refined Metals

P.O. BOX 188, BEECH GROVE, INDIANA 46107 (317)-787-6364

RECEIVED

JUN 29 1989

Air Pollution Control Division

June 26, 1989

Mr. Mark Caraher
Air Pollution Control Division
2700 South Belmont Avenue
Indianapolis, Indiana 46221

SUBJECT: Refinery Operation during Stack Testing of the Refinery Baghouse

TIME OF TEST: 12:42 P.M. - 4:58 P.M., June 19, 1989

Dear Mark:

A. Kettle #1 - Being filled from the blast furnace and hooded.

B. Kettle #3 - Holding metal at 800°F and hooded.

C. Kettle #5 - Being stirred for drossing process.

D. Kettle #7 - Being cast.

E. Casting production during the stack test was 141,918 lbs.

Sincerely,

REFINED METALS CORPORATION

R. Widner

Ronald E. Widner
Plant Manager

REW/be