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EMISSION TEST REPORT
for the
Dexter Company
on the
Cupola Baghouse

located in
Fairfield, Iowa

February 10, 1998

Conducted by

Comprehensive Emission Services
1112 Maple Street
West Des Moines, Iowa 50265
(515) 225-7372

Project No. 798

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PREFACE

This report summarizes the results of the data collected on a compliance demonstration test on the Cupola baghouse at the Dexter Company facility in Fairfield, Iowa. To the best of our knowledge, the data in this report are accurate and complete. Any questions concerning this report should be directed to Mr. Tim Titus or Mr. Jay Titus. They may be reached by phone at (515) 225-7372.

Doug Ostrander MCA

Doug Ostrander
Test Leader

Timothy C. Titus
Reviewed by

February 13, 1998

INTRODUCTION

An emission test was conducted by Comprehensive Emission Services on the Cupola baghouse at the Dexter Company facility in Fairfield, Iowa. Three Method 5, Particulate sampling runs were performed. PM-10, Method 201A could not be performed due to stratified flow conditions within the stack. PM-10 results will have to be assumed from the TSP, Method 5 samples. Three Method 7E, Nitrogen oxides, and three Method 10, Carbon monoxide sampling runs were also performed. The testing fulfills the requirements for testing established in the Iowa Department of Natural Resources Permit Number 92-A-474-S2. The testing was performed on February 10, 1998.

Coordinating the field tests:

Tim Titus - Comprehensive Emission Services
Tom Kunkle - Dexter Company

Conducting the field tests:

Doug Ostrander - Comprehensive Emission Services
Mike Ankerstjerne - Comprehensive Emission Services
Lincoln Chew - Comprehensive Emission Services

Witnessing the field tests for the IDNR:

Mark Stone - University of Iowa Hygienic Lab

The appendices to this report contain the following information and data:

Appendix A: Example Calculations
Appendix B: Laboratory Data Forms
Appendix C: Field Data Forms
Appendix D: Pretest Calibrations
Appendix E: Posttest Calibrations
Appendix F: Process Data
Appendix G: CEM Data
Appendix H: Gas Certifications

SUMMARY OF RESULTS

Table 1 summarizes the test results for testing performed on the Cupola baghouse at the Dexter Company facility in Fairfield, Iowa. Methods 5 with 202, 7E, and 10 were used for testing. Testing was performed on February 10, 1998.

The allowable limits for Particulates is 6.0 lb/hr..

The allowable limits for NOx is 32.76 lb/hr.

The allowable limits for CO is 29 lb/hr.

No blank corrections were performed.

Table 1
Summary of Test Results

	units	Run 1	Run 2	Run 3
Particulate Net Weight	g	0.0300	0.0295	0.0260
Particulate Emissions	gr/dscf	0.0044	0.0045	0.0039
Particulate Emission Rate	lb/hr	1.57	1.77	1.54
NOx Concentration	ppm	9.6	8.9	10.2
NOx Emission Rate	lb/hr	2.885	2.936	3.429
CO Concentration	ppm	51.4	71.9	118.7
CO Emission Rate	lb/hr	9.379	14.515	24.222
Flow Rate	dscfm	41.861	46.281	46.811

SAMPLING AND ANALYTICAL PROCEDURES

Sampling Procedures

Particulate emissions were determined by U.S. Environmental Protection Agency (EPA) Methods 1, 2, 3, 4, 5, 7E, 10, and 202. These Methods are titled;

Method 1 - "Sample and Velocity Traverse for Stationary Sources"
Method 2 - "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"
Method 3 - "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air and Dry Molecular Weight"
Method 4 - "Determination of Moisture Content in Stack Gases"
Method 5 - "Determination of Particulate Emissions from Stationary Sources"
Method 7E - "Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10 - "Determination of Carbon Monoxide Emissions from Stationary Sources"
Method 202 - "Determination of Condensible Emissions from Stationary Sources"

These methods appear in detail in Title 40, Code of Federal Regulations (CFR), Part 60, Appendix A, and Part 51, Appendix M.

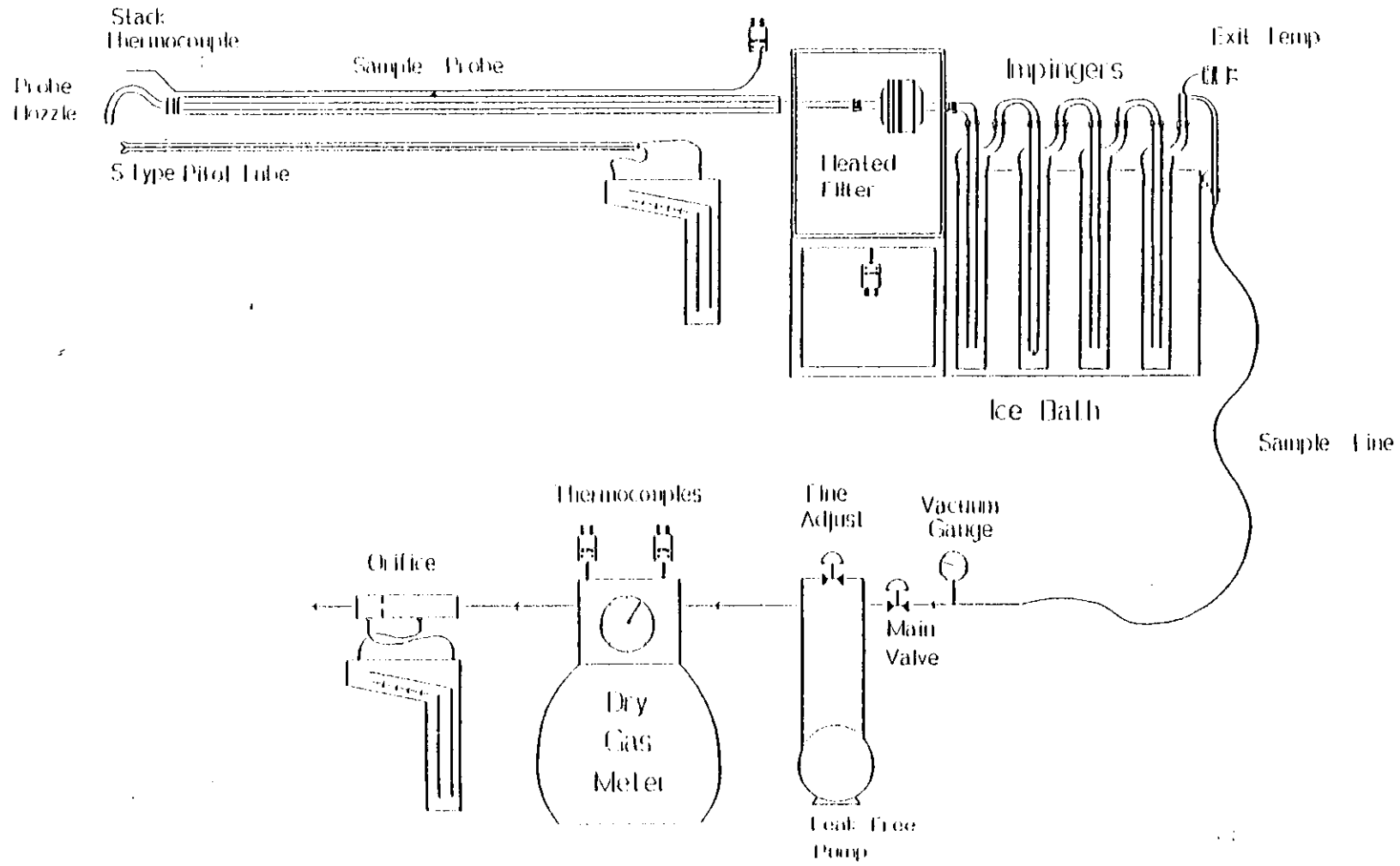
The Particulate Sampling Apparatus is shown in Figure 1 on Page 6. All equipment was calibrated at Comprehensive Emission Services' office prior to shipment to the test site.

Sampling Locations

A total of 24 sample points were used to determine particulate emissions. The stack sampling point locations can be found along with the field data sheets in Appendix C.

Analytical Procedures

The particulate emission rate was determined following procedures detailed in EPA Methods 5. Particulate samples collected on Whatman glass fiber filters were analyzed gravimetrically. The probe and nozzles were rinsed with acetone. The rinse was transferred to tarred beakers and evaporated to dryness.



Schematic of Method 5 Sampling Train

Figure 1

Table 3
Particulate Emission Results

Parameters	Units	Run 1	Run 2	Run 3
Particulate Emissions				
Weight Collected	g	0.0300	0.0295	0.0260
Actual	gr/dscf	0.0044	0.0045	0.0039
Particulate Emission Rate				
Emission Rate	lb/hr	1.57	1.77	1.54
Stack Flow Rate				
Velocity	ft/min	3,407	3,705	3,767
Actual	acfm	58,271	63,363	64,433
Standard Conditions	dscfm	41,861	46,281	46,811
Sampling Results				
Isokinetics	%	94.2	99.5	100.7
Sample Volume	dscf	105.480	101.778	104.205
Ave. Stack Temperature	°F	245	233	238
Ave. Square Root ΔP	inches H_2O	0.8725	0.9572	0.9710
Ave. ΔH	inches H_2O	2.33	2.07	2.16
Ave. Meter Temperature	°F	74.3	74.8	74.6
Oxygen	%	17.10	17.10	17.90
Carbon Dioxide	%	3.80	3.80	3.90
Moisture Collected	ml	77.0	78.0	75.8
Moisture	% H_2O	3.3	3.5	3.3
Run Start Time	HH:MM	9:16	12:08	14:49
Sampling Time	minutes	120	120	120

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PARTICULATE EMISSION TEST
_____ OPERATING DATA
(Type of Source)

Owner Dexter Company Run No. 1-3

Source I.D. Cupola Stack Date 2/10/98

Maximum Continuous Process Weight (Manufacturer's Rating) 20 ton ~~lbs./hr.~~

Historical Average Process Weight _____ lbs./hr.

Historical Maximum Process Weight _____ lbs./hr.

Type and Sources of Fuels Normally Burned _____

Approximate Quantities of Each of Above Fuels Burned Annually _____

Recycling Capability: Yes _____ No _____

Process Data During Run (Averaged)

Process Weight: (Dry) 13 1/2 tons per hour lbs./hr.

Percent Moisture _____ %

Process Weight: (Wet) _____ lbs./hr.

How Process Weight Determined _____

Type of Fuel Burned During Run _____

Recycling in Progress: Yes _____ No _____

Person Responsible for Data: Tom Dunkle

Signature: Tom Dunkle

Title/Position: Mgr. Human Resources

*Averages of operating data taken during actual test run unless requested otherwise.

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
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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 fiberglas 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		