MONTROSE
AIR QUALITY SERVICES

COMPLIANCE STACK EMISSION TEST REPORT

BRASS MANUFACTURING PROCESSES

Determination of Filterable Particulate Matter, Total Particulate Matter, and Inorganic Lead Emissions

Utilizing US EPA Methods 1, 2, 3, 4, 5, 12, and 202

Test Date(s): August 27-30, 2019
State Registration Number: A6262
Source Location: Port Huron, Michigan

Permit: EGLE Permit-to-Install No.180-00D

Prepared For:

Mueller Brass Company
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Source Name:	**Melting Line C**	
Source ID :	**FGSYSTEMC**	
Control Device:	**Baghouse C**	
Sampling Location:	**North Exhaust Stack**	**South Exhaust Stack**
Test Dates:	**August 27-30, 2019**	
Brass Casting Operations (ton/day)*	**88.1**	
Total Particulate Matter (PM) Emissions (lb/hr)†	**1.0**	
Permit Limit - Total PM (lb/hr)†	*1.0*	
Compliance Permit Requirement Met (YES/NO)	*YES*	
Filterable PM Emissions (lb/hr)†	**0.7**	
Permit Limit - Filterable PM (lb/hr)†	*1.0*	
Compliance Permit Requirement Met (YES/NO)	*YES*	
Inorganic Lead Emissions (lb/hr)†	**0.0007**	
Permit Limit - Lead (lb/hr)†	*0.0350*	
Compliance Permit Requirement Met (YES/NO)	*YES*	
Permit:	**EGLE Permit-to-Install No. 180-00D**	

* Production data was provided by Mueller Brass Company personnel. See Appendix A.
† Combined Emissions

TEST RESULTS SUMMARY

Source Name:	**Cast Shop**	**Melt Line E**
Source ID :	**N/A**	**FGSYSTEME**
Control Device:	**Baghouse D**	**Baghouse E**
Sampling Location:	**Baghouse D Exhaust Stack**	**Baghouse E Exhaust Stack**
Test Dates:	**August 27-30, 2019**	
Brass Casting Operations (ton/day)*	**N/A**	**345.6**
Total Particulate Matter (PM) Emissions (lb/hr)†	**< 1.6**	**0.8**
Permit Limit - Total PM (lb/hr)	*N/A*	*1.0*
Compliance Permit Requirement Met (YES/NO)	*N/A*	*YES*
Filterable PM Emissions (lb/hr)§	**< 0.3**	**0.3**
Permit Limit - Filterable PM (lb/hr)	*N/A*	*1.0*
Compliance Permit Requirement Met (YES/NO)	*N/A*	*YES*
Inorganic Lead Emissions (lb/hr)	**0.0011**	**0.0003**
Permit Limit - Lead (lb/hr)	*N/A*	*0.0350*
Compliance Permit Requirement Met (YES/NO)	*N/A*	*YES*
Permit:	**EGLE Permit-to-Install No. 180-00D**	

* Production data was provided by Mueller Brass Company personnel. See Appendix A.

† Concentration values denoted with a '<' were measured to be below the minimum detection limit (MDL) in at least one fraction of the applicable analytical method. See Section 2.3 for details.

§ Concentration values denoted with a '<' were measured to be below the minimum detection limit (MDL) applicable analytical method. See Section 2.3 for details.

REVIEW AND CERTIFICATION

The results of the Compliance Test conducted on August 27-30, 2019 are a product of the application of the United States Environmental Protection Agency (US EPA) Stationary Source Sampling Methods listed in 40 CFR Part 60, and Appendix A, 40 CFR Part 51, Appendix M, that were in effect at the time of this test.

All work, calculations, and other activities and tasks performed and presented in this document were carried out by me or under my direction and supervision. I hereby certify that, to the best of my knowledge, Montrose operated in conformance with the requirements of the Montrose Quality Management System and ASTM D7036-04 during this test project.

Signature: _____ Date: 10-25-19

Name: Mason Sakshaug Title: Client Project Manager

I have reviewed, technically and editorially, details, calculations, results, conclusions, and other appropriate written materials contained herein. I hereby certify that, to the best of my knowledge, the presented material is authentic, accurate, and conforms to the requirements of the Montrose Quality Management System and ASTM D7036-04.

Signature: _____ Date: 10-25-19

Name: Randal Tysar Title: District Manager

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

The Mueller Brass Company (State Registration Number: A6262), located in Port Huron, Michigan, contracted Montrose Air Quality Services, LLC (Montrose) of Detroit, Michigan, to conduct compliance stack emission testing for their Brass Manufacturing Processes. Testing was performed to satisfy the emissions testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Permit-to-Install (PTI) No. 180-00D and Administrative Consent Order AQD No. 2019-17. The testing was performed on August 27-30, 2019.

Sampling was performed at the Baghouse C North Exhaust Stack, Baghouse C South Exhaust Stack, Baghouse D Exhaust Stack, and Baghouse E Exhaust Stack to determine the emissions of filterable particulate matter (PM), total PM, and inorganic lead (Pb). Testing was conducted during maximum capacity operations. During this test, emissions from Melting Lines C and E were controlled by their respective baghouses. Emissions from the Cast Shop were controlled by Baghouse D.

The test methods that were conducted during this test were US EPA Methods 1, 2, 3, 4, 5, 12, and 202.

1.2 KEY PERSONNEL

The key personnel who coordinated this test program (and their phone numbers) were:

- Jim Davidson, Vice President, Manufacturing, Mueller Brass Company, 810-987-7770 ext. 6210
- Timothy McFarlane, Facilities Manager, Mueller Brass Company, 810-488-4815
- Tom Gasloli, Technical Programs Unit, Michigan Department of Environment, Great Lakes and Energy (EGLE), 517-284-6778
- Remilando Pinga, Senior Environmental Engineer, EGLE, 586-753-3723
- Mason Sakshaug QI, Field Project Manager, Montrose, 248-548-7980

2.0 SUMMARY AND DISCUSSION OF TEST RESULTS

2.1 OBJECTIVES AND TEST MATRIX

The purpose of this test was to determine the emissions of filterable PM, total PM, and Pb at the Baghouse C North Exhaust Stack, Baghouse C South Exhaust Stack, Baghouse D Exhaust Stack, and Baghouse E Exhaust Stack during normal shop operations. Testing was performed to satisfy the emissions testing requirements pursuant to EGLE PTI No. 180-00D and Administrative Consent Order AQD No. 2019-17.

The specific test objectives for this test were as follows:

- Measure the concentration of filterable PM, condensable PM, and inorganic Pb at the Baghouse C North Exhaust Stack, Baghouse C South Exhaust Stack, Baghouse D Exhaust Stack, and Baghouse E Exhaust Stack.
- Measure the actual and dry standard volumetric flow rate of the stack gas at the Baghouse C North Exhaust Stack, Baghouse C South Exhaust Stack, Baghouse D Exhaust Stack, and Baghouse E Exhaust Stack.
- Utilize the above variables to determine the emissions of filterable PM, total PM and inorganic Pb at the Baghouse C North Exhaust Stack, Baghouse C South Exhaust Stack, Baghouse D Exhaust Stack, and Baghouse E Exhaust Stack during maximum capacity operations.

Tables 2.1.1 and 2.1.2 present the sampling matrix log for this test.

2.2 FIELD TEST CHANGES AND PROBLEMS

2.2.1 US EPA Method 202 Sample Purge

After receiving approval from the EGLE administrator the US EPA Method 202 samples from Baghouse Exhaust Stack D and Baghouse Exhaust Stack E were not purged prior to sample recovery for this test event. Only US EPA Method 202 samples from Baghouse Exhaust Stack C were purged prior to sample recovery.

2.2.2 US EPA Method 5/202 Sample Train

The post-test US EPA Method 5/202 sample train leak check performed after Run 2 at the Baghouse D Exhaust Stack yielded a leakage rate which was greater than the allowable leakage rate of 0.020 cfm (4% of the sampling rate) as specified within US EPA Method 5, Section 8.4.4. Therefore, Run 2 was voided and an additional run, Run 4, was performed. Results from Run 2 are displayed in this test report for informational purposes only and are not included in the averages displayed in Table 2.2.2.

2.2.3 US EPA Method 12 Sample Train

The post-test US EPA Method 12 sample train leak check performed after Run 1 at the Baghouse E Exhaust Stack yielded a leakage rate which was greater than the allowable leakage rate of 0.020 cfm (4% of the sampling rate) as specified within US EPA Method 5, Section 8.4.4. Therefore, Run 1 was voided and an additional run, Run 4, was performed. Results from Run 1 are displayed in this test report for informational purposes only and are not included in the averages displayed in Table 2.3.2.

2.3 PRESENTATION OF RESULTS

Two sampling trains were utilized during each run at the Baghouse C North Exhaust Stack, Baghouse C South Exhaust Stack, Baghouse D Exhaust Stack, and Baghouse E Exhaust Stack to determine the emissions of total PM and inorganic Pb. One sampling train measured the stack gas volumetric flow rate, moisture content, and the concentrations of filterable PM and condensable PM. The second sampling train measured the stack gas volumetric flow rate, moisture content, and concentration of inorganic Pb. At each location, grab samples of stack gas were obtained during each run for dry molecular weight determination.

Table 2.2.1 displays the emissions of filterable PM and total PM measured at the Baghouse C North Exhaust Stack and Baghouse C South Exhaust Stack during maximum capacity operations.

Table 2.2.2 displays the emissions of filterable PM and total PM measured at the Baghouse D Exhaust Stack and Baghouse E Exhaust Stack during maximum capacity operations.

Concentration values in Table 2.2.2 denoted with a '<' were measured to be below the minimum detection limit (MDL) or below the MDL in at least one fraction of the applicable analytical method. Emissions denoted with a '<' in Table 2.2.2 were calculated utilizing the applicable MDL concentration value instead of the "as measured" concentration value.

Table 2.3.1 displays the emissions of inorganic Pb measured at the Baghouse C North and South Exhaust Stacks during maximum capacity operations.

Table 2.3.2 displays the emissions of inorganic Pb measured at the Baghouse D Exhaust Stack and Baghouse E Exhaust Stack during maximum capacity operations.

TABLE 2.1.1
SAMPLING MATRIX OF TEST METHODS UTILIZED

Date	Run No.	Sampling Location	US EPA METHODS 1/2 (Flow) Sampling Time / Duration (min)	US EPA METHOD 3 (Dry Mol. Wt.) Sampling Time / Duration (min)	US EPA METHOD 4 ($\%H_2O$) Sampling Time / Duration (min)	US EPA METHOD 12 (Inorganic Lead) Sampling Time / Duration (min)
8/27/2019	1	Baghouse C North Exhaust Stack	7:58 - 9:37 / 90	8:04 - 8:12 / 8	7:58 - 9:37 / 90	7:58 - 9:37 / 90
8/27/2019	2	Baghouse C North Exhaust Stack	10:09 - 11:47 / 90	10:15 - 10:21 / 6	10:09 - 11:47 / 90	10:09 - 11:47 / 90
8/27/2019	3	Baghouse C North Exhaust Stack	12:33 - 14:18 / 90	12:35 - 12:40 / 5	12:33 - 14:18 / 90	12:33 - 14:18 / 90
8/27/2019	1	Baghouse C South Exhaust Stack	7:58 - 9:37 / 90	8:16 - 8:24 / 8	7:58 - 9:37 / 90	7:58 - 9:37 / 90
8/27/2019	2	Baghouse C South Exhaust Stack	10:09 - 11:47 / 90	10:25 - 10:30 / 5	10:09 - 11:47 / 90	10:09 - 11:47 / 90
8/27/2019	3	Baghouse C South Exhaust Stack	12:33 - 14:18 / 90	12:44 - 12:49 / 5	12:33 - 14:18 / 90	12:33 - 14:18 / 90
8/28/2019	1	Baghouse D Exhaust Stack	15:25 - 17:16 / 90	15:30 - 15:36 / 6	15:25 - 17:16 / 90	15:25 - 17:16 / 90
8/29/2019	2	Baghouse D Exhaust Stack	7:27 - 9:14 / 90	8:00 - 8:07 / 7	7:27 - 9:14 / 90	7:27 - 9:14 / 90
8/29/2019	3	Baghouse D Exhaust Stack	9:44 - 11:28 / 90	10:12 - 10:17 / 5	9:44 - 11:28 / 90	9:44 - 11:28 / 90
8/28/2019	1	Baghouse E Exhaust Stack	13:46 - 15:26 / 90	13:05 - 13:55 / 5	13:46 - 15:26 / 90	13:46 - 15:26 / 90
8/28/2019	2	Baghouse E Exhaust Stack	16:04 - 17:43 / 90	16:05 - 16:08 / 4	16:04 - 17:43 / 90	16:04 - 17:43 / 90
8/29/2019	3	Baghouse E Exhaust Stack	7:34 - 9:14 / 90	7:39 - 7:44 / 5	7:34 - 9:14 / 90	7:34 - 9:14 / 90
8/29/2019	4	Baghouse E Exhaust Stack	9:41 - 11:17 / 90	9:46 - 9:52 / 4	9:41 - 11:17 / 90	9:41 - 11:17 / 90

All times are Eastern Daylight Time.

TABLE 2.1.2
SAMPLING MATRIX OF TEST METHODS UTILIZED

Date	Run No.	Sampling Location	US EPA METHODS 1/2 (Flow) Sampling Time / Duration (min)	US EPA METHOD 3 (Dry Mol. Wt.) Sampling Time / Duration (min)	US EPA METHOD 4 (%H_2O) Sampling Time / Duration (min)	US EPA METHOD 5 (Filterable PM) Sampling Time / Duration (min)	US EPA METHOD 202 (Condensable PM) Sampling Time / Duration (min)
8/27/2019	1	Baghouse C North Exhaust Stack	15:12 - 16:51 / 90	15:15 - 15:21 / 6	15:12 - 16:51 / 90	15:12 - 16:51 / 90	15:12 - 16:51 / 90
8/28/2019	2	Baghouse C North Exhaust Stack	7:40 - 9:17 / 90	7:46 - 7:54 / 8	7:40 - 9:17 / 90	7:40 - 9:17 / 90	7:40 - 9:17 / 90
8/28/2019	3	Baghouse C North Exhaust Stack	10:01 - 11:38 / 90	10:02 - 10:08 / 6	10:01 - 11:38 / 90	10:01 - 11:38 / 90	10:01 - 11:38 / 90
8/27/2019	1	Baghouse C South Exhaust Stack	15:12 - 16:51 / 90	15:26 - 15:33 / 7	15:12 - 16:51 / 90	15:12 - 16:51 / 90	15:12 - 16:51 / 90
8/28/2019	2	Baghouse C South Exhaust Stack	7:40 - 9:17 / 90	8:00 - 8:07 / 7	7:40 - 9:17 / 90	7:40 - 9:17 / 90	7:40 - 9:17 / 90
8/28/2019	3	Baghouse C South Exhaust Stack	10:01 - 11:38 / 90	10:15 - 10:21 / 6	10:01 - 11:38 / 90	10:01 - 11:38 / 90	10:01 - 11:38 / 90
8/29/2019	1	Baghouse D Exhaust Stack	12:07 - 13:52 / 90	12:15 - 12:21 / 6	12:07 - 13:52 / 90	12:07 - 13:52 / 90	12:07 - 13:52 / 90
8/29/2019	2	Baghouse D Exhaust Stack	14:38 - 16:23 / 90	14:40 - 14:47 / 7	14:38 - 16:23 / 90	14:38 - 16:23 / 90	14:38 - 16:23 / 90
8/30/2019	3	Baghouse D Exhaust Stack	7:27 - 9:13 / 90	7:41 - 7:59 / 8	7:27 - 9:13 / 90	7:27 - 9:13 / 90	7:27 - 9:13 / 90
8/30/2019	4	Baghouse D Exhaust Stack	9:56 - 11:37 / 90	9:00 - 9:06 / 6	9:56 - 11:37 / 90	9:56 - 11:37 / 90	9:56 - 11:37 / 90
8/29/2019	1	Baghouse E Exhaust Stack	11:57 - 13:33 / 90	12:00 - 12:08 / 8	11:57 - 13:33 / 90	11:57 - 13:33 / 90	11:57 - 13:33 / 90
8/29/2019	2	Baghouse E Exhaust Stack	14:17 - 15:55 / 90	14:25 - 14:30 / 5	14:17 - 15:55 / 90	14:17 - 15:55 / 90	14:17 - 15:55 / 90
8/30/2019	3	Baghouse E Exhaust Stack	7:29 - 9:07 / 90	7:36 - 7:44 / 8	7:29 - 9:07 / 90	7:29 - 9:07 / 90	7:29 - 9:07 / 90

All times are Eastern Daylight Time.

TABLE 2.2.1
EMISSION RESULTS

Parameter	Baghouse C North Exhaust Stack				Baghouse C South Exhaust Stack			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Total Particulate Matter Emissions (lb/hr)	1.3	0.8	0.2	0.8	0.3	0.3	0.2	0.2
Filterable Particulate Matter Concentration (lb/hr)	1.1	0.6	0.1	0.6	0.2	0.1	0.1	0.1
Filterable Particulate Matter Concentration (grains/dscf)	0.0027	0.0014	0.00022	0.0015	0.00050	0.00024	0.00022	0.00032
Condensable Particulate Matter Emissions (lb/hr)	0.21	0.19	0.12	0.17	0.10	0.16	0.12	0.13
Condensable Particulate Matter Concentration (grains/dscf)	0.0005	0.0005	0.0003	0.0004	0.00027	0.00042	0.00032	0.00034
Stack Gas Average Flow Rate (acfm)	52,473	54,964	53,531	53,656	49,483	51,510	49,065	50,019
Stack Gas Average Flow Rate (scfm)	46,703	50,240	48,432	48,458	43,556	46,572	43,874	44,667
Stack Gas Average Flow Rate (dscfm)	45,421	49,232	47,317	47,323	42,459	45,683	43,077	43,740
Stack Gas Average Velocity (fpm)	2,860	2,996	2,918	2,924	2,697	2,807	2,674	2,726
Stack Gas Average Static Pressure (in-H_2O)	-0.48	-0.48	-0.48	-0.48	-0.40	-0.40	-0.21	-0.33
Stack Gas Average Temperature (°F)	116	102	108	109	123	109	115	115
Stack Gas Percent by Volume Moisture (%H_2O)	2.74	2.01	2.30	2.35	2.52	1.91	1.82	2.08
Measured Stack Inner Diameter (in)			58				58	
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent by Volume Oxygen in Stack Gas (%-dry)	20.90	20.09	20.09	20.36	20.90	20.90	20.90	20.90
Percent by Volume Nitrogen in Stack Gas (%-dry)	79.10	79.91	79.91	79.64	79.10	79.10	79.10	79.10

TABLE 2.2.2
EMISSION RESULTS

Parameter	Baghouse D Exhaust Stack					Baghouse E Exhaust Stack			
	Run 1	Run 2*	Run 3	Run 4	Average†	Run 1	Run 2	Run 3	Average
Total Particulate Matter (PM) Emissions (lb/hr)‡	3.73	0.85	0.82	< 0.34	< 1.63	1.4	0.6	0.4	0.8
Filterable PM Concentration (lb/hr)§	0.30	0.30	0.28	< 0.17	< 0.25	0.4	0.4	0.2	0.3
Filterable PM Concentration (grains/dscf)§	0.00030	0.00031	0.00028	< 0.00020	< 0.00026	0.00087	0.00084	0.00044	0.00072
Condensable PM Emissions (lb/hr)	3.43	0.55	0.54	0.16	1.4	1.1	0.2	0.2	0.5
Condensable PM Concentration (grains/dscf)	0.0035	0.00057	0.00054	0.00019	0.00142	0.00234	0.00050	0.00040	0.00108
Stack Gas Average Flow Rate (acfm)	130,236	127,467	129,099	113,314	124,216	61,286	58,657	59,897	59,947
Stack Gas Average Flow Rate (scfm)	115,632	114,246	117,313	102,054	111,666	53,484	50,715	52,352	52,184
Stack Gas Average Flow Rate (dscfm)	113,695	112,588	115,071	100,035	109,600	52,621	49,835	51,237	51,231
Stack Gas Average Velocity (fpm)	3,015	2,950	2,988	2,623	2,875	2,660	2,545	2,599	2,601
Stack Gas Average Static Pressure (in-H_2O)	-0.52	-0.52	-0.52	-0.52	-0.52	-0.37	-0.37	-0.37	-0.37
Stack Gas Average Temperature (°F)	122	116	108	113	114	132	137	131	133
Stack Gas Percent by Volume Moisture (%H_2O)	1.68	1.45	1.91	1.98	1.85	1.61	1.73	2.13	1.83
Measured Stack Inner Diameter (in)			89					65	
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent by Volume Oxygen in Stack Gas (%-dry)	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90
Percent by Volume Nitrogen in Stack Gas (%-dry)	79.10	79.10	79.10	79.10	79.10	79.10	79.10	79.10	79.10

* Run 2 at the Baghouse D Exhaust Stack was voided. See Section 2.2.1 for details.
† The results for Run 2 at the Baghouse D Exhaust Stack are not included in the average.
‡ Concentration values denoted with a '<' were measured to be below the minimum detection limit (MDL) in at least one fraction of the applicable analytical method. See Section 2.3 for details.
§ Concentration values denoted with a '<' were measured to be below the minimum detection limit (MDL) of the applicable analytical method. See Section 2.3 for details.

TABLE 2.3.1
EMISSION RESULTS

Parameter	Baghouse C North Exhaust Stack				Baghouse C South Exhaust Stack			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Inorganic Lead Emissions (lb/hr)	0.0004	0.0004	0.0003	0.0004	0.0004	0.0003	0.0002	0.0003
Inorganic Lead Concentration (mg/dscm)	0.0024	0.0023	0.0016	0.0021	0.0025	0.0022	0.0013	0.0020
Stack Gas Average Flow Rate (acfm)	50,960	52,496	51,733	51,730	53,300	49,690	51,795	51,595
Stack Gas Average Flow Rate (scfm)	46,424	47,363	46,248	46,679	48,025	44,354	45,820	46,066
Stack Gas Average Flow Rate (dscfm)	44,857	45,750	44,957	45,188	46,453	42,909	44,587	44,650
Stack Gas Average Velocity (fpm)	2,777	2,861	2,820	2,819	2,905	2,708	2,823	2,812
Stack Gas Average Static Pressure (in-H_2O)	-0.48	-0.48	-0.48	-0.48	-0.40	-0.40	-0.40	-0.40
Stack Gas Average Temperature (°F)	103	108	114	108	109	115	120	114
Stack Gas Percent by Volume Moisture (%H_2O)	3.38	3.41	2.79	3.19	3.27	3.26	2.69	3.07
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent by Volume Oxygen in Stack Gas (%-dry)	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90
Percent by Volume Nitrogen in Stack Gas (%-dry)	79.10	79.10	79.10	79.10	79.10	79.10	79.10	79.10

TABLE 2.3.2
EMISSION RESULTS

Parameter	Baghouse D Exhaust Stack				Baghouse E Exhaust Stack				
	Run 1	Run 2	Run 3	Average	Run 1*	Run 2	Run 3	Run 4	Average†
Inorganic Lead Emissions (lb/hr)	0.0014	0.0010	0.00066	0.0011	0.00022	0.00045	0.00025	0.00032	0.0003
Inorganic Lead Concentration (mg/dscm)	0.0035	0.0024	0.0015	0.0025	0.0012	0.0026	0.0013	0.0016	0.0018
Stack Gas Average Flow Rate (acfm)	126,113	132,749	131,858	130,240	57,942	55,572	61,941	60,051	59188
Stack Gas Average Flow Rate (scfm)	112,673	120,958	118,319	117,317	50,351	47,371	55,186	52,091	51549
Stack Gas Average Flow Rate (dscfm)	110,821	118,480	115,825	115,042	49,435	46,553	54,116	51,158	50609
Stack Gas Average Velocity (fpm)	2,919	3,073	3,052	3,015	2,514	2,412	2,688	2,606	2568
Stack Gas Average Static Pressure (in-H_2O)	-0.52	-0.52	-0.52	-0.52	-0.37	-0.37	-0.37	-0.37	-0.37
Stack Gas Average Temperature (°F)	116	107	115	113	132	144	120	135	133
Stack Gas Percent by Volume Moisture (%H_2O)	1.64	2.05	2.11	1.93	1.82	1.73	1.94	1.79	1.82
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent by Volume Oxygen in Stack Gas (%-dry)	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90	20.90
Percent by Volume Nitrogen in Stack Gas (%-dry)	79.10	79.10	79.10	79.10	79.10	79.10	79.10	79.10	79.10

* Run 1 at the Baghouse E Exhaust Stack was voided. See Section 2.2.2 for details.
† The results for Run 1 at the Baghouse E Exhaust Stack are not included in the average.

3.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

3.1 PROCESS DESCRIPTION AND OPERATION

Mueller Brass Company is a manufacturer of standard and Pb-free brass alloys for various industrial uses. Brass Manufacturing Processes (Melting Lines C, E, and the Cast Shop) were in operation for this test event.

Figure 3.1 schematically depicts the sampling location.

3.2 CONTROL EQUIPMENT DESCRIPTION

During this test, emissions from Melting Lines C and E were controlled by their respective baghouses. Emisisons from the Cast Shop were controlled by Baghouse D.

3.3 SAMPLING LOCATION(S)

3.3.1 Baghouse C North Exhaust Stack

The Baghouse C North Exhaust Stack had an inner diameter of 58.0-inches and was oriented in the vertical plane. Two sampling ports were located 90° apart from one another at a location that met US EPA Method 1, Section 11.1.1 criteria. Prior to emissions sampling, the stack was traversed to verify the absence of cyclonic flow. An average yaw angle of 3.1° was measured. Therefore, the sampling location also met US EPA Method 1, Section 11.4.2 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flow rate, moisture content, filterable PM, condensable PM, and inorganic Pb concentration determinations. Grab samples of the stack gas were analyzed for dry molecular weight determination.

3.3.2 Baghouse C South Exhaust Stack

The Baghouse C South Exhaust Stack had an inner diameter of 58.0-inches and was oriented in the vertical plane. Two sampling ports were located 90° apart from one another at a location that met US EPA Method 1, Section 11.1.1 criteria. Prior to emissions sampling, the stack was traversed to verify the absence of cyclonic flow. An average yaw angle of 2.3° was measured. Therefore, the sampling location also met US EPA Method 1, Section 11.4.2 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flow rate, moisture content, filterable PM, condensable PM, and inorganic Pb concentration determinations. Grab samples of the stack gas were analyzed for dry molecular weight determination.

3.3.3 Baghouse D Exhaust Stack

The Baghouse D Exhaust Stack had an inner diameter of 89.0-inches and was oriented in the vertical plane. Four sampling ports were located 90° apart from one another at a location that met US EPA Method 1, Section 11.1.1 criteria. Prior to emissions sampling, the stack was traversed to verify the absence of cyclonic flow. An average yaw angle of 5.8º was measured. Therefore, the sampling location also met US EPA Method 1, Section 11.4.2 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flow rate, moisture content, filterable PM, condensable PM, and inorganic Pb concentration determinations. Grab samples of the stack gas were analyzed for dry molecular weight determination.

3.3.4 Baghouse E Exhaust Stack

The Baghouse E Exhaust Stack had an inner diameter of 65-inches and was oriented in the vertical plane. Two sampling ports were located 90° apart from one another at a location that met US EPA Method 1, Section 11.1.1 criteria. Prior to emissions sampling, the stack was traversed to verify the absence of cyclonic flow. An average yaw angle of 4.58º was measured. Therefore, the sampling location also met US EPA Method 1, Section 11.4.2 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flow rate, moisture content, filterable PM, condensable PM, and inorganic Pb concentration determinations. Grab samples of the stack gas were analyzed for dry molecular weight determination.

Figures 3.2 to 3.5 schematically illustrate the traverse point and sample port locations utilized.

3.4 PROCESS SAMPLING LOCATION(S)

The US EPA Reference Test Methods performed did not specifically require that process samples were to be taken during the performance of this testing event. It is in the best knowledge of Montrose that no process samples were obtained and therefore no process sampling location was identified in this report.

FIGURE 3.1
BOF/FGBOFSHOP SAMPLING LOCATION SCHEMATIC

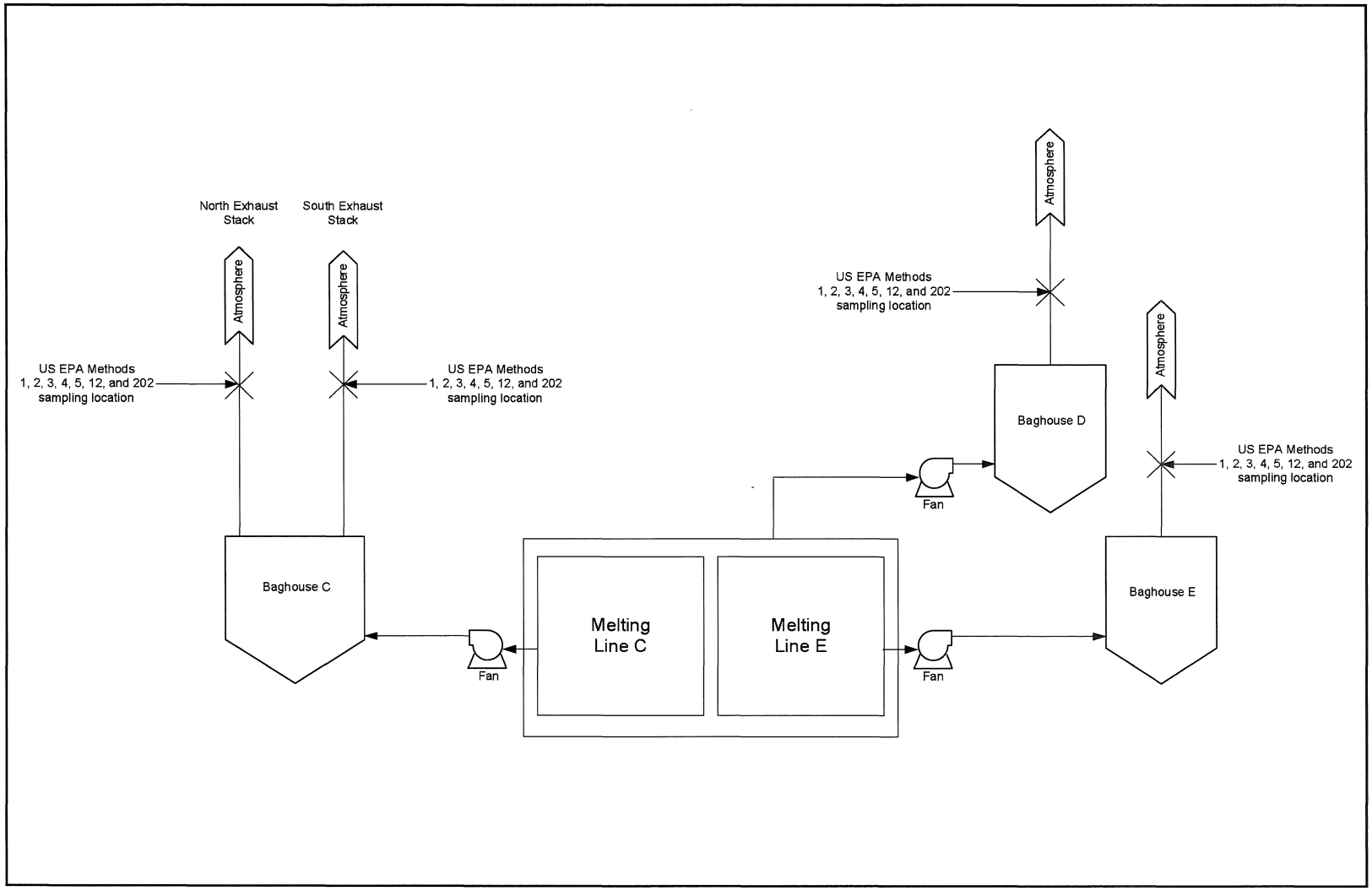
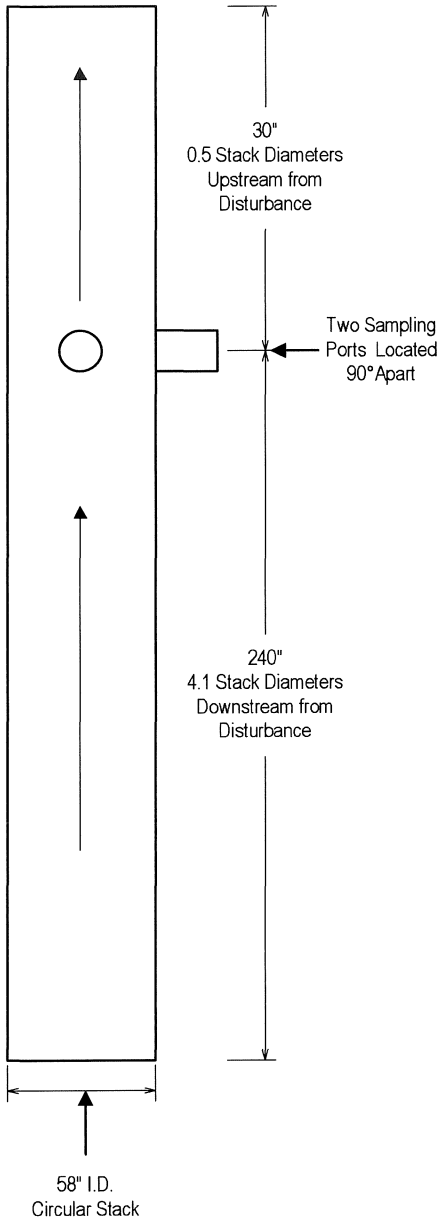
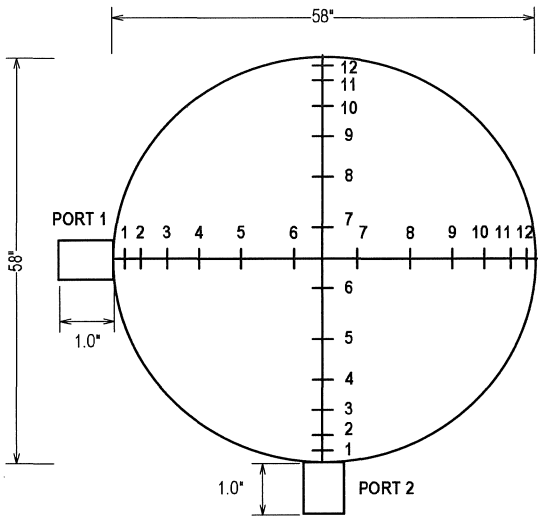


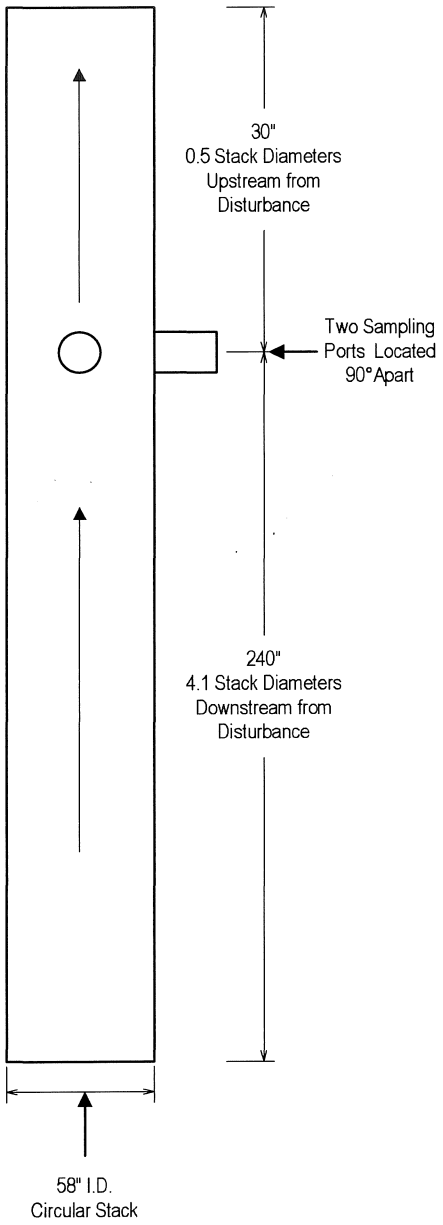
FIGURE 3.2
EXHAUST C NORTH TRAVERSE POINT LOCATION DRAWING

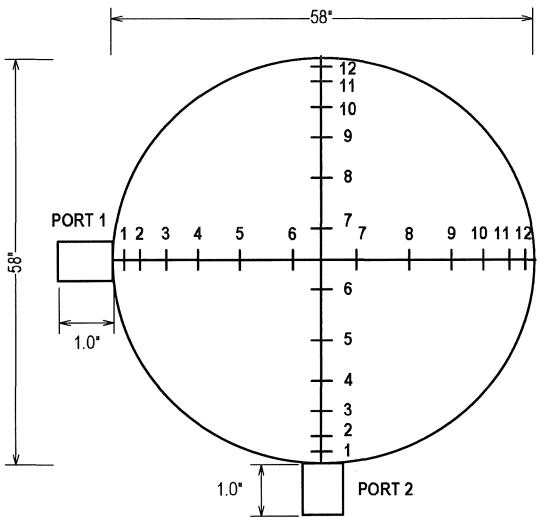




Point	% of Stack Depth	Distance from Inside Wall (in.) PORT 1	Distance from Inside Wall (in.) PORT 2
1	2.1	1.2	1.2
2	6.7	3.9	3.9
3	11.8	6.8	6.8
4	17.7	10.3	10.3
5	25.0	14.5	14.5
6	35.6	20.6	20.6
7	64.4	37.4	37.4
8	75.0	43.5	43.5
9	82.3	47.7	47.7
10	88.2	51.2	51.2
11	93.3	54.1	54.1
12	97.9	56.8	56.8

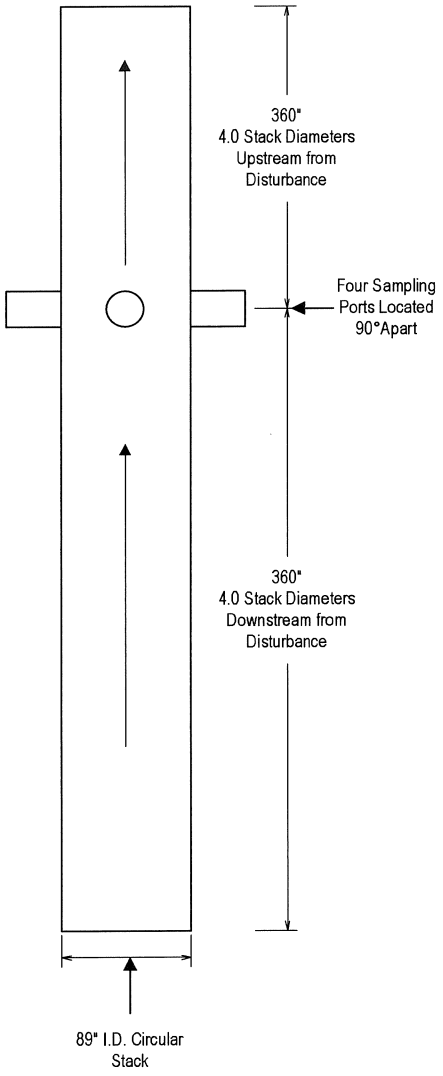
FIGURE 3.3
BAGHOUSE C SOUTH EXHAUST TRAVERSE POINT LOCATION DRAWING

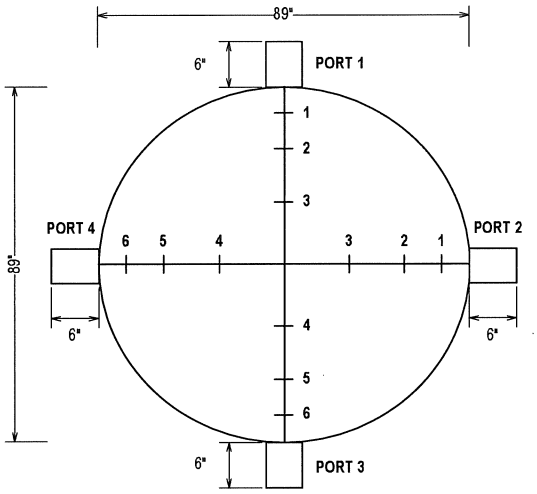




Point	% of Stack Depth	Distance from Inside Wall (in.) PORT 1	Distance from Inside Wall (in.) PORT 2
1	2.1	1.2	1.2
2	6.7	3.9	3.9
3	11.8	6.8	6.8
4	17.7	10.3	10.3
5	25.0	14.5	14.5
6	35.6	20.6	20.6
7	64.4	37.4	37.4
8	75.0	43.5	43.5
9	82.3	47.7	47.7
10	88.2	51.2	51.2
11	93.3	54.1	54.1
12	97.9	56.8	56.8

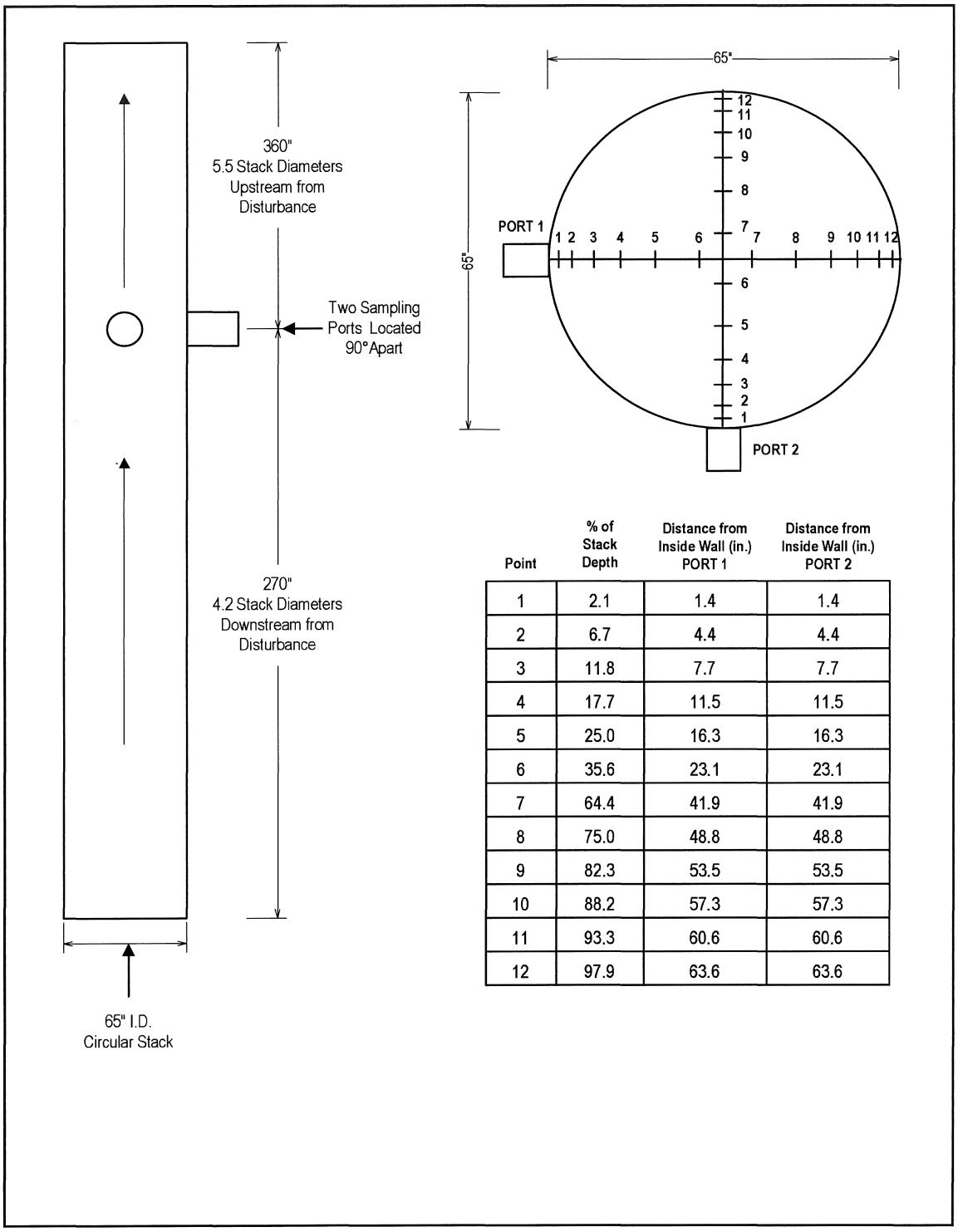
FIGURE 3.4
BAGHOUSE D EXHAUST TRAVERSE POINT LOCATION DRAWING





Point	% of Stack Depth	Distance from Inside Wall (in.) PORT 1 & 3	Distance from Inside Wall (in.) PORT 2 & 4
1	4.4	1.9	1.9
2	14.6	6.0	6.0
3	29.6	10.5	10.5
4	70.4	15.8	15.8
5	85.4	22.3	22.3
6	95.6	31.7	31.7

FIGURE 3.5
BAGHOUSE E EXHAUST TRAVERSE POINT LOCATION DRAWING



Point	% of Stack Depth	Distance from Inside Wall (in.) PORT 1	Distance from Inside Wall (in.) PORT 2
1	2.1	1.4	1.4
2	6.7	4.4	4.4
3	11.8	7.7	7.7
4	17.7	11.5	11.5
5	25.0	16.3	16.3
6	35.6	23.1	23.1
7	64.4	41.9	41.9
8	75.0	48.8	48.8
9	82.3	53.5	53.5
10	88.2	57.3	57.3
11	93.3	60.6	60.6
12	97.9	63.6	63.6

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

4.1.1 US EPA Method 1: "Sample and Velocity Traverses for Stationary Sources"

Principle: To aid in the representative measurement of pollutant emissions and/or total volumetric flow rate from a stationary source, a measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. A traverse point is then located within each of these equal areas. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.2 US EPA Method 2: "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"

Principle: The average gas velocity in a stack is determined from the gas density and from measurement of the average velocity head with a Type S (Stausscheibe or reverse type) pitot tube. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.3 US EPA Method 3: "Gas Analysis for the Determination of Dry Molecular Weight"

Principle: A gas sample is extracted from a stack by one of the following methods: (1) single-point, grab sampling; (2) single-point, integrated sampling; or (3) multi-point, integrated sampling. The gas sample is analyzed for percent CO_2, percent O_2, and if necessary, for percent CO. For dry molecular weight determination, either an Orsat or a Fyrite analyzer may be used for the analysis. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.4 US EPA Method 4: "Determination of Moisture Content in Stack Gases"

Principle: A gas sample is extracted at a constant rate from the source; moisture is removed from the sample stream and determined either volumetrically or gravimetrically. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.5 US EPA Method 5: "Determination of Particulate Emissions from Stationary Sources (Filterable PM Only)"

Principle: Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 120 ± 14°C (248 ± 25°F) or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. The PM mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after the removal of uncombined water. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.6 US EPA Method 12: "Determination of Inorganic Lead Emissions from Stationary Sources"

Principle: Particulate and gaseous Pb emissions are withdrawn isokinetically from the source and collected on a filter and in dilute nitric acid. The collected samples are digested in acid solution and analyzed by atomic absorption spectrometry using an air acetylene flame. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.7 US EPA Method 202: "Determination of Condensable Particulate Emissions from Stationary Sources"

Principle: Condensable Particulate Matter (CPM) is collected in dry impingers after filterable PM has been collected on a filter maintained as specified in either Method 5 of appendix A-3 to part 60, US EPA Method 17 of appendix A-6 to part 60, or US EPA Method 201A of appendix M to this part. The organic and aqueous fractions of the impingers and an out-of-stack CPM filter are then taken to dryness and weighed. The total of the impinger fractions and the CPM filter represents the CPM. Compared to the version of US EPA Method 202 that was promulgated on December 17, 1991, this method eliminates the use of water as the collection media in impingers and includes the addition of a condenser followed by a water dropout impinger immediately after the final in-stack or heated filter. This method also includes the addition of one modified Greenburg Smith impinger (backup impinger) and a CPM filter following the water dropout impinger.

The sampling trains utilized during this testing project are depicted in Figures 4.1 to 4.2.

4.2 PROCEDURES FOR OBTAINING PROCESS DATA

Process data was recorded by Mueller Brass Company personnel utilizing their typical record keeping procedures. Recorded process data was provided to Montrose personnel at the conclusion of this test event. The process data is located in Appendix A.

FIGURE 4.1
US EPA METHOD 5/202 SAMPLING TRAIN SCHEMATIC

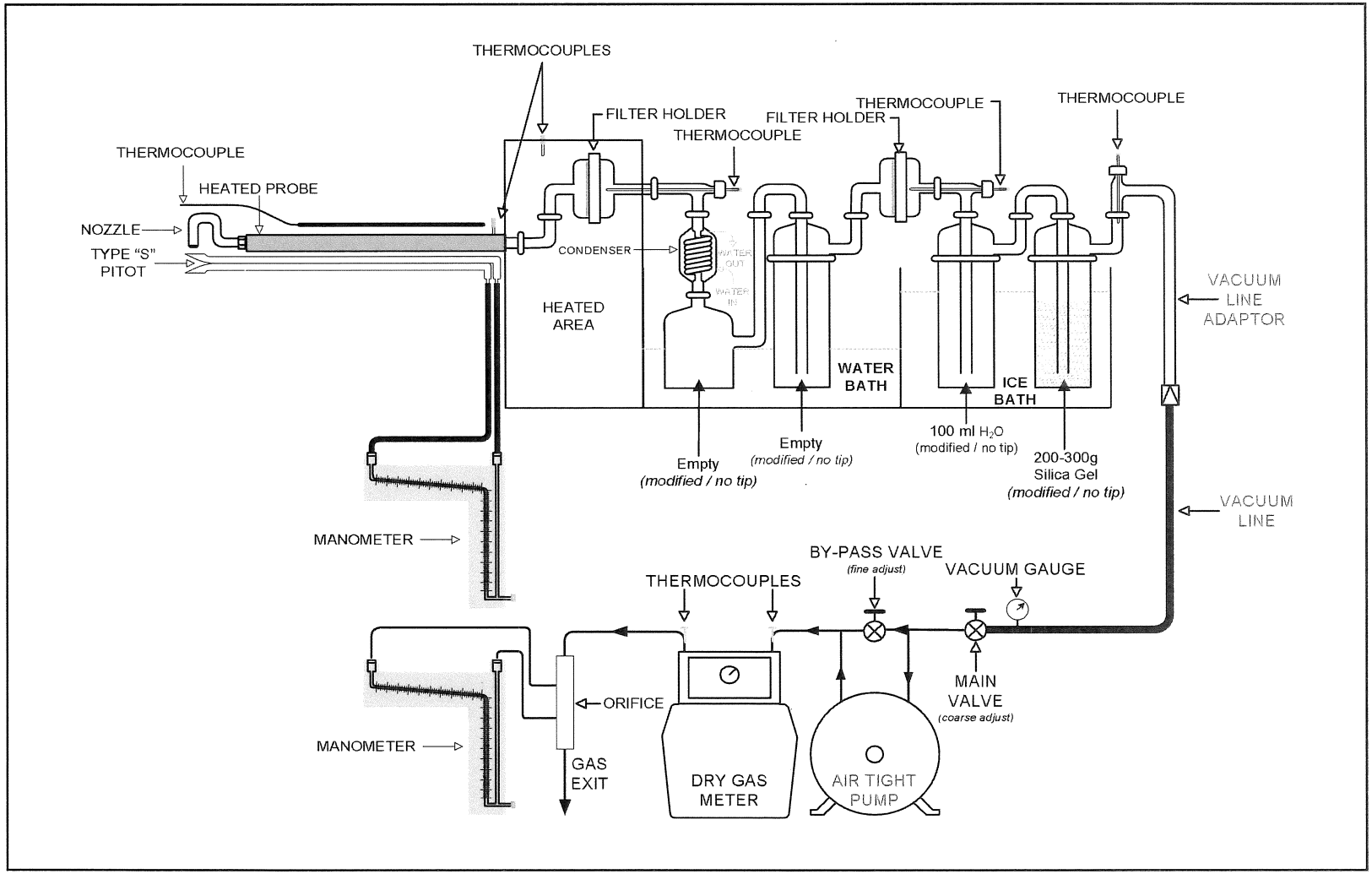
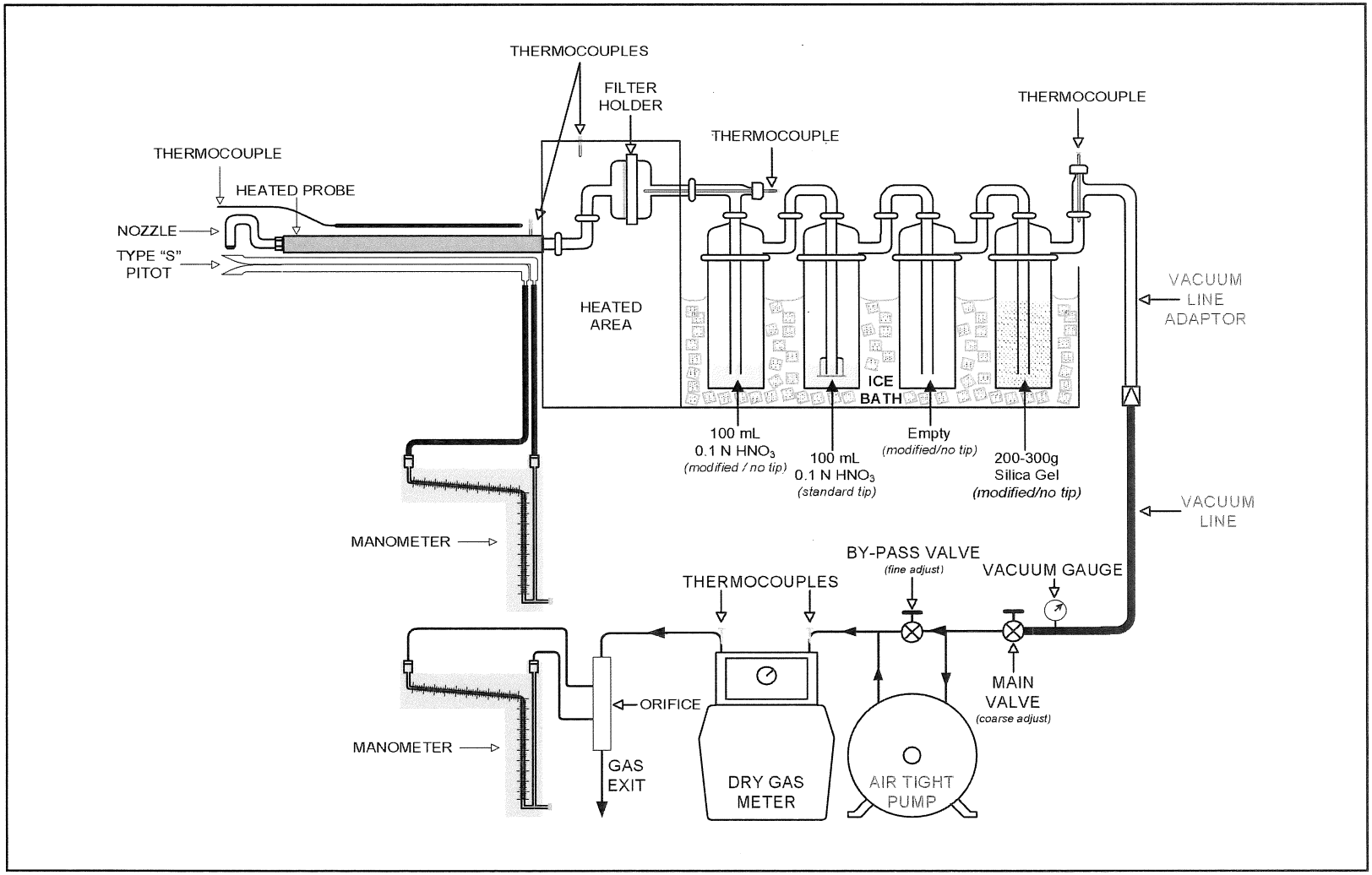


FIGURE 4.2
US EPA METHOD 12 SAMPLING TRAIN SCHEMATIC



5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA AUDITS

Tables 5.1.1 to 5.4 illustrate the QA audits that were performed during this test.

All meter boxes and sampling trains used during sampling performed within the requirements of their respective methods as is shown in Tables 5.1.1 to 5.2.2. All post-test leak checks were well below the applicable limit expect for Run 2 EPA Method 5/202 at the Baghouse D Exhaust Stack and Run 1 EPA Method 12 at the Baghouse E Exhaust Stack. Minimum metered volumes and percent isokinetics were also met where applicable.

Table 5.3 displays the US EPA Method 3 Fyrite Audits which were performed during this test in accordance with US EPA Method 3, Section 10.1 requirements. As shown, all Fyrite analyzer results were within ±0.5% of the respective Audit Gas concentrations.

Table 5.4 displays the laboratory QA results for US EPA Method 12. The Pb spike recovery was within the normal range of 75% to 125%. All samples were analyzed in duplicate.

5.2 QA/QC PROBLEMS

An onsite Montrose Qualified Individual (QI) with Group IV certification for US EPA Method 12 was not present during this test event as required by ASTM D 7036-04 Section 8.3.

5.3 QUALITY STATEMENT

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is presented in the report appendices.

TABLE 5.1.1
US EPA METHOD 5/202 SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3
Sampling Location	**Baghouse C North Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.000	0.000	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	80.365	85.914	82.655
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	101.7	100.3	100.4
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes
Sampling Location	**Baghouse C South Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.002	0.001	0.010
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	83.098	88.707	84.001
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	101.1	100.3	100.7
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes

TABLE 5.1.2
US EPA METHOD 5/202 SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3	Run 4
Sampling Location		**Baghouse D Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.005	> 0.020 *	0.002	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020	0.020
Acceptable	Yes	No	Yes	Yes
Volume of Dry Gas Collected (dscf)	86.066	85.148	86.866	76.176
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	100.1	100.0	99.8	100.7
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes	Yes
Sampling Location		**Baghouse E Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.000	0.000	0.000	
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020	
Acceptable	Yes	Yes	Yes	
Volume of Dry Gas Collected (dscf)	82.009	77.455	80.121	
Recommended Volume of Dry Gas Collected (dscf)	44.143	44.143	44.143	
Acceptable	Yes	Yes	Yes	
Percent of Isokinetic Sampling Rate (%)	100.4	100.1	100.7	
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10	
Acceptable	Yes	Yes	Yes	

* See Section 2.2.2 for further details

TABLE 5.1.3
US EPA METHOD 12 SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3
Sampling Location	**Baghouse C North Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.000	0.000	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	79.906	81.174	79.292
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	102.4	102.0	101.4
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes
Sampling Location	**Baghouse C South Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.000	0.000	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	90.558	85.152	87.274
Recommended Volume of Dry Gas Collected (dscf)	44.143	44.143	44.143
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	100.7	102.5	101.1
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes

TABLE 5.1.4
US EPA METHOD 12 SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3	Run 4
Sampling Location		**Baghouse D Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.000	0.001	0.002	-
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020	-
Acceptable	Yes	Yes	Yes	-
Volume of Dry Gas Collected (dscf)	84.055	89.718	88.481	-
Recommended Volume of Dry Gas Collected (dscf)	44.143	44.143	44.143	-
Acceptable	Yes	Yes	Yes	-
Percent of Isokinetic Sampling Rate (%)	100.3	100.1	101.0	-
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10	-
Acceptable	Yes	Yes	Yes	-
Sampling Location		**Baghouse E Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.500 *	0.000	0.001	0.000
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020	0.020
Acceptable	No	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	77.104	72.187	84.466	79.355
Recommended Volume of Dry Gas Collected (dscf)	44.143	44.143	44.143	44.143
Acceptable	Yes	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	100.4	99.9	100.5	99.9
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes	Yes

* See Section 2.2.3 for further details

TABLE 5.2.1
US EPA METHOD 5/202 DRY GAS METER AUDIT RESULTS

Sampling Location	Pre-Test Dry Gas Meter Calibration Factor (Y)	Average Post-Test Dry Gas Meter Calibration Check Value (Yqa)	Post Test Dry Gas Meter Calibration Check Value Difference From Pre-Test Calibration Factor (%)	Applicable Method Allowable Difference (%)	Acceptable
Baghouse C North Exhaust Stack	1.0160	1.0108	0.52%	5.00%	Yes
Baghouse C South Exhaust Stack	1.0240	1.0178	0.61%	5.00%	Yes
Baghouse D Exhaust Stack	1.0160	1.0229	-0.68%	5.00%	Yes
Baghouse E Exhaust Stack	1.0240	1.0221	0.18%	5.00%	Yes

TABLE 5.2.2
US EPA METHOD 12 DRY GAS METER AUDIT RESULTS

Sampling Location	Pre-Test Dry Gas Meter Calibration Factor (Y)	Average Post-Test Dry Gas Meter Calibration Factor (Y)	Post Test Dry Gas Meter Calibration Check Value Difference From Pre-Test Calibration Factor (%)	Applicable Method Allowable Difference (%)	Acceptable
Baghouse C North Exhaust Stack	1.0160	1.0126	0.33%	5.00%	Yes
Baghouse C South Exhaust Stack	1.0240	1.0202	0.37%	5.00%	Yes
Baghouse D Exhaust Stack	1.0160	1.0228	-0.67%	5.00%	Yes
Baghouse E Exhaust Stack	1.0240	1.0241	-0.01%	5.00%	Yes

TABLE 5.3
US EPA METHOD 3 FYRITE AUDIT

Audit Date	August 19, 2019	
Audit Gas	**%CO_2**	**%O_2**
Audit Gas Concentration (%)	**10.1**	**10.1**
Fyrite Response 1 (%)	10.0	10.0
Fyrite Response 2 (%)	10.0	10.0
Fyrite Response 3 (%)	10.0	10.0
Average (%)	10.0	10.0
Average Within ±0.5%	Yes	Yes

Audit Gas Cylinder Number: CC469695

TABLE 5.4
US EPA METHOD 12 LABORATORY QA

Parameter	Pb
Pb Spike Recovery (%)	82
Acceptable per US EPA Method 12 (Expected Range 75%-125%)	YES
Front-Half Duplicate, %RPD	2.3
Acceptable per US EPA Method 12 (Expected Difference Within 20%)	YES

APPENDIX

APPENDIX CHECKLIST - M049AS-553001-RT-138R0

A.1-FACILITY DATA
- [x] ESP Process Operational Data

B-LABORATORY DATA
- [x] Laboratory Reports

C-FIELD DATA

C.1-Baghouse C (North) Exhaust
- [x] Calculation Spreadsheet(s) and Example Calculations
- [ ] Test Log (CEMS Methods)
- [ ] CEMS Graphs
- [ ] Main Method Field Data Sheets
- [x] Isokinetic Field Data Sheets
- [ ] US EPA Method 9 Field Data
- [x] Sample Recovery & Calibration Check Data
- [x] US EPA Method 3 / Dry MW Calculation
- [ ] US EPA Method 2 Flow Data Sheets
- [x] US EPA Method 1 Cyclonic Flow
- [ ] US EPA Method 1 Preliminary Field Data

C.2-Baghouse C (South) Exhaust
- [x] Calculation Spreadsheet(s) and Example Calculations
- [ ] Test Log (CEMS Methods)
- [ ] CEMS Graphs
- [ ] Main Method Field Data Sheets
- [x] Isokinetic Field Data Sheets
- [ ] US EPA Method 9 Field Data
- [x] Sample Recovery & Calibration Check Data
- [x] US EPA Method 3 / Dry MW Calculation
- [ ] US EPA Method 2 Flow Data Sheets
- [x] US EPA Method 1 Cyclonic Flow
- [ ] US EPA Method 1 Preliminary Field Data

C.3-Baghouse D Exhaust
- [x] Calculation Spreadsheet(s) and Example Calculations
- [ ] Test Log (CEMS Methods)
- [ ] CEMS Graphs
- [ ] Main Method Field Data Sheets
- [x] Isokinetic Field Data Sheets
- [ ] US EPA Method 9 Field Data
- [x] Sample Recovery & Calibration Check Data
- [x] US EPA Method 3 / Dry MW Calculation
- [ ] US EPA Method 2 Flow Data Sheets
- [x] US EPA Method 1 Cyclonic Flow
- [ ] US EPA Method 1 Preliminary Field Data

C-FIELD DATA (continued)

C.4-Baghouse E Exhaust
- [x] Calculation Spreadsheet(s) and Example Calculations
- [ ] Test Log (CEMS Methods)
- [ ] CEMS Graphs
- [ ] Main Method Field Data Sheets
- [x] Isokinetic Field Data Sheets
- [ ] US EPA Method 9 Field Data
- [x] Sample Recovery & Calibration Check Data
- [x] US EPA Method 3 / Dry MW Calculation
- [ ] US EPA Method 2 Flow Data Sheets
- [x] US EPA Method 1 Cyclonic Flow
- [ ] US EPA Method 1 Preliminary Field Data

D-CALIBRATIONS AND CERTIFICATIONS

D.1-CEMS ANALYZERS
- [ ] Analyzer Calibration Error, System Bias, and System Drift
- [ ] US EPA Method 7E Converter Efficiency Check
- [ ] US EPA Method 205 Calibration Gas Dilution System Evaluation

D.2-FIELD EQUIPMENT
- [ ] Probe Nozzle Inspections
- [x] Pre-Test Pitot Tube / Probe Inspections
- [ ] Post-Test Pitot Tube / Probe Inspections
- [x] Pre-Test Thermocouple System Audit
- [ ] Post-Test Thermocouple Check
- [ ] 10-Minute Calibrations
- [x] Pre-Test Meter Box Calibration
- [ ] Post-Test dry Gas Meter ALT-009 Leak Check
- [x] Post-Test Dry Gas Meter / Orifice and Console Calibration
- [ ] Post-Test Mini Meter / Orifice and Console Calibration
- [ ] Calibration Kit (C-CKT-00) Audit
- [ ] Digital Pressure Gauge / Barometer Audit
- [ ] Thermometer Audit
- [ ] Equipment Calibration Histories

D-CALIBRATIONS AND CERTIFICATIONS (continued)

D.3-REFERENCE EQUIPMENT/STANDARDS
- [x] Calibration Gas Certifications
- [x] Calibration Gas Diluter Certifications
- [ ] True Primary Flow Standard Certification
- [ ] Field Balance Calibration Weights Certifications
- [ ] Field / Shop Balance Calibration Certifications
- [ ] Daily Field/Shop Balance Audit
- [ ] Micromanometer Certificate
- [ ] Reference Meter Calibration
- [ ] Reference Field Hygrometer Calibration
- [ ] VE Azimuth Tables
- [ ] VE Declination
- [ ] VE Certificates
- [ ] Reference Digital Pressure Gauge Certification
- [ ] Reference Thermometer (Omega) Certification
- [ ] Reference Ruler Certification
- [ ] Reference Protractor Certification
- [ ] Reference Caliper Certification

D.4-MONTROSE STAC & PERSONNEL
- [x] Montrose - Accreditation Certificate
- [x] Montrose Personnel - QI/QSTI Certificates/Conformance Documents

D.5-TEST PLANS AND APPROVALS
- [x] Test Plan and Approval