Background Report Reference

AP-42 Section Number: 12.11

Background Chapter: 2

Reference Number: 31

Title: Report of Particulate/Lead Emissions Test for Refined Metals Corporation Secondary Lead Smelter, Beech Grove, Inc.

Environmental Monitoring Laboratories

June 1989

#3

REPORT OF
PARTICULATE/LEAD EMISSIONS TEST
FOR
REFINED METALS CORPORATION
SECONDARY LEAD SMELTER

Beech Grove, Indiana
June 19 and 20, 1989

INDIANA AIR POLLUTION CONTROL BUREAU

NEW

Performed By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 • 224-B Hwy 51 North
Ridgeland, Mississippi 39157

(601) 856-3092

July 27, 1989

Subject: Refined Metals Corporation - Beech Grove, Indiana
Particulate/lead emissions test, June 19 and 20, 1989

On June 19 and 20, 1989, Environmental Monitoring Laboratories conducted air emissions tests for Refined Metals Corporation's secondary lead smelter in Beech Grove, Indiana. The tests were performed to determine emissions of lead and particulate matter from three emission points in accordance with requirements of the City of Indianapolis' Air Pollution Control Division.

The three emission points from the smelter activity are the blast furnace metalurgical baghouse (M-1), the blast furnace sanitary baghouse (M-2), and the refinery sanitary baghouse (M-3). The results of the tests are:

Source	Particulate	Lead
M-1	1.493 #/hr	0.635 #/hr
M-2	0.350 #/hr	0.051 #/hr
M-3	0.299 #/hr	0.013 #/hr

The testing project was coordinated by Mr. Bill Freudiger, Vice President of Refined Metals Corporation. On site coordination of the project was provided by Mr. Ron Wiedner, plant manager of Refined Metals' Beech Grove operation. Also on site was Mr. Scott Carrol representing Refined Metals. Mr. Mark Caraher of the City of Indianapolis' Air Pollution Control Division witnessed portions of the tests. Danny Russell of Environmental Monitoring Laboratories was responsible for the collection and analysis of all but the lead samples, and custody of those samples was limited to Mr. Russell. Following their use for determining particulate emissions, the lead samples were shipped by way of Mr. E. F. Williams of E. F. Williams and Associates to Environmental Testing and Consulting, Inc. in Memphis, Tennessee, for analysis.
Following is a report of the test.

REPORT OF PARTICULATE/LEAD EMISSIONS TESTS
REFINED METALS CORPORATION
BEECH GROVE, INDIANA
JUNE 19 AND 20, 1989

CONTENTS

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

1.0 Tests Results: The following tables present the measured flow parameters and test results for emissions tests taken for Refined Metals Corporation in Beech Grove, Indiana during the period June 19 and 20, 1989.

1.1 Refinery Sanitary Baghouse (M-3)

Run. No.		1	2	3	avg.
Date		06-19-89	06-19-89	06-19-89	------
Time start		1242	1403	1519	------
Time end		1345	1504	1620	------
PARTICULATE EMISSIONS	#/hr.	0.401	0.247	0.247	0.299
PARTICULATE EMISSIONS	gr./dscf	0.003	0.002	0.002	0.002
LEAD EMISSIONS	#/hr.	0.013	0.009	0.016	0.013
VOLUMETRIC FLOWRATE	acfm	20219	18376	18469	19021
VOLUMETRIC FLOWRATE	dscfm	17613	15950	16136	16566
VELOCITY	ft./sec.	64.29	58.43	58.73	60.48
STACK TEMPERATURE	degrees F	123	125	124	124
MOISTURE	%	2.13	2.25	1.69	20.3
SAMPLE RATE	%Isokinetic	93	95	93	93

1.2 Blast Furnace Sanitary Baghouse (M-2)
Particulate/Lead test on June 20, 1989

Run. No. / Date / Time start / Time end		1 06-20-89 1421 1523	2 06-20-89 1535 1637	3 06-20-89 1648 1749	avg.
PARTICULATE EMISSIONS	#/hr.	0.412	0.427	0.211	0.350
PARTICULATE EMISSIONS	gr./dscf	0.001	0.001	0.001	0.001
LEAD EMISSIONS	#/hr.	0.053	0.055	0.046	0.051
VOLUMETRIC FLOWRATE	acfm	39052	38416	37844	38437
VOLUMETRIC FLOWRATE	dscfm	39052	38416	37844	38437
VELOCITY	ft./sec.	45.88	45.13	44.46	45.16
STACK TEMPERATURE	degrees F	113	118	111	113
MOISTURE	%	1.76	1.17	1.90	1.79
SAMPLE RATE	%isokinetic	96	97	96	96

1.3 Blast Furnace Metalurgical Baghouse (M-1)
Particulate/Lead test on June 20, 1989

Run. No. / Date / Time start / Time end		1 06-20-89 0827 0929	2 06-20-89 0947 1049	3 06-20-89 1105 1207	avg.
PARTICULATE EMISSIONS	#/hr.	1.783	1.406	1.291	1.493
PARTICULATE EMISSIONS	gr./dscf	0.008	0.007	0.006	0.007
LEAD EMISSIONS	#/hr.	0.791	0.657	0.457	0.635
VOLUMETRIC FLOWRATE	acfm	29093	28810	28086	28663
VOLUMETRIC FLOWRATE	dscfm	24831	24534	24047	24470
VELOCITY	ft./sec.	40.25	39.85	38.85	39.65
STACK TEMPERATURE	degrees F	128	128	123	126
MOISTURE	%	1.76	1.71	1.90	1.79
SAMPLE RATE	%isokinetic	96	97	96	96

2.0 Source Description: Source operation descriptions and process rates are presented under separate cover. Presented here are descriptions of the sampling locations. In addition to these descriptions, the stacks and selection of sample points are illustrated in the appendix.

2.1 M-1. The blast furnace metalurgical baghouse is equipped with a vertical exhaust stack which is 47.0 inches in diameter and extends about 135 feet above grade. Two sample ports are provided at 90° at a location which is about 100 feet below the stack exit, and 24 feet (6.1 diameters) above the blower inlet duct.

2.2 M-2. The blast furnace sanitary baghouse is equipped with a vertical exhaust stack which is 51.0 inches in diameter and extends about 100 feet above grade. Two sample ports are provided at 90° at a location which is about 46 feet (10.8 diameters) below the stack exit, and 43 feet (10.1 diameters) above the blower inlet duct.

2.3 M-3. The refinery sanitary baghouse is equipped with a vertical exhaust stack which is 32.0 inches in diameter and extends about 80 feet above grade. Two sample ports are provided at 90° at a location which is about 30 feet (11.3 diameters) below the stack exit, and 28 feet (10.5 diameters) above the blower inlet duct.

3.0 Test Procedures: Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points, Method 3 to determine excess air and molecular weight of the stack gas, and Methods 5 and 12 to determine flow rates, moisture content, and particulate and lead emissions. Sampling was performed in triplicate. The sampling train used is identical to that described in Method 12. There were no significant departures from the standard procedures.

Particulate adhering to the sample exposed surfaces of the probe and nozzle was washed and brushed with acetone into a sample container. Filters were recovered by rinsing the front half of the filter holder into the probe wash and securing the filters in glass petri dishes. (Some of the filter material usually adheres to the silicone filter gasket and is recovered into the probe wash. Therefore a small amount of the filter weight is usually attributed to the probe wash weight.)

Filters were heated in an oven for 2 hours at 105^{o} 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 were made at 6 hour or longer intervals (samples stored in desiccator). Weights were recorded and considered valid final weights if there was no more than 0.5 milligrams difference from the previous weighing.

Following the particulate analysis, the probe wash residue and filters were combined with the impinger contents residue and prepared for lead analysis in accordance with Method 12.

4.0 Data Reduction

Refined Metals - Refinery Sanitary Baghouse
Particulate/Lead Emissions Test, June 19, 1989

Collected test data			RUN 1	RUN 2	RUN 3	
1.	As	: sq ft	5.241442	5.241442	5.241442	
2.	Dh	: in.	.195	.195	.195	
3.	Cp	: dimensionless	.84	.84	.84	
4.	Theta	: minutes	60	60	60	
5.	Y	: dimensionless	.99	.99	.99	
6.	Pbar	: in. Hg	29.46	29.46	29.44	
7.	Pg	: in. H2O	-.5	-.5	-.5	
8.	Vm	: cf (dry gas)	42.028	38.824	38.711	
9.	sqr(DP),avg	: in.H2O^.5	1.0751	.9757	.9821	
10.	DH	: in. H2O	1.675	1.3425	1.35	
11.	ts	: degrees F	123.33	124.75	123.83	123.97
12.	tm	: degrees F	98.88	99.83	102.79	
13.	Vlc	: ml	18	17.5	13	
14.	CO2	: percent	.00	.00	.00	
15.	O2	: percent	20.50	20.50	20.50	
16.	Mn	: milligrams	6.7	4.2	4.1	
17.	M,Pb	: milligrams	.22	.1525	.2625	

Refined Metals - Refinery Sanitary Baghouse
Particulate/Lead Emissions Test, June 19, 1989

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.58	29.56	29.54	N/A
2. Ps : in. Hg (Pg/13.6)+Pbar	29.42	29.42	29.40	N/A
3. An : sq ft ((Dn/24)^2)(3.1416)	2.074e-4	2.074e-4	2.074e-4	N/A
4. Vmstd: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	38.86622	35.81271	35.49729	N/A
5. Vwstd: scf (.04707cf/ml)(Vlc)	.84726	.823725	.61191	N/A
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	.0213343	.0224838	.0169461	.0202547
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	28.59	28.58	28.64	N/A
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	64.29	58.43	58.73	60.48
10. Q : cfm Vs As(60 sec/min)	20219	18376	18469	19021
11. Qstd : dscfm Q(1-Bws)(Ps/Pstd)(Tstd/Ts)	17613	15950	16136	16566
12. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/ (60 Theta Vs Ps An)	92.95	94.58	92.66	93.40
13. E : pounds/hr ((Mn/Vmstd)(Qstd)(60))/453590 mg/#	.4016334	.2474361	.2465311	.2985335
14. C's : grains/dscf (Mn/Vmstd)(.0154 grains/mg)	.0026547	.0018061	.0017787	.0020798
15. E,Pb : pounds/hr ((M,Pb/Vmstd)(Qstd)(60))/453590	.0131880	.0089843	.0157840	.0126521

Refined Metals - Blast Furnace Sanitary Baghouse
Particulate/Lead Emissions Test, June 20, 1989

Collected test data		RUN 1	RUN 2	RUN 3	
1. As	: sq ft	14.18625	14.18625	14.18625	
2. Dn	: in.	.261	.261	.261	
3. Cp	: dimensionless	.84	.84	.84	
4. Theta	: minutes	60	60	60	
5. Y	: dimensionless	.99	.99	.99	
6. Pbar	: in. Hg	29.47	29.47	29.48	
7. Pg	: in. H2O	-.37	-.37	-.37	
8. Vm	: cf (dry gas)	57.074	56.696	56.124	
9. sqr(DP),avg	: in.H2O^.5	.7752	.759	.7535	
10. DH	: in. H2O	3.0458	2.9333	2.9167	
11. ts	: degrees F	112.58	118.08	109.00	113.22
12. tm	: degrees F	103.08	111.00	111.41	
13. Vlc	: ml	20	19	21	
14. CO2	: percent	.00	.00	.00	
15. O2	: percent	20.50	20.50	20.50	
16. Mn	: milligrams	4.7	4.9	2.4	
17. M,Pb	: milligrams	.6055	.6325	.5175	

Refined Metals - Blast Furnace Sanitary Baghouse
Particulate/Lead Emissions Test, June 20, 1989

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.69	29.69	29.69	N/A
2. Ps : in. Hg (Pg/13.6)+Pbar	29.44	29.44	29.45	N/A
3. An : sq ft ((Dn/24)^2)(3.1416)	3.715e-4	3.715e-4	3.715e-4	N/A
4. Vmstd: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	52.58281	51.49569	50.95465	N/A
5. Vwstd: scf (.04707cf/ml)(Vlc)	.9414	.89433	.98847	N/A
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	.0175883	.0170706	.0190299	.0178963
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	28.63	28.64	28.61	N/A
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	45.88	45.13	44.46	45.16
10. Q : cfm Vs As(60 sec/min)	39052	38416	37844	38437
11. Qstd : dscfm Q(1-Bws)(Ps/Pstd)(Tstd/Ts)	34814	33939	33911	34221
12. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/ (60 Theta Vs Ps An)	96.12	96.56	95.62	96.10
13. E : pounds/hr ((Mn/Vmstd)(Qstd)(60))/453590 mg/#	.4116216	.4271768	.2112795	.3500260
14. C's : grains/dscf (Mn/Vmstd)(.0154 grains/mg)	.0013765	.0014654	.0007254	.0011891
15. E,Pb : pounds/hr ((M,Pb/Vmstd)(Qstd)(60))/453590	.0530291	.0551407	.0455571	.0512423

Refined Metals - Blast Furnace Metalurgical Baghouse
Particulate/Lead Emissions Test, June 20, 1989

Collected test data		RUN 1	RUN 2	RUN 3	
1. As	: sq ft	12.04823	12.04823	12.04823	
2. Dn	: in.	.261	.261	.261	
3. Cp	: dimensionless	.84	.84	.84	
4. Theta	: minutes	60	60	60	
5. Y	: dimensionless	.99	.99	.99	
6. Pbar	: in. Hg	29.47	29.47	29.49	
7. Pg	: in. H20	-.2	-.2	-.2	
8. Vm	: cf (dry gas)	48.119	47.122	46.992	
9. sqr(DP),avg	: in.H20^.5	.6705	.6639	.6498	
10. DH	: in. H20	2.27	2.2125	2.0825	
11. ts	: degrees F	128.25	127.70	122.55	126.17
12. tm	: degrees F	89.80	96.25	101.40	
13. Vlc	: ml	34	36	39.5	
14. CO2	: percent	1.00	1.00	1.00	
15. O2	: percent	20.00	20.00	20.00	
16. Mn	: milligrams	24.6	19	17.6	
17. M,Pb	: milligrams	10.9075	8.8775	6.2275	

Refined Metals - Blast Furnace Metalurgical Baghouse
Particulate/Lead Emissions Test, June 20, 1989

Calculations:	RUN 1	RUN 2	RUN 3	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.64	29.63	29.64	N/A
2. Ps : in. Hg (Pg/13.6)+Pbar	29.46	29.46	29.48	N/A
3. An : sq ft ((Dn/24)^2)(3.1416)	3.715e-4	3.715e-4	3.715e-4	N/A
4. Vmstd: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	45.31608	43.85632	43.34939	N/A
5. Vwstd: scf (.04707cf/ml)(Vlc)	1.60038	1.69452	1.859265	N/A
6. Bws : dimensionless Vwstd/(Vwstd+Vmstd)	.0341113	.0372006	.0411263	.0374794
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	28.59	28.55	28.51	N/A
9. Vs : ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	40.25	39.85	38.85	39.65
10. Q : cfm Vs As(60 sec/min)	29093	28810	28086	28663
11. Qstd : dscfm Q(1-Bws)(Ps/Pstd)(Tstd/Ts)	24831	24534	24047	24470
12. I : percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/ (60 Theta Vs Ps An)	98.64	96.61	97.43	97.56
13. E : pounds/hr ((Mn/Vmstd)(Qstd)(60))/453590 mg/#	1.783038	1.405958	1.291425	1.493474
14. C's : grains/dscf (Mn/Vmstd)(.0154 grains/mg)	.0083599	.0066718	.0062525	.0070947
15. E,Pb : pounds/hr ((M,Pb/Vmstd)(Qstd)(60))/453590	.7905890	.6569154	.4569518	.6348188

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's	grains/dscf	Particulate concentration
C,SO2	ppm	Sulfur dioxide concentration
Dn	inches	Nozzle diameter
delta H	in. H_2O	Pressure drop across meter orifice (also DH)
delta P	in. H_2O	Stack velocity pressure head (also DP)
E	#/hr	Particulate emission rate
E,lead	#/hr	Lead emission rate
E,SO2	#/hr	Sulfur dioxide emission rate
I	percent	Percent isokinetic sampling
Kp	consistent	Pitot tube constant = 85.49
Mn	milligrams	Particulate sample weight
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. H_2O	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^o
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

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. Test Data
- b. Calibration Data

SAMPLING AND PARTICULATE ANALYSIS DATA

REFINERY SANITARY BAGHOUSE (M-3)

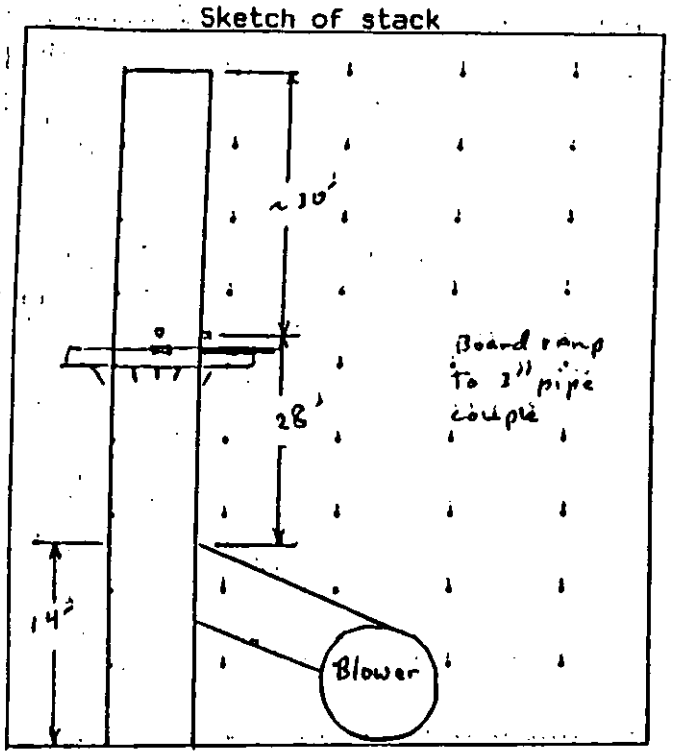
Ron 787-8364

STACK CONFIGURATION / SAMPLE AND VELOCITY POINTS

Plant Name Refined Metals - Indianapolis Source Refinery Sanitary Baghouse

Data For: Particulate Pollutant Emissions Date 11-17-87

Sketch of stack



%Diameter

	4	6	8	10	12	14	16
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	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 32.0

Distance from ports to disturbance:

distance to uptrean disturbance ~28'

distance to downstream disturbance ~30'

upstream diameters 10.5

downstream diameters 11.3

Minimum No. points required 12

No. points selected 12

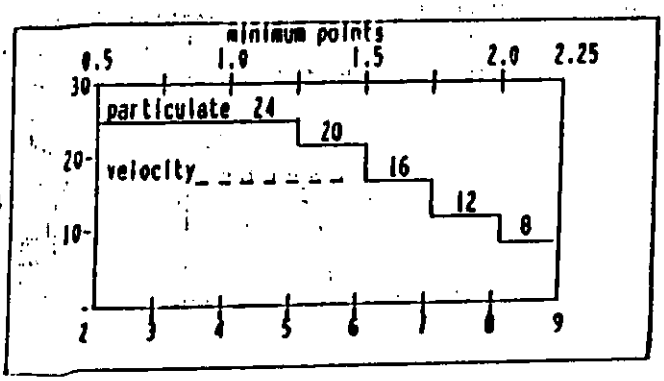
Nipple length 3.5"

Velocity profile / Sample point layout

pitot I.D. 3'QG pq = 455

pitot Cp .84 ts = 90

Point No.	"from wall	delta P: ∝	delta P: w
1	1.4	1.40	1.6
2	4.7	1.60	1.7
3	9.5	1.90	
4	22.5	2.00	
5	27.3	1.90	
6	30.6	1.85	
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			



Notes:

Scott Sample Co.

Plant Refined Metals - Beech Grove, Indiana

Sampling Location Refinery Sanitary Baghouse

Test For Particulate / Lead M-17 / M-12

Test Operators Russell / Tanner

RUN No. 1

Date 6-19-89

Time start 1242 end 1345

Meter Box	RAC 591349
Sample Box	No. 3
Probe/Pitot	3' QG
Pitot Cp	.84
Nozzle Dia.	.195
Filter No.	
Amb. Temp. °F	83
Bar. Press. "Hg	29.46
Static Press. "H_2O	-.50

No. Sample Pts.	6x2
Minutes/Pt.	5.0

NOMOGRAPH

ΔH@	1.95
Meter Temp.	95
% H_2O	8
C-Factor	1.05
Stack Temp.	180
Ref. ΔP	1.30

Gas Analysis Fyrite

CO_2	0
O_2	20.5
CO	
Time	

Condensate: tare 200 HNO3 fin 208

Silica gel: tare 637 fin 647

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	763.381	0.88	1.25	118	85	85	230	70	2
2	5	766.5	1.30	1.80	124	88	84	230	60	2
3	10	770.2	1.40	2.00	124	93	86	235	60	2
4	15	773.6	1.40	2.05	125	101	90	250	63	3
5	20	777.6	1.30	1.85	125	105	91	230	65	3
6	25	781.5	0.61	0.85	125	111	93	240	65	2
1	30/0	784.128	0.80	1.10	123	107	93	250	63	2
2	5	787.1	1.45	2.10	124	105	95	225	58	2
3	10	790.8	1.45	2.10	124	111	97	240	60	3
4	15	794.8	1.40	2.00	120	117	100	250	60	3
5	20	798.8	1.20	1.70	125	119	101	220	56	2
6	25	802.1	0.91	1.35	121	115	101	240	65	2
1	60	805.409								
		42.028	1.0751	1.6750	123.33		98.88			

Leak check .096 → 105 = .009 cfm @ 8" Hg

Pitot + ve 5.6

Pitot - ve 4.8

Plant Refined Metals - Beech Grove [illegible]
Sampling Location Refinery Sanitary Baghouse
Test For Particulate / Lead
Test Operators Russell / [illegible]

RUN No. 2
Date 6-19-89
Time start 1403 end 1507

Meter Box	EAC 591395
Sample Box	No. 1
Probe/Pitot	3' QG
Pitot Cp	.84
Nozzle Dia.	.195
Filter No.	
Amb. Temp. °F	84
Bar. Press. "Hg	29.46
Static Press. "H_2O	-.50

No. Sample Pts.	6x2
Minutes/Pt.	5

NOMOGRAPH

ΔH@	1.95
Meter Temp.	100
% H_2O	8
C-Factor	1.05
Stack Temp.	130
Ref. ΔP	1.20

Gas Analysis Fyrite

CO_2	0		
O_2	20.5		
CO			
Time			

Condensate:
tare 200 HNO_3 fin 211
Silica gel:
tare 702.5 fin 709

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	806.727	0.85	1.20	120	96	95	200	67	2
2	5	811.0	1.15	1.15	123	101	96	180	62	1
3	10	814.4	1.20	1.70	127	102	96	200	60	1
4	15	817.5	1.10	1.50	127	104	96	220	60	1
5	20	820.7	0.75	1.30	124	104	96	235	66	1
6	25	823.9	0.66	0.91	125	104	96	245	60	1
						~~103~~				
1	30/0	826.938	0.92	1.30	127	103	97	250	63	1
2	5	829.8	0.96	1.25	125	103	97	260	65	1
3	10	832.8	1.00	1.40	126	104	97	230	65	1
4	15	836.4	1.00	1.40	126	104	97	240	66	1
5	20	839.4	0.99	1.40	125	107	99	240	65	1
6	25	842.7	0.72	1.00	122	106	98	255	65	1
end	60	845.551								
		38.824	.9757	1.3475	124.75	98.83				

Leak check: .000 → .010 = .010 cfm @ 8" Hg
pitot + ve 5.6
pitot − ve 8.5

Plant	Refined Metals
Sampling Location	[illegible] Baghouse
Test For	Particulate / Lead
Test Operators	[illegible] / [illegible]
RUN No.	3
Date	6-15-89
Time start	1515
end	1620

Meter Box	RAC 591395
Sample Box	No. 2
Probe/Pitot	2' Qc
Pitot Cp	.84
Nozzle Dia.	.155
Filter No.	
Amb. Temp. °F	84
Bar. Press. "Hg	29.44
Static Press. "H_2O	-.50

No. Sample Pts.	6x2
Minutes/Pt.	5
NOMOGRAPH	
ΔH@	1.95
Meter Temp.	100
% H_2O	8
C-Factor	1.05
Stack Temp.	130
Ref. ΔP	1.3

Gas Analysis	Fyrite
CO_2	0
O_2	
CO	
Time	
Condensate: tare	200 HNO_3
fin	207
Silica gel: tare	863
fin	869

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	845.811	0.92	1.30	124	96	96	200	67	3
2	5	849.3	0.93	1.30	125	102	98	210	65	2
3	10	852.2	1.00	1.40	126	104	98	220	66	2
4	15	855.5	1.00	1.40	128	105	99	235	60	2
5	20	858.6	0.90	1.25	125	107	100	250	66	2
6	25	861.8	0.82	1.15	124	108	100	245	65	2
1	30/0	864.856	1.00	1.40	127	105	100	250	64	2
2	5	868.3	1.10	1.50	120	104	98	225	68	2
3	10	871.5	1.20	1.70	124	107	100	220	65	2
4	15	875.2	1.10	1.50	123	110	100	210	65	2
5	20	878.5	0.90	1.25	121	113	102	220	65	2
6	25	881.7	0.75	1.05	123	111	104	225	65	2
end	60	884.522								
		38.711	.9821	1.3510	123.83	104.79				

Leak check: .072 → .073 = .001 cfm @ 7"

pitot + side 5.9

pitot - side 6.9

R. Metals

PARTICULATE CATCH ANALYSIS:

SAMPLES: Refinery Sanitary Baghouse

DATE TAKEN: 6-19-00 DATE ANALYZED: 6-22

SAMPLES DELIVERED BY: DGA RECEIVED BY: DGA

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.	4042	4040	4041
Tare wt., g	.4252	.4277	.4319
	.4223	.4233	.4288
	.4223	.4232	.4286
Final wt., g	.4223	.4232	.4286
Net gain, g	-.0029	-.0045	-.0033

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	RMRSBR1	RMRSBR2	RMRSBR3	
Volume intact?	✓	✓	✓	✓
Volume, ml	120	145	125	200
Tare wt., g	(1) 103.2059	(21) 98.8554	(22) 99.0948	
	103.2559	98.8651	99.1025	
	103.2158	98.8647	99.1025	
Final wt., g	103.2158	98.8647	99.1025	
Net gain, g	.0099	.0091	.0077	.0005
Less blank, g	-.0005	-.0005	-.0005	

PARTICULATE	Run 1	Run 2	Run 3
filter+probe	6.7	4.2	14.1

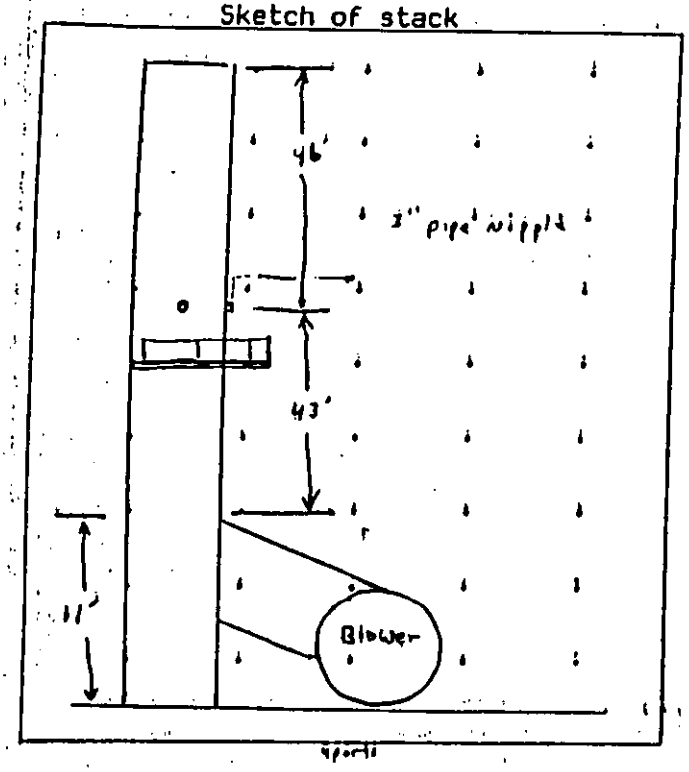
BLAST FURNACE SANITARY BAGHOUSE (M-2)

STACK CONFIGURATION / SAMPLE AND VELOCITY POINTS

Plant Name Refined Metals - Indianapolis Source Blast Furnace Sanitary Baghouse

Data For: Preliminary Velocity Date 11-16-87

Sketch of stack



%Diameter

	4	6	8	10	12	14	16
1	6.1	4.4	3.2	2.6	2.1	1.8	1.6
2	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

Velocity profile / Sample point layout

pitot I.D.: 5" pg = .228

pitot Cp .84

Point No.	"from wall	delta P S	delta P E
1	2.2	.40	.38
2	7.4	.45	.40
3	15.1	.46	.44
4	35.9	.44	.45
5	43.6	.42	.46
6	48.8	.39	.46
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Stack diameter 51.0"

Distance from ports to disturbance:

distance to uptream disturbance 43"

distance to downstream disturbance 46"

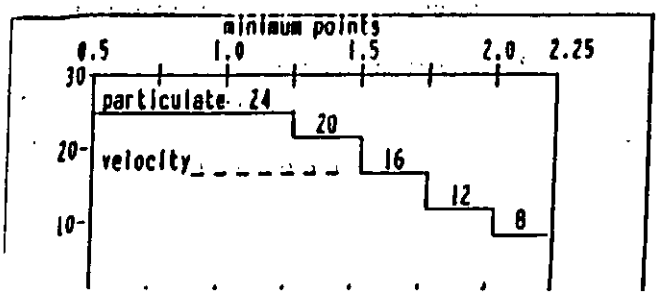
upstream diameters 10.1

downstream diameters 10.8

Minimum No. points required 12

No. points selected 12

Nipple length 3" pN 4"



Notes:

Plant: Refined Metals - Beech Grove, Indiana
Sampling Location: Blast Furnace Sanitary Baghouse
Test For: Particulate / Lead
Test Operators: Russell / Tanner

RUN No. 1
Date 6-20-89
Time start 1421 end 1523

Meter Box	RACS91249
Sample Box	No. 1
Probe/Pitot	4' QG
Pitot Cp	.84
Nozzle Dia.	.261
Filter No.	~~290~~
Amb. Temp. °F	88
Bar. Press. "Hg	29.47
Static Press. "H_2O	-.37

No. Sample Pts.	6x2
Minutes/Pt.	5
NOMOGRAPH	
ΔH@	1.95
Meter Temp.	95
% H_2O	8
C-Factor	1.1
Stack Temp.	110
Ref. ΔP	.31

Gas Analysis	Fyrite
CO_2	0
O_2	20.5
CO	
Time	
Condensate: tare	200 HNO_3 fin 207
Silica gel: tare	716 fin 729

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
E 1	0	027.655	0.60	3.00	112	96	90	240	70	3
2	5	032.9	0.61	3.10	110	98	91	235	65	2
3	10	037.3	0.60	3.00	114	108	96	240	65	3
4	15	042.0	0.64	3.30	115	107	93	240	65	3
5	20	046.7	0.56	2.85	115	110	95	240	65	2
6	25	051.4	0.51	2.60	113	111	95	240	65	2
N 1	30/0	055.807	0.72	3.70	112	110	98	250	65	3
2	5	061.2	0.71	3.70	113	114	99	255	60	3
3	10	066.6	0.70	3.60	113	117	102	250	62	3
4	15	071.5	0.59	2.90	111	117	99	250	65	3
5	20	076.8	0.52	2.60	111	120	98	250	66	2
6	25	080.6	0.48	2.20	111	115	101	250	67	2
end	60	084.729								

leak check: .085 → .099 = .009 cfm @ 6" Hg →
pitot - 6.3
pitot - 3.2

57.074	.7752	3.0198 / 1.8275	112.58	103.0	

Plant Refined Metals

Sampling Location Blast Furnace Sanitary Baghouse

Test For Particulate / Lead

Test Operators [illegible] / [illegible]

RUN No. 2

Date 6-20-89

Time start 1535 end 1637

Meter Box	RAC 551248
Sample Box	No 2
Probe/Pitot	4' Q6
Pitot Cp	.84
Nozzle Dia.	.261
Filter No.	
Amb. Temp. °F	88
Bar. Press. "Hg	29.47
Static Press. "H_2O	-.37

No. Sample Pts.	6x2
Minutes/Pt.	5

NOMOGRAPH	
ΔH@	1.95
Meter Temp.	105
% H_2O	<10
C-Factor	1.1
Stack Temp.	120
Ref. ΔP	.37

Gas Analysis Expite

CO_2			
O_2			
CO			
Time			

Condensate: tare 200 HNO_3 fin 206

Silica gel: tare 669 fin 681

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
E 1	0	084.939	0.58	3.00	115	102	100	195	67	4
2	5	090.0	0.60	3.00	116	110	102	210	68	5
3	10	094.4	0.59	3.00	116	112	102	200	65	5
4	15	099.3	0.62	3.20	118	118	103	225	65	5
5	20	104.0	0.55	2.80	118	119	103	225	65	5
6	25	108.7	0.43	2.15	118	120	104	230	64	2
1	30/0	112.653	0.69	3.55	116	116	107	240	65	5
2	5	117.9	0.70	3.60	119	118	106	240	65	6
3	10	123.3	0.65	3.30	120	123	107	240	65	6
4	15	128.3	0.58	2.95	122	123	108	245	68	5
5	20	133.0	0.50	2.50	120	122	108	250	66	4
6	25	137.4	0.45	2.25	119	122	109	250	62	3
end	60	141.635								

Leak check: .093 → .093 = 0.000 ~~@ 9"/3~~

pitot + 4.2

pitot - 3.5

DGM	ΔP	ΔH	Stack Temp.	Meter Temp.
56.696	.7590	2.9333	118.08	111.00

Plant Refined Metals - Beech Grove, Indiana
Sampling Location Blast Furnace Secondary Baghouse
Test For Particulate / Lead
Test Operators Russell / Tom

RUN No. 3
Date 6-20-87
Time start 1648 end 1749

Meter Box	RAC591245	No. Sample Pts.	6x2	Gas Analysis	Fyrite
Sample Box	No. 2	Minutes/Pt.	5	CO_2	
Probe/Pitot	4'QG			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.261	ΔH@	1.95	Time	
Filter No.		Meter Temp.	112		
		% H_2O	8	Condensate:	
Amb. Temp. °F	88	C-Factor	1.1	tare 200 HNO_3	fin 207
Bar. Press. "Hg	29.48	Stack Temp.	120	Silica gel:	
Static Press. "H_2O	-.37	Ref. ΔP	.30	tare 651	fin 665

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	141.958	0.58	2.95	113	106	105	170	70	4
2	5	146.5	0.57	2.80	112	115	105	215	65	4
3	10	151.2	0.58	2.95	112	117	105	216	67	3
4	15	156.0	0.61	3.10	112	120	105	220	65	4
5	20	160.8	0.53	2.70	109	120	105	225	64	4
6	25	165.3	0.47	2.40	108	118	107	230	64	4
1	30/0	167.662	0.70	3.60	105	114	105	230	65	5
2	5	174.6	0.69	3.55	102	120	105	235	63	5
3	10	179.8	0.66	3.40	109	120	106	240	65	5
4	15	184.6	0.56	2.85	111	120	106	240	65	4
5	20	189.7	0.47	2.40	107	120	105	240	66	4
6	25	194.2	0.43	2.20	108	119	106	250	65	3
off	60	198.082								
		56.124	.7535	2.961	109.90	119.41				

leak check: .048 → .053 = .005 cfm @ 7"Hg

pitot +ve 8.0
pitot -ve 6.1

R. Metals

PARTICULATE CATCH ANALYSIS:

SAMPLES: Blast Furnace Sanitary Baghouse

DATE TAKEN: 6-20-87 DATE ANALYZED: 6-22-87

SAMPLES DELIVERED BY: DEA RECEIVED BY:

ANALYZED BY: DEA

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.	4031	4032	4046
Tare wt., g	.4259	.4267	.4200
	.4188	.4209	.4178
	.4188	.4209	.4176
Final wt., g	.4188	.4209	.4176
Net gain, g	-.0071	-.0058	-.0024

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				
Volume Intact?				
Volume, ml	130	150	150	200
Tare wt., g	(29) 98.3996	(31) 95.7726	(32) 97.5795	109.6529
	98.4120	95.7838	97.5848	
	98.4117	95.7837	97.5847	
Final wt., g	98.4117	95.7837	97.5847	109.6534
Net gain, g	.0121	.0111	.0052	.0005
Less blank, g	-.0007	-.0004	-.0001	

PARTICULATE	Run 1	Run 2	Run 3
Filter+probe	4.7	4.9	2.4

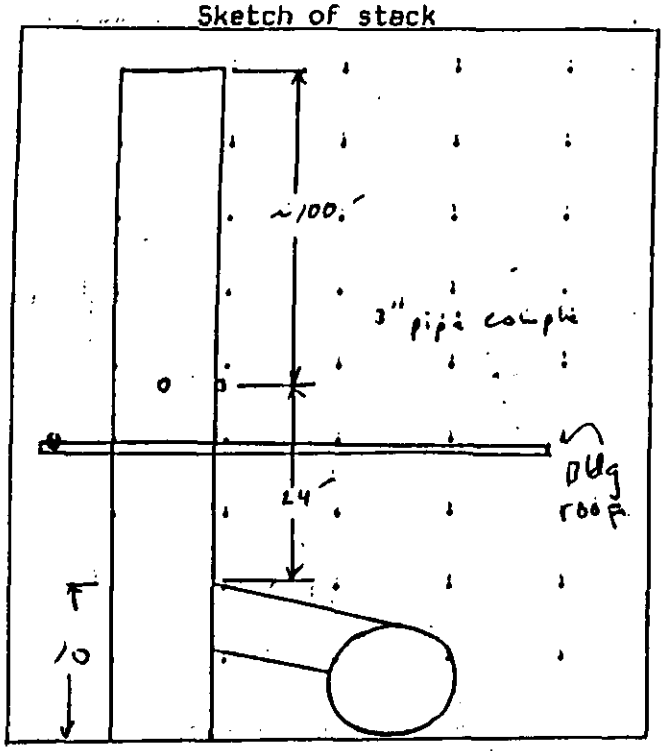
BLAST FURNACE METALURGICAL BAGHOUSE (M-1)

STACK CONFIGURATION / SAMPLE AND VELOCITY POINTS

Plant Name Refined Metals Source Blast Furnace/Metallurgical Bhouse

Data For: Ltd. Particulate Velocity Date 11-17-87

Sketch of stack



%Diameter

	4	6	8	10	12	14	16
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	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 47.0

Distance from ports to disturbance:

distance to uptream disturbance 24'

distance to downstream disturbance ~100'

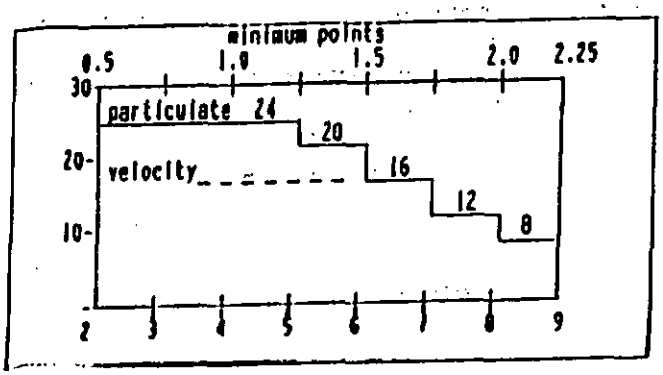
upstream diameters 6.1

downstream diameters >20

Minimum No: points required 16

No: points selected 20

Nipple length 4"



Velocity profile / Sample point layout

pitot I.D: 5/8

pitot Cp .84 = .99

Point No:	"from wall	delta P
1	1.2	1.25
2	3.7	1.20
3	6.9	1.50
4	10.6	1.50
5	16.1	1.5
6	32.9	1.1
7	36.4	1.2
8	40.1	1.2
9	43.1	1.1
10	45.9	1.1
11		
12		
13		
14		
15		
16		

Notes:

Plant: Refined Metals - Beech Grove, Indiana
Sampling Location: Blast Furnace Baghouse
Test For: Particulate / Lead
Test Operators: Russell / Tanner

RUN No. 1
Date 6-20-89
Time start 0827 end 0929

Meter Box	RAC 591391
Sample Box	No. 1
Probe/Pitot	4' RG
Pitot Cp	.84
Nozzle Dia.	.261
Filter No.	
Amb. Temp. °F	77
Bar. Press. "Hg	29.47
Static Press. "H_2O	-.20

No. Sample Pts.	10 x 2
Minutes/Pt.	3
NOMOGRAPH	
ΔH@	1.95
Meter Temp.	95
% H_2O	8
C-Factor	1.05
Stack Temp.	130
Ref. ΔP	.37

Gas Analysis: Fyrite
- CO_2: 1.0
- O_2: 20.0
- CO:
- Time:

Condensate: tare 200 fin 219
Silica gel: tare 649 fin 664

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
E	1	0	884.753	0.41	2.05	127	77	78	210	66	1
	2	3	887.2	0.43	2.15	125	79	77	230	65	2
	3	6	889.6	0.40	2.00	124	83	77	230	66	2
	4	9	891.7	0.47	2.35	123	85	77	210	60	2
	5	12	894.1	0.47	2.35	127	92	79	220	60	2
	6	15	896.6	0.47	2.35	128	96	81	220	58	2
	7	18	899.0	0.47	2.35	129	96	83	230	58	2
	8	21	901.3	0.48	2.40	129	100	82	220	63	2
	9	24	903.9	0.48	2.40	129	100	84	230	65	2
	10	27	906.3	0.42	2.05	135	100	84	220	60	2
S	1	30/0	908.862	0.48	2.40	127	97	86	230	61	2
	2	3	911.2	0.47	2.35	134	98	85	230	58	2
	3	6	913.7	0.53	2.70	132	97	86	230	58	2
	4	9	916.3	0.55	2.80	130	97	87	230	55	2
	5	12	919.1	0.52	2.60	131	102	86	225	58	2
	6	15	921.5	0.51	2.60	132	103	87	230	59	2
	7	18	924.4	0.49	2.45	127	103	89	230	52	2
	8	21	926.7	0.37	1.85	126	103	89	240	60	2
	9	24	929.1	0.32	1.60	126	103	90	250	60	1
	10	27	931.0	0.30	1.50	124	103	90	250	60	1
end		60	932.872								
			48.119	.6705	2.2700	128.25	89.80				

leak chk. .025 → .036 .011 cfm @ 9" Hg
pitot + 9.5
pitot - 8.8

Plant: Refined metals - Beech Grove, Indiana
Sampling location: Blast Furnace Baghouse
Test For: Particulate / Lead
Test Operators: Russell / Jansen

RUN No. 2
Date 6-20-89
Time start 0947 end 1049

Meter Box	RAC59/84T	No. Sample Pts.	10 x 2	Gas Analysis	Exit	Remarks:	
Sample Box	No 2	Minutes/Pt.	3.0	CO,	1.0		
Probe/Pitot	4' BG	NOMOGRAPH		O,	20.0		
Pitot Cp	.84	ΔH@	1.95	CO			
Nozzle Dia.	.261	Meter Temp.	95	Time			
Filter No.		% H_2O	8	Condensate:			
Amb. Temp. °F	79	C-Factor	1.05	tare 200	fin 221		
Bar. Press. "Hg	29.47	Stack Temp.	130	Silica gel:			
Static Press. "H_2O	-.20	Ref. ΔP	0.37	tare 613	fin 628		

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
E 1	0	933.098	0.42	2.05	128	87	86	200	67	3
2	3	935.6	0.42	2.05	127	89	87	210	60	3
3	6	937.8	0.44	2.20	127	93	88	220	60	3
4	9	940.0	0.45	2.25	125	95	87	225	60	3
5	12	942.6	0.46	2.30	126	98	88	230	58	3
6	15	945.0	0.45	2.25	125	99	88	230	55	3
7	18	947.1	0.46	2.30	128	101	92	230	55	3
8	21	949.4	0.45	2.25	126	102	89	235	56	3
9	24	952.0	0.41	2.00	128	104	91	240	58	3
10	27	954.8	0.40	2.00	127	103	92	240	58	3
S 1	30	956.576	0.52	2.60	126	101	92	250	60	3
2	3	958.4	0.52	2.60	129	102	90	235	58	3
3	6	961.3	0.51	2.60	130	104	94	240	55	3
4	9	963.8	0.53	2.70	130	105	92	240	58	3
5	12	966.3	0.50	2.50	128	106	93	240	58	5
6	15	968.6	0.47	2.35	128	110	95	235	58	4
7	18	971.8	0.43	2.15	124	108	93	235	60	3
8	21	973.9	0.40	2.00	129	108	96	240	60	3
9	24	976.1	0.35	1.75	129	105	95	240	60	3
10	27	978.5	0.27	1.35	131	107	95	240	60	2
end	66	980.220								
		Pitot Leak .064 → .074								
		Pitot Leak 3.1								
		Pitot Leak 3.1								
		47.122	.0639	2.2125	127.70		96.25			

Plant Refined Metals - Beech Grove
Sampling Location Blast Furnace Metallurgical Baghouse
Test For Particulate / Lead
Test Operators Russell / Tomson

RUN No. 3
Date 6-20-89
Time start 1105 end 1207

Meter Box	RACS91145
Sample Box	No. 3
Probe/Pitot	4' OG
Pitot Cp	.84
Nozzle Dia.	.261
Filter No.	
Amb. Temp. °F	80
Bar. Press. "Hg	29.49
Static Press. "H_2O	-.20

No. Sample Pts.	10 x 2
Minutes/Pt.	3
NOMOGRAPH	
ΔH@	1.95
Meter Temp.	95
% H_2O	8
C-Factor	1.05
Stack Temp.	130
Ref. ΔP	.37

Gas Analysis Fyrite
CO_2 1.0
O_2 20.0
CO
Time

Condensate:
tare 200 HNO_3 fin 224
Silica gel:
tare 703.5 fin 719

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
E	1	0	980.410	0.40	2.00	126	91	91	185	66	2
	2	3	982.8	0.38	1.85	122	95	91	215	65	2
	3	6	985.2	0.41	2.00	124	102	93	225	63	2
	4	9	987.3	0.42	2.00	122	102	93	220	62	2
	5	12	989.5	0.45	2.20	120	102	92	225	62	3
	6	15	991.7	0.47	2.30	124	106	95	225	60	3
	7	18	994.3	0.50	2.45	125	110	95	230	60	3
	8	21	996.7	0.47	2.30	122	108	95	225	60	3
	9	24	999.5	0.47	2.30	121	107	95	225	60	3
	10	27	001.7	0.39	1.95	120	110	95	235	60	3
S	1	30/0	003.983	0.48	2.40	123	106	95	240	61	3
	2	3	006.8	0.47	2.30	121	108	98	220	60	3
	3	6	009.6	0.50	2.45	121	108	96	220	60	3
	4	9	011.6	0.53	2.65	126	111	98	220	60	3
	5	12	014.2	0.47	2.30	126	112	99	220	60	3
	6	15	016.8	0.40	1.95	122	111	99	225	63	2
	7	18	019.0	0.38	1.85	125	113	100	220	63	2
	8	21	021.5	0.32	1.55	121	112	101	240	65	2
	9	24	023.8	0.31	1.50	120	111	100	235	65	2
	10	27	025.3	0.28	1.35	120	111	101	235	65	2
end		60	027.402								

Leak check: .050 → .055 = .005 cfm @ 6" Hg
pitot + @ 7.0
pitot - @ 8.0

		46.992	.6498	2.0825	122.55	101.40

Refined Metals

PARTICULATE CATCH ANALYSIS:

SAMPLES: Blast Furnace Metallurgical Baghouse

DATE TAKEN: 6-20-89 DATE ANALYZED: 6-22-89

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.	4043	4045	4044
Tare wt., g	.4249	.4199	.4376
	.4277	.4243	.4378
	.4276	.4242	.4377
Final wt., g	.4276	.4242	.4377
Net gain, g	.0027	.0043	.0001

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	RMBMB-R1	RMBMB-R2	RMBMB-R3	—
Volume intact?				—
Volume, ml	240	255	270	200
Tare wt., g	(28) 96.6339	(25) 97.0958	(26) 98.6878	
	96.6668	97.1109	98.7062	
	96.6564	97.1111	98.7060	
Final wt., g	96.6564	97.1111	98.7060	
Net gain, g	.0225	.0153	.0182	-.0005
Less blank, g	-.0006	-.0006	-.0007	—

PARTICULATE	Run 1	Run 2	Run 3
Filter+probe	24.6	19.0	17.6

LEAD ANALYSIS REPORT

ENVIRONMENTAL TESTING & CONSULTING INC.
2924 WALNUT GROVE RD. • MEMPHIS, TENN 38111 • PHONE (901) 327-2750

July 24, 1989

Mr. Edward F. Williams III, P.E.
E.F. Williams & Associates, Inc.
3637 Park Ave., Suite 224
Memphis, TN 38111

REF: ANALYTICAL TESTING
SAMPLE DATE: JUNE 1989 STACK TESTS
REFINED METALS, BEECH GROVE, INDIANA
P.O. 02304

Dear Mr. Williams:

The above referenced samples have been analyzed per your instructions. The tests were performed in our laboratory (#00210) in accordance with EPA Method 12. The results are shown below:

Sample I.D.	Lead Results (mg/sample)	By	Date	
001	0.3425	JF	6/29	RSB
002	0.275	JF	6/29	
003	0.385	JF	6/29	
004	11.03	JF	6/29	MB
005	9.00	JF	6/29	
006	6.35	JF	6/29	
007	0.728	JF	6/29	MSB
008	0.755	JF	6/29	
009	0.640	JF	6/29	
010	12.7	JF	6/29	IN
011	7.85	JF	6/29	
012	14.3	JF	6/29	
013	5.70	JF	6/29	Perf
014	4.83	JF	6/29	
015	4.60	JF	6/29	
016	0.113	JF	6/29	BLANKS
017	0.078	JF	6/29	
018	0.027	JF	6/29	

If you have any questions please call me.

Very truly yours,

Michael J. Cimbalo
President

MJC/mg

Blank = .1225 mg

CHAIN OF CUSTODY RECORD FOR SAMPLES

PROJECT DESCRIPTION: Plant: Refined Metals - Indianapolis Date: 6-28-89
Tests on Refinery Baghouse, Blast Furnace Metallurgical Baghouse, Blast Furnace Sanitary Baghouse, for particulate and lead emissions on June 19 + 20, 1989

SAMPLE DESCRIPTION:

Sample Container ID	Sample Description:
001 RMRSBR1	
002 RMRSBR2	
003 RMRSBR3	
004 RMBFMBR1	
005 RMBFMBR2	
006 RMBFMBR3	
007 RMBFSBR1	
008 RMBFSBR2	
009 RMBFSBR3	
016 Filter Blank No.1	
017 Filter Blank No.2	
018 HNO_3 Blank	

SAMPLE COLLECTION:
Collected by: (signature) David G. Rosser
Date and time of last sample: Afternoon 6-20-89
Delivered to: EMC - RTP
Remarks: No custody Exchange

SAMPLE RECOVERY:
Recipient of samples for recovery (signature): David G Rosser
Recovered by: (signature): David G. Rosser
Date/time/location of recovery: 6-21-89 EMC - Ridgland, MS.
Delivered to: [redacted]
Remarks: No custody exchange

SAMPLE ANALYSIS:
Recipient of samples for analysis (signature):
Samples analyzed by (signature):
Date/time/location of analysis:
Remarks:

****

SAMPLE CUSTODY TRANSFER:

No.	From/To	Relinquished by	Accepted by	Date/Time
1	EMC/E.F. Williams	David G. Rosser	E.F. Williams	6/29 9am
2	E.F. Williams / ETC	E.F. Williams	Paul Hill Jr	6/29 2pm

CALIBRATION DATA

DRY GAS METER CALIBRATION

Meter I.D: RAC 591249 Date 6-22-85

Calibration Method DGM/DGM Bell Prover By DGR

Calibration Meter I.D: 651725

Barometric Pressure 30.00

Previous use: _____

Vac In. Hg	Dll In. H_2O	Time min.	Calibrating Meter Vl cf	Calibrating Meter Vf cf	Calibrating Meter Temp °F	Field Meter Vl cf	Field Meter Vf cf	Field Meter Temp °F In	Field Meter Temp °F out	Y
5	2.00	19.5	102.487	116.231	72	262.662	277.372	96 : 115	96 : 93	.9787
5	2.00	16.0	116.231	127.800	72	277.372	289.724	115 : 122	95 : 96	.9928
5	2.00	95.5	127.800	196.549	71	289.724	364.373	119 : 135	97 : 109	.9924
								:	:	.9943
								:	: $\bar{Y}$ =	.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+Dll/13.6); in. Hg

Tdgm = Average Dry gas meter temp.; °R

Tcal = Temperature of gas through calibrating meter; °R

DRY GAS METER CALIBRATION

Meter I.D: RAC 591349 Date 2-2-89

Calibration Method DGM/DGM Bell Prove By DGM

Calibration Meter I.D: 651229

Barometric Pressure 30.08

Previous use: 5 point calibration following overhaul on 2-1-89

Vac In. Hg	Dll In. H_2O	Time min.	Calibrating Meter VI cf	Calibrating Meter VF cf	Calibrating Meter Temp °F	Field Meter VI cf	Field Meter VF cf	Field Meter Temp °F In	Field Meter Temp °F out	Y	
1	4.00	10'0"	491.709	501.830	70	471.896	482.318	72 : 96	72 : 73	.9962	2.095
1	3.00	10'55"	501.830	511.559	71	482.318	492.346	96 : 107	72 : 78	.9944	2.119
1	2.00	13'21"	511.559	521.337	71	492.346	502.558	105 : 110	76 : 83	.9919	2.075
1	1.50	15'2"	521.337	530.971	71	502.558	512.560	107 : 112	81 : 86	1.0058	2.014
1	1.032	16'22"	530.971	540.472	72	512.560	522.564	111 : 117	87 : 92	1.0043	1.669
									Avg	.99	1.992

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

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+Dll/13.6); in; Hg

Tdgm = Average Dry gas meter temp., °R

Tcal = Temperature of gas through calibrating meter; °R

THERMOMETER/THERMOCOUPLE CALIBRATION

Date: 6-19-89 By: RGR

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

Last Service

Field Thermometer	Temp. Source	Reference Temperature	Field Therm. Temperature	% error, absolute
3' T'couple Omega 650	RSB stack	121	124	<1
Meter In Omega 650	Ambient	85	85	—
Meter Out Omega 650	Ambient	85	85	—
Impinger out Bimetal-dial	Ambient	85	87	<1
Sample Box Bimetal-dial	Box No.1	238	230	2

PITOT TUBE GEOMETRY CALIBRATION

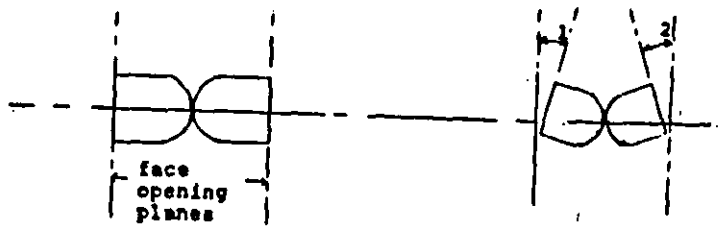
Pitot tube/probe identification: 3' Q Date Checked: 6-22-85 By: PGR

I. 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 $\alpha 2 < 10^0$)

$\alpha 1$ = 0

$\alpha 2$ = 0

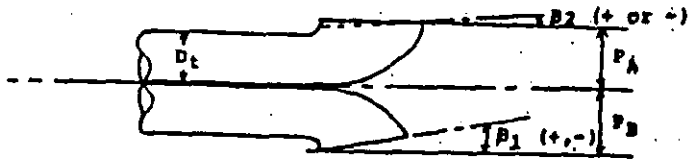


2. Face openings parallel to longitudinal axis: (β_1 and β_2 5°; P = 1.05 D_t to 1.50 D_t; $P_A = P_B$)

D_t = .375 β_1 = 0

P_A = .450 β_2 = 0

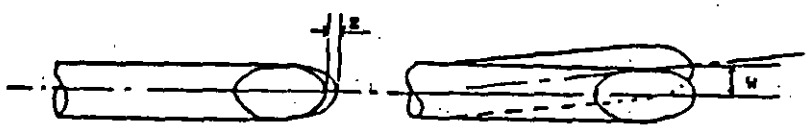
P_B = .450



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

z = 0

w = 0



PITOT/PROBE CLEARANCE CHECK:

Nozzle ID: .195 Nozzle dia: .195 Date: 6-22-89

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 ≥ .75 inch X_1 = .90"

3. X_2 ≥ 0 inch X_2 = .9"

4. Y ≥ 3.0 inch Y = 6.2"

5. z ≥ 2.0 inch z = 2.35"