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.

PARTICULATE EMISSION TEST REPORT

For a Scrubber Stack for

a Grey Iron Cupola at

DEWEY BROTHERS, INCORPORATED

Goldsboro, North Carolina

Performed by the Source Testing Staff
of the
North Carolina Department
of Natural Resources & Community Development
Division of Environmental Management
Air Quality Management
April 7, 1978

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INTRODUCTION

This report presents the results of a follow-up test performed April 7, 1978 on the scrubber stack at Dewey Brothers, Incorporated Foundry in Goldsboro, North Carolina. Purpose of the test was to compare emissions during previous testing to emissions during a reduced production rate. Results, summarized in this report, indicate non-compliance. The results are discussed further on Page 4.

Test personnel were Michael Y. Aldridge and Julius A. Shanklin of the State source testing staff and W. F. Bulow of the Northeastern Field Office all of the North Carolina Environmental Management Division. The source representative was Richard Helms.

PROCESS DESCRIPTION

The source has two cupolas for melting grey iron. These cupolas are used alternately one at a time. The cupolas discharge into a common manifold which is connected to an impingement-type scrubber. The treated gas is then routed thru a fan and out the stack.

The peak plant capacity has been previously reported as 28,440 lb/hr. in Reference 5. During the subject test period, the production rate, as reported by the source, was 18,207 lb/hr. See Appendix G for an explanation of the determination of emission limits.

SAMPLING AND ANALYTICAL PROCEDURES

Particulate testing and analysis of samples were performed according to procedures developed by the U. S. Environmental Protection Agency and referred to as Method 5. Sampling port locations and number of test points to be used were determined according to Method 1. The above federal test methods appear in their original form in the December 23, 1971 Federal Register (Reference 2), with updated versions appearing in the Environment Reporter (Reference 3).

Test point locations and sampling port placement are shown in Appendix E.

The composition of the flue gas was determined by the following method: carbon dioxide measurements were made periodically during the run with a Bacharach Fyrite instrument and averaged. Percent oxygen was determined from a nomograph (Chart 9 in Reference 4). Carbon monoxide was assumed to be zero and the percent nitrogen was determined by subtracting the percentages of carbon dioxide and oxygen from 100%.

SUMMARY OF RESULTS

As seen in the summary on the following page, emissions were about 1½ to 2 times the allowable amount depending on whether the source is classed as new or existing. When comparing emissions to the previous test period (Reference 5) overall emissions were just slightly less and specific emission (lb/ton product) were actually higher.

Julius A. Shanklin
Environmental Engineer
November 16, 1978

REFERENCES

1. North Carolina Administrative Code, Title 15, Chapter 2, Subchapter 2D, Section .0514 "Control of Paritculate from Ferrous Jobbing Foundries", Environmental Management Commission, Raleigh, NC (January, 1977).
2. Federal Register, Standards of Performance for New Stationary Sources, Volume 36, Number 247, U.S. Government Printing Office, Washington, D.C. (December 23, 1971).
3. Environment Reporter, pp 121:0401 - 121:0485 updated thru November 12, 1974, The Bureau of National Affairs, Washington, D.C.
4. Smith, Walter S., and D. James Grove, Stack Sampling Nomographs for Field Estimations, Entropy Environmentalists, Inc., Research Triangle Park, NC (1973).
5. Particulate Emissions Test Report for a Ferrous Foundry Cupola at Dewey Brothers, Inc., Environmental Management Division, Raleigh, NC (August 30, 1977).

TEST SUMMARY - DEWEY BROTHERS, INCORPORATED

	Parameter	Run 1	Run 2	Run 3	Test Average	Average Previous Test*
Q_s	Stack volume flow rate, acfm	37,450	39,043	31,672	36,055	(33,463)
Q_{std}	Stack volume flow rate, scfm	34,828	37,560	28,937	33,775	(29,687)
V_{std}	Sample volume, scf	52.1	37.2	30.6	--	--
%I	Percent isokinetic	95	98	107	--	--
pmr_{avg}	Emission rate, lb/hr	34.2	37.2	44.6	38.6	(41.0)
P	Production Rate during test, lb/hr				18,207	(24,000)
pmr_u	Specific emission rate, lb/ton product				4.24	(3.42)
E	Maximum allowable emission rate based on NCAC 2D .0514, See Appendix G		Existing Source lb/hr New Source lb/hr		23.5 18.0	(21.67) --

*Reference 5

Calculation Summary

SOURCE Dewey Brothers Date 4/7/78

LOCATION Goldsboro

ENTRY	RUN 1	RUN 2	RUN 3	ANSWER
Ave. ΔH (in H_2O)	2.4700	1.1900	0.7200	
P_{atm} (in Hg)	29.9400	29.9400	29.9300	
	30.1216	30.0275	29.9829	P_m (in Hg)
P_s(gage)(in H_2O)	-0.1200	-0.1200	-0.1200	
	29.9312	29.9312	29.9212	P_s (in Hg)
T_m (^oR)	565.0000	574.0000	584.0000	
V_m (ft^3)	50.9960	36.6760	29.2900	
	48.1487	33.9788	26.6317	$V_{m_{std}}$ (ft^3)
V_{lq} (ml)	84.0000	68.0000	83.5000	
	3.9732	3.2164	3.9496	$V_{v_{std}}$ (ft^3)
	52.1219	37.1952	30.5813	V_{std} (ft^3)
	7.6229	8.6474	12.9149	%M
	0.9238	0.9135	0.8709	M_d
MW_d	29.0000	29.1000	29.2000	
	28.1615	28.1401	27.7535	M
T_s (^oR)	570.0000	551.0000	580.0000	
$\Sigma\sqrt{\Delta p}$	6.5972	6.9926	5.4899	
$n_{\Delta p}$	12.0000	12.0000	12.0000	
	0.5498	0.5827	0.4575	Ave $\sqrt{\Delta p}$
C_p	0.8400	0.8400	0.8400	
	32.4616	33.8417	27.4532	v_s (ft/sec)
D_s (in)	59.3750	59.3750	59.3750	
	19.2280	19.2280	19.2280	A_s (ft^2)
	37450.	39043.	31672.	Q_s (ft^3/min)
	34828.	37560.	28937.	Q_{std} (ft^3/min)
W_t (gm)	0.3965	0.2816	0.3442	
	35.0515	37.6214	43.0886	pmr_c (lb/hr)
D_n (in)	0.3040	0.2440	0.2410	
	0.0726	0.0468	0.0456	A_n (in^2)
θ (min)	60.0000	60.0000	60.0000	
	33.3512	36.7679	46.0673	pmr_a (lb/hr)
	95.1493	97.7315	106.9128	%I
	34.2013	37.1946	44.5780	pmr_{avg} (lb/hr)
%CO				
$\%O_2$				
$\%N_2$				%EA
F Factor				HI (10^6 BTU)
				pmr_u(lbs/10^6BTU)

34.2 +
37.2 +
44.5 =
115.9000
115.9 ÷
3. =
38.6333 TEST AVG.

EQUATIONS

1. Absolute Pressure in Dry Gas Meter - P_m (in. Hg.)

$$P_m = P_{atm} + \frac{\Delta H}{13.6}$$

2. Absolute Stack Pressure - P_s (in. Hg.)

$$P_s = P_{atm} + \frac{P_{s(gage)}}{13.6}$$

3. Sample Volume at Standard Conditions - $V_{m_{std}}$ (ft^3)

$$V_{m_{std}} = V_m \frac{T_{std}}{T_m} \frac{P_m}{P_{std}}$$

4. Volume of Water Vapor Collected, Corrected to Standard Conditions - $V_{v_{std}}$ (ft^3)

$$V_{v_{std}} = K_2 V_{lq} \frac{T_{std}}{P_{std}} \qquad K_2 = 0.00267 \text{ (units conversion)}$$

5. Total Sample Volume at Standard Conditions - V_{std} (ft^3)

$$V_{std} = V_{m_{std}} + V_{v_{std}}$$

6. Percent Moisture in Stack Gas - %M

$$\%M = \frac{V_{v_{std}}}{V_{std}} \times 100$$

7. Mole Fraction of Dry Gas - M_d

$$M_d = \frac{100 - \%M}{100}$$

8. Molecular Weight of Wet Gas - M (lb/lb mole)

$$M = (MW_d \times M_d) + 18(1 - M_d)$$

9. Stack Velocity - v_s (ft/sec)

$$v_s = K_p C_p \sqrt{\frac{T_s}{P_s M}} \quad \frac{\Sigma\sqrt{\Delta p}}{n_{\Delta p}}$$

K_p = 85.48 (units conversion factor)

10. Stack Volume Flow Rate - Q_s (ft^3/min)

$$Q_s = K_1 v_s A_s' \qquad K_1 = 60 \text{ (units conversion)}$$

11. Stack Volume Flow Rate at Standard Conditions - Q_{std} (ft^3/min)

$$Q_{std} = \frac{T_{std}}{P_{std}} \frac{P_s}{T_s} Q_s$$

12. Pollutant Mass Rate Based on Particulate Concentration - pmr_c (lb/hr)

$$pmr_c = K_3 \frac{W_t Q_{std}}{V_{std}} \qquad K_3 = 0.1323 \text{ (units conversion)}$$

13. Pollutant Mass Rate Based on the Ratio of the Cross Sectional Area of the Stack and the Sampling Nozzle - pmr_a (lb/hr)

$$pmr_a = K_3 \frac{W_t A_s}{\theta A_n} \qquad K_3 = 0.1323 \text{ (units conversion)}$$

14. Percent Isokineticity - %I

$$\%I = \frac{pmr_a}{pmr_c} \times 100$$

15. Average Pollutant Mass Rate - pmr_{avg} (lb/hr)

$$pmr_{avg} = \frac{pmr_a + pmr_c}{2}$$

16. Percent Excess Air - %EA

$$\%EA = \frac{\%O_2 - .5(\%CO)}{.264(\%N_2) - \%O_2 + .5(\%CO)} (100)$$

17. Heat Input Rate - HI (10^6 BTU/hr)

$$HI = \frac{60 \; Q_{std} \; M_d}{F(100 + \%EA)} (100)$$

18. Specific Emission Rate - pmr_u (lb/10^6 BTU)

$$pmr_u = \frac{pmr_{avg}}{HI}$$

NOMENCLATURE

A_n	(in^2), Cross sectional area of nozzle
A_s	(in^2), Cross sectional area of stack
A_s'	(ft^2), Cross sectional area of stack
C_p	Pitot tube calibration coefficient
%EA	Percent Excess Air
F	($scfd/10^6$ BTU), F factor
ΔH	(in H_2O), Average orifice meter reading
HI	(10^6 BTU/hr), Heat Input Rate
%I	Percent Isokineticity
M	(lb/lb mole), Molecular Weight of wet gas
%M	Percent Moisture
M_d	Mole fraction of dry gas
MW_d	(lb/lb mole) Molecular weight of dry gas
$n_{\Delta p}$	Number of Δp readings
P_{atm}	(in Hg), Local atmospheric pressure
P_m	(in Hg), Absolute pressure in dry gas meter
P_s	(in Hg), Absolute stack pressure
$P_{s(gage)}$	(in H_2O), Measured static stack pressure
P_{std}	(29.92 in Hg), Standard pressure
pmr_a	(lb/hr), Pollutant mass rate based on ratio of areas
pmr_{avg}	(lb/hr), Average pollutant mass rate
pmr_c	(lb/hr), Pollutant mass rate based on concentration
pmr_u	($lb/10^6$ BTU), Specific emission rate
Δp	(in H_2O), Velocity pressure
Q_s	(ft^3/min), Actual stack volume flow rate
Q_{std}	(ft^3/min), Stack volume flow rate at standard conditions

T_m (^oR), Average dry gas meter temperature

T_s (^oR), Average stack temperature

T_{std} (530 ^oR), Standard temperature

V_{lq} (ml), Liquid volume

V_m (ft^3), Sample volume measured by dry gas meter

$V_{m_{std}}$ (ft^3), Sample volume at standard conditions

V_{std} (ft^3), Total sample volume at standard conditions

$V_{v_{std}}$ (ft^3), Volume of water vapor collected, corrected to standard conditions

v_s (ft/sec), Stack velocity

W_t (gm), Total weight of particulate collected

θ (min), Duration of test

Determination of Dry Molecular Weight (MW_d)

WHERE:

$$MW_d = \frac{\%CO_2}{100} \times 44 + \frac{\%O_2}{100} \times 32 + \frac{\%CO}{100} \times 28 + \frac{(100-\%CO_2-\%O_2-\%CO)}{100} \times 28$$

ENTRY	RUN 1	RUN 2	RUN 3	Ans.
% CO_2	1.5000	1.9000	3.3000	
% O_2*	19.2000	18.7000	17.2500	
% CO**	0.0000	0.0000	0.0000	
	29.0080	29.0520	29.2150	MW_d
	79.3000	79.4000	79.4500	N_2

* Based on Chart 9 of Reference 4
** Assumed

ANALYTICAL DATA

Lab No. 1195

4-14-78 og
4-17-78 J Meyer

Plant DEWEY BROTHERS

Run Number 1 Date 4/7/78

Location Goldsboro

FILTER WEIGHTS				TOTALS
Filter Number	55531	55467		
Final Weight (g)				*
Tare Weight (g)	.3949	.3951		.7900

WASHINGS				TOTALS
Beaker Number	2			
Volume (Acetone)	300			
Final Weight (g)	173.9355			
Tare Weight (g)	172.7452			

ACETONE BLANK

Lot Number	Fisher 772553
Beaker Number	6A
Volume (ml)	300
Final Weight (g)	174.1241
Tare Weight (g)	174.1203
Blank Residue (g)	.003~~4~~8

TOTAL PARTICULATE CATCH

Filter Final Weight	*
+ Washings, Final Weight	173.9355
- Filter Tare	.7900
- Beaker Tare (Washings)	172.7452
- Corrected Blank	.003~~4~~8
= Total Particulate (g)	0.39~~69~~65

BLANK CORRECTION =

$$\frac{(\text{Vol. Washings})}{(\text{Vol. Blank})} \times (\text{Blank Residue})$$

$$\left(\frac{300}{300}\right) \times (.003\cancel{4}8) = .003\cancel{4}8$$

IMPINGERS (1, 2, 3)

Final Volume (ml)	269
Initial Volume (200 ml)	200
Water Collected (ml)	69

SILICA GEL

Final Weight (g)	215.0
Initial Weight (g)	200.0
Moisture Collected (g)	15.0

Total Water Collected (ml) 84

*These blocks will be blank if filter is weighed together with the washings.

10-23-75

-14-78
ag
4-17-78
✓ Meyer

ANALYTICAL DATA

Lab No. 1196

Plant DEWEY BROTHERS

Run Number 2 Date 4/7/78

Location Goldsboro

FILTER WEIGHTS				TOTALS
Filter Number	55532			
Final Weight (g)				*
Tare Weight (g)	.3958			

WASHINGS				TOTALS
Beaker Number	Q			
Volume (Acetone)	255			
Final Weight (g)	184.4086			
Tare Weight (g)	183.7280			

ACETONE BLANK	
Lot Number	Fisher 772553
Beaker Number	6A
Volume (ml)	300
Final Weight (g)	
Tare Weight (g)	
Blank Residue (g)	.0038

TOTAL PARTICULATE CATCH	
Filter Final Weight	*
+ Washings, Final Weight	184.4086
- Filter Tare	.3958
- Beaker Tare (Washings)	183.7280
- Corrected Blank	.0032
= Total Particulate (g)	0.2816

BLANK CORRECTION =

$$\frac{(\text{Vol. Washings})}{(\text{Vol. Blank})} \times (\text{Blank Residue})$$

$$\frac{(255)}{(300)} \times (.0038) = .0032$$

IMPINGERS (1, 2, 3)	
Final Volume (ml)	259
Initial Volume (200 ml)	200
Water Collected (ml)	59

SILICA GEL	
Final Weight (g)	209.0
Initial Weight (g)	200.0
Moisture Collected (g)	9.0

Total Water Collected (ml) 68

*These blocks will be blank if filter is weighed together with the washings.

10-23-75

ANALYTICAL DATA

Lab No. 1197

4-14-78 ag
4-17-78 J Meyer

Plant: DEWEY BROTHERS

Run Number: 3 Date: 4/7/78

Location: Goldsboro

FILTER WEIGHTS				TOTALS
Filter Number	55533			
Final Weight (g)				*
Tare Weight (g)	.3909			

WASHINGS				TOTALS
Beaker Number	3-2			
Volume (Acetone)	250			
Final Weight (g)	175.8831			
Tare Weight (g)	175.1448			

ACETONE BLANK

Fisher

Lot Number: 772553

Beaker Number:

Volume (ml):

Final Weight (g):

Tare Weight (g):

Blank Residue (g): .003~~4~~8

TOTAL PARTICULATE CATCH

Filter Final Weight *

+ Washings, Final Weight: 175.8831

- Filter Tare: .3909

- Beaker Tare (Washings): 175.1448

- Corrected Blank: .00~~28~~32

= Total Particulate (g): 0.344~~8~~2

BLANK CORRECTION =

$$\frac{(\text{Vol. Washings})}{(\text{Vol. Blank})} \times (\text{Blank Residue})$$

$$\frac{(250)}{(300)} \times (.003\cancel{4}8) = .00\cancel{28}32$$

IMPINGERS (1, 2, 3)

Final Volume (ml): 276

Initial Volume (200 ml): 200

Water Collected (ml): 76

SILICA GEL

Final Weight (g): 207.5

Initial Weight (g): 200.0

Moisture Collected (g): 7.5

Total Water Collected (ml): 83.5

*These blocks will be blank if filter is weighed together with the washings.

AIR QUALITY SECTION

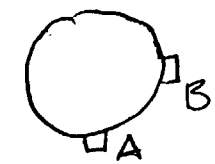
SOURCE SAMPLING FIELD DATA

Plant Dewey Brothers
Date 4/7/78
Location Goldsboro
Sample Type Particulate
Run Number 1
Operator JAS
Sample Box No. 1
Meter Box No. 2

Meter $\Delta H_@$ 1.856
C Factor 0.87, 1.0
Probe Type Pyrex
Probe Length 5'
Probe Tip Dia., In. .304
Probe Heater Setting Hi
Heater Box Setting Hi
Assumed Moisture % 16

Ambient Temperature 80
Barometric Pressure, In. Hg. 29.94
Static Pressure (P_s), ~.12
Stack Dimension(s)
Distance: Disturbance to port
Distance: Port to exit
Leak Rate 0, 0.001, .002 cfm@ 16, 20, 15, 5
Filter number(s) 55531, 55467

Remarks:



TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	%CO_2
A1	0	1144	327.397	0.17		1.25	105		94	3	—	—	
2	5		330.53	0.22		1.70	110		96	4½	170	55	2½
3	10		334.03	0.26		1.95	110		98	6	175	55	
4	15		337.81	0.41		3.10	110		101	9½	173	57	2
5	20		342.33	0.39		2.90	110		104	10	170	57	
6	25		346.97	0.38		2.85	110		107	11½	162	59	1
A6	30		351.59										
B1	30		351.59	0.32		2.90	107		110	14	180	60	1
2	35		356.45	0.42	3.5	(3.70)	110		111	18	190	58	
3	40		361.61	0.45	3.25	(3.95)	112		112	19½	195	55	1
4	45		366.64	0.35	3.05	(3.15)	110		113	20	195	67	changed filters
5	50	12:59	371.421/371.652	0.18		1.6	110		109	3½	185	53	
6	55		375.12	0.18		1.6	112		109	4	190	59	1½
B6	60		378.624										
						29.6/12	1316		1264/12				
			51.227										
			− 0.231	(leak check) (.5495)		2.47	109.7		105.3				1.5
			50.996	$\Sigma\sqrt{\Delta p}$ 6.5972			570R		565R				(19.2)
				$n\Delta p$ 12									

AQ-44 Diff
Avg.
12-15-72 6-2-76

AIR QUALITY SECTION

SOURCE SAMPLING FIELD DATA

Plant Dewey Brothers
Date 4/7/78
Location Goldsboro
Sample Type Particulate
Run Number 2
Operator MYA
Sample Box No. 2
Meter Box No. 2

Meter $\Delta H_@$ 1.856
C Factor ~~0.87~~ 1.0
Probe Type 5'
Probe Length Pyrex
Probe Tip Dia., In. ~~0.307~~ .244
Probe Heater Setting Hi
Heater Box Setting Hi
Assumed Moisture % ~~16~~ 9

Ambient Temperature 80.
Barometric Pressure, In. Hg. 29.94
Static Pressure (P_s), -.12
Stack Dimension(s)
Distance: Disturbance to port
Distance: Port to exit
Leak Rate 0 / 0 cfm@ 15 / 15
Filter number(s) 55532

Remarks:

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	% CO_2
B1	0	1347	378.774	0.31		1.10	110		101	3	130	53	2
2	5		381.67	0.38		1.35	108		103	3½	-	-	
3	10		384.85	.42		1.45	108		106	4.5	130	54	2
4	15		388.20	.36		1.25	110		110	4.5	-	-	
5	20		391.35	.27		.94	108		112	4.0	160	58	2
6	25		394.1	.18		.62	-		114	4.0	-	-	
B6	30		396.435										
A1	30		396.435	.29		1.0	-		116	5.0	-	-	
2	35		399.31	.34		1.2	105		118	5.5	175	57	1½
3	40		402.32	.40		1.4	105		119	6.0	172	58	
4	45		405.62	.39		1.35	107		121	6.5	164	56	2
5	50		408.90	.40		1.4	112		123	7.0	155	57	
6	55		412.22	.38		1.3	115		124	7.0	162	58	2
A6	60		415.45										
		1500				14.33/12	1058/12		1367				1.9
			36.676			1.19	90.67		113.9				(18.7)
							551R		574R				

AQ-44 Diff. 60
Avg. -
12-15-72 6-2-76

(.5827)
$\Sigma\sqrt{\Delta P}$ 6.9726
nDP 12

AIR QUALITY SECTION

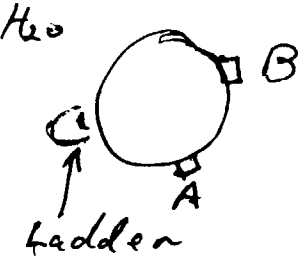
SOURCE SAMPLING FIELD DATA

Plant Dewey Brothers
Date 4-7-78
Location Goldsboro
Sample Type Particulate
Run Number 3
Operator M.Y.A.
Sample Box No. 3
Meter Box No. 2

Meter $\Delta H_@$ 1.856
C Factor 1.0
Probe Type Pyrex
Probe Length 5'
Probe Tip Dia., In. .241
Probe Heater Setting Hi
Heater Box Setting Hi
Assumed Moisture % 9

Ambient Temperature 85
Barometric Pressure, In. Hg. 29.93
Static Pressure (P_s), — .12 in H_2O
Stack Dimension(s)
Distance: Disturbance to port
Distance: Port to exit
Leak Rate 0/0 cfm@ 15/15
Filter number(s) 55533

Remarks:



TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK) 1520	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\ in}$), °F	OUTLET ($T_{m\ out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	% CO_2
A 1	00	415.61	.17		.58	120		120	2.5	185	69	
2	5	417.87	.19		.64	120		120	3.0	190	63	2½
3	10	420.2	.22		.74	120		120	3.0	192	61	
4	15	422.6	.25		.86	120		122	4.0	203	61	1½
5	20		.26		.89	120		124	4.0	198	61	
6	25	427.92	.24		.82	120		125	4.5	197	63	2
6	30	430.525										
	1600											
B 1	30.0 ↓	430.525	.21		.7	120		126	4.5	-	-	
2	35	432.90	.24		.82	120		125	5.0	225	63	3
3	40	435.52	.26		.89	120		126	6.0	220	63	
4	45	438.20	.20		.68	120		126	5.5	195	64	3
5	50	440.75	.19		.64	120		127	5.5	240	67	
6	55	443.00	.11		.37	120		127	5.0	230	68	3
6	60	444.90										
					8.63			1488				
	Diff 60	29.29										3.3
AQ-44	Avg. —	—	(.4575)		0.72	120		124		—	—	(17.25)
12-15-72 6-2-76			$\Sigma\Delta P$ 5.4899			580R		584R				
			$n\Delta P$ 12									

APPENDIX D

Preliminary Field Data

Plant DEWEY BROS. INC

Date 4/7/76

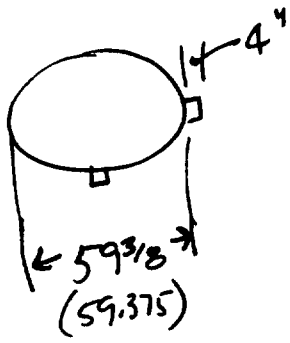
Port Location Stack

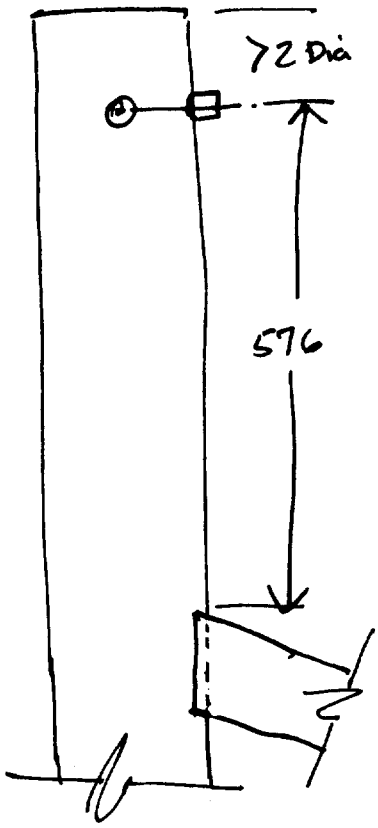
Nearest Disturbance:

Before Port 576"

After Port >2 dias.

Duct Diameter 59 3/8"





Sketch of stack or duct showing location of sampling ports

Point Number	% of Diameter	Distance From Near Wall	
1	.044	2.61	2 5/8
2	.147	8.73	8 3/4
3	.295	17.52	17 1/2
4	.705	41.86	41 7/8
5	.853	50.65	50 5/8
6	.956	56.76	56 3/4

NOMOGRAPH DATA

PLANT Dewey Brothers

DATE 4/7/78

SAMPLING LOCATION Stack

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.856
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	95
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	16
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	-.06
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	140
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.21
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.29
C FACTOR	.87	
CALCULATED NOZZLE DIAMETER, in.	.32	
ACTUAL NOZZLE DIAMETER, in.	.304 .307 .308	
REFERENCE Δp, in. H_2O		

EPA (Dur) 234
4/72

APPENDIX G

DETERMINATION OF EMISSION LIMITS

The average production rate for the subject source during the test period was supplied by the source as 18,207 lb/hr (9.1 t/hr.). The applicable North Carolina Emission Control Standard is NCAC 2D .0514 "Control of Particulates from Ferrous Jobbing Foundries".

For existing sources, emission limits for production rates or capacities below 10 tons/hr. are based on a table given in Standard NCAC 2D .0514 (Reference 1 page 2-144). The emission limits for 18,000 and 20,000 lb/hr. are 23.40 and 25.10 respectively. Intermediate values between the two points can be calculated by fitting those points to a formula having the form $y = mx^n$. Solving for slope and intercept gives:

$$E = 0.0236\ P^{0.7036}$$

$$\text{or } E = 4.967\ P_1^{0.7036}$$

where:

E = lb/hr
P = lb/hr
P_1 = T/hr

<u>Note</u>: x_n , y_n values were 3.05 @ 1,000 lb/hr. & 25.1 @ 20,000 lb/hr. respectively

For an existing source, the allowable emission rate during the test period is:

$$E = 0.0236\ (18{,}207)^{0.7030}$$
$$= 23.33 \text{ lb/hr.}$$

If the source were classified as a "new source" the allowable emission rate, according to NCAC 2D .0514, would be

$$E = 4.1\ \left(\frac{18{,}207}{2{,}000}\right)^{0.67}$$
$$= 18.0 \text{ lb/hr.}$$