

To: Jim Maysilles
USEPA – Maildrop 13
R.T.P., NC. 27711

From: Tom McManamy
Grede Foundries
700 Ash St.
Reedsburg, Wi. 53959

Our cupola is an above charge door take off with Modern Equipment orifice and afterburners for combustion of the gasses. After the cupola stack the gasses travel through a drop out chamber (old quench tank) then into a dirty air recuperative hot blast, then through a duct to a air to air heat exchanger and then into the baghouse.

The system from the outlet of the hot blast through the bag house, was installed just over two years ago, this replaced an old wet quench and precipitator collector. We have limited testing that has been done on the baghouse and mainly it was for PM to be sure that the manufacture met the guarantied grain loading. Hope you can sort through the information. If you have any questions please contact me and we can discuss.

Thanks

Tom McManamy



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CUPOLA TEST 11/24/98

Test #1
40 ton's of iron charged

Test # 2
40 ton's of iron charged

Test #3
42.5 ton's of iron charged

Charge make up.

Regular Returns	= 1100 #
Cu X Returns	= 1000 #
Cu H Returns	= 800 #
Steel Clip	= 800 #
Steel Bundles	= 800 #
Pig Iron	= 500 #
Total Metallic	= 5000 #

Coke 2x4	= 260 #
Coke 4x6	= 260 #
Stone	= 100 #
SiC Brick	= 70 #

2.0 RESULTS

All samples were collected and analyzed in accordance with EPA test methods. A sketch with the sampling location is included in APPENDIX C of this report. The methods were as follows:

Parameter	Reference Method
Front Half Particulate	EPA Method 5
Total Particulate	EPA Method 5 and Method 202
PM10	EPA Method 201A
Total VOC	EPA Method 18
Nox	EPA Method 7E
SO2	EPA Method 6
CO	EPA Method 10
Formaldehyde	EPA Method 011
Benzene	EPA Method 18

2.1 Cupola Baghouse

Results of the individual particulate tests are included as Tables 2-1, 2-2, and 2-3. A summary of all test results is included as Table 2-4. All field and laboratory records are included in the APPENDIX.

TABLE 2-4

CUPOLA BAGHOUSE November 24, 1998

TEST NO.	PARTICULATE	PM10	SO2	CO	NOx
1	0.21 lb/hr	0.20 lb/hr	7.8 lb/hr	99.9 lb/hr	3.4 lb/hr
2	0.16	0.16	7.0	50.9	2.9
3	0.17	0.16	7.3	44.0	2.9
AVERAGE	0.18 lb/hr	0.17 lb/hr	7.4 lb/hr	64.9 lb/hr	3.1 lb/hr

↑
See sheets 25, 26, 27 for front + back half.

TEST NO.	1	
BAROMETRIC PRESSURE	29.45	IN HG
TIP DIAMETER	0.305	IN
STACK DIAMETER	72	IN
STACK AREA	28.274	FT ²
SAMPLING TIME PER POINT	2.5	MIN
NUMBER OF POINTS	24	
METER VOLUME	66.53	FT ³
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.990	
PARTICULATE COLLECTED	0.0017	GRAMS
WATER COLLECTED	32	ML
STATIC PRESSURE	-0.5	IN H ₂ O

ORSAT RESULTS

CO₂
6.40%O₂
13.40%CO
0.00%N₂
80.20%

POINT	STACK TEMP DEG F	DELTA P IN H ₂ O	ORIFICE DEL P IN H ₂ O	METER TEMP DEG F	VELOCITY AFPS
1	275	0.32	2.20	35	37.52
2	280	0.37	2.55	38	40.48
3	278	0.37	2.55	40	40.42
4	278	0.40	2.80	41	42.03
5	280	0.50	3.50	43	47.05
6	281	0.70	4.90	44	55.71
7	282	0.72	5.00	44	56.54
8	280	0.72	5.00	44	56.46
9	280	0.62	4.30	45	52.40
10	277	0.57	3.90	46	50.14
11	276	0.65	4.50	47	53.50
12	275	0.60	4.20	48	51.37
13	282	0.70	4.90	50	55.75
14	283	0.82	5.70	53	60.38
15	282	0.85	6.00	56	61.43
16	283	0.75	5.20	60	57.74
17	280	0.59	4.10	62	51.11
18	280	0.60	4.20	65	51.54
19	280	0.60	4.20	67	51.54
20	278	0.65	4.50	70	53.58
21	279	0.72	5.00	72	56.43
22	280	0.72	5.00	74	56.46
23	277	0.65	4.50	75	53.54
24	275	0.30	2.10	75	36.32
AVERAGE	279		4.20	54	51.23

DRY STANDARD VOLUME	65.51	SCF
PERCENT WATER VAPOR	2.25	% VOL
FLOW RATE	86905	ACFM
	59651	DSCFM
	101360	M ³ /HR
PARTICULATE CONCENTRATION	0.0004	GR/DSCF
PARTICULATE EMISSION RATE	0.21	LB/HR
LB PART PER 1000 LB GAS	0.0007	
ISOKINETIC PERCENT	102.0	

TEST NO.	2	
BAROMETRIC PRESSURE	29.45	IN HG
TIP DIAMETER	0.305	IN
STACK DIAMETER	72	IN
STACK AREA	28.274	FT ²
SAMPLING TIME PER POINT	2.5	MIN
NUMBER OF POINTS	24	
METER VOLUME	60.50	FT ³
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.990	
PARTICULATE COLLECTED	0.0013	GRAMS
WATER COLLECTED	31	ML
STATIC PRESSURE	-0.45	IN H ₂ O

ORSAT RESULTS

CO₂
6.00%O₂
13.40%CO
0.00%N₂
80.60%

POINT	STACK TEMP DEG F	DELTA P IN H ₂ O	ORIFICE DEL P IN H ₂ O	METER TEMP DEG F	VELOCITY AFPS
1	270	0.50	3.50	80	46.79
2	270	0.45	3.10	80	44.39
3	272	0.55	3.80	80	49.15
4	274	0.55	3.80	79	49.21
5	272	0.58	4.00	79	50.47
6	273	0.58	4.00	79	50.50
7	277	1.05	6.60	80	68.14
8	272	0.56	3.85	80	49.59
9	272	0.60	4.20	81	51.33
10	272	0.60	4.20	81	51.33
11	273	0.62	4.30	81	52.22
12	270	0.47	3.25	81	45.37
13	271	0.53	3.70	82	48.21
14	271	0.57	3.95	84	50.00
15	273	0.59	4.04	86	50.94
16	273	0.46	3.20	87	44.98
17	272	0.44	3.02	88	43.96
18	269	0.42	2.90	86	42.86
19	267	0.42	2.90	87	42.80
20	265	0.34	2.33	87	38.46
21	265	0.35	2.41	87	39.02
22	266	0.47	3.25	87	45.24
23	265	0.47	3.25	87	45.21
24	264	0.55	3.80	88	48.88
AVERAGE	270		3.64	83	47.88

DRY STANDARD VOLUME	59.49	SCF
PERCENT WATER VAPOR	2.39	% VOL
FLOW RATE	81221	ACFM
	56350	DSCFM
	95749	M ³ /HR
PARTICULATE CONCENTRATION	0.0003	GR/DSCF
PARTICULATE EMISSION RATE	0.16	LB/HR
LB PART PER 1000 LB GAS	0.0006	
ISOKINETIC PERCENT	98.1	

GREDE FOUNDRIES

CUPOLA BAGHOUSE

24-Nov-98

TABLE 2-3

TEST NO.	3	
BAROMETRIC PRESSURE	29.45	IN HG
TIP DIAMETER	0.305	IN
STACK DIAMETER	72	IN
STACK AREA	28.274	FT ²
SAMPLING TIME PER POINT	2.5	MIN
NUMBER OF POINTS	24	
METER VOLUME	61.57	FT ³
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.990	
PARTICULATE COLLECTED	0.0014	GRAMS
WATER COLLECTED	31	ML
STATIC PRESSURE	-0.47	IN H ₂ O

ORSAT RESULTS

CO₂
6.00%

O₂
13.60%

CO
0.00%

N₂
80.40%

POINT	STACK TEMP DEG F	DELTA P IN H ₂ O	ORIFICE DEL P IN H ₂ O	METER TEMP DEG F	VELOCITY AFPS
1	272	0.62	4.30	90	52.17
2	272	0.62	4.30	90	52.17
3	273	0.60	4.20	91	51.36
4	274	0.70	4.90	92	55.51
5	275	0.77	5.35	92	58.26
6	278	0.50	3.50	93	47.04
7	272	0.48	3.30	93	45.90
8	272	0.48	3.30	93	45.90
9	270	0.50	3.50	93	46.79
10	272	0.57	3.90	93	50.02
11	272	0.60	4.20	94	51.32
12	270	0.60	4.20	94	51.25
13	272	0.60	4.20	94	51.32
14	272	0.55	3.80	95	49.14
15	271	0.48	3.30	95	45.87
16	271	0.50	3.50	95	46.82
17	270	0.44	3.00	95	43.89
18	267	0.40	2.80	95	41.76
19	265	0.38	2.60	94	40.65
20	267	0.40	2.80	94	41.76
21	268	0.46	3.20	93	44.81
22	270	0.55	3.80	93	49.07
23	272	0.60	4.20	93	51.32
24	270	0.55	3.80	93	49.07
AVERAGE	271		3.75	93	48.47

DRY STANDARD VOLUME	60.56	SCF
PERCENT WATER VAPOR	2.35	% VOL
FLOW RATE	82220	ACFM
	57002	DSCFM
	96858	M ³ /HR
PARTICULATE CONCENTRATION	0.0004	GR/DSCF
PARTICULATE EMISSION RATE	0.17	LB/HR
LB PART PER 1000 LB GAS	0.0007	
ISOKINETIC PERCENT	98.7	

PARTICULATE LABORATORY DATA SHEET							
JOB NO.		Grede					
TEST DATE		11/24/98					
TEST LEADER		WJD					
STACK		Cupola					
RUN NO.		1					
WATER COLLECTED							
IMPINGER NO.			FINAL	INITIAL		GAIN	
1			126	100		26	
2			104	100		4	
3			100	100		0	
SIL GEL			667	665		2	
			TOTAL GAIN			32	
PARTICULATE							
FRONT HALF			FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	FILTER		1.0164	1.0161	0.0000	0.0003	
	WASHINGS		95.3867	95.3862	0.0003	0.0002	
	GAIN					0.0005	29
BACK HALF			FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	EXTRACT		68.5768	68.5761	0.0005	0.0002	
	WATER		113.2310	113.2297	0.0003	0.0010	
	GAIN					0.0012	71
			TOTAL GAIN			0.0017	

PARTICULATE LABORATORY DATA SHEET								
JOB NO.				Grede				
TEST DATE				11/24/98				
TEST LEADER				WJD				
STACK				Cupola				
RUN NO.				2				
WATER COLLECTED								
IMPINGER NO.				FINAL	INITIAL		GAIN	
1				118	100		18	
2				107	100		7	
3				103	100		3	
SIL GEL				671	668		3	
				TOTAL GAIN			31	
PARTICULATE								
FRONT HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	FILTER			1.1414	1.1412	0.0000	0.0002	
	WASHINGS			110.4528	110.4524	0.0003	0.0001	
	GAIN						0.0003	23
BACK HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	EXTRACT			70.2942	70.2936	0.0005	0.0001	
	WATER			113.7442	113.7430	0.0003	0.0009	
	GAIN						0.0010	77
				TOTAL GAIN			0.0013	

PARTICULATE LABORATORY DATA SHEET								
JOB NO.								
TEST DATE				Grede				
TEST LEADER				11/24/98				
STACK				WJD				
RUN NO.				Cupola				
				3				
WATER COLLECTED								
IMPINGER NO.				FINAL	INITIAL		GAIN	
1				121	100		21	
2				108	100		8	
3				101	100		1	
SIL GEL				681	680		1	
				TOTAL GAIN			31	
PARTICULATE								
FRONT HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	FILTER			1.1256	1.1255	0.0000	0.0001	
	WASHINGS			108.6518	108.6513	0.0003	0.0002	
	GAIN						0.0003	21
BACK HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	EXTRACT			68.6507	68.6500	0.0005	0.0002	
	WATER			111.4305	111.4293	0.0003	0.0009	
	GAIN						0.0011	79
				TOTAL GAIN			0.0014	

GREDE REEDSBURG
CUPOLA BAGHOUSE

11/24/98

PM10 TESTING

STAGE	FINAL g	TARE g	GAIN g	CUMULATIVE g	CUT SIZE microns	% GREATER THAN	% LESS THAN	CUT SIZE microns
0	0.1521	0.1520	0.0001	0.0001	10.0	2.7	97.3	10.0
1	0.1361	0.1360	0.0001	0.0002	6.2	5.4	94.6	6.2
3	0.1520	0.1518	0.0002	0.0004	2.8	10.8	89.2	2.8
4	0.1386	0.1383	0.0003	0.0007	1.6	18.9	81.1	1.6
5	0.1524	0.1514	0.0010	0.0017	0.9	45.9	54.1	0.9
7	0.1415	0.1401	0.0014	0.0031	0.4	83.8	16.2	0.4
F	0.2066	0.2060	0.0006	0.0037	0.0	100.0	0.0	0.0
			0.0037					

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GREDE REEDSBURG
 CUPOLA BAGHOUSE EMISSIONS
 24-Nov-98

	TEST 1	TEST 2	TEST 3	AVERAGE
C O				
ppm	384.0	207.0	177.0	256.0
mg/m3	447.1	241.0	206.1	298.0
lb/hr	99.9	50.9	44.0	64.9
NOx				
ppm	8.0	7.3	7.0	7.4
mg/m3	15.3	14.0	13.4	14.2
lb/hr	3.4	2.9	2.9	3.1
SO2				
mg/m3	35.0	33.3	34.2	34.2
lb/hr	7.8	7.0	7.3	7.4
FLOW				
dscfm	59651	56350	57002	57668
m3/hr	101359	95750	96858	97989

GREDE REEDSBURG															
CUPOLA STACK															
SO2 LAB RESULTS															
Sample no.	Vol. Solution ml	Vol. Aliq. ml	Vol. Titrant ml	Vol. Tit. Bl. ml	N. Titrant	mg. SO2	mg/m3	Meter Vol. ft3	Meter GAMA	Meter T deg F	Pb in Hg	Meter Std. scf	Std m3	Flow Rate m3/hr	Emission Rate lb/hr
1	221.0	3.0	0.30	0.02	0.100	66.067	35.03	66.53	0.99	54	29.45	66.596	1.886	101630	7.85
2	220.0	3.0	0.25	0.02	0.100	54.024	33.28	60.50	0.99	83	29.45	57.326	1.623	95749	7.02
3	226.0	3.0	0.25	0.02	0.100	55.497	34.21	61.57	0.99	93	29.45	57.284	1.622	96858	7.30
AVG							34.17					60.40			7.39

To: Jim Maysilles
USEPA – Maildrop 13
R.T.P., NC. 27711

7/01

From: Tom McManamy
Grede Foundries
700 Ash St.
Reedsburg, Wi. 53959

Our cupola is an above charge door take off with Modern Equipment orifice and afterburners for combustion of the gasses. After the cupola stack the gasses travel through a drop out chamber (old quench tank) then into a dirty air recuperative hot blast, then through a duct to a air to air heat exchanger and then into the baghouse.

The system from the outlet of the hot blast through the bag house, was installed just over two years ago, this replaced an old wet quench and precipitator collector. We have limited testing that has been done on the baghouse and mainly it was for PM to be sure that the manufacture met the guaranteed grain loading. Hope you can sort through the information. If you have any questions please contact me and we can discuss.

Thanks

Tom McManamy



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CUPOLA TEST 11/24/98

Test #1

40 ton's of iron charged

Test # 2

40 ton's of iron charged

Test #3

42.5 ton's of iron charged

Charge make up.

Regular Returns	= 1100 #
Cu X Returns	= 1000 #
Cu H Returns	= 800 #
Steel Clip	= 800 #
Steel Bundles	= 800 #
Pig Iron	= 500 #
Total Metallic	= 5000 #

Coke 2x4	= 260 #
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Coke 4x6	= 260 #
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Stone	= 100 #
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SiC Brick	= 70 #
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Nov 24 19 88

2.0 RESULTS

All samples were collected and analyzed in accordance with EPA test methods. A sketch with the sampling location is included in APPENDIX C of this report. The methods were as follows:

Parameter	Reference Method
Front Half Particulate	EPA Method 5
Total Particulate	EPA Method 5 and Method 202
PM10	EPA Method 201A
Total VOC	EPA Method 18
Nox	EPA Method 7E
SO2	EPA Method 6
CO	EPA Method 10
Formaldehyde	EPA Method 011
Benzene	EPA Method 18

2.1 Cupola Baghouse

Results of the individual particulate tests are included as Tables 2-1, 2-2, and 2-3. A summary of all test results is included as Table 2-4. All field and laboratory records are included in the APPENDIX.

TABLE 2-4
CUPOLA BAGHOUSE
November 24, 1998

TEST NO.	PARTICULATE	PM10	SO2	CO	NOx
1	0.21 lb/hr	0.20 lb/hr	7.8 lb/hr	99.9 lb/hr	3.4 lb/hr
2	0.16	0.16	7.0	50.9	2.9
3	0.17	0.16	7.3	44.0	2.9
AVERAGE	0.18 lb/hr	0.17 lb/hr	7.4 lb/hr	64.9 lb/hr	3.1 lb/hr

↑
See sheets 25-27 for front + back ~~half~~ half.

Test 1 40 Ton
 Test 2 40 Ton
 Test 3 42.5 Ton

TEST NO.	1	
BAROMETRIC PRESSURE	29.45	IN HG
TIP DIAMETER	0.305	IN
STACK DIAMETER	72	IN
STACK AREA	28.274	FT ²
SAMPLING TIME PER POINT	2.5	MIN
NUMBER OF POINTS	24	
METER VOLUME	66.53	FT ³
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.990	
PARTICULATE COLLECTED	0.0017	GRAMS
WATER COLLECTED	32	ML
STATIC PRESSURE	-0.5	IN H ₂ O

ORSAT RESULTS

CO₂
6.40%O₂
13.40%CO
0.00%N₂
80.20%

POINT	STACK TEMP DEG F	DELTA P IN H ₂ O	ORIFICE DEL P IN H ₂ O	METER TEMP DEG F	VELOCITY AFPS
1	275	0.32	2.20	35	37.52
2	280	0.37	2.55	38	40.48
3	278	0.37	2.55	40	40.42
4	278	0.40	2.80	41	42.03
5	280	0.50	3.50	43	47.05
6	281	0.70	4.90	44	55.71
7	282	0.72	5.00	44	56.54
8	280	0.72	5.00	44	56.46
9	280	0.62	4.30	45	52.40
10	277	0.57	3.90	46	50.14
11	276	0.65	4.50	47	53.50
12	275	0.60	4.20	48	51.37
13	282	0.70	4.90	50	55.75
14	283	0.82	5.70	53	60.38
15	282	0.85	6.00	56	61.43
16	283	0.75	5.20	60	57.74
17	280	0.59	4.10	62	51.11
18	280	0.60	4.20	65	51.54
19	280	0.60	4.20	67	51.54
20	278	0.65	4.50	70	53.58
21	279	0.72	5.00	72	56.43
22	280	0.72	5.00	74	56.46
23	277	0.65	4.50	75	53.54
24	275	0.30	2.10	75	36.32
AVERAGE	279		4.20	54	51.23

DRY STANDARD VOLUME	65.51	SCF
PERCENT WATER VAPOR	2.25	% VOL
FLOW RATE	86905	ACFM
	59651	DSCFM
	101360	M ³ /HR
PARTICULATE CONCENTRATION	0.0004	GR/DSCF
PARTICULATE EMISSION RATE	0.21	LB/HR
LB PART PER 1000 LB GAS	0.0007	
ISOKINETIC PERCENT	102.0	

TEST NO.	2	
BAROMETRIC PRESSURE	29.45	IN HG
TIP DIAMETER	0.305	IN
STACK DIAMETER	72	IN
STACK AREA	28.274	FT ²
SAMPLING TIME PER POINT	2.5	MIN
NUMBER OF POINTS	24	
METER VOLUME	60.50	FT ³
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.990	
PARTICULATE COLLECTED	0.0013	GRAMS
WATER COLLECTED	31	ML
STATIC PRESSURE	-0.45	IN H ₂ O

ORSAT RESULTS

CO₂
6.00%O₂
13.40%CO
0.00%N₂
80.60%

POINT	STACK TEMP DEG F	DELTA P IN H ₂ O	ORIFICE DEL P IN H ₂ O	METER TEMP DEG F	VELOCITY AFPS
1	270	0.50	3.50	80	46.79
2	270	0.45	3.10	80	44.39
3	272	0.55	3.80	80	49.15
4	274	0.55	3.80	79	49.21
5	272	0.58	4.00	79	50.47
6	273	0.58	4.00	79	50.50
7	277	1.05	6.60	80	68.14
8	272	0.56	3.85	80	49.59
9	272	0.60	4.20	81	51.33
10	272	0.60	4.20	81	51.33
11	273	0.62	4.30	81	52.22
12	270	0.47	3.25	81	45.37
13	271	0.53	3.70	82	48.21
14	271	0.57	3.95	84	50.00
15	273	0.59	4.04	86	50.94
16	273	0.46	3.20	87	44.98
17	272	0.44	3.02	88	43.96
18	269	0.42	2.90	86	42.86
19	267	0.42	2.90	87	42.80
20	265	0.34	2.33	87	38.46
21	265	0.35	2.41	87	39.02
22	266	0.47	3.25	87	45.24
23	265	0.47	3.25	87	45.21
24	264	0.55	3.80	88	48.88
AVERAGE	270		3.64	83	47.88

DRY STANDARD VOLUME	59.49	SCF
PERCENT WATER VAPOR	2.39	% VOL
FLOW RATE	81221	ACFM
	56350	DSCFM
	95749	M ³ /HR
PARTICULATE CONCENTRATION	0.0003	GR/DSCF
PARTICULATE EMISSION RATE	0.16	LB/HR
LB PART PER 1000 LB GAS	0.0006	
ISOKINETIC PERCENT	98.1	

TEST NO.	3	
BAROMETRIC PRESSURE	29.45	IN HG
TIP DIAMETER	0.305	IN
STACK DIAMETER	72	IN
STACK AREA	28.274	FT ²
SAMPLING TIME PER POINT	2.5	MIN
NUMBER OF POINTS	24	
METER VOLUME	61.57	FT ³
PITOT COEFFICIENT	0.84	
METER COEFFICIENT	0.990	
PARTICULATE COLLECTED	0.0014	GRAMS
WATER COLLECTED	31	ML
STATIC PRESSURE	-0.47	IN H ₂ O

ORSAT RESULTS

CO₂
6.00%

O₂
13.60%

CO
0.00%

N₂
80.40%

POINT	STACK TEMP DEG F	DELTA P IN H ₂ O	ORIFICE DEL P IN H ₂ O	METER TEMP DEG F	VELOCITY AFPS
1	272	0.62	4.30	90	52.17
2	272	0.62	4.30	90	52.17
3	273	0.60	4.20	91	51.36
4	274	0.70	4.90	92	55.51
5	275	0.77	5.35	92	58.26
6	278	0.50	3.50	93	47.04
7	272	0.48	3.30	93	45.90
8	272	0.48	3.30	93	45.90
9	270	0.50	3.50	93	46.79
10	272	0.57	3.90	93	50.02
11	272	0.60	4.20	94	51.32
12	270	0.60	4.20	94	51.25
13	272	0.60	4.20	94	51.32
14	272	0.55	3.80	95	49.14
15	271	0.48	3.30	95	45.87
16	271	0.50	3.50	95	46.82
17	270	0.44	3.00	95	43.89
18	267	0.40	2.80	95	41.76
19	265	0.38	2.60	94	40.65
20	267	0.40	2.80	94	41.76
21	268	0.46	3.20	93	44.81
22	270	0.55	3.80	93	49.07
23	272	0.60	4.20	93	51.32
24	270	0.55	3.80	93	49.07
AVERAGE	271		3.75	93	48.47

DRY STANDARD VOLUME	60.56	SCF
PERCENT WATER VAPOR	2.35	% VOL
FLOW RATE	82220	ACFM
	57002	DSCFM
	96858	M ³ /HR
PARTICULATE CONCENTRATION	0.0004	GR/DSCF
PARTICULATE EMISSION RATE	0.17	LB/HR
LB PART PER 1000 LB GAS	0.0007	
ISOKINETIC PERCENT	98.7	

PARTICULATE LABORATORY DATA SHEET								
JOB NO.				Grede				
TEST DATE				11/24/98				
TEST LEADER				WJD				
STACK				Cupola				
RUN NO.				1				
WATER COLLECTED								
IMPINGER NO.				FINAL	INITIAL		GAIN	
1				126	100		26	
2				104	100		4	
3				100	100		0	
SIL GEL				667	665		2	
				TOTAL GAIN			32	
PARTICULATE								
FRONT HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	FILTER			1.0164	1.0161	0.0000	0.0003	
	WASHINGS			95.3867	95.3862	0.0003	0.0002	
	GAIN						0.0005	29
BACK HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
	EXTRACT			68.5768	68.5761	0.0005	0.0002	
	WATER			113.2310	113.2297	0.0003	0.0010	
	GAIN						0.0012	71
				TOTAL GAIN			0.0017	

PARTICULATE LABORATORY DATA SHEET								
JOB NO.				Grede				
TEST DATE				11/24/98				
TEST LEADER				WJD				
STACK				Cupola				
RUN NO.				2				
WATER COLLECTED								
IMPINGER NO.				FINAL	INITIAL		GAIN	
1				118	100		18	
2				107	100		7	
3				103	100		3	
SIL GEL				671	668		3	
							TOTAL GAIN	31
PARTICULATE								
FRONT HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
FILTER				1.1414	1.1412	0.0000	0.0002	
WASHINGS				110.4528	110.4524	0.0003	0.0001	
GAIN							0.0003	23
BACK HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
EXTRACT				70.2942	70.2936	0.0005	0.0001	
WATER				113.7442	113.7430	0.0003	0.0009	
GAIN							0.0010	77
							TOTAL GAIN	0.0013

PARTICULATE LABORATORY DATA SHEET								
JOB NO.				Grede				
TEST DATE				11/24/98				
TEST LEADER				WJD				
STACK				Cupola				
RUN NO.				3				
WATER COLLECTED								
IMPINGER NO.				FINAL	INITIAL		GAIN	
1				121	100		21	
2				108	100		8	
3				101	100		1	
SIL GEL				681	680		1	
				TOTAL GAIN			31	
PARTICULATE								
FRONT HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
				1.1256	1.1255	0.0000	0.0001	
				108.6518	108.6513	0.0003	0.0002	
							0.0003	21
BACK HALF				FINAL	INITIAL	BLANK	GAIN	% OF TOTAL
				68.6507	68.6500	0.0005	0.0002	
				111.4305	111.4293	0.0003	0.0009	
							0.0011	79
				TOTAL GAIN			0.0014	

GREDE REEDSBURG
CUPOLA BAGHOUSE

11/24/98

PM10 TESTING

STAGE	FINAL g	TARE g	GAIN g	CUMULATIVE g	CUT SIZE microns	% GREATER THAN	% LESS THAN	CUT SIZE microns
0	0.1521	0.1520	0.0001	0.0001	10.0	2.7	97.3	10.0
1	0.1361	0.1360	0.0001	0.0002	6.2	5.4	94.6	6.2
3	0.1520	0.1518	0.0002	0.0004	2.8	10.8	89.2	2.8
4	0.1386	0.1383	0.0003	0.0007	1.6	18.9	81.1	1.6
5	0.1524	0.1514	0.0010	0.0017	0.9	45.9	54.1	0.9
7	0.1415	0.1401	0.0014	0.0031	0.4	83.8	16.2	0.4
F	0.2066	0.2060	0.0006	0.0037	0.0	100.0	0.0	0.0
			0.0037					

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GREDE REEDSBURG
 CUPOLA BAGHOUSE EMISSIONS
 24-Nov-98

	TEST 1	TEST 2	TEST 3	AVERAGE
CO				
ppm	384.0	207.0	177.0	256.0
mg/m3	447.1	241.0	206.1	298.0
lb/hr	99.9	50.9	44.0	64.9
NOx				
ppm	8.0	7.3	7.0	7.4
mg/m3	15.3	14.0	13.4	14.2
lb/hr	3.4	2.9	2.9	3.1
SO2				
mg/m3	35.0	33.3	34.2	34.2
lb/hr	7.8	7.0	7.3	7.4
FLOW				
dscfm	59651	56350	57002	57668
m3/hr	101359	95750	96858	97989

GREDE REEDSBURG CUPOLA STACK SO2 LAB RESULTS															
Sample no.	Voi. Solution ml	Voi. Allq. ml	Voi. Titrant ml	Voi. Tit. Bl. ml	N. Titrant	mg. SO2	mg/m3	Meter Voi. ft3	Meter GAMA	Meter T deg F	Pb in Hg	Meter Std. scf	Std m3	Flow Rate m3/hr	Emission Rate lb/hr
1	221.0	3.0	0.30	0.02	0.100	66.067	35.03	66.53	0.99	54	29.45	66.596	1.886	101630	7.85
2	220.0	3.0	0.25	0.02	0.100	54.024	33.28	60.50	0.99	83	29.45	57.326	1.623	95749	7.02
3	220.0	3.0	0.25	0.02	0.100	55.497	34.21	61.57	0.99	93	29.45	57.284	1.622	96858	7.30
AVG							34.17					60.40			7.39

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National Emission Standards for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries - Background Information for Proposed Standards

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EPA-453/R-02-013
December 2002

National Emission Standards for Hazardous Air Pollutants (NESHAP) for
Iron and Steel Foundries--
Background Information for Proposed Standards

Prepared by:
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Emission Standards Division

Contract No. 68-D01-73
Work Assignment No. 1-14

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Emission Standards Division
Metals Group
Research Triangle Park, NC

APPENDIX D

**SOURCE TEST PARTICULATE MATTER DATA
FOR CUPOLA BAGHOUSES**

D.1 SOURCE TEST PARTICULATE MATTER DATA FOR CUPOLA BAGHOUSES

This appendix presents the individual sampling run data for the source tests available to characterize the control performance for baghouses applied to cupolas (Chapter 4). Summary test data are given in Table D-1 along with information on melting rates and capacities and a description of the control systems and the processes they serve.

The data in Table D-1 represent a range of cupola sizes and types of baghouses. The design melting rates range from 3.5 to 80 tons per hour, and ventilation rates range from 30,000 to 195,000 actual cubic feet per minute. The cupolas include both recuperative and non-recuperative, and both above and below charge take off. The baghouses include both negative and positive pressure operating modes and employ both shaker and pulse jet cleaning systems. Some were installed about 30 years ago, and some are relatively new (rebuilt). The design air-to-cloth ratios cover a range of 1.68 to 5.1 feet per minute. No information is available on the ages of the bags in service when the tests were conducted.

The reported results were checked to ensure the weights of PM from the filter and the probe catch were above detection limits. When the reported catch was less than 3 mg, a detection limit value of 3 mg and the sample volume were used to estimate the detection limit in gr/dscf. Values calculated in this manner are reported as “less than” (<).

TABLE D-1. PM SOURCE TEST RESULTS FOR BAGHOUSES SERVING CUPOLAS

Foundry WI-35 (tested March 1998)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	<0.0006	<0.4	75,974	107,297	271	1.7		45 tph capacity, afterburner, recuperative, above charge takeoff	Installed 1998, negative pressure, pulse jet, horizontally- supported bags, 10.8 oz Nomex fabric, air:cloth = 2.4 ft/min, design for 280°F and 148,000 acfm
2	<0.0006	<0.4	75,412	107,145	273	1.7			
3	<0.0006	<0.4	74,847	105,854	274	1.7			
Avg	<0.0006	<0.4	75,411	106,765	273	1.7			
Foundry WI-35 (tested November 1998)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)		
1	<0.0007	<0.4	59,651	86,905	279	1.4	40		
2	<0.0008	<0.4	56,350	81,221	270	1.3	40		
3	<0.0008	<0.4	57,002	82,220	271	1.3	42.5		
Avg	<0.0008	<0.4	57,668	83,449	273	1.3	41		
Foundry WI-35 (tested May 2000)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)		
1	<0.0007	<0.4	61,074	88,945	271	1.4			
2	<0.0007	<0.4	60,856	88,346	269	1.4			
3	<0.0007	<0.4	61,132	88,483	267	1.4			
Avg	<0.0007	<0.4	61,021	88,591	269	1.4			

Foundry IN-01 (tested March 2000)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.00086	0.43	58,178	81,782	259		69.5	75 tph capacity, afterburner, below charge takeoff	New baghouse, pulse jet, horizontally-supported bags
2	0.00079	0.42	61,481	87,303	270		61.8		
3	0.00069	0.39	65,454	95,494	293		68.6		
Avg	0.00078	0.41	61,704	88,193	274		66.6		
Foundry MI-26 (tested December 1995)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0012	0.22	20,987				10	15 tph capacity, afterburner, above charge takeoff	Installed 1995, positive pressure, shaker, fiberglass fabric, air:cloth = 0.75 ft/min, design for 500°F and 25,700 acfm
2	0.0023	0.40	20,987						
3	0.0017	0.29	21,029						
Avg	0.0017	0.30	21,001						
Foundry NC-05 (tested February 2000)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0019	1.15	65,932	102,298	288	2.3	62.9	70 tph capacity, afterburner, above charge takeoff	New baghouse, negative pressure, pulse jet, air:cloth = 1.76 ft/min, design for 350°F and 79,000 acfm
2	0.0027	1.69	64,883	105,026	292	2.3	59.8		
3	0.0019	1.14	64,879	102,995	296	2.3	65.3		
Avg	0.0022	1.33	65,231	103,440	292	2.3	62.7		

Foundry NJ-3 (tested August 1991)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0048	12.7	306,488	390,656	213	3.5	87	2 cupolas with 64 tph capacity (only one operates at a time), afterburner, recuperative, below charge takeoff	Installed 1974, positive pressure, shaker, fiberglass fabric, air:cloth = 1.75 ft/min, design for 500°F and 195,000 acfm, controls melting
2	0.0055	11.2	238,254	305,489	217	2.7	67		
3	0.0026	3.5	159,297	211,491	241	1.9	88		
Avg	0.0043	8.9	234,680	304,017	224	2.7	81		
Foundry NJ-3 (tested September 1997)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)		
1	0.0012	3.06	219,000	263,000	175	2.4	80		
2	0.0023	1.89	220,100	282,000	216	1.9	90		
3	0.0014	2.99	240,200	316,000	235	2.8	75		
Avg	0.0016	2.6	226,433	287,000	209	2	82		
Foundry IN-34 (tested September 1997)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0026	0.71	32,100	45,000	231	1.2	53	80 tph capacity, afterburner, recuperative, below charge takeoff	Installed 1997, negative pressure, pulse jet, Nomex, air:cloth = 1.8 ft/min, design for 320°F and 70,000 acfm, controls melting and charging
2	<0.0003	<0.14	49,700	69,600	253	1.8	41		
3	0.0011	0.46	48,500	68,200	254	1.8	47		
Avg	<0.0013	<0.5	40,300	56,600	243	1.5	50		

Foundry VA-8 (tested January 1998)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0039	1.64	48,697	70,363	278	2.6	49	2 cupolas with 65 tph capacity (only one operates at a time), afterburner, recuperative, below charge takeoff	Installed 1997, negative pressure, pulse jet, Nomex, air:cloth = 3.74 ft/min, design for 375°F and 100,000 acfm, controls melting and charging
2	0.0028	1.14	47,588	69,934	281	2.6	51		
3	0.0026	1.08	48,934	72,472	283	2.7	53		
Avg	0.0031	1.29	48,407	70,923	281	2.6	51		
Foundry FL-6 (tested February 1998)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0028	0.52	21,976	35,420	246	0.9	17.7	22 tph capacity, afterburner, recuperative, above charge takeoff	Installed 1998, negative pressure, reverse air, fiberglass fabric, air:cloth = 1.68 ft/min, design for 460°F and 65,000 acfm, controls melting and charging
2	0.0031	0.67	25,178	42,114	266	0.7	19.8		
3	0.0051	1.11	25,288	41,495	272	0.7	25.1		
Avg	0.0037	0.77	24,147	39,676	261	0.8	20.9		
Foundry IA-19 (tested February 1998)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0026	0.92	41,861	58,271	245	4.2	13.5	20 tph capacity, afterburner, recuperative, below charge takeoff	Installed 1992, negative pressure, pulse jet, Nomex felt fabric, air:cloth = 5.1 ft/min, design for 450°F and 70,000 acfm, controls melting, charging, tapping
2	0.0015	0.58	46,281	63,363	233	4.6	13.5		
3	0.0022	0.90	46,811	64,433	238	4.7	13.5		
Avg	0.0021	0.80	44,984	62,022	239	4.5	13.5		

Foundry IN-35 (tested November 1997)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0044	1.71	45,055	66,407	213	4.1		22 tph capacity, afterburner, nonrecuperative, above charge takeoff	Installed 1997, positive pressure, pulse jet, Tuflex fabric, air:cloth = 4.65 ft/min, design for 400°F and 75,000 acfm, controls melting
2	0.0043	1.68	44,780	66,018	215	4.1			
3	0.0043	1.66	44,773	66,532	212	4.1			
Avg	0.0043	1.69	44,869	66,319	213	4.1			
Foundry SD-1 (tested March 1995)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0058	0.72	14,580	20,403	227	2.7	4.3	3.5 tph capacity, no afterburner, nonnonrecuperative, above charge takeoff	Installed 1994, negative pressure, pulse jet, 16 oz Nomex fabric, air:cloth = 3.96 ft/min, design for 400°F and 30,000 acfm, controls melting and charging
2	0.0035	0.48	16,008	21,992	216	2.9	4.3		
3	0.0047	0.62	15,336	21,567	231	2.9	6.4		
Avg	0.0046	0.61	15,308	21,321	225	2.8	5.0		
Foundry WI-49/50 (tested September 1995)									
Run	PM (gr/dscf)	PM (lb/hr)	Flow (dscfm)	Flow (acfm)	Temp (°F)	Air:cloth ratio (ft/min)	Melt rate (tph)	Cupola information	Baghouse information
1	0.0044	1.2	30,852	59,684	338	3.0	29.7	2 cupolas, 30 tph capacity, afterburner, recuperative, above charge takeoff	Installed 1994, negative pressure, pulse jet, woven fiberglass fabric, air:cloth = 2.4 to 3.7 ft/min, design for 450°F and 50,000 to 70,000 acfm, controls melting
2	0.0047	1.2	30,826	59,347	332	3.0	28.4		
3	0.0060	1.5	29,750	60,281	339	3.0	24.4		
Avg	0.0050	1.3	30,476	59,771	336	3.0	27.5		