Compliance Stack Emission Test Report

Determination of Filterable Particulate Matter, Visible and Fugitive Emissions

Cupola Emission System (P901)

EPA Methods 1, 2, 3, 4, 5, 9, and 22

Clow Water Systems Co.
Coshocton, Ohio

Date Conducted: May 11, 2011
Job Number: 110504

Prepared by:

Air Compliance Testing, Inc.

PO Box 41156
Cleveland OH 44141-0156
Phone: (800) EPA-AIR1 (372-2471)

Report Date: June 6, 2011

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Air Compliance Testing, Inc.

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June 6, 2011

Heather Klesch
Environmental Manager
Clow Water Systems Co.
PO Box 6001
Coshocton, Ohio 43812-6001

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Dear Heather:

The following report provides the results of the compliance emission testing conducted on May 11, 2011. These results are a product of the application of the U.S. EPA Stationary Source Sampling Methods listed in 40 CFR Part 60 Appendix A that were in effect at the time of this test. To the best of my knowledge, this report has been checked for completeness, and the results presented are accurate, error-free, legible, and representative of the actual emissions measured during testing.

Please mail one copy of this report along with any other supportive process operating data collected during this test to your local EPA representative. You should also attach a cover letter (on company letterhead) stating the purpose and the outcome of this test. Additionally, you may address, preferably in a timetable format, any obligations or implications that might be necessary to achieve environmental compliance because of the result of this test.

Please do not hesitate to call if you have any questions or concerns about these test results. On behalf of Air Compliance Testing, I would also like to personally thank you for the opportunity to work with you on this testing project and would enjoy the opportunity to work with you again on any additional future testing projects.

Sincerely,

Robert J. Lisy, Jr.
Quality Assurance Manager

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1.0 INTRODUCTION

1.1 Summary of Test Program

Clow Water Systems Co. (Facility ID: 06-16-01-0006), located in Coshocton, Ohio, contracted Air Compliance Testing, Inc. of Cleveland, Ohio, to conduct compliance stack emission testing for their Cupola Emission System (P901). Testing was performed to satisfy the emission testing requirements pursuant to Appendix 3 Section III of the McWane, Inc. Consent Decree and the testing requirements outlined in the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries Area Sources (40 CFR Part 63 Subpart ZZZZZ). The testing was performed on May 11, 2011.

Sampling was performed at the P901 Scrubber Exhaust Stack to determine the emissions of filterable particulate matter (PM). In addition, observations were performed at the P901 Scrubber System Shroud Area to determine the percent opacity of visible emissions (VE's). Observations were also performed at the Flange Fabrication Building to determine the frequency of fugitive emissions. Testing was conducted during maximum achievable operations. During this test, emissions from P901 were controlled by an afterburner, wet cap, venturi scrubber, and Ring Jet scrubber system which includes packed bed, Ring Jets and demister.

The test methods that were conducted during this test were EPA Methods 1, 2, 3, 4, 5, 9, and 22. EPA Method 22 observations were performed by Clow Water Systems personnel.

1.2 Key Personnel

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

Heather Klesch, Environmental Manager, Clow Water Systems Company, 740-291-1087
Tyson Houchin QSTI, Operations Director, Air Compliance Testing, Inc., 800-372-2471
Chuck Giffels QI, Operations Manager, Air Compliance Testing, Inc., 800-372-2471

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 at the P901 Scrubber System Exhaust Stack, the percent opacity of VE's at the P901 Scrubber System Shroud Area, and the frequency of fugitive emissions at the Flange Fabrication Building during maximum achievable operations. Testing was performed to satisfy the emission testing requirements pursuant to Appendix 3 Section III of the McWane, Inc. Consent Decree and the testing requirements outlined in 40 CFR Part 63 Subpart ZZZZZ.

The specific test objectives for this test were to:

Measure the concentration of filterable PM at the P901 Scrubber System Exhaust Stack.

Measure the dry standard and actual volumetric flow rate of the stack gas at the P901 Scrubber Exhaust Stack.

Utilize the above variables to determine the emissions of filterable PM at the P901 Scrubber Exhaust Stack during maximum achievable operations.

Determine the VE's (as %-opacity) at the P901 Scrubber System Shroud Area during maximum achievable operations.

Determine the frequency of fugitive emissions at the Flange Fabrication Building during maximum achievable operations.

Table 2.1 presents the sampling and analytical matrix log for this test.

2.2 Field Test Changes and Problems

No field test changes or problems occurred during the performance of this test that would bias the accuracy of the results of this test.

2.3 Presentation of Results

A single sampling train was utilized during each run at the P901 Scrubber Exhaust Stack to determine the emissions of filterable PM. This sampling train measured the stack gas volumetric flow rate, dry molecular weight, moisture content, and concentration of filterable PM.

Table 2.2 displays the emissions of filterable PM measured at the P901 Scrubber Exhaust Stack.

Table 2.3 summarizes the VE results. The table displays the minimum, maximum, and six-minute average opacity readings. Table 2.3 also displays the frequency of fugitive emissions recoded at the Flange Fabrication Building. Fugitive emission frequencies were recorded by Clow Water Systems personnel.

Tables 2.3.1 - 2.3.3.2 display the measured results for the VE readings at the P901 Scrubber System Shroud Area. The data displays the minimum, maximum, and maximum six-minute average opacity readings.

			EPA TEST METHODS UTILIZED					
			M1/M2 (Flow)	M3 (Dry Mol. Wt.)	M4 (%H_2O)	M5 (Filterable PM)	M9 (VE's)	M22* (Fugitive Emissions)
Date	Run No.	Sampling Location	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)	Sampling Time / Duration (min)
5/11/2011	1	P901 Scrubber Exhaust Stack	5:03 - 7:07 120	5:03 - 7:07 120	5:03 - 7:07 120	5:03 - 7:07 120	6:30 - 7:05 35	6:32 - 7:32 45.7
5/11/2011	2	P901 Scrubber Exhaust Stack	7:38 - 9:42 120	7:38 - 9:42 120	7:38 - 9:42 120	7:38 - 9:42 120	7:40 - 9:40 120	7:40 - 9:42 98.6
5/11/2011	3	P901 Scrubber Exhaust Stack	10:44 - 12:48 120	10:44 - 12:48 120	10:44 - 12:48 120	10:44 - 12:48 120	10:44 - 12:44 120	10:49 - 12:49 96.03

All times are Eastern Daylight Time.

* Performed at the Flange Fabrication Building by Clow Water Systems personnel.

Table 2.1 - Sampling and Analytical Matrix

	P901 Scrubber Exhaust Stack			
	Run 1	Run 2	Run 3	Average
Total Metal Charged (ton/hr)*	65.0	78.0	78.0	73.7
Filterable Particulate Matter Mass Emission Rate (lb/ton)	0.061	0.036	0.029	0.042
Filterable Particulate Matter Mass Emission Rate (lb/hr)	3.96	2.83	2.29	3.03
Filterable Particulate Matter Concentration (grains/dscf)	0.011	0.0085	0.0072	0.0089
Stack Gas Average Flow Rate (acfm)	53,721	51,111	50,888	51,907
Stack Gas Average Flow Rate (scfm)	45,696	43,006	42,307	43,669
Stack Gas Average Flow Rate (dscfm)	41,703	38,847	37,284	39,278
Stack Gas Average Velocity (fpm)	2,474	2,354	2,343	2,390
Stack Gas Average Static Pressure (in-H_2O)	-0.48	-0.45	-0.52	-0.48
Stack Gas Average Temperature (°F)	138	145	152	145
Stack Gas Percent by Volume Moisture (%H_2O)	8.74	9.67	11.87	10.09
Measured Stack Inner Diameter (in)**	63.0 X 63.2	63.0 X 63.2	63.0 X 63.2	63.0 X 63.2
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	14.00	15.00	15.00	14.67
Percent by Volume Oxygen in Stack Gas (%-dry)	10.00	9.00	9.00	9.33
Percent by Volume Nitrogen in Stack Gas (%-dry)	76.00	76.00	76.00	76.00

* Provided by Clow Water Systems personnel.

** The P901 Scrubber Exhaust Stack was elliptical in shape.

Table 2.2 - Emission Results

Date	Run No.	Sampling Location	Test Run Start Time	Test Run Stop Time	Test Run Duration (min)	Minimum Reading (%-opacity)	Maximum Reading (%-opacity)	Highest Six-Minute Average (%-opacity)
5/11/2011	1	P901 Scrubber System Shroud Area	6:30	7:05	35	0.0	10.0	6.7
5/11/2011	2	P901 Scrubber System Shroud Area	7:40	9:40	120	0.0	10.0	6.5
5/11/2011	3	P901 Scrubber System Shroud Area	10:44	12:44	120	0.0	10.0	7.3

Date	Run No.	Sampling Location	Test Run Start Time	Test Run Stop Time	Test Run Duration (min)	Accumulated Emission Time (min)
5/11/2011	1	Flange Fabrication Building	6:32	7:32	45.65	0.0
5/11/2011	2	Flange Fabrication Building	7:40	9:42	98.61	0.0
5/11/2011	3	Flange Fabrication Building	10:49	12:49	96.03	0.0

Note: EPA Method 22 observations were performed by Clow Water Systems personnel.

Table 2.3 - Opacity Test Result Summary

Max 6 min average	6.67
Minimum Reading	0
Maximum Reading	10.00

Start Time	6:30
End Time	7:05

Sec.	0	15	30	45	Six minute averages:			
Min.								
0	5	5	5	0	5.00	5.00	5.00	5.00
1	5	5	5	5	5.21	5.42	5.63	5.63
2	5	5	5	5	5.63	5.63	5.63	5.42
3	5	10	5	5	5.21	5.00	4.79	4.79
4	5	5	10	0	4.79	4.79	4.79	4.58
5	0	5	10	5	4.79	5.21	5.21	4.79
6	5	5	5	5	4.58	4.58	4.58	4.58
7	10	10	5	5	4.38	4.17	3.96	3.96
8	5	5	0	0	3.96	3.96	3.96	4.17
9	0	5	5	5	4.38	4.58	4.58	4.58
10	5	5	5	5	4.58	4.58	4.58	4.58
11	10	5	0	0	4.58	4.38	4.38	4.58
12	5	5	5	0	4.79	4.79	4.79	4.79
13	5	5	5	5	5.00	5.00	5.00	5.00
14	5	5	5	5	5.00	5.00	5.00	5.21
15	5	5	5	5	5.21	5.21	5.21	5.21
16	5	5	5	5	5.21	5.21	5.21	5.21
17	5	5	5	5	5.21	5.21	5.21	5.21
18	5	5	5	5	5.42	5.63	5.63	5.83
19	5	5	5	5	5.83	5.83	6.04	6.25
20	5	5	10	5	6.46	6.46	6.46	6.04
21	5	5	5	5	5.83	5.83	5.83	6.04
22	5	5	5	5	6.04	6.25	6.25	6.46
23	5	5	5	10	6.46	6.67	6.67	6.67
24	10	5	10	5	6.67	6.25	6.04	5.63
25	5	10	10	10	5.63	5.63	5.42	5.21
26	5	5	0	0	5.00	5.00	4.79	5.00
27	5	5	10	5	5.21	5.21	5.21	5.00
28	10	5	10	5	5.21	5.00	5.00	4.79
29	10	5	5	10	4.79			
30	0	0	0	5				
31	5	5	5	5				
32	5	0	5	5				
33	5	5	5	10				
34	5	5	5	5				

Table 2.3.1 - Visible Emissions

Max 6 min average	6.46
Minimum Reading	0
Maximum Reading	10.00

Start Time	7:40
End Time	9:40

Sec.	0	15	30	45	Six minute averages:			
Min.								
0	5	5	5	5	5.83	5.83	5.83	5.83
1	5	10	5	0	6.04	6.04	6.04	6.25
2	5	5	10	10	6.46	6.46	6.46	6.25
3	5	5	5	5	6.04	6.04	6.04	6.04
4	5	10	5	10	6.04	6.04	5.83	6.04
5	5	5	5	5	5.83	5.83	5.83	5.83
6	5	5	5	10	6.04	6.04	6.25	6.46
7	5	10	10	5	6.25	6.25	6.04	5.83
8	5	5	5	5	5.83	5.83	5.83	5.83
9	5	5	5	5	6.04	6.04	6.04	6.04
10	5	5	10	5	6.04	6.04	6.25	6.25
11	5	5	5	10	6.46	6.46	6.46	6.46
12	5	10	10	5	6.25	6.25	6.04	6.04
13	5	5	5	5	6.04	5.83	5.63	5.63
14	5	5	5	10	5.42	5.21	5.21	5.21
15	5	5	5	5	4.79	4.58	4.58	4.58
16	5	10	10	10	4.58	4.58	4.38	4.17
17	5	5	5	5	3.96	3.75	3.75	3.75
18	5	5	10	5	3.75	3.96	3.96	3.75
19	0	0	5	0	3.75	3.96	4.17	4.17
20	0	5	5	0	4.38	4.58	4.58	4.58
21	0	5	5	5	4.79	5.00	5.00	5.00
22	5	5	5	5	5.21	5.21	5.21	5.21
23	0	5	5	5	5.21	5.63	5.63	5.83
24	10	5	5	5	6.04	5.83	5.83	5.83
25	5	5	5	5	5.83	5.83	5.63	5.42
26	5	5	5	5	5.42	5.42	5.42	5.42
27	5	5	5	10	5.42	5.42	5.42	5.42
28	5	5	5	5	5.21	5.21	5.00	5.00
29	10	5	10	10	5.21	5.00	5.21	5.21
30	5	5	5	5	5.00	5.00	5.21	5.21
31	5	0	0	5	5.42	5.42	5.83	6.04
32	5	5	5	5	5.83	5.63	5.63	5.63
33	5	5	5	5	5.63	5.63	5.83	6.04
34	5	0	5	10	6.04	6.04	6.25	6.25
35	5	10	10	5	6.04	6.04	5.83	5.63
36	5	10	5	10	5.63	5.42	5.00	5.00
37	5	10	5	0	4.79	4.79	4.58	4.58
38	0	5	5	5	4.79	5.00	5.00	5.00
39	5	10	10	5	5.00	4.79	4.58	4.38
40	5	5	5	5	4.17	4.17	4.17	4.17
41	5	5	5	5	4.17	4.17	4.17	4.17
42	0	0	5	5	4.38	4.58	4.79	4.79
43	5	5	5	5	4.79	4.79	5.00	5.00
44	5	5	5	5	5.21	5.21	5.21	5.21
45	0	5	5	0	5.21	5.42	5.42	5.42
46	5	5	5	5	5.63	5.63	5.63	5.83
47	5	5	5	10	6.04	6.04	6.04	6.04
48	5	5	5	5	5.83	5.63	5.63	5.63
49	5	10	5	10	5.42	5.42	5.42	5.63
50	5	5	5	5	5.63	5.63	5.63	5.63
51	5	5	5	5	5.83	6.04	6.04	6.04
52	5	5	10	10	5.83	5.83	5.83	5.42
53	5	5	5	5	5.21	5.21	5.21	5.21
54	0	5	5	0	5.21	5.42	5.42	5.63
55	5	10	10	10	6.04	6.04	5.83	5.63
56	5	5	5	10	5.63	5.63	5.63	5.63
57	10	5	5	0	5.42	5.00	5.00	5.00
58	5	5	0	5	5.21	5.21	5.21	5.42
59	5	5	5	5	5.42	5.42	5.42	5.63

Table 2.3.2.1 - Visible Emissions

Max 6 min average	6.46
Minimum Reading	0
Maximum Reading	10.00

Start Time	7:40
End Time	9:40

Sec.	0	15	30	45	Six minute averages:			
Min.								
60	5	5	10	10	5.83	5.83	6.04	5.83
61	5	5	5	10	5.63	5.63	5.63	5.63
62	5	5	5	5	5.63	5.63	5.63	5.83
63	0	5	5	5	5.83	6.04	6.25	6.46
64	5	5	5	5	6.46	6.46	6.67	6.88
65	5	5	10	10	7.08	7.08	7.08	6.88
66	5	10	5	5	6.67	6.67	6.46	6.46
67	5	5	5	10	6.46	6.46	6.46	6.67
68	5	5	10	5	6.67	6.46	6.25	6.04
69	5	10	10	5	6.04	5.83	5.63	5.21
70	5	10	10	10	5.21	5.21	5.00	4.79
71	5	5	5	5	4.79	4.79	4.79	4.79
72	5	5	5	5	4.58	4.58	4.58	4.58
73	5	5	10	10	4.58	4.58	4.58	4.38
74	0	0	5	5	4.17	4.38	4.58	4.79
75	0	5	0	5	4.79	5.00	5.00	5.21
76	5	5	5	10	5.21	5.21	5.42	5.42
77	5	5	5	0	5.21	5.21	5.21	5.21
78	5	5	5	5	5.42	5.63	5.63	5.83
79	5	5	5	5	6.04	6.04	6.04	6.25
80	5	5	10	5	6.25	6.25	6.46	6.46
81	5	5	5	5	6.46	6.25	6.25	6.25
82	5	10	5	5	6.25	6.25	6.25	6.46
83	5	5	5	5	6.46	6.67	6.88	7.08
84	10	5	10	10	7.08	6.67	6.67	6.46
85	5	5	10	5	6.25	6.25	6.25	6.04
86	5	10	10	5	6.04	6.04	5.83	5.83
87	0	5	5	5	6.04	6.25	6.25	6.25
88	5	10	10	5	6.25	6.25	6.25	6.25
89	10	10	10	5	6.25	6.04	5.83	5.63
90	0	5	5	5	5.63	5.83	5.83	5.83
91	5	5	5	5	5.83	5.63	5.42	5.42
92	5	5	10	10	5.42	5.63	5.63	5.42
93	5	5	5	5	5.21	5.21	5.21	5.21
94	5	10	10	5	5.21	5.00	4.79	4.38
95	5	5	5	5	4.17	4.17	4.17	4.17
96	5	5	5	5	4.17	4.17	4.17	4.17
97	0	0	5	5	4.17	4.38	4.38	4.17
98	10	5	5	5	4.17	3.96	3.96	3.96
99	5	5	5	5	3.96	3.96	3.96	3.75
100	0	5	0	0	3.75	3.75	3.75	3.75
101	5	5	5	5	3.75	3.75	3.54	3.54
102	5	5	5	5	3.54	3.54	3.54	3.54
103	5	0	0	5	3.54	3.54	3.96	4.38
104	5	5	5	5	4.38	4.58	4.58	4.58
105	5	5	0	5	4.58	4.58	4.58	5.00
106	0	5	0	0	5.00	5.21	5.21	5.63
107	5	0	5	5	6.04	6.04	6.25	6.25
108	5	5	5	5	6.25	6.25	6.46	6.67
109	5	10	10	5	6.88	6.88	6.67	6.46
110	10	5	5	5	6.46	6.25	6.25	6.25
111	5	5	10	5	6.25	6.04	5.83	5.63
112	5	5	10	10	5.83	5.83	5.83	5.63
113	5	5	5	5	5.42	5.42	5.42	5.42
114	5	10	10	10	5.42	5.43	5.23	5.00
115	5	5	5	5				
116	5	5	5	5				
117	0	0	5	10				
118	5	5	5	5				
119	5	5	5	5				

Table 2.3.2.2 - Visible Emissions

Max 6 min average	7.29
Minimum Reading	0
Maximum Reading	10.00

Start Time	10:44
End Time	12:44

Sec.	0	15	30	45	Six minute averages:			
Min.								
0	5	0	0	5	5.63	5.63	5.83	6.04
1	5	5	5	5	6.04	6.04	6.25	6.46
2	5	10	10	5	6.67	6.88	6.67	6.46
3	5	10	10	5	6.25	6.04	5.83	5.63
4	10	5	5	5	5.83	5.63	5.83	5.83
5	5	5	5	5	6.04	6.04	6.04	6.25
6	5	5	5	5	6.25	6.25	6.25	6.25
7	5	10	10	10	6.25	6.25	6.04	6.04
8	10	5	5	0	6.04	6.04	6.25	6.46
9	0	5	5	10	6.67	7.08	7.08	7.29
10	5	10	5	10	7.08	7.08	6.88	6.67
11	5	5	10	5	6.25	6.46	6.67	6.67
12	5	5	5	5	6.67	6.67	6.67	6.88
13	5	5	10	10	6.88	6.88	6.88	6.67
14	10	10	10	5	6.67	6.46	6.25	6.04
15	10	5	10	5	6.04	6.04	6.04	5.83
16	5	5	0	0	5.83	5.63	5.63	6.04
17	10	10	10	5	6.25	6.04	5.83	5.63
18	5	5	10	5	5.63	5.42	5.21	5.00
19	5	5	5	10	5.00	5.00	5.21	5.21
20	5	5	5	5	5.00	5.21	5.42	5.42
21	10	5	5	5	5.42	5.21	5.21	5.21
22	0	5	10	5	5.21	5.21	5.00	4.79
23	5	5	5	5	4.79	4.58	4.38	4.38
24	0	0	5	5	4.58	4.79	5.00	5.21
25	5	10	5	5	5.42	5.42	5.21	5.00
26	10	10	5	5	4.79	4.58	4.38	4.38
27	5	5	5	5	4.38	4.58	4.58	4.58
28	0	0	5	5	4.79	5.21	5.42	5.42
29	0	0	5	10	5.63	5.83	5.83	5.63
30	5	5	10	10	5.42	5.42	5.42	5.21
31	5	5	0	0	5.00	5.00	5.00	5.00
32	5	5	5	5	5.00	4.79	4.79	4.79
33	10	5	5	10	5.00	4.79	4.79	4.79
34	10	5	5	10	4.79	4.79	5.00	5.00
35	5	0	0	5	4.79	4.79	5.00	5.21
36	5	5	5	5	5.21	5.21	5.21	5.21
37	5	5	0	0	5.21	5.21	5.21	5.21
38	0	5	5	10	5.42	5.42	5.21	5.21
39	5	5	5	10	5.00	5.21	5.42	5.42
40	10	10	5	5	5.21	5.21	5.00	5.00
41	5	5	5	5	5.00	5.00	5.00	5.21
42	5	5	5	5	5.42	5.42	5.21	5.21
43	5	5	0	5	5.00	5.00	5.00	5.42
44	0	0	5	5	5.63	5.83	5.83	6.04
45	10	10	5	5	6.25	6.04	6.04	6.04
46	10	5	5	5	6.04	5.83	5.83	5.83
47	5	5	10	10	5.83	5.83	5.83	5.63
48	5	0	5	0	5.42	5.63	6.04	6.04
49	5	5	10	10	6.25	6.46	6.67	6.46
50	5	0	10	10	6.04	5.83	6.04	6.04
51	5	10	5	5	5.63	5.63	5.42	5.42
52	5	5	5	5	5.42	5.42	5.42	5.42
53	5	5	5	5	5.42	5.42	5.42	5.42
54	10	10	5	5	5.42	5.21	5.00	5.00
55	10	10	5	0	5.00	4.79	4.58	4.38
56	0	5	10	0	4.58	4.79	4.79	4.79
57	5	5	5	5	5.21	5.00	5.00	5.00
58	5	5	5	5	5.00	5.00	5.00	5.00
59	5	5	5	5	5.00	5.00	5.00	5.00

Table 2.3.3.1 - Visible Emissions

Max 6 min average	7.29
Minimum Reading	0
Maximum Reading	10.00

Start Time	10:44
End Time	12:44

Sec.	0	15	30	45	Six minute averages:			
Min.								
60	5	5	5	5	5.00	5.00	5.00	5.00
61	5	5	0	5	5.00	5.00	5.21	5.63
62	5	5	10	10	5.83	6.04	6.04	5.83
63	0	5	5	5	5.63	5.83	5.83	6.04
64	5	5	5	5	6.04	6.04	6.04	6.04
65	5	5	5	5	6.04	6.04	6.25	6.46
66	5	5	5	5	6.46	6.46	6.46	6.46
67	5	10	10	10	6.46	6.46	6.46	6.46
68	10	5	5	5	6.25	5.83	5.63	5.63
69	5	5	10	5	5.42	5.21	5.21	5.00
70	5	5	5	5	5.00	5.00	4.79	4.79
71	5	10	10	5	4.58	4.58	4.58	4.58
72	5	5	5	5	4.58	4.38	4.38	4.38
73	5	10	10	5	4.58	4.38	4.17	3.96
74	0	0	5	0	4.17	4.38	4.79	5.00
75	0	5	5	5	5.21	5.42	5.42	5.63
76	5	0	5	0	5.83	6.04	6.04	6.25
77	5	10	10	5	6.46	6.46	6.25	6.04
78	0	5	5	10	6.04	6.04	6.04	6.04
79	0	5	5	10	6.04	6.25	6.46	6.46
80	5	10	10	5	6.46	6.46	6.25	6.04
81	5	5	10	10	6.25	6.25	6.25	6.04
82	10	0	10	5	5.83	5.63	5.83	5.42
83	5	5	5	5	5.63	5.63	5.42	5.21
84	0	5	5	10	5.21	5.42	5.42	5.42
85	5	10	5	10	5.21	5.42	5.21	5.21
86	5	5	5	10	5.21	5.21	5.21	5.21
87	5	5	5	5	4.79	4.58	4.38	4.17
88	5	5	0	10	4.17	4.17	4.17	4.38
89	5	0	0	5	4.17	4.17	4.38	4.79
90	5	5	5	5	5.00	5.00	5.00	5.00
91	10	5	5	10	5.00	4.79	4.79	4.58
92	5	5	5	0	4.17	4.17	4.38	4.38
93	0	0	0	5	4.58	4.58	4.58	4.79
94	5	5	5	5	4.79	4.79	4.79	4.58
95	5	5	10	10	4.58	4.58	4.58	4.38
96	5	5	5	5	4.17	4.17	4.17	4.17
97	5	5	0	0	3.96	3.96	4.17	4.38
98	5	10	5	5	4.38	4.38	4.17	3.96
99	0	0	5	5	3.75	3.96	3.96	4.17
100	5	5	0	5	4.38	4.38	4.38	4.38
101	5	5	5	5	4.38	4.38	4.58	4.58
102	5	5	5	0	4.58	4.79	4.58	4.79
103	5	10	5	0	5.00	5.00	4.79	4.58
104	5	5	0	0	4.58	4.58	4.38	4.58
105	5	0	10	10	4.79	4.79	5.00	4.79
106	5	5	0	5	4.58	4.58	4.58	5.00
107	5	10	5	5	5.21	5.21	5.21	5.42
108	10	0	10	5	5.42	5.00	5.21	4.79
109	5	5	0	0	4.58	4.58	4.79	5.00
110	5	0	5	5	5.42	5.42	5.63	5.63
111	5	5	5	5	5.63	5.63	5.83	6.04
112	5	5	10	10	6.04	5.83	5.63	5.21
113	5	10	10	5	4.79	4.79	4.58	4.58
114	0	5	0	0	4.58			
115	5	10	5	10				
116	5	5	5	5				
117	5	10	10	5				
118	0	0	0	0				
119	5	5	10	5				

Table 2.3.3.2 - Visible Emissions

3.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

3.1 Process Description and Operation

Clow Water Systems Company manufactures ductile iron pipe and fittings. As part of the grey and ductile iron casting process, scrap metal is melted in a cupola, poured into specially designed sand molds or centrifugal casting machines, and then, undergoes a controlled solidification and cooling process. The P901 Cupola Melting Furnace was in operation for this test event and has a permitted capacity of 85 tons/hr.

Figure 3.1 depicts the process schematic.

3.2 Control Equipment Description

During this test, emissions from P901 were controlled by an afterburner, wet cap, venturi scrubber, and Ring Jet scrubber system which includes packed bed, Ring Jets and demister.

3.3 Flue Gas Sampling Locations

The P901 Scrubber Exhaust Stack was elliptical in shape with measured inner diameters of 63.00-inches and 63.20-inches. The stack was oriented in the vertical plane and was accessed from a manlift. Two (2) 6.0-inch I.D. sampling ports were located 90° apart from one another at a location that met EPA Method 1, Section 11.1.1 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flow rate, dry molecular weight, moisture content, and filterable PM concentration determination.

Figure 3.2 schematically illustrates the traverse point and sample port locations utilized.

3.4 Process Sampling Location

The 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 Air Compliance Testing that no process samples were obtained and therefore no process sampling location was identified in this report.

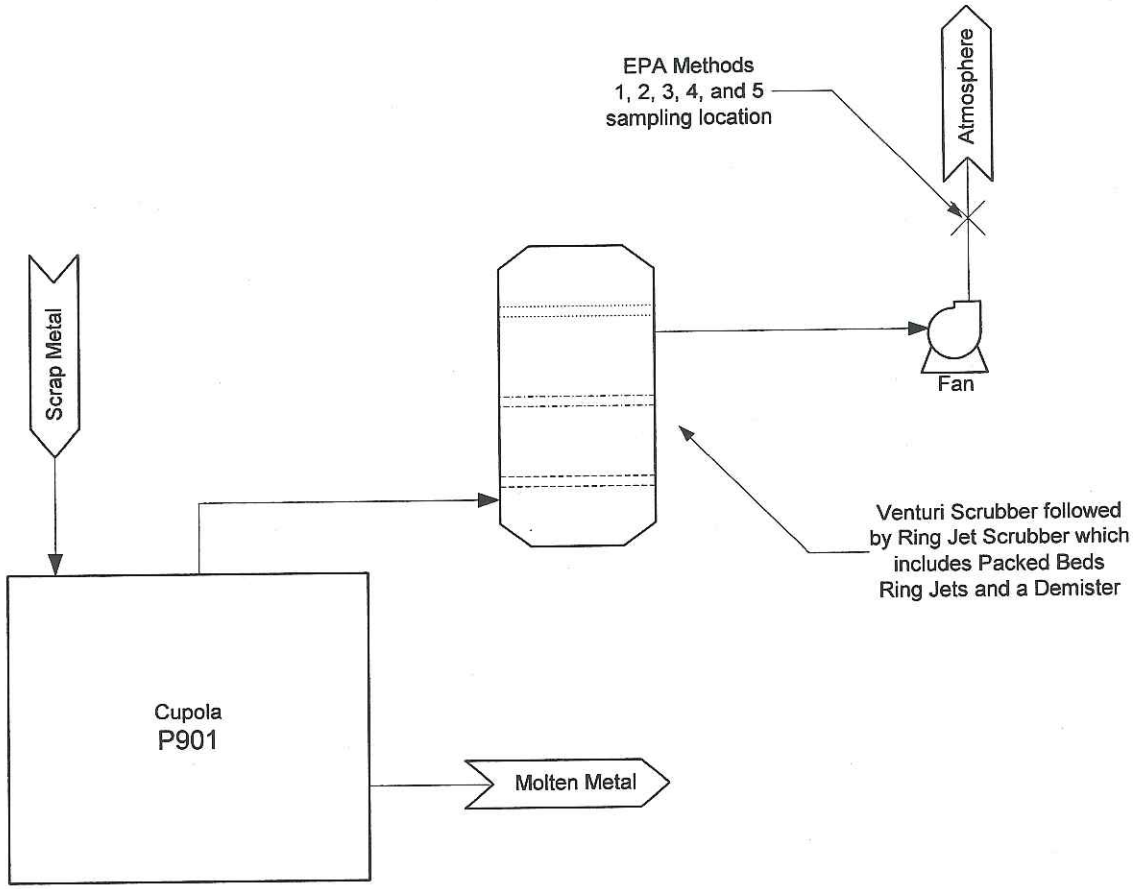
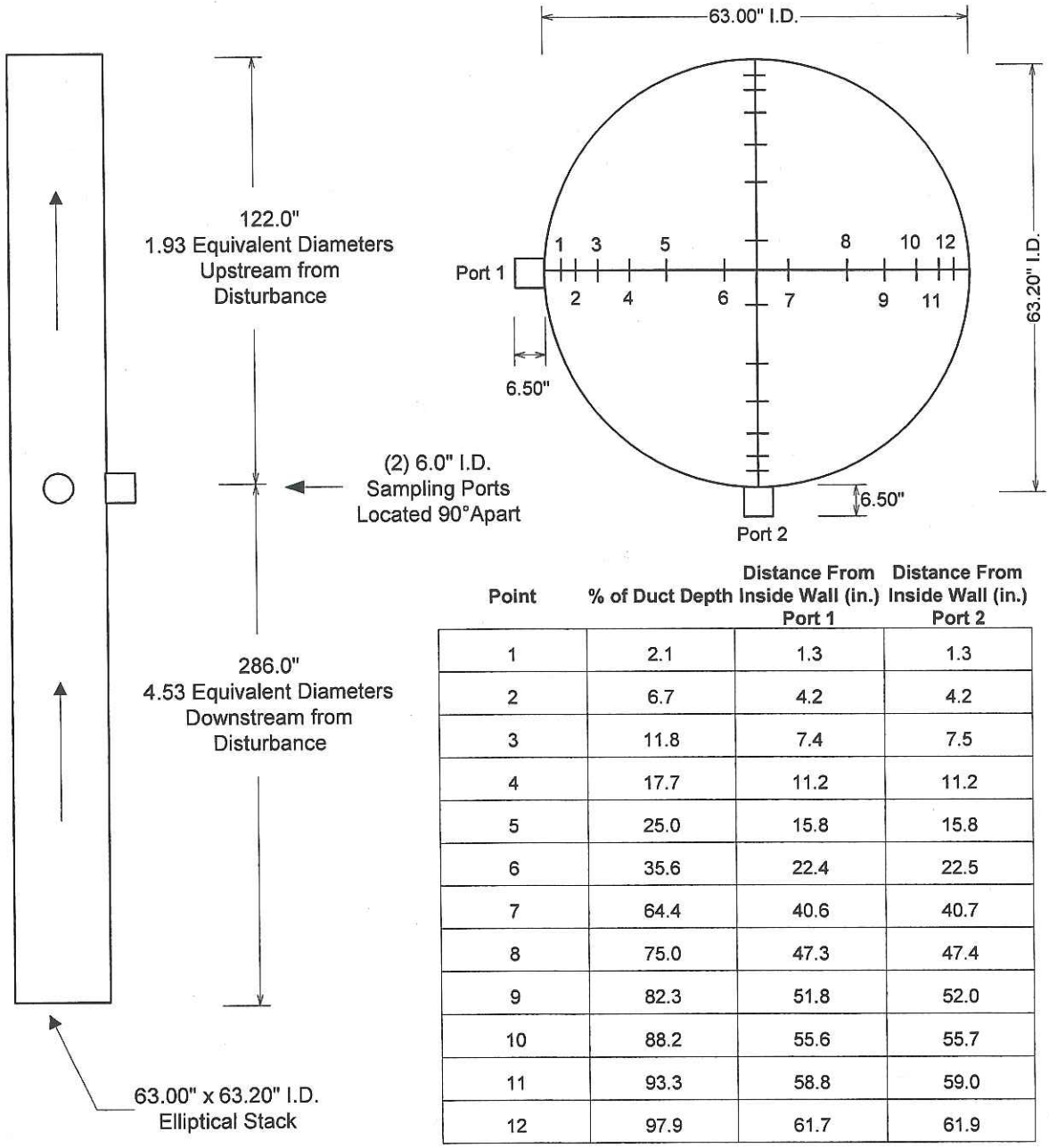


Figure 3.1 - Cupola Emission Control System Schematic



Point	% of Duct Depth	Distance From Inside Wall (in.) Port 1	Distance From Inside Wall (in.) Port 2
1	2.1	1.3	1.3
2	6.7	4.2	4.2
3	11.8	7.4	7.5
4	17.7	11.2	11.2
5	25.0	15.8	15.8
6	35.6	22.4	22.5
7	64.4	40.6	40.7
8	75.0	47.3	47.4
9	82.3	51.8	52.0
10	88.2	55.6	55.7
11	93.3	58.8	59.0
12	97.9	61.7	61.9

Figure 3.2 - P901 Scrubber Exhaust Stack Traverse Point Location Drawing

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Test Methods

4.1.1 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 EPA Method 2: Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S)
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 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 a Fyrite analyzer will 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 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 EPA Method 5: Determination of Particulate Emissions from Stationary Sources (Filterable PM only)
Principle: Particulate matter (PM) is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature in the range 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, U.S. Environmental Protection Agency, for a particular application. The PM mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after 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 EPA Method 9: Visual Determination of the Opacity of Emissions from Stationary Sources
Principle: The opacity of emissions from stationary sources is determined visually by a qualified observer. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.7 EPA Method 22: Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares

Principle: Fugitive emissions produced during material processing, handling, and transfer operations or smoke emissions from flares are visually determined by an observer without the aid of instruments. This method is used also to determine visible smoke emissions from flares used for combustion of waste process materials. This method determines the amount of time that visible emissions occur during the observation period (i.e., the accumulated emission time.). This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

The sampling train utilized during this testing project is depicted in Figure 4.1.

4.2 Procedures for Obtaining Process Data

Process data was recorded by Clow Water Systems Co. personnel utilizing their typical record keeping procedures. Recorded process data was provided to Air Compliance Testing, Inc. personnel at the conclusion of this test event. The process data is located in Table 2.2 and in the Appendix.

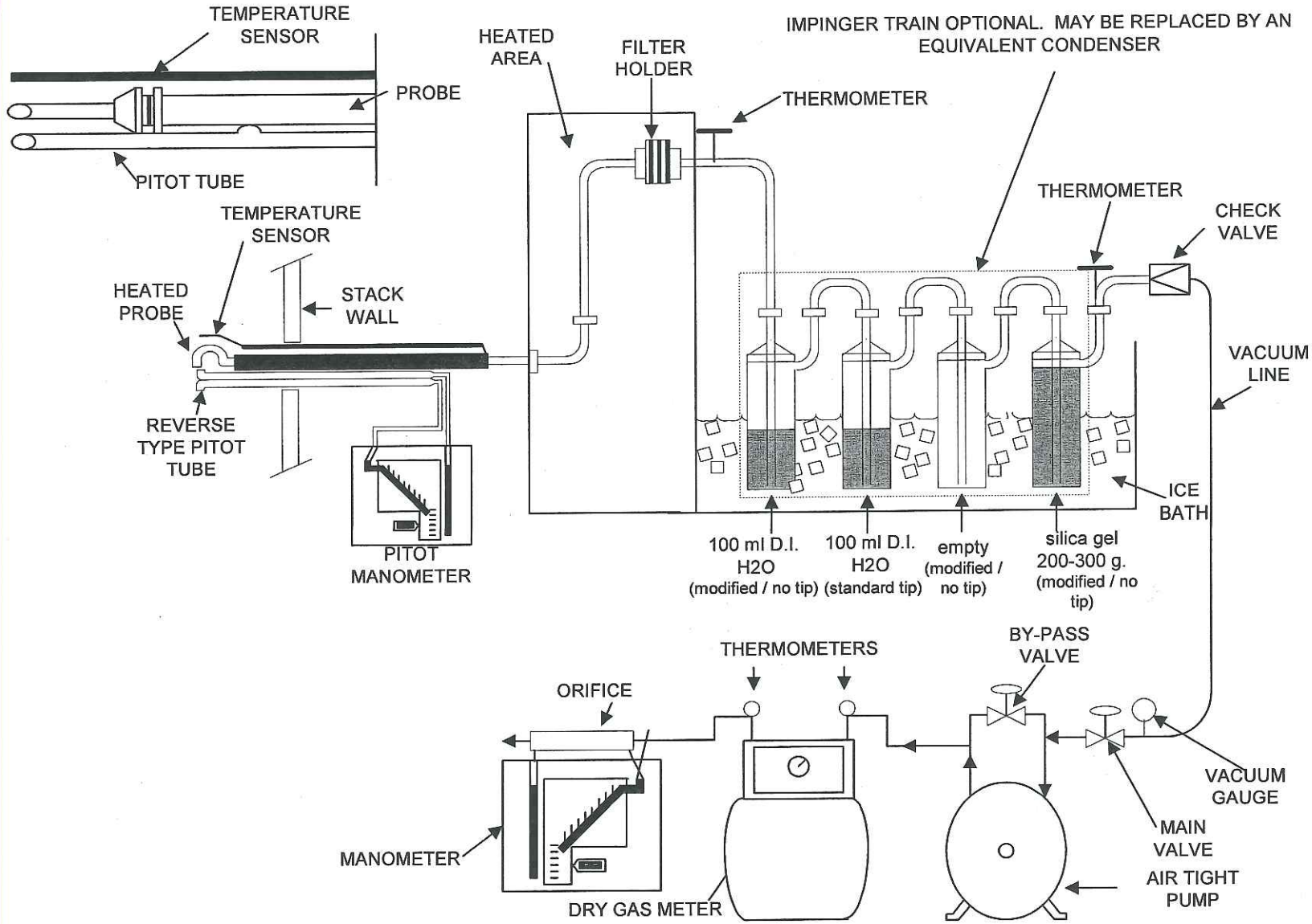


Figure 4.1 - EPA Method 5 Sampling Train Schematic

5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA Audits

Tables 5.1 and 5.2 illustrate the QA audit activities 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 and 5.2. All pre-test and post-test leak checks were well below the applicable limit. Minimum metered volumes and percent isokinetics were also met where applicable.

Tatum Strickler was certified on April 6, 2011 as a Visible Emissions Evaluator. The expiration date is six months from the issue date.

For quality assurance, the observers obtained a view of the emissions with the best available contrasting background and with the sun oriented in the 140° sector to their back. Readings were taken every 15 seconds and made to the nearest 5% opacity.

5.2 QA/QC Problems

No QA/QC problems occurred during this test event.

	P901 Scrubber Exhaust Stack		
Method 5 Sampling Train	**Run 1**	**Run 2**	**Run 3**
Leak Rate Observed (Pre/Post) (cfm)	0.001 / 0.000	0.001 / 0.001	0.001 / 0.001
Applicable Method Allowable Leak Rate (cfm)	< 0.020	< 0.020	< 0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	74.610	69.803	67.029
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	98.9	99.3	99.4
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes

Table 5.1 - EPA Method 5 Sample Train Audit Results Table

P901 Scrubber Exhaust Stack				
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
1.0059	1.0404	3.43%	5.00%	Yes

Table 5.2 - EPA Method 5 Dry Gas Meter Audit Results Table

6.0 APPENDIX

Appendix attached.

APPENDIX

to

Compliance Stack Emission Test Report

Determination of Filterable Particulate Matter, Visible and Fugitive Emissions

Cupola Emission System (P901)

EPA Methods 1, 2, 3, 4, 5, 9, and 22

Clow Water Systems Co.
Coshocton, Ohio

Date Conducted: May 11, 2011
Job Number: 110504

Prepared by:
Air Compliance Testing, Inc.
PO Box 41156
Cleveland OH 44141-0156
Phone: (800) EPA-AIR1 (372-2471)

Report Date: June 6, 2011

Appendix Contents

PROCESS DATA

- [x] Process Operational Data - All (PRINT)

LABORATORY DATA

- [x] Laboratory Results - All
- [x] Acetone/Inorganic/Organic Residuals Calc.
- [x] Record of Custody Sheets

FIELD DATA

- [x] Excel Test Data Tabs (PRINT)
- [x] Excel Method Specific Tab (PRINT)
- [x] Excel Run Data Tab (PRINT)
- [x] Example Calculation (PRINT)

- [ ] Test Log (CEMS Methods)
- [ ] Main Method Field Data Sheets
- [x] Isokinetic Field Data Sheets
- [ ] EPA Method 9 Field Data
- [x] EPA Method 4 and ALT-008 Moisture Recovery
- [x] EPA Method 3 Fyrite/Orsat Field Data
- [x] EPA Method 3 Dry Molecular Weight Calculation
- [ ] EPA Method 2 Flow Data Sheets
- [ ] EPA Method 1 Cyclonic Flow
- [x] EPA Method 1 Preliminary Field Data

(REPEAT THIS SECTION FOR EACH STACK)

ANALYZER CALIBRATIONS

- [ ] Analyzer Calibration Error
- [ ] Analyzer System Bias and System Drift

EQUIPMENT INSPECTIONS / CALIBRATIONS

- [x] 10-Minute Cals - All
- [x] Probe Nozzle Inspections - All (Isokinetic Methods)
- [x] Pre-Test Pitot Tube / Probe Inspections - All
- [x] Post-Test Pitot Tube / Probe Insp. - All (Compliance Only)

- [x] Pre-Test Thermocouple System Audit
- [x] Post-Test Thermocouple Check (Compliance Only)

- [ ] Pre-Test Meter Box Leak Check
- [ ] Pre-Test Dry Gas Meter / Orifice Calibration
- [ ] Pre-Test Meter Console Calibration

- [ ] Post-Test Dry Gas Meter / Orifice Calibration
- [ ] Post-Test Meter Console Calibration
- [ ] *Post Test Calibrations Required for all Mini Meter Boxes and when Yqa does not pass.

EQUIPMENT CERTIFICATIONS / HISTORY

- [ ] Micromanometer Certificate (when utilized)
- [x] Dry Gas Meter Calibration History
- [x] Aneroid Barometer/ DPG Calibration History — T-BAR-001
- [x] Acetone Residuals History

- [ ] Calibration Gas Certifications
- [x] Quartz or Glass Fiber Filter Certification
- [x] Reference Meter Calibration
- [x] Ω Thermocouple Certificate of Calibration
- [x] Lake Balance (Method 4 and ALT-008)
- [x] Lake Balance Report for H64 (Gravimetrics)
- [x] VE Azimuth Tables
- [x] VE Declination
- [x] VE Certificates
- [x] Intent to Test Notification (Compliance Only) (PRINT)

A	T-MTB -	015	B	T-MTB -	
	Gamma	1.0059		Gamma	
	Del H	2.202		Del H	
	Date	3/11/2011		Date	
	T-PRB -	808		T-PRB -	
	T-PRB -	810		T-PRB -	
	T-PRB -			T-PRB -	
	T-PIT-			T-PIT-	
	T-PIT-			T-PIT-	
	T-PIT-			T-PIT-	
	BAL -	005		BAL -	
	BAL -	008		BAL -	
X	T-MTB -		X	T-MTB -	
	Gamma			Gamma	
	Del H			Del H	
	Date			Date	
	T-PRB -			T-PRB -	
	T-PRB -			T-PRB -	
	T-PRB -			T-PRB -	
	T-PIT-			T-PIT-	
	T-PIT-			T-PIT-	
	T-PIT-			T-PIT-	
	BAL -			BAL -	
	BAL -			BAL -	
X	T-MTB -		X	T-MTB -	
	Gamma			Gamma	
	Del H			Del H	
	Date			Date	
	T-PRB -			T-PRB -	
	T-PRB -			T-PRB -	
	T-PRB -			T-PRB -	
	T-PIT-			T-PIT-	
	T-PIT-			T-PIT-	
	T-PIT-			T-PIT-	
	BAL -			BAL -	
	BAL -			BAL -	

CLOW WATER OPERATIONAL DATA
05/11/11 SUMMARY

					60 minute averages				
Run	Start Time	Pause Time	Stop Time	Total Metal Charged (ton/hr)	Emission System Total DP (in.H2O)	Ring Jet Water Flow Rate (gpm)	Ring Jet Pump Pressure (psi)	Venturi Water Flow Rate (gpm)	Venturi Pump Pressure (psi)
1	5:03am	6:03am-6:07am	7:07am	65	74	781	36	316	15
2	7:38am	8:38am-8:42am	9:42am	78	75	779	36	316	14
3	10:44am	11:44am-11:48am	12:48pm	78	74	787	37	311	14
			AVERAGE	**74**	**74**	**782**	**36**	**314**	**14**

Run 1

(5:03am - 6:03am; 6:07am - 7:07am)

Emission System Monitoring Data

Date	Time	Emission System Total DP (in.H2O)	Ring Jet Water Flow Rate (gpm)	Ring Jet Pump Pressure (psi)	Venturi Water Flow Rate (gpm)	Venturi Pump Pressure (psi)
05/11/11	05:03:33.592	71	765	35	314	14
05/11/11	05:04:33.608	73	764	35	313	14
05/11/11	05:05:33.624	73	781	37	312	14
05/11/11	05:06:33.625	72	781	37	312	15
05/11/11	05:07:33.626	72	781	36	315	14
05/11/11	05:08:33.642	72	782	37	315	15
05/11/11	05:09:33.643	72	783	37	314	14
05/11/11	05:10:33.660	71	782	37	313	14
05/11/11	05:11:33.660	72	784	37	313	14
05/11/11	05:12:33.677	72	781	37	313	15
05/11/11	05:13:33.693	73	783	37	313	14
05/11/11	05:14:33.694	72	783	37	313	15
05/11/11	05:15:33.726	73	784	37	313	14
05/11/11	05:16:33.727	73	781	37	317	15
05/11/11	05:17:33.743	73	783	37	316	14
05/11/11	05:18:33.744	72	781	37	315	15
05/11/11	05:19:33.760	72	782	37	316	14
05/11/11	05:20:33.839	73	782	36	319	15
05/11/11	05:21:33.840	73	782	37	316	15
05/11/11	05:22:33.856	73	783	37	317	15
05/11/11	05:23:33.904	74	781	36	317	15
05/11/11	05:24:33.905	73	782	36	317	14
05/11/11	05:25:33.921	74	781	36	318	15
05/11/11	05:26:33.953	73	781	36	317	15
05/11/11	05:27:33.969	74	783	36	317	15
05/11/11	05:28:33.986	73	783	36	317	15
05/11/11	05:29:33.987	72	783	37	319	15
05/11/11	05:30:33.987	74	780	36	317	14
05/11/11	05:31:34.004	73	782	36	317	14
05/11/11	05:32:34.005	72	781	36	317	15
05/11/11	05:33:34.021	73	782	36	319	14
05/11/11	05:34:34.100	73	782	36	317	14
05/11/11	05:35:34.116	73	782	36	317	15
05/11/11	05:36:34.133	73	781	36	317	15
05/11/11	05:37:34.133	74	780	36	317	15
05/11/11	05:38:34.150	74	780	36	319	15
05/11/11	05:39:34.166	73	780	36	318	14
05/11/11	05:40:34.167	74	783	37	317	15
05/11/11	05:41:34.183	73	781	36	317	15
05/11/11	05:42:34.184	73	782	36	317	15
05/11/11	05:43:34.201	74	781	36	316	15
05/11/11	05:44:34.264	73	780	36	315	14
05/11/11	05:45:34.265	72	781	36	318	14
05/11/11	05:46:34.265	73	781	36	318	15
05/11/11	05:47:34.282	73	782	37	319	15
05/11/11	05:48:34.283	73	781	36	317	14
05/11/11	05:49:34.299	73	780	36	317	14
05/11/11	05:49:34.315	73	780	36	317	14
05/11/11	05:50:34.362	74	782	36	318	15
05/11/11	05:51:34.363	73	781	36	318	15
05/11/11	05:52:34.379	74	781	36	318	14
05/11/11	05:53:34.380	73	781	36	318	15
05/11/11	05:54:34.396	75	783	36	318	15
05/11/11	05:55:34.397	75	782	36	317	15
05/11/11	05:56:34.414	73	784	36	318	14
05/11/11	05:57:34.430	74	782	36	317	14
05/11/11	05:58:34.665	75	783	36	317	14
05/11/11	05:59:34.682	74	781	36	317	15
05/11/11	06:00:34.698	74	782	36	317	15
05/11/11	06:01:34.699	74	781	36	316	15
05/11/11	06:02:34.715	74	781	36	316	15

Run 1

(5:03am - 6:03am; 6:07am - 7:07am)

Emission System Monitoring Data

Date	Time	Emission System Total DP (In.H2O)	Ring Jet Water Flow Rate (gpm)	Ring Jet Pump Pressure (psi)	Venturi Water Flow Rate (gpm)	Venturi Pump Pressure (psi)
05/11/11	06:07:34.750	75	780	36	317	14
05/11/11	06:08:34.767	75	784	36	317	14
05/11/11	06:09:34.783	75	782	36	316	15
05/11/11	06:10:34.784	74	781	36	316	14
05/11/11	06:11:34.785	74	783	36	318	14
05/11/11	06:12:34.801	74	783	36	317	14
05/11/11	06:13:34.802	75	782	36	317	14
05/11/11	06:14:34.818	74	783	36	317	15
05/11/11	06:15:34.819	75	782	36	318	14
05/11/11	06:16:34.835	73	782	36	317	15
05/11/11	06:17:34.836	75	782	36	316	14
05/11/11	06:18:34.852	74	782	36	317	15
05/11/11	06:19:34.853	74	780	36	317	14
05/11/11	06:20:34.885	74	782	36	317	15
05/11/11	06:21:34.902	74	780	36	317	14
05/11/11	06:22:34.902	75	780	36	316	15
05/11/11	06:23:34.919	74	780	36	318	15
05/11/11	06:24:34.920	74	781	36	318	15
05/11/11	06:25:34.920	75	781	36	318	14
05/11/11	06:26:34.937	73	782	36	315	15
05/11/11	06:27:34.937	74	782	36	317	14
05/11/11	06:28:34.954	74	780	36	317	14
05/11/11	06:29:34.955	74	781	36	317	15
05/11/11	06:30:34.971	75	782	36	316	14
05/11/11	06:31:34.972	75	782	36	316	15
05/11/11	06:32:34.973	74	782	36	317	15
05/11/11	06:33:34.989	75	780	36	318	15
05/11/11	06:34:34.990	76	780	36	315	14
05/11/11	06:35:35.006	74	781	36	315	14
05/11/11	06:36:35.007	75	782	37	317	15
05/11/11	06:37:35.023	75	784	36	317	14
05/11/11	06:38:35.087	75	782	36	317	14
05/11/11	06:39:35.087	73	782	36	316	15
05/11/11	06:40:35.104	74	782	36	316	14
05/11/11	06:41:35.104	75	782	36	317	14
05/11/11	06:42:35.324	72	781	36	315	14
05/11/11	06:43:35.340	74	780	36	315	14
05/11/11	06:44:35.357	75	780	36	316	14
05/11/11	06:45:35.420	75	782	36	316	14
05/11/11	06:46:35.436	74	781	36	316	15
05/11/11	06:47:35.437	75	782	36	315	14
05/11/11	06:48:35.438	74	783	36	315	15
05/11/11	06:49:35.454	74	783	36	317	15
05/11/11	06:50:35.471	74	782	36	316	15
05/11/11	06:51:35.472	75	783	36	317	15
05/11/11	06:52:35.488	75	782	36	315	15
05/11/11	06:53:35.504	75	780	36	315	15
05/11/11	06:54:35.505	76	781	36	317	15
05/11/11	06:55:35.521	74	782	36	316	14
05/11/11	06:56:35.522	74	781	36	315	14
05/11/11	06:57:35.523	76	782	36	315	15
05/11/11	06:58:35.539	75	782	36	318	14
05/11/11	06:59:35.540	75	783	36	318	15
05/11/11	07:00:35.557	75	780	36	316	14
05/11/11	07:01:35.557	75	782	36	316	15
05/11/11	07:02:35.558	74	782	36	315	15
05/11/11	07:03:35.574	74	781	36	314	14
05/11/11	07:04:35.575	74	781	36	315	14
05/11/11	07:05:35.592	73	782	36	313	14
05/11/11	07:06:35.592	75	780	36	315	15
	AVERAGE	74	781	36	316	15

Run 1

(5:03am - 6:03am; 6:07am - 7:07am)

Cupola Melt Data

Date	Time	Total Metal Charged (lb)	
05/11/11	05:03:23	6,994	
05/11/11	05:09:29	7,089	
05/11/11	05:12:54	7,039	
05/11/11	05:17:34	7,029	
05/11/11	05:21:14	7,079	
05/11/11	05:23:44	6,979	
05/11/11	05:27:34	7,254	
05/11/11	05:30:25	7,164	
05/11/11	05:33:24	7,233	
05/11/11	05:37:14	6,919	
05/11/11	05:41:34	6,979	
05/11/11	05:44:48	6,994	
05/11/11	05:48:42	7,158	
05/11/11	05:52:20	7,024	
05/11/11	05:55:35	7,009	
05/11/11	05:59:04	6,979	
05/11/11	06:01:34	6,989	
05/11/11	06:09:30	7,108	
05/11/11	06:13:15	7,159	
05/11/11	06:15:45	6,999	
05/11/11	06:19:20	7,029	
05/11/11	06:22:37	6,998	
05/11/11	06:26:03	6,939	
05/11/11	06:28:47	7,198	
05/11/11	06:31:24	7,263	
05/11/11	06:33:53	7,118	
05/11/11	06:36:42	7,243	
05/11/11	06:39:14	7,038	
05/11/11	06:42:08	7,063	
05/11/11	06:44:53	7,063	
05/11/11	06:47:27	7,104	
05/11/11	06:50:22	7,003	
05/11/11	06:54:24	6,938	
05/11/11	06:57:14	6,993	
05/11/11	07:00:39	6,978	
05/11/11	07:03:09	7,038	
05/11/11	07:06:33	6,959	
	TOTAL	261,137	
	TOTAL	65	ton/hr

Run 2

(7:38am - 8:38am, 8:42am - 9:42am)

Emission System Monitoring Data

Date	Time	Emission System Total DP (in.H2O)	Ring Jet Water Flow Rate (gpm)	Ring Jet Pump Pressure (psi)	Venturi Water Flow Rate (gpm)	Venturi Pump Pressure (psi)
05/11/11	07:38:35.836	75	779	36	315	14
05/11/11	07:39:35.852	75	778	36	314	14
05/11/11	07:40:35.915	75	778	36	314	14
05/11/11	07:41:35.916	75	779	36	314	14
05/11/11	07:42:35.933	75	779	36	314	14
05/11/11	07:43:35.933	75	781	36	316	14
05/11/11	07:44:35.950	74	777	36	315	14
05/11/11	07:45:35.951	76	777	36	315	14
05/11/11	07:46:35.967	75	775	36	316	14
05/11/11	07:47:35.983	75	776	36	315	14
05/11/11	07:48:35.984	74	776	36	314	14
05/11/11	07:49:35.985	75	774	36	314	14
05/11/11	07:50:36.032	73	774	36	316	14
05/11/11	07:51:36.033	74	774	36	316	14
05/11/11	07:52:36.050	74	776	36	314	14
05/11/11	07:53:36.066	74	775	36	314	14
05/11/11	07:54:36.067	75	774	36	316	14
05/11/11	07:55:36.083	73	776	36	316	14
05/11/11	07:56:36.084	73	775	36	315	14
05/11/11	07:56:36.115	73	775	36	315	14
05/11/11	07:57:36.100	75	775	36	315	14
05/11/11	07:58:36.101	73	774	36	314	14
05/11/11	07:59:36.118	76	775	36	316	14
05/11/11	08:00:36.118	76	774	36	315	14
05/11/11	08:01:36.135	74	776	36	315	15
05/11/11	08:02:36.151	76	774	36	314	14
05/11/11	08:03:36.152	75	775	36	317	15
05/11/11	08:04:36.153	77	776	36	316	14
05/11/11	08:05:36.169	76	774	36	315	14
05/11/11	08:06:36.170	76	775	36	315	14
05/11/11	08:07:36.186	76	776	36	317	14
05/11/11	08:08:36.187	76	777	36	317	14
05/11/11	08:09:36.188	76	775	36	315	15
05/11/11	08:10:36.204	77	778	36	314	14
05/11/11	08:11:36.220	76	775	36	316	14
05/11/11	08:12:36.221	76	775	36	317	14
05/11/11	08:13:36.222	76	775	36	316	14
05/11/11	08:14:36.238	75	776	36	314	14
05/11/11	08:15:36.239	76	775	36	314	15
05/11/11	08:16:36.238	75	775	36	317	14
05/11/11	08:17:36.252	75	777	36	316	15
05/11/11	08:18:36.251	75	777	36	316	14
05/11/11	08:19:36.265	76	775	36	315	14
05/11/11	08:20:36.263	75	776	36	316	14
05/11/11	08:21:36.278	75	789	37	316	14
05/11/11	08:22:36.277	75	788	37	316	14
05/11/11	08:23:36.292	75	787	37	315	14
05/11/11	08:24:36.291	75	789	37	315	15
05/11/11	08:25:36.306	76	788	37	318	14
05/11/11	08:26:36.306	74	788	37	316	14
05/11/11	08:27:36.306	75	783	36	315	14
05/11/11	08:28:36.322	76	781	36	315	14
05/11/11	08:29:36.322	74	780	36	317	14
05/11/11	08:30:36.337	76	779	36	316	14
05/11/11	08:31:36.337	74	780	36	315	14
05/11/11	08:32:36.353	75	780	36	315	14
05/11/11	08:33:36.353	75	781	36	316	15
05/11/11	08:34:36.368	75	780	36	316	14
05/11/11	08:35:36.368	76	780	36	315	14
05/11/11	08:36:36.368	75	780	36	315	14
05/11/11	08:37:36.384	74	781	36	317	14

Run 2

(7:38am - 8:38am, 8:42am - 9:42am)

Emission System Monitoring Data

Date	Time	Emission System Total DP (in.H2O)	Ring Jet Water Flow Rate (gpm)	Ring Jet Pump Pressure (psi)	Venturi Water Flow Rate (gpm)	Venturi Pump Pressure (psi)
05/11/11	08:42:36.415	75	779	36	317	14
05/11/11	08:43:36.415	76	781	36	317	14
05/11/11	08:44:36.431	76	781	36	315	14
05/11/11	08:45:36.431	77	781	36	315	14
05/11/11	08:46:36.462	75	780	36	317	14
05/11/11	08:47:36.478	76	781	36	315	15
05/11/11	08:48:36.478	76	780	36	316	14
05/11/11	08:49:36.478	75	781	36	314	14
05/11/11	08:50:36.493	77	782	36	318	14
05/11/11	08:51:36.493	75	781	36	317	14
05/11/11	08:52:36.509	76	780	36	317	14
05/11/11	08:53:36.509	76	780	36	316	14
05/11/11	08:54:36.587	77	780	36	317	14
05/11/11	08:55:36.587	76	778	36	317	14
05/11/11	08:56:36.587	76	781	36	316	14
05/11/11	08:57:36.603	76	781	36	317	14
05/11/11	08:58:36.618	75	780	36	318	14
05/11/11	08:59:36.634	75	781	36	317	14
05/11/11	09:00:36.634	75	781	36	317	15
05/11/11	09:01:36.650	75	781	36	316	14
05/11/11	09:02:36.650	75	781	36	318	15
05/11/11	09:03:36.665	76	781	36	317	15
05/11/11	09:04:36.728	75	780	36	316	15
05/11/11	09:05:36.728	75	779	36	315	14
05/11/11	09:06:36.743	75	780	36	316	14
05/11/11	09:07:36.806	75	781	36	316	15
05/11/11	09:08:36.806	76	780	36	316	14
05/11/11	09:09:36.822	76	781	36	316	14
05/11/11	09:10:36.822	77	780	36	316	14
05/11/11	09:11:36.837	74	779	36	317	14
05/11/11	09:12:36.837	76	779	36	316	14
05/11/11	09:13:36.853	76	779	36	316	14
05/11/11	09:14:36.868	75	780	36	315	14
05/11/11	09:15:36.868	76	781	36	317	14
05/11/11	09:16:36.890	75	781	36	316	14
05/11/11	09:17:36.898	75	780	36	316	14
05/11/11	09:18:36.936	75	780	36	316	14
05/11/11	09:19:37.194	76	781	36	316	15
05/11/11	09:20:37.202	73	780	36	317	15
05/11/11	09:21:37.221	76	781	36	316	14
05/11/11	09:22:37.240	76	779	36	315	14
05/11/11	09:23:37.242	75	779	36	316	14
05/11/11	09:24:37.448	75	780	36	316	14
05/11/11	09:25:37.670	75	780	36	316	14
05/11/11	09:26:37.687	76	780	36	316	14
05/11/11	09:27:37.689	76	778	36	314	14
05/11/11	09:28:37.706	76	779	36	316	14
05/11/11	09:29:37.942	76	779	36	316	15
05/11/11	09:30:37.943	76	780	36	315	14
05/11/11	09:31:37.960	74	779	36	315	14
05/11/11	09:32:37.961	75	780	36	317	14
05/11/11	09:33:37.977	74	777	36	317	14
05/11/11	09:34:37.993	76	779	36	315	14
05/11/11	09:35:37.994	75	781	36	315	14
05/11/11	09:36:38.260	74	779	36	316	14
05/11/11	09:37:38.276	76	779	36	317	14
05/11/11	09:38:38.277	76	777	36	316	14
05/11/11	09:39:38.293	74	780	36	315	14
05/11/11	09:40:38.324	77	780	36	315	14
05/11/11	09:41:38.340	75	780	36	315	14
	AVERAGE	75	779	36	316	14

Run 2

(7:38am - 8:38am, 8:42am - 9:42am)

Cupola Melt Data

Date	Time	Total Metal Charged (lb)	
05/11/11	07:40:01	7,113	
05/11/11	07:42:31	6,988	
05/11/11	07:45:00	7,048	
05/11/11	07:47:31	7,183	
05/11/11	07:50:00	7,273	
05/11/11	07:52:30	7,173	
05/11/11	07:55:02	7,063	
05/11/11	07:57:30	7,038	
05/11/11	08:00:00	7,073	
05/11/11	08:02:29	6,948	
05/11/11	08:05:00	7,403	
05/11/11	08:07:31	7,076	
05/11/11	08:10:23	6,968	
05/11/11	08:13:04	7,119	
05/11/11	08:15:34	6,979	
05/11/11	08:18:04	7,009	
05/11/11	08:20:33	7,148	
05/11/11	08:23:03	7,178	
05/11/11	08:25:33	7,018	
05/11/11	08:28:04	6,988	
05/11/11	08:30:34	7,198	
05/11/11	08:33:03	7,023	
05/11/11	08:35:35	7,034	
05/11/11	08:42:12	7,038	
05/11/11	08:45:21	7,133	
05/11/11	08:47:57	7,079	
05/11/11	08:51:00	6,990	
05/11/11	08:54:20	6,999	
05/11/11	08:58:11	7,104	
05/11/11	09:00:41	7,024	
05/11/11	09:03:11	7,038	
05/11/11	09:05:42	7,023	
05/11/11	09:08:12	7,009	
05/11/11	09:11:25	6,964	
05/11/11	09:13:55	7,263	
05/11/11	09:16:49	6,969	
05/11/11	09:19:18	7,093	
05/11/11	09:22:46	7,043	
05/11/11	09:26:11	7,138	
05/11/11	09:29:38	7,228	
05/11/11	09:32:36	6,984	
05/11/11	09:35:25	7,039	
05/11/11	09:38:26	7,263	
05/11/11	09:40:55	7,024	
	TOTAL	311,486	
	TOTAL	78	ton/hr

Run 3

(10:44am - 11:44am, 11:48am - 12:48pm)

Emission System Monitoring Data

Date	Time	Emission System Total DP (In.H2O)	Ring Jet Water Flow Rate (gpm)	Ring Jet Pump Pressure (psi)	Venturi Water Flow Rate (gpm)	Venturi Pump Pressure (psi)
05/11/11	10:44:38.849	75	779	36	312	14
05/11/11	10:45:38.849	75	780	36	314	14
05/11/11	10:46:38.865	75	779	36	313	14
05/11/11	10:47:38.866	75	780	36	313	14
05/11/11	10:48:38.866	75	779	36	314	14
05/11/11	10:49:38.882	75	780	36	314	14
05/11/11	10:50:38.882	76	779	36	314	15
05/11/11	10:51:38.898	75	780	36	313	14
05/11/11	10:52:38.899	76	780	36	312	14
05/11/11	10:53:38.899	74	780	36	314	14
05/11/11	10:54:38.915	75	779	36	315	14
05/11/11	10:55:38.916	74	781	36	313	14
05/11/11	10:56:38.932	75	780	36	313	14
05/11/11	10:57:38.932	76	779	36	314	15
05/11/11	10:58:38.932	74	780	36	314	14
05/11/11	10:59:38.948	73	779	36	314	15
05/11/11	11:00:38.949	74	780	36	313	15
05/11/11	11:01:38.949	76	780	36	312	14
05/11/11	11:02:38.965	75	781	36	313	14
05/11/11	11:03:38.966	75	779	36	313	14
05/11/11	11:04:38.982	74	780	36	313	14
05/11/11	11:05:38.982	74	781	36	314	14
05/11/11	11:06:38.982	74	779	36	314	15
05/11/11	11:06:38.998	74	779	36	314	15
05/11/11	11:07:38.998	74	780	36	314	14
05/11/11	11:08:38.999	74	781	36	313	14
05/11/11	11:09:38.999	75	779	36	313	14
05/11/11	11:10:39.015	74	780	36	314	15
05/11/11	11:11:39.031	73	779	36	312	14
05/11/11	11:12:39.047	73	778	36	312	14
05/11/11	11:13:39.048	74	780	36	313	15
05/11/11	11:14:39.064	74	780	36	313	15
05/11/11	11:15:39.064	73	780	36	312	15
05/11/11	11:16:39.086	73	779	36	312	14
05/11/11	11:17:39.093	74	780	36	313	14
05/11/11	11:18:39.132	74	780	36	312	14
05/11/11	11:19:39.156	75	780	36	312	14
05/11/11	11:20:39.179	75	779	36	313	15
05/11/11	11:21:39.184	75	780	36	312	14
05/11/11	11:22:39.203	74	780	36	313	14
05/11/11	11:23:39.222	73	781	36	313	15
05/11/11	11:24:39.226	74	779	36	314	15
05/11/11	11:25:39.230	73	779	36	313	14
05/11/11	11:26:39.248	73	779	36	312	14
05/11/11	11:27:39.266	75	779	36	312	14
05/11/11	11:28:39.269	75	792	37	312	14
05/11/11	11:29:39.271	74	792	37	313	14
05/11/11	11:30:39.289	74	793	37	313	14
05/11/11	11:31:39.291	74	791	37	312	15
05/11/11	11:32:39.308	74	791	37	313	14
05/11/11	11:33:39.310	74	791	37	313	15
05/11/11	11:34:39.312	74	793	37	313	14
05/11/11	11:35:39.580	74	791	37	311	14
05/11/11	11:36:40.941	74	792	37	313	14
05/11/11	11:37:40.958	74	792	37	311	14
05/11/11	11:38:40.960	74	790	37	312	15
05/11/11	11:39:40.977	74	792	37	312	14
05/11/11	11:40:40.994	75	792	37	313	14
05/11/11	11:41:41.011	73	791	37	312	14
05/11/11	11:42:41.013	74	792	37	312	14
05/11/11	11:43:41.030	74	792	37	311	14

Run 3

(10:44am - 11:44am, 11:48am - 12:48pm)

Emission System Monitoring Data

Date	Time	Emission System Total DP (In.H2O)	Ring Jet Water Flow Rate (gpm)	Ring Jet Pump Pressure (psi)	Venturi Water Flow Rate (gpm)	Venturi Pump Pressure (psi)
05/11/11	11:48:41.116	75	791	37	312	15
05/11/11	11:49:41.117	74	792	37	313	14
05/11/11	11:50:41.134	74	792	37	313	14
05/11/11	11:51:41.151	72	791	37	312	14
05/11/11	11:52:41.153	73	792	37	313	14
05/11/11	11:53:41.154	74	792	37	312	14
05/11/11	11:54:41.172	74	790	37	313	14
05/11/11	11:55:41.173	74	792	37	311	14
05/11/11	11:56:41.190	73	790	37	312	14
05/11/11	11:57:41.192	73	791	37	313	15
05/11/11	11:58:41.209	73	790	37	313	14
05/11/11	11:59:41.211	73	791	37	312	14
05/11/11	12:00:41.228	75	791	37	312	14
05/11/11	12:01:41.292	75	790	37	312	14
05/11/11	12:02:41.293	73	791	37	314	14
05/11/11	12:03:41.310	73	792	37	312	14
05/11/11	12:04:41.312	75	791	37	312	14
05/11/11	12:05:41.376	74	791	37	311	14
05/11/11	12:06:41.393	75	791	37	312	14
05/11/11	12:07:41.395	74	791	37	312	14
05/11/11	12:08:42.365	75	790	37	313	15
05/11/11	12:09:42.398	74	791	37	312	15
05/11/11	12:10:42.415	75	791	37	312	15
05/11/11	12:11:42.432	76	792	37	313	14
05/11/11	12:12:42.449	73	790	37	312	14
05/11/11	12:13:42.451	74	793	37	311	15
05/11/11	12:14:42.468	73	790	37	312	15
05/11/11	12:15:42.470	74	790	37	312	15
05/11/11	12:16:42.465	74	789	37	313	14
05/11/11	12:17:42.475	73	790	37	310	15
05/11/11	12:18:42.470	73	790	37	310	14
05/11/11	12:19:42.480	72	790	37	311	14
05/11/11	12:20:42.475	75	791	37	312	14
05/11/11	12:21:42.489	74	790	37	311	14
05/11/11	12:22:42.488	73	791	37	311	15
05/11/11	12:23:42.503	73	790	37	311	14
05/11/11	12:24:42.502	73	790	37	310	15
05/11/11	12:25:42.501	74	791	37	311	15
05/11/11	12:26:42.516	73	791	37	311	14
05/11/11	12:27:42.516	74	790	37	310	14
05/11/11	12:28:42.532	75	789	37	306	14
05/11/11	12:29:42.533	75	792	37	306	15
05/11/11	12:30:42.549	75	790	37	307	14
05/11/11	12:31:42.549	73	789	37	305	14
05/11/11	12:32:42.565	73	792	37	306	14
05/11/11	12:33:42.566	73	791	37	307	14
05/11/11	12:34:42.598	74	789	37	307	14
05/11/11	12:35:42.599	73	791	37	307	14
05/11/11	12:36:42.600	74	791	37	306	15
05/11/11	12:37:42.616	74	792	37	307	14
05/11/11	12:38:42.617	73	791	37	305	14
05/11/11	12:39:42.634	74	791	37	306	14
05/11/11	12:40:42.635	73	790	37	306	14
05/11/11	12:41:42.652	74	791	37	307	15
05/11/11	12:42:42.653	76	792	37	305	14
05/11/11	12:43:42.670	76	791	37	305	14
05/11/11	12:44:42.671	74	791	37	305	14
05/11/11	12:45:42.688	74	792	37	306	14
05/11/11	12:46:42.705	74	790	37	305	14
05/11/11	12:47:42.706	72	791	37	305	14
	AVERAGE	74	787	37	311	14

Run 3

(10:44am - 11:44am, 11:48am - 12:48pm)

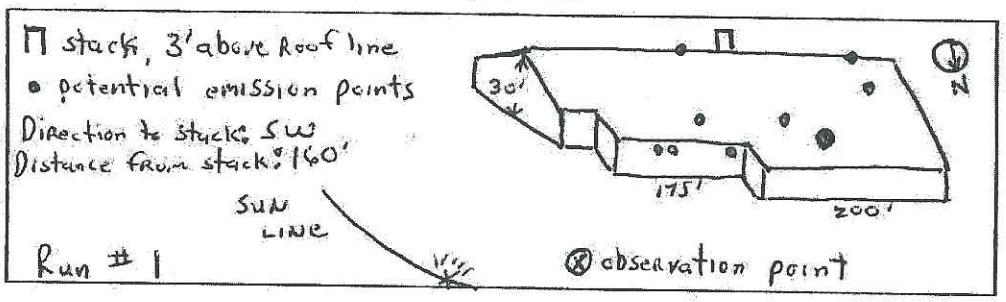
Cupola Melt Data

Date	Time	Total Metal Charged (lb)	
05/11/11	10:44:42	7,144	
05/11/11	10:47:21	7,578	
05/11/11	10:50:45	7,044	
05/11/11	10:53:15	7,299	
05/11/11	10:56:01	6,989	
05/11/11	10:59:00	6,939	
05/11/11	11:02:24	6,934	
05/11/11	11:05:12	6,934	
05/11/11	11:08:13	7,094	
05/11/11	11:10:47	6,969	
05/11/11	11:13:50	7,064	
05/11/11	11:16:18	7,179	
05/11/11	11:18:59	6,969	
05/11/11	11:22:16	7,079	
05/11/11	11:24:52	6,974	
05/11/11	11:27:22	7,019	
05/11/11	11:29:51	6,934	
05/11/11	11:32:23	6,959	
05/11/11	11:35:15	7,304	
05/11/11	11:37:46	7,019	
05/11/11	11:40:31	7,244	
05/11/11	11:43:00	7,019	
05/11/11	11:48:48	6,919	
05/11/11	11:51:17	7,039	
05/11/11	11:53:56	6,929	
05/11/11	11:56:52	7,224	
05/11/11	11:59:21	6,934	
05/11/11	12:01:50	6,994	
05/11/11	12:04:20	7,149	
05/11/11	12:06:51	6,999	
05/11/11	12:09:21	7,229	
05/11/11	12:11:51	6,964	
05/11/11	12:14:20	6,934	
05/11/11	12:16:50	7,253	
05/11/11	12:19:21	6,994	
05/11/11	12:23:07	6,934	
05/11/11	12:25:53	6,959	
05/11/11	12:29:32	6,929	
05/11/11	12:32:03	7,119	
05/11/11	12:34:36	7,004	
05/11/11	12:37:41	6,984	
05/11/11	12:40:11	6,904	
05/11/11	12:42:38	6,979	
05/11/11	12:45:28	7,034	
	TOTAL	310,094	
	TOTAL	78	ton/hr

FUGITIVE OR SMOKE EMISSION INSPECTION
OUTDOOR LOCATION

Company Clow Water Systems Location Cosmocton OH Company Rep.	Observer Bill Couto Affiliation Clow Water Systems Date May 11, 2011
Sky Conditions Cloudy Precipitation None 61°F	Wind Direction N/A Wind Speed 0
Industry Ductile Iron Foundry	Process Unit Machining / Flg Bldg

Sketch process unit: indicate observer position relative to source and sun, indicate potential emission points and/or actual emission points.



OBSERVATIONS

	Clock Time	Observation Period Duration, min:sec	Accumulated Emission Time, min:sec
Begin Observation	6:32 am	20:10	0
	6:52 am	—	
	7:02 am	15:08	0
	7:17 am	—	
	7:22 am	10:21	0
	7:32 am		
End Observation			

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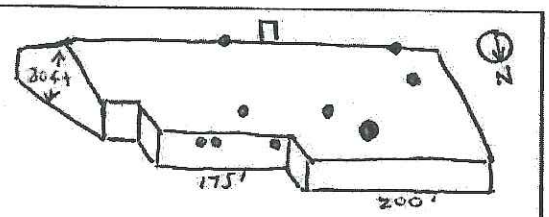
FUGITIVE OR SMOKE EMISSION INSPECTION
OUTDOOR LOCATION

Company Clow Water Systems Location Coshocton, OH Company Rep.	Observer Bill Couto Affiliation Clow Water Systems Date May 11, 2011
Sky Conditions Partly Cloudy Precipitation None 64°F	Wind Direction N/A Wind Speed 0
Industry Ductile Iron Foundry	Process Unit Machining / Hg Bldg

Sketch process unit: indicate observer position relative to source and sun, indicate potential emission points and/or actual emission points.

Π stacks, 3' above Roof line
• potential emission points
Direction to stacks: SW
Distance from stacks: 160'



SUN LINE

Run # 2

⊗ observation point

OBSERVATIONS

	Clock Time	Observation Period Duration, min:sec	Accumulated Emission Time, min:sec
Begin Observation	7:40am	19:47	0
	8:00am	—	
	8:05am	20:15	0
	8:25am	—	
	8:30am	20:24	0
	8:50am	—	
	8:58am	19:14	0
	9:18am	—	
	9:23am	18:57	0
End Observation	9:42am		

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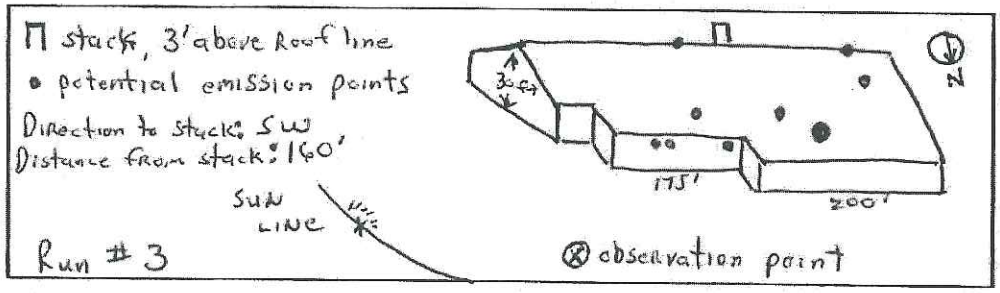
FUGITIVE OR SMOKE EMISSION INSPECTION
OUTDOOR LOCATION

Company Clow Water Systems	Observer Bill Couts
Location Coshocton, OH	Affiliation Clow Water Systems
Company Rep.	Date May 11, 2011
Sky Conditions Clear to Slightly Overcast	Wind Direction SE
Precipitation None 70°F	Wind Speed 1 mph
Industry Ductile Iron Foundry	Process Unit Machining / Flg Bldg

Sketch process unit: indicate observer position relative to source and sun, indicate potential emission points and/or actual emission points.



OBSERVATIONS	Clock Time	Observation Period Duration, min:sec	Accumulated Emission Time, min:sec
Begin Observation	10:49am		
	11:09am	20:10	0
	11:16am	–	
	11:35am	19:10	0
	11:41am	–	
	12:01pm	19:54	0
	12:08pm	–	
	12:28pm	20:11	0
	12:33pm	–	
End Observation	12:49pm	16:37	0

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Method 5 Filter Gravimetric

Plant Name Low Water Systems Location Cupola Emission System (P901) Exhaust Stack

Run Number	1
Run Date	5.11.11
Filter Recovered By	TS / JG
Were filters intact upon opening filter assembly?	Yes
Were there any visible filter fragments remaining on the frit after initial filter removal?**	Yes
Were filter fragments rinsed into acetone rinse container?	Yes
Sample Loading - lt / med / heavy	med
Sample Color	brown
Filter Number	5139
Petri Dish Number	337

Weight Number	Total Weight (g) (Includes Dish)*	Done By	Date/Time	Lab Temp/RH (°F)/(%)	PBar ("Hg)
1	3.0789	JG	5.15.11 7:21	68 / 49	28.72
✓ 2	3.0792	JG	5.16.11 5:41	69 / 44	28.92
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.	3.0791				

0.3584 Filter Tare Weight (g)

2.6754 Dish Tare Weight (g)

45.25 **Filter Catch Weight (mg)**

Describe Sample:

Run Number	2
Run Date	5.11.11
Filter Recovered By	TS/JG
Were filters intact upon opening filter assembly?	Yes
Were there any visible filter fragments remaining on the frit after initial filter removal?**	Yes
Were filter fragments rinsed into acetone rinse container?	Yes
Sample Loading - lt / med / heavy	med
Sample Color	brown
Filter Number	5137
Petri Dish Number	341

Weight Number	Total Weight (g) (Includes Dish)*	Done By	Date/Time	Lab Temp/RH (°F)/(%)	PBar ("Hg)
1	3.1301	JG	5.15.11 7:20	68 / 49	28.72
✓ 2	3.1303	JG	5.16.11 5:42	69 / 44	28.92
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.	3.1302				

0.3815 Filter Tare Weight (g)

2.7173 Dish Tare Weight (g)

31.40 **Filter Catch Weight (mg)**

Describe Sample:

Analytical Balance I.D. 3004206

Balance Located in Stable, Draft-Free Area? (Yes) No

* Consecutive weighings must not differ by more than 0.5mg or 1% of the total catch weight, whichever is greater.

** If visible filter fragments were removed from frit, then negative filter weight values may be possible.

Job Number: 110504 A

Done By / Date: JG / 5.15.11

Checked By / Date: – / – : – / –

Final Check By / Date: SS / 5.23.11

Method 5 Filter Gravimetric

Plant Name ...ow Water Systems Location Cupola Emission Sy...m (P901) Exhaust Stack

Run Number	3
Run Date	5.11.11
Filter Recovered By	TS/JG
Were filters intact upon opening filter assembly?	Yes
Were there any visible filter fragments remaining on the frit after initial filter removal?**	Yes
Were filter fragments rinsed into acetone rinse container?	Yes
Sample Loading - lt / med / heavy	med
Sample Color	brown
Filter Number	T-289
Petri Dish Number	342

Weight Number	Total Weight (g) (Includes Dish)*	Done By	Date/Time	Lab Temp/RH (°F)/(%)	PBar ("Hg)
1	2.9738	JG	5.15.11 7:19	68 / 50	28.72
✓ 2	2.9736	JG	5.16.11 5:40	69 / 44	28.92
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.	2.9737				

0.2639 Filter Tare Weight (g)

2.6814 Dish Tare Weight (g)

28.40 **Filter Catch Weight (mg)**

Describe Sample:

Run Number	
Run Date	
Filter Recovered By	
Were filters intact upon opening filter assembly?	
Were there any visible filter fragments remaining on the frit after initial filter removal?**	
Were filter fragments rinsed into acetone rinse container?	
Sample Loading - lt / med / heavy	
Sample Color	
Filter Number	
Petri Dish Number	

Weight Number	Total Weight (g) (Includes Dish)*	Done By	Date/Time	Lab Temp/RH (°F)/(%)	PBar ("Hg)
1				/	
2				/	
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.					

Filter Tare Weight (g)

Dish Tare Weight (g)

Filter Catch Weight (mg)

Describe Sample:

Analytical Balance I.D. 3004206

Balance Located in Stable, Draft-Free Area? (Yes / No)

* Consecutive weighings must not differ by more than 0.5mg or 1% of the total catch weight, whichever is greater.

** If visible filter fragments were removed from frit, then negative filter weight values may be possible.

Job Number: 110504A

Done By / Date: JG / 5.15.11

Checked By / Date: — / — : — / —

Final Check By / Date: SS / 5.23.11

Method 5 Rinse Gravimetric

Plant Name Clow Water Systems

Location Cupola Emission System (P901) Exhaust Stack

Run Number	1
Run Date	5.11.11
Rinse Recovered By	TS/JG
Sample Loading - lt / med / heavy	med
Sample Color	brown
Beaker Number	495

Weight Number	Total Weight (g) (Includes Beaker)*	Done By	Date/Time	Temp/RH (°F)/(%)	PBar ("Hg)
1	107.4076	JG	5.15.11 7:23	68 / 48	28.72
✓ 2	107.4080	JG	5.16.11 5:43	69 / 44	28.92
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.	107.4078				

107.3981 Beaker Tare Weight (g)

200 Rinse Volume (ml)

0.0014 Residue Weight (g)

8.34 **Rinse Catch Weight (mg)**

Describe Sample:

Run Number	2
Run Date	5.11.11
Rinse Recovered By	TS/JG
Sample Loading - lt / med / heavy	med
Sample Color	brown
Beaker Number	507

Weight Number	Total Weight (g) (Includes Beaker)*	Done By	Date/Time	Temp/RH (°F)/(%)	PBar ("Hg)
1	105.7847	JG	5.15.11 7:24	69 / 48	28.72
✓ 2	105.7851	JG	5.16.11 5:44	69 / 44	28.92
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.	105.7849				

105.7765 Beaker Tare Weight (g)

200 Rinse Volume (ml)

0.0014 Residue Weight (g)

7.04 **Rinse Catch Weight (mg)**

Describe Sample:

Analytical Balance I.D. 3004206

Balance Located in Stable, Draft-Free Area? (Yes) No

* Consecutive weighings must not differ by more than 0.5mg or 1% of the total catch weight, whichever is greater.

** If no visible fragments remain on frit, then negative filter weight values may be deemed a zero value.

Job Number: 110504A

Done By / Date: JG / 5.16.11

Checked By / Date: — / — : — / —

Final Check By / Date: SS / 5-23-11

Method 5 Rinse Gravimetric

Plant Name Clow Water Systems

Location Cupola Emission System (P901) Exhaust Stack

Run Number	3
Run Date	5.11.11
Rinse Recovered By	TS/JG
Sample Loading - lt / med / heavy	med
Sample Color	brown
Beaker Number	512

Weight Number	Total Weight (g) (Includes Beaker)*	Done By	Date/Time	Temp/RH (°F)/(%)	PBar ("Hg)
1	109.8365	JG	5.15.11 7:26	69 / 48	28.72
✓ 2	109.8362	JG	5.16.11 5:45	69 / 44	28.92
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.	109.8364				

109.8323 Beaker Tare Weight (g)

200 Rinse Volume (ml)

0.0014 Residue Weight (g)

2.69 **Rinse Catch Weight (mg)**

Describe Sample:

Run Number	BL
Run Date	5.11.11
Rinse Recovered By	TS/JG
Sample Loading - lt / med / heavy	—
Sample Color	—
Beaker Number	513

Weight Number	Total Weight (g) (Includes Beaker)*	Done By	Date/Time	Temp/RH (°F)/(%)	PBar ("Hg)
1	106.8063	JG	5.15.11 7:27	69 / 48	28.72
✓ 2	106.8060	JG	5.16.11 5:47	69 / 44	28.92
3				/	
4				/	
5				/	
6				/	
7				/	
8				/	
9				/	
10				/	
Avg.	106.8062				

106.8048 Beaker Tare Weight (g)

200 Rinse Volume (ml)

0.0014 Residue Weight (g)

— **Rinse Catch Weight (mg)**

Describe Sample:

Analytical Balance I.D. 3004206

Balance Located in Stable, Draft-Free Area? Yes / No

* Consecutive weighings must not differ by more than 0.5mg or 1% of the total catch weight, whichever is greater.

** If no visible fragments remain on frit, then negative filter weight values may be deemed a zero value.

Job Number: 110504 A

Done By / Date: JG / 5.15.11

Checked By / Date: — / — : — / —

Final Check By / Date: SS / 5.23.11

Method 5 Acetone Residuals Calculation

Determine weight of acetone residuals (g) 0.0014

Divide by the volume of the acetone blank (ml) 200

Acetone residuals measured (g/ml) 0.0000068 (should be less than 0.0000079g/ml)

Acetone residuals used (g/ml) 0.0000068

	Run 1	Run 2	Run 3	Run 4
Determine volume of front half rinse (ml)	200	200	200	–
Acetone residuals in sample (g)	0.0014	0.0014	0.0014	–

*Subtract sample residuals from sample catch weight (g)

Job Number: 1105041A

Done By / Date: JG / 5.15.11

Checked By / Date: – / – : – / –

Final Check By / Date: SS / 5-23-11

Method 5 Record of Custody Filter

Shipping/Transportation Container Number: 8

Sample ID		Full Signature	Date	Time	Remarks	Filter Number	Dish Number
110504 A - 1 - M5/F	S	[illegible]	5/9/11			5139	~~495~~ 337
	B	[illegible]					
	S						
	B						
110504 A - 2 - M5/F	S	[illegible]	5/9/11			5137	341
	B	[illegible]					
	S						
	B						
110504 A - 3 - M5/F	S	[illegible]	5/9/11			T-289	342
	B	[illegible]					
	S						
	B						
110504 A - 4 - M5/F	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						

Were all seals intact? ✓ Yes _____ No (Describe seal and reasoning in the "Remarks")

Received By Sample Custodian [illegible] 5/11/11

(Full Signature) (Date)

Remarks: _____

Job Number: 110504 A

Done By / Date: TS 5/25/11

Final Check By / Date: SS 5-22-11

Method 5 Record of Custody Sheet

Shipping/Transportation Container Number: 5

Sample ID		Full Signature	Date	Time	Remarks	Final Vol. ml	Beaker Number
110504 A - 1 - M5/AR	S		5/11/11	800		200	495
	B		5/13/11	1307			
	S						
	B						
110504 A - 2 - M5/AR	S		5/11/11	1520		200	507
	B		5/13/11	1307			
	S						
	B					~~300~~	
110504 A - 3 - M5/AR	S		5/11/11	1520		200	512
	B		5/13/11	1315			
	S						
	B						
110504 A - 4 - M5/AR	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
	S						
	B						
110504 A - BL - M5/AR	S		5/10/11	1500		200	513
	B		5/13/11	1330			

Were all seals intact? ✓ Yes ____ No (Describe seal and reasoning in the "Remarks")

Were all liquid levels at marked levels? ✓ Yes ____ No (Estimate loss in the "Remarks")

Received By Sample Custodian _____ 5/11/11

(Full Signature) (Date)

Remarks: _____

Job Number: 110504 A

Done By / Date: CG / 5/24/11

Final Check By / Date: SS / 5-23-11

TEST DATA

Number of Test Runs	3			
Traverse Points	24			
	Run 1	Run 2	Run 3	Average
Stack Cross-Sectional Diameter 1 (**circular**) (in)	63.00	63.00	63.00	63.00
Stack Cross-Sectional Diameter 2 (**circular**) (in)	63.20	63.20	63.20	63.20
Pitot Tube Coefficient (Cp)	0.84	0.84	0.84	0.84
Barometric Pressure at Ground Level (Pbar) (in Hg)	28.90	28.90	28.90	28.90
Elevation Difference Between Ground Level and Meter Box Locations (ft)	6.00	6.00	6.00	6.00
Elevation Difference Between Ground Level and Sampling Locations (ft)	30.00	30.00	30.00	30.00
Initial Dry Gas Meter Reading (ft3)	319.010	397.075	474.000	
Final Dry Gas Meter Reading (ft3)	396.900	470.235	545.687	
Dry Gas Meter Calibration Factor (Gamma)	1.0059	1.0059	1.0059	1.0059
Dry Gas Meter Calibration Coefficient (Delta H@)	2.202	2.202	2.202	2.202
Total Sampling Run Time (Theta) (min)	120	120	120	120
Volume of Water Vapor Condensed in the Impingers (g)	126.9	133.0	175.5	145.1
Weight of Water Vapor Collected in Silica Gel (g)	24.6	25.5	16.0	22.0
Air Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	14.00	15.00	15.00	14.67
Air Percent by Volume Oxygen in Stack Gas (%-dry)	10.00	9.00	9.00	9.33
Air Percent by Volume Nitrogen in Stack Gas (%-dry)	76.00	76.00	76.00	76.00
Test Run Start Time (hrmin)	5/11/2011 5:03	5/11/2011 7:38	5/11/2011 10:44	
Test Run Stop Time (hrmin)	5/11/2011 7:07	5/11/2011 9:42	5/11/2011 12:48	

DETAILED RESULTS

Stack Gas Conditions	Run 1	Run 2	Run 3	Average
Stack Cross-Sectional Area (A) (ft2)	21.716	21.716	21.716	21.716
Barometric Pressure at Sampling Location (in Hg)	28.87	28.87	28.87	28.87
Dry Molecular Weight of Stack Gas (Md) (lb/lb-mole)	30.64	30.76	30.76	30.72
Wet Molecular Weight of Stack Gas (Ms) (lb/lb-mole)	29.54	29.53	29.25	29.44
Average Absolute Stack Gas Pressure (Ps) (in Hg)	28.83	28.84	28.83	28.83
Average Stack Gas Static Pressure (ps) (in H2O)	-0.48	-0.45	-0.52	-0.48
Average Stack Gas Temperature (ts) (°F)	138.2	144.8	152.0	145.0
Average Stack Gas Temperature (Ts) (°R)	598.2	604.8	612.0	605.0
Average Stack Gas Velocity (Vs) (ft/sec)	41.23	39.23	39.06	39.84
Average Stack Gas Velocity (Vs) (ft/min)	2,474	2,354	2,343	2,390
Wet Volumetric Stack Gas Flow at Actual Conditions (Qaw) (acfm)	53,721	51,111	50,888	51,907
Wet Volumetric Stack Gas Flow at Standard Conditions (scfm)	45,696	43,006	42,307	43,669
Dry Volumetric Stack Gas Flow at Standard Conditions (Qstd) (dscfm)	41,703	38,847	37,284	39,278
Percent by Volume Moisture as measured in Stack Gas (%H2O)	8.74	9.67	11.87	10.09
Test Results				
Volume of Dry Gas Sampled at Standard Conditions (Vmstd) (dscf)	74.610	69.803	67.029	70.481
Rate of Dry Gas Sampled at Standard Conditions (dscfm)	0.622	0.582	0.559	0.587
Predicted 1-Hour Sample Volume Based on Current Sampling Rate (dscf)	37.305	34.902	33.515	35.240
Dry Mole Fraction of Flue Gas (Mfd) (1-bw/100)	0.913	0.903	0.881	0.899
Average Velocity Pressure (Delta P) (in H2O)	0.4813	0.4304	0.4183	0.4433
Average Square Root of Delta P	0.6850	0.6481	0.6384	0.6572
Average Pressure Differential of Orifice Meter (Delta H) (in H2O)	1.7808	1.5650	1.5200	1.6219
Average DGM Temperature (tm) (°F)	77.875	79.708	90.667	82.750
Average Dry Gas Meter Temperature (Tm) (°R)	537.875	539.708	550.667	542.750
Volume of Metered Gas Sample (Vm) (dry) (acf)	77.890	73.160	71.687	74.246
Post-Test Calibration (Yqa)	1.0362	1.0342	1.0508	1.0404
Post-Test/Pre-Test Calibration Factor Difference (%)	-3.02	-2.82	-4.46	-3.43

SAMPLING QA

Current Predicted Allowable Post-Test Leak Rate (dscfm)	0.020	0.020	0.020
Current Sampling Rate Status	**OK**	**OK**	**OK**
Probe Nozzle Diameter (in)	0.245	0.245	0.245
Percent Isokinetic of Sampling Rate (% I)	98.9	99.3	99.4
In Field Isokinetic QA	**GOOD**	**GOOD**	**GOOD**
Count of Velocity Pressure Readings Below 0.05 in H2O	0	0	0
Sensitivity Factor for Differential Pressure Gauge (T)	1.005	1.006	1.006
Is Meter Box Manometer Adequate (Yes / No) ?	YES	YES	YES

MEASURED DATA FROM TEST RUNS

Point Count	Run #	Run Time (min)	Pitot Delta P (in H2O)	Square Root of Delta P	Orifice Delta H (in H2O)	DGM Temp OUT (°F)	Average DGM Temp (°F)	Stack Pressure (in H2O)	Stack Temp (°F)
1	1	0	0.22	0.469	0.77	72	72.00	-0.48	125
2	1	5	0.27	0.520	0.95	73	73.00		128
3	1	10	0.33	0.574	1.16	74	74.00		131
4	1	15	0.36	0.600	1.27	75	75.00		133
5	1	20	0.42	0.648	1.48	76	76.00		134
6	1	25	0.45	0.671	1.58	76	76.00		135
7	1	30	0.70	0.837	2.46	77	77.00		136
8	1	35	0.75	0.866	2.64	81	81.00		136
9	1	40	0.77	0.877	2.71	80	80.00		137
10	1	45	0.75	0.866	2.64	79	79.00		137
11	1	50	0.67	0.819	2.36	79	79.00		137
12	1	55	0.43	0.656	1.51	80	80.00		137
13	1	60	0.46	0.678	1.62	78	78.00		137
14	1	65	0.48	0.693	1.73	78	78.00		142
15	1	70	0.52	0.721	1.92	79	79.00		142
16	1	75	0.52	0.721	2.10	79	79.00		143
17	1	80	0.52	0.721	2.10	80	80.00		144
18	1	85	0.52	0.721	2.10	79	79.00		144
19	1	90	0.48	0.693	1.92	79	79.00		145
20	1	95	0.48	0.693	1.92	79	79.00		144
21	1	100	0.44	0.663	1.76	79	79.00		144
22	1	105	0.40	0.632	1.60	79	79.00		142
23	1	110	0.35	0.592	1.40	79	79.00		143
24	1	115	0.26	0.510	1.04	79	79.00		141
25	2	0	0.49	0.700	1.76	74	74.00	-0.45	133
26	2	5	0.47	0.686	1.70	75	75.00		138
27	2	10	0.49	0.700	1.76	76	76.00		139
28	2	15	0.49	0.700	1.76	77	77.00		141
29	2	20	0.50	0.707	1.86	78	78.00		142
30	2	25	0.50	0.707	1.86	79	79.00		143
31	2	30	0.48	0.693	1.79	81	81.00		145
32	2	35	0.46	0.678	1.71	80	80.00		146
33	2	40	0.46	0.678	1.71	80	80.00		146
34	2	45	0.41	0.640	1.51	80	80.00		145
35	2	50	0.36	0.600	1.32	81	81.00		146
36	2	55	0.28	0.529	1.03	80	80.00		142
37	2	60	0.20	0.447	0.72	79	79.00		143
38	2	65	0.23	0.480	0.83	79	79.00		145
39	2	70	0.25	0.500	0.90	80	80.00		147
40	2	75	0.27	0.520	0.97	80	80.00		148
41	2	80	0.31	0.557	1.12	80	80.00		148
42	2	85	0.34	0.583	1.22	80	80.00		148
43	2	90	0.55	0.742	1.98	81	81.00		149
44	2	95	0.63	0.794	2.27	81	81.00		148
45	2	100	0.63	0.794	2.27	82	82.00		149
46	2	105	0.63	0.794	2.27	83	83.00		149
47	2	110	0.58	0.762	2.09	83	83.00		148
48	2	115	0.32	0.566	1.15	84	84.00		147

MEASURED DATA FROM TEST RUNS

Point Count	Run #	Run Time (min)	Pitot Delta P (in H2O)	Square Root of Delta P	Orifice Delta H (in H2O)	DGM Temp OUT (°F)	Average DGM Temp (°F)	Stack Pressure (in H2O)	Stack Temp (°F)
49	3	0	0.20	0.447	0.72	81	81.00	-0.52	145
50	3	5	0.25	0.500	0.90	82	82.00		149
51	3	10	0.27	0.520	0.97	84	84.00		151
52	3	15	0.29	0.539	1.04	85	85.00		151
53	3	20	0.31	0.557	1.12	86	86.00		151
54	3	25	0.35	0.592	1.26	87	87.00		152
55	3	30	0.60	0.775	2.16	88	88.00		152
56	3	35	0.66	0.812	2.44	89	89.00		152
57	3	40	0.68	0.825	2.52	90	90.00		152
58	3	45	0.68	0.825	2.52	91	91.00		152
59	3	50	0.60	0.775	2.22	92	92.00		152
60	3	55	0.29	0.539	1.04	93	93.00		148
61	3	60	0.41	0.640	1.48	92	92.00		151
62	3	65	0.41	0.640	1.48	92	92.00		152
63	3	70	0.43	0.656	1.55	93	93.00		152
64	3	75	0.43	0.656	1.55	93	93.00		154
65	3	80	0.43	0.656	1.55	93	93.00		153
66	3	85	0.43	0.656	1.55	94	94.00		154
67	3	90	0.43	0.656	1.55	94	94.00		154
68	3	95	0.45	0.671	1.62	95	95.00		154
69	3	100	0.43	0.656	1.55	95	95.00		154
70	3	105	0.41	0.640	1.50	95	95.00		154
71	3	110	0.35	0.592	1.28	96	96.00		154
72	3	115	0.25	0.500	0.91	96	96.00		155

TEST DATA

	Run 1	Run 2	Run 3	Average
Particulate Weight in Probe Rinse (mg)	**8.34**	**7.04**	**2.69**	6.02
Particulate Weight in Filter Catch (mg)	**45.25**	**31.40**	**28.40**	35.02

DETAILED RESULTS

	Run 1	Run 2	Run 3	Average
Emission Results				
Filterable Particulate Matter Emission Rate (lb/hr)	3.962	2.830	2.288	3.027
Filterable Particulate Matter Concentration (grains/dscf)	0.0111	0.0085	0.0072	0.0089

EPA Methods 1, 2, 3, 4, and 5 Nomenclature and Sample Calculations
Run No. - 1

Constants

CO_2F_{wt}= 44.0	in wg= 0.073529	NO_2F_{wt}= 46.01	$HClF_{wt}$= 36.46
O_2F_{wt}= 32.0	gr= 0.000142857	COF_{wt}= 28.01	SO_2F_{wt}= 64.06
CON_2F_{wt}= 28.0	mmBtu= 1000000 Btu	$H_2SO_4F_{wt}$= 98.08	Cl_2F_{wt}= 70.91
H_2OF_{wt}= 18.0	CF_{wt}= 12.011	T_{std}= 528	P_{std}= 29.92
	PF_{wt}= 44.0962		

Stack Variables

Cp =	0.84		pitot tube coefficient (dimensionless)
P_{bar} =	28.90	in. Hg	barometric pressure
E_{box} =	6	ft	elevation difference between ground level and meter box
E_{sam} =	30	ft	elevation difference between ground level and sampling ports
γ =	1.0059		gamma, dry gas meter calibration factor (dimensionless)
θ =	120.0	min	net run time (minutes)
V_{lc} =	151.5	g	total mass of liquid collected in impingers (g)
$\%CO_2$ =	14.00	%	percent CO_2 by volume (dry basis) (dimensionless)
$\%O_2$ =	10.00	%	percent O_2 by volume (dry basis) (dimensionless)
$\%N_2$ =	76.00	%	percent N_2 by volume (dry basis) (dimensionless)
A =	21.7163	ft^2	stack cross-sectional area
P_g =	-0.48	in. H_2O	flue gas static pressure
T_{savg} =	598.21	R	average absolute flue gas temperature (460R+tsavg °F)
$SQ\Delta P_{avg}$ =	0.69	in. wg	average square root ΔP
ΔH =	1.78	in. wg	average pressure differential of orifice meter
T_m =	537.88	R	dry gas meter temperature (460R+tsavg °F)
V_m =	77.89	ft^3	volume of metered gas sample (dry actual cubic feet)
D_n =	0.245	in.	sampling nozzle diameter

Calculated Stack Variables

Barometric pressure at sampling location

NOTE: Barometric pressure recorded at ground level

$$P_{sam} = P_{bar} - [(E_{sam} / 100 \text{ ft}) * 0.1 \text{ in. Hg}]$$

$$P_{sam} = 28.90 - ((30.0 / 100) * 0.1)$$

$$P_{sam} = 28.87 \text{ in. Hg}$$

Volume of dry gas sampled at standard conditions (dscf)

$$V_{mstd} = \gamma * Vm * [P_{bar} - ([(E_{box} / 100 \text{ ft}) * 0.1 \text{ in. Hg}] + (\Delta H / 13.6)) / P_{std}] * (T_{std} / T_m)$$

$$V_{mstd} = 1.0059 * 77.890 * ((28.90 - ((6.0 / 100) * 0.1) + (1.7808 / 13.6)) / 29.92) * (528.0 / 537.875)$$

$$V_{mstd} = 74.610 \text{ ft}^3$$

Volume of water vapor at standard conditions (68 °F, scf)

$$V_{wstd} = (0.04715 \text{ ft}^3/\text{g}) * Vlc$$

$$V_{wstd} = (0.04715 * 151.5)$$

$$V_{wstd} = 7.1 \text{ ft}^3$$

Percent moisture by volume as measured in flue gas

$\%H_2O$ (Measured) = 100 * [V_{wstd} / (V_{wstd} + V_{mstd})]

$\%H_2O$ (Measured) = 100 * (7.143 / (7.143 + 74.610))

$\%H_2O$ (Measured) = 8.74

$\%H_2O$ (Saturated) = (100 / P_{sam}) * 10 ^ (6.6911 - (3144 / (T_{savg} + 390.86 - 460)))

$\%H_2O$ (Saturated) = (100 / 28.834706) * 10 ^ (6.6911 - (3144 / (598.208333 + 390.86 - 460)))

$\%H_2O$ (Saturated) = 19.44

$\%H_2O$ = 8.74

Absolute flue gas pressure

P_s = P_{sam} + (Pg / 13.6)

P_s = 28.87 + (-0.48 / 13.6)

P_s = 28.83 in. Hg

Dry mole fraction of flue gas (dimensionless)

M_{fd} = 1 - ($\%H_2O$ / 100)

M_{fd} = 1 - (8.74 / 100)

M_{fd} = 0.913

Dry molecular weight of flue gas (lb/lb-mole)

M_d = [($\%CO_2$ / 100) * 44.0] + [($\%O_2$ / 100) * 32.0] + [((100 - $\%CO_2$ - $\%O_2$) / 100) * 28.0]

M_d = ((14.00 / 100) * 44.0) + ((10.00 / 100) * 32.0) + (((100 - 14.00 - 10.00) / 100) * 28.0)

M_d = 30.64 lb/lb-mole

M_d = 30.64

Wet molecular weight of flue gas (lb/lb-mole)

M_s = M_d * M_{fd} + (H_2OF_{wt} * ($\%H_2O$ / 100))

M_s = 30.640 * 0.913 + 18.00 * (8.74 / 100)

M_s = 29.54 lb/lb-mole

Average flue gas velocity (ft/sec)

v_s = 85.49 * Cp * ($SQ\Delta P_{avg}$) * (T_{avg} / (P_s * M_s))$^{0.5}$

v_s = 85.49 * 0.84 * (0.6850) * (598.21 / (28.835 * 29.536)) ^ 0.5

v_s = 41.23 ft/sec

Wet volumetric flue gas flow rate at actual conditions (acfm)

Q_{aw} = v_s * A * 60 sec/min

Q_{aw} = 41.229 * 21.716 * 60

Q_{aw} = 53,721 ft^3/min

Wet volumetric flue gas flow rate at standard conditions (scfm)

$Q_{sdw} = v_s * A * (T_{std} / T_{savg}) * (P_s / P_{std}) * 60$ sec/min

$Q_{sdw} = 41.229 * 21.716 * (528.0 / 598.208) * (28.835 / 29.92) * 60$

$Q_{sdw} =$ 45,696 ft^3/min

Dry volumetric flue gas flow rate at standard conditions (dscfm)

$Q_{sd} = M_{fd} * v_s * A * (T_{std} / T_{savg}) * (P_s / P_{std}) * 60$ sec/min

$Q_{sd} = 0.913 * 41.2292 * 21.7163 * (528.0 / 598.208) * (28.835 / 29.92) * 60$

$Q_{sd} =$ 41,703 ft^3/min

Percent Excess Air

$\%EA = [\%O_2 - (0.5) * \%CO] / [0.264 * (100 - \%CO_2 - \%O_2) - (\%O_2 - 0.5 * \%CO)]$

$\%EA = ((10.00 - (0.5) * 0.00) / (0.264 * (100 - 14.00 - 10.00) - (10.00 - 0.5 * 0.00))) * 100$

$\%EA =$ 99.36 %

Isokinetic Calculations

Percent isokinetic of sampling rate (%)

$\%I = (P_{std} / T_{std}) * (T_{savg} / P_s) * [V_{mstd} / (v_s * M_{fd} * \theta * \pi * (D_n / 2)^2)]$

%I = ((((29.92 / 528.0) * (598.208 / 28.835)) * (74.610 / (41.2292 * 0.913 * 120.0 * (()3.141593 * (0.245 / 2) ^ 2) / 144))) / 60) * 100

%I = 98.9 %

Method 5 Calculations

Filterable PM total catch weight (mg)

$mg_{quan} =$ 53.59 mg

Filterable PM concentration (grains/dscf)

$C_{grcm} = 0.154322 * mg_{quan} / V_{mstd}$

$C_{grcm} = 0.0154322 * 53.59 / 74.610$

$C_{grcm} =$ 0.0111 gr/ft^3

Filterable PM mass emission rate (lb/hr)

$EMRlbhr = (mg_{quan} / V_{mstd}) * Q_{sd} * (60 / 453592)$

EMRlbhr = 53.59 / 74.610 * 41,703.179 * (60 / 453592)

EMRlbhr = 3.96 lb/hr

Method 5 Isokinetic Field Data

Plant	Clow Water Systems Co.	Meter box no.	T-MTB- 015	Gamma 1.0059	ΔH@ 2.202
Location	P901 Exhaust Stack (A)	Pump no.	T-PMP- 011	K Factor 3.52 / 3.6 / 3.7 / 4.0	
Run no. 1		Nomograph no.	T-NOM- CALC	Nozzle Size, in. .245	
Test start time 503		Probe no.	T-PRB- 808	Barometric pressure, in.Hg 28.9	Barometer no. T-BAR-001
Test stop time 707		Filter box no.	T-FLB- 016	Ambient temperature, °F 62	
Pre-test leak rate @ 15in.Hg .001		Impinger box no.	T-IMB- 001	Filter box temperature setting, °F 248	
Post-test leak rate @ 3 in.Hg 0.000		Umbilical cord no.	T-UMC- 106	Probe temperature setting, °F 248	
Pre-test pitot leak check - total ✓	static ✓	Umbilical adapter no.	T-UMA- 006	Orsat flow rate setting, SCFH .30	Orsat bag no. 110504A-1
Post-test pitot leak check - total ✓	static ✓	Filter Exit Therm. no.	T-FXT- 008	Meter box operator CG	Date 5/11/11

POINT	CLOCK TIME min	DRY GAS METER CF	PITOT In. H_2O ΔP	ORIFICE ΔH In. H_2O DESIRED	ORIFICE ΔH In. H_2O ACTUAL	PROBE TEMP °F	STACK TEMP °F	DRY GAS TEMP °F INLET	DRY GAS TEMP °F OUTLET	FILTER BOX TEMP °F	IMPINGER EXIT TEMP °F	FILTER EXIT TEMP °F	PUMP VACUUM in.Hg	ORSAT FLOW SCFH	STATIC PRESSURE ± in.H_2O
1	0	319.010	.22	.77	.77	251	125	—	72	252	60	248	1.0	.30	-.48
2	5	321.275	.27	.95	.95	252	128	—	73	250	55	249	1.5	.15	
3	10	323.725	.33	1.16	1.16	251	131	—	74	251	51	246	2.0	.15	
4	15	326.420	.36	1.27	1.27	252	133	—	75	249	51	244	2.0	.15	
5	20	329.190	.42	1.48	1.48	253	134	—	76	250	53	245	2.0	.15	
6	25	332.140	.45	1.58	1.58	251	135	—	76	250	59	243	2.0	.15	
7	30	335.200	.70	2.46	2.46	252	136	—	77	251	59	244	3.0	.15	
8	35	339.000	.75	2.64	2.64	252	136	—	81	250	61	242	3.0	.15	
9	40	342.980	.77	2.71	2.71	252	137	—	80	249	63	243	3.0	.15	
10	45	347.020	.75	2.64	2.64	253	137	—	79	250	65	242	3.0	.15	
11	50	351.040	.67	2.36	2.36	252	137	—	79	251	64	241	3.0	.15	
12	55	354.880	.43	1.51	1.51	251	137	—	80	250	64	242	3.0	.15	
1	60	357.920	.46	1.62	1.62	252	137	—	78	250	59	237	2.5	.15	
2	65	360.960	.48	1.73	1.73	253	142	—	78	251	57	238	3.0	.15	
3	70	364.120	.52	1.92	1.92	251	142	—	79	249	54	239	3.0	.15	
4	75	367.500	.52	~~1.92~~ 2.10	2.10	253	143	—	79	250	53	238	3.0	.15	
5	80	371.025	.52	2.10	2.10	253	144	—	80	250	53	239	3.0	.15	
6	85	374.550	.52	2.10	2.10	252	144	—	79	251	54	237	3.0	.15	
7	90	378.050	.48	1.92	1.92	257	145	—	79	255	55	236	3.0	.15	
8	95	381.475	.48	1.92	1.92	256	144	—	79	254	55	238	3.0	.15	
9	100	384.825	.44	1.76	1.76	~~256~~ 257	144	—	79	255	54	239	3.0	.15	
10	105	388.090	.40	1.60	1.60	256	142	—	79	255	54	240	2.5	.15	
11	110	391.155	.35	1.40	1.40	257	143	—	79	255	54	240	2.0	.15	
12	115	394.085	.26	1.04	1.04	258	141	—	79	255	55	241	2.0	.15	
Final	120	396.900													

Nomograph Calibration Variables Cp .84 Ts 130 Tm 75 Ps 29 Pm 29 Bws

Comments:

Leak Checks

Int. DGM Reading

Final DGM Reading

Pause Times

Pause: 603

Resume: 607

Air Compliance Testing, Inc.

(Me' .xls - Isokinetic Field Data) 05/02/11

Done By / Date : Checked By / Date CG 15/11/11 : SS 16.2-11

Job Numbe. J504 A

Method 5 Isokinetic Field Data

Plant	Clow Water Systems Co.	Meter box no.	T-MTB- 015	Gamma 1.0059	ΔH@ 2.202
Location	P901 Exhaust Stack (A)	Pump no.	011	K Factor 3.6 / 3.72 / 3.68 / 3.6	
Run no. 2		Nomograph no.	CALC	Nozzle Size, in. .246	
Test start time 738		Probe no.	816	Barometric pressure, in.Hg 28.9	Barometer no. T-BAR-001
Test stop time 942		Filter box no.	T-FLB- 011	Ambient temperature, °F 62	
Pre-test leak rate @ 15in.Hg .001		Impinger box no.	T-IMB- 007	Filter box temperature setting, °F 248	
Post-test leak rate @ 3 in.Hg .001		Umbilical cord no.	T-UMC- 106	Probe temperature setting, °F 248	
Pre-test pitot leak check - total ✓	static ✓	Umbilical adapter no.	T-UMA- 013	Orsat flow rate setting, SCFH .15	Orsat bag no. 110504 A-2
Post-test pitot leak check - total ✓	static ✓	Filter Exit Therm. no.	T-FXT- 018	Meter box operator CG	Date 5/11/11

POINT	CLOCK TIME min	DRY GAS METER CF	PITOT In. H_2O ΔP	ORIFICE ΔH In. H_2O DESIRED	ORIFICE ΔH In. H_2O ACTUAL	PROBE TEMP °F	STACK TEMP °F	DRY GAS TEMP °F INLET	DRY GAS TEMP °F OUTLET	FILTER BOX TEMP °F	IMPINGER EXIT TEMP °F	FILTER EXIT TEMP °F	PUMP VACUUM in.Hg	ORSAT FLOW SCFH	STATIC PRESSURE ± in.H_2O
1	0	397.075	.49	1.76	1.76	256	133	—	74	254	64	228	2.0	.15	-.45
2	5	400.300	.47	1.70	1.70	257	138	—	75	255	52	237	2.0	.15	
3	10	403.465	.49	1.76	1.76	258	139	—	76	255	51	240	2.0	.15	
4	15	406.620	.49	1.76	1.76	260	141	—	77	257	52	243	2.0	.15	
5	20	409.900	.50	1.86	1.86	257	142	—	78	255	54	241	2.0	.15	
6	25	413.110	.50	1.86	1.86	258	143	—	79	256	55	240	2.0	.15	
7	30	416.420	.48	1.79	1.79	258	145	—	81	255	56	238	2.0	.15	
8	35	419.710	.46	1.71	1.71	257	146	—	80	255	57	237	2.0	.15	
9	40	422.910	.46	1.71	1.71	257	146	—	80	254	57	236	2.0	.15	
10	45	426.125	.41	1.51	1.51	258	145	—	80	253	58	237	2.0	.15	
11	50	429.300	.36	1.32	1.32	258	146	—	81	256	58	235	2.0	.15	
12	55	432.075	.28	1.03	1.03	257	142	—	80	255	58	236	2.0	.15	
1	60	434.520	.20	.72	.72	258	143	—	79	256	58	230	1.5	.15	
2	65	436.625	.23	.83	.83	257	145	—	79	256	56	231	1.5	.15	
3	70	438.900	.25	.90	.90	258	147	—	80	254	54	232	1.5	.15	
4	75	441.235	.27	.97	.97	258	148	—	80	255	54	229	1.5	.15	
5	80	443.700	.31	1.12	1.12	258	148	—	80	256	54	228	1.5	.15	
6	85	446.295	.34	1.22	1.22	259	148	—	80	258	54	228	1.5	.15	
7	90	448.955	.55	1.98	1.98	260	149	—	81	258	56	229	2.0	.15	
8	95	452.300	.63	2.27	2.27	258	148	—	81	258	57	228	3.0	.15	
9	100	456.025	.63	2.27	2.27	258	149	—	82	257	58	227	3.0	.15	
10	105	459.730	.63	2.27	2.27	261	149	—	83	258	59	229	3.0	.15	
11	110	463.450	.58	2.09	2.09	258	148	—	83	257	60	228	3.0	.15	
12	115	466.950	.32	1.15	1.15	254	147	—	84	256	62	227	3.0	.15	
Final	120	470.235													

Nomograph Calibration Variables Cp .84 Ts Tm Ps Pm Bws

Comments:

Leak Checks

Int. DGM Reading

Final DGM Reading

Pause Times

Pause: 838

Resume: 842

Done By / Date : Checked By / Date CG 5/11/11 : SS 16-2-11

Air Compliance Testing, Inc.

(Method 5.xls - Isokinetic Field Data) 05/02/11

Job Number: 110504 A

Method 5 Isokinetic Field Data

Plant	Clow Water Systems Co.	Meter box no.	T-MTB- 015	Gamma 1.0059	ΔH@ 2.202
Location	P901 Exhaust Stack (A)	Pump no.	T-PMP- 011	K Factor 3.6 / 3.7	/ 3.6 / 3.65
Run no. 3		Nomograph no.	T-NOM- CALC	Nozzle Size, in. .245	
Test start time 1044		Probe no.	T-PRB- 808	Barometric pressure, in.Hg 28.9	Barometer no. T - BAR-001
Test stop time 1248		Filter box no.	T-FLB- 016	Ambient temperature, °F 68	
Pre-test leak rate @ 15in.Hg .001		Impinger box no.	T-IMB- 003	Filter box temperature setting, °F 248	
Post-test leak rate @ 3 in.Hg .001		Umbilical cord no.	T-UMC- 106	Probe temperature setting, °F 248	
Pre-test pitot leak check - total ✓	static ✓	Umbilical adapter no.	T-UMA- 006	Orsat flow rate setting, SCFH .15	Orsat bag no. 105044-3
Post-test pitot leak check - total ✓	static ✓	Filter Exit Therm. no.	T-FXT- 008	Meter box operator CG	Date 5/11/11

POINT	CLOCK TIME min	DRY GAS METER CF	PITOT In. H_2O ΔP	ORIFICE ΔH In. H_2O DESIRED	ORIFICE ΔH In. H_2O ACTUAL	PROBE TEMP °F	STACK TEMP °F	DRY GAS TEMP °F INLET	DRY GAS TEMP °F OUTLET	FILTER BOX TEMP °F	IMPINGER EXIT TEMP °F	FILTER EXIT TEMP °F	PUMP VACUUM in.Hg	ORSAT FLOW SCFH	STATIC PRESSURE ± in.H_2O
1	0	474.000	.20	.72	.72	260	145	—	81	258	58	227	1.0	.15	-.52
2	5	476.140	.25	.90	.90	265	149	—	82	263	54	228	1.0	.15	
3	10	478.495	.27	.97	.97	263	151	—	84	261	49	234	1.5	.15	
4	15	480.985	.29	1.04	1.04	265	151	—	85	260	47	241	1.5	.15	
5	20	483.540	.31	1.12	1.12	259	151	—	86	256	48	249	1.5	.15	
6	25	486.145	.35	1.26	1.26	260	152	—	87	256	49	251	2.0	.15	
7	30	488.900	.60	2.16	2.16	259	152	—	88	256	51	254	3.0	.15	
8	35	492.390	.66	2.44	2.44	256	152	—	89	254	50	256	3.0	.15	
9	40	496.210	.68	2.52	2.52	257	152	—	90	253	51	259	3.0	.15	
10	45	500.135	.68	2.52	2.52	255	152	—	91	253	52	258	3.0	.15	
11	50	504.050	.60	2.22	2.22	254	152	—	92	254	54	257	3.0	.15	
12	55	507.710	.29	1.04	1.04	257	148	—	93	256	55	258	2.0	.15	
1	60	510.328	.41	1.48	1.48	258	151	—	92	246	63	254	2.0	.15	
2	65	513.270	.41	1.48	1.48	255	152	—	92	253	60	259	2.0	.15	
3	70	516.230	.43	1.55	1.55	256	152	—	93	255	58	260	2.5	.15	
4	75	519.265	.43	1.55	1.55	255	154	—	93	253	59	263	2.5	.15	
5	80	522.280	.43	1.55	1.55	257	153	—	93	255	60	262	2.5	.15	
6	85	525.275	.43	1.55	1.55	256	154	—	94	254	60	261	2.5	.15	
7	90	528.250	.43	1.55	1.55	255	154	—	94	253	62	262	2.5	.15	
8	95	531.270	.44	1.62	1.62	253	154	—	95	254	56	264	3.0	.15	
9	100	534.360	.43	1.55	1.55	256	154	—	95	254	53	267	2.5	.15	
10	105	537.470	.41	1.50	1.50	255	154	—	95	253	53	268	2.5	.15	
11	110	540.435	.35	1.28	1.28	253	154	—	96	254	53	270	2.5	.15	
12	115	543.270	.25	.91	.91	256	155	—	96	253	54		2.0	.15	
Final	120	545.687													

Nomograph Calibration Variables Cp Ts Tm Ps Pm Bws

Comments:

Leak Checks

Int. DGM Reading

Final DGM Reading

Pause Times

Pause: 1144

Resume: 1148

Air Compliance Testing, Inc.

(Met xls - Isokinetic Field Data) 05/02/11

Done By / Date : Checked By / Date CG / 5/11/11 SS / 6-2-11

Job Numbe. 504 A

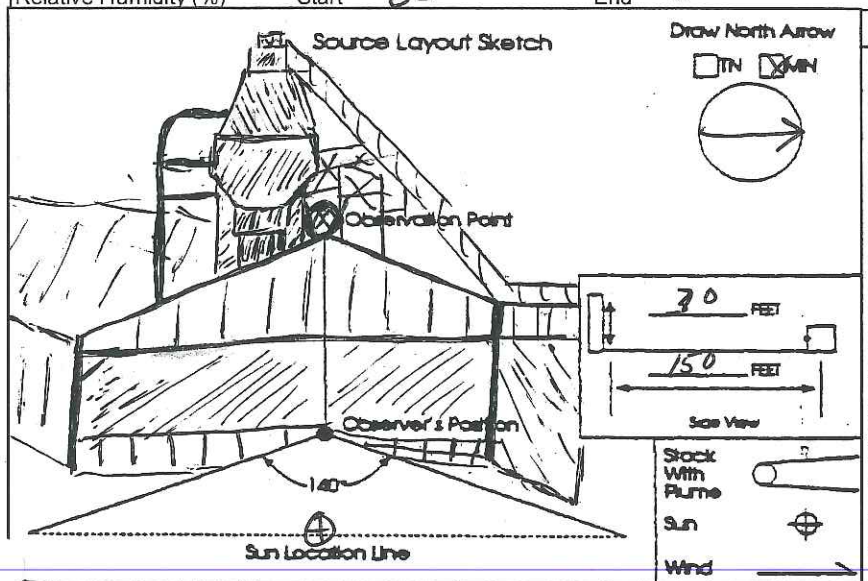
Method 9 Visible Emissions Observation Form-1

Company Name	Clow Water Systems Co.	Observation Date	Run No. 1
Facility Name	Clow Water Systems Co.	Start Time 0630	(1 of 1)
Street Address	S Sixth St	End Time 0705	
City Coshocton	State OH Zip 43812		

Process & Unit #	Cupola Emission System (P901)	Operating Mode	Maximum Achievable
Control Equipment	NA	Operating Mode	NA

Describe Emission Point	Shroud Area		
Height of Emission Point	Start 70'	End 70'	
Height Relative to Observer	Start 30'	End 30'	
Distance from Observer	Start 150'	End 150'	
Direction from Observer (°)	Start 260	End 260	
Vertical Angle to Observation Point (°)	Start 5	End 5	
Distance and Direction to Observation Point from Emission Point			
Start	6" above emission point		
End	Same		
Describe Emissions	Start Lofting Plume	End Same	
Emission Color	Start grey	End Grey	
If Water Droplet Plume	Attached NA	Detached NA	
Point in the Plume at which Opacity was Determined			
Start	6" above emission point		
End	Same		
Describe Plume Background	Start Sky/Metal Structure	End Same	
Background Color	Start grey/brown	End Same	
Sky Conditions	Start Overcast	End Same	
Wind Speed (mph)	Start Calm	End Same	
Wind Direction (From)	Start –	End –	
Ambient Temperature (°F)	Start 61	End 61	
Relative Humidity (%)	Start 80	End 80	

Sec.	0	15	30	45	Sec.	0	15	30	45
Min.									
0	5	5	5	0	30	0	0	0	5
1	5	5	5	5	31	5	5	5	5
2	5	5	5	5	32	5	0	5	5
3	5	10	5	5	33	5	5	5	10
4	5	5	10	0	34	5	5	5	5
5	0	5	10	5	35				
6	5	5	5	5	36				
7	10	10	5	5	37				
8	5	5	0	0	38				
9	0	5	5	5	39				
10	5	5	5	5	40				
11	10	5	0	0	41				
12	5	5	5	0	42				
13	5	5	5	5	43				
14	5	5	5	5	44				
15	5	5	5	5	45				
16	5	5	5	5	46				
17	5	5	5	5	47				
18	5	5	5	5	48				
19	5	5	5	5	49				
20	5	5	10	5	50				
21	5	5	5	5	51				
22	5	5	5	5	52				
23	5	5	5	10	53				
24	10	5	10	5	54				
25	5	10	10	10	55				
26	5	5	0	0	56				
27	5	5	10	5	57				
28	10	5	10	5	58				
29	10	5	5	10	59				



Longitude	Latitude	Declination
W 81.8640066	N 40.300934	7°47' W

Range of Opacity Readings	
Minimum 0	Maximum 10
Average Opacity for Highest Period	6.67
Observer's Name (Print)	TATE STACHLER
Observer's Signature	Tate Stachler
Date	5/11/11
Organization	*Air Compliance Testing, Inc.*
Certified By **Eastern Technical Associates**	Date: 9/6/11

Job Number: 110504 B
Done By / Date: TS / 5/11/11
Checked By / Date: – / – : – / –
Final Check By / Date: SS / 6-2-11

Method 9 Visible Emissions Observation Form-1

Company Name	Clow Water Systems Co.	Observation Date 5/11/11	Run No. 2 (1 of 2)
Facility Name	Clow Water Systems Co.	Start Time 0740	
Street Address	S Sixth St	End Time 0940	
City Coshocton	State OH Zip 43812		

Process & Unit # Cupola Emission System P(901)	Operating Mode Maximum Achievable
Control Equipment NA	Operating Mode NA

Describe Emission Point	Shroud Area		
Height of Emission Point	Start 70'	End 70'	
Height Relative to Observer	Start 30'	End 30'	
Distance from Observer	Start 150'	End 150'	
Direction from Observer (°)	Start 260	End 240	
Vertical Angle to Observation Point (°)	Start 5	End 5	
Distance and Direction to Observation Point from Emission Point			
Start	6" above emission point		
End	Same		
Describe Emissions	Start Lofting Plume	End Same	
Emission Color	Start Grey	End Grey	
If Water Droplet Plume	Attached NA	Detached NA	
Point in the Plume at which Opacity was Determined			
Start	6" above emission point		
End	Same		
Describe Plume Background	Start Sky / Metal Structure	End Same	
Background Color	Start Green / Brown	End Same	
Sky Conditions	Start Overcast	End Scattered	
Wind Speed (mph)	Start Calm	End Calm	
Wind Direction (From)	Start —	End —	
Ambient Temperature (°F)	Start 61	End 62	
Relative Humidity (%)	Start 80	End 78	

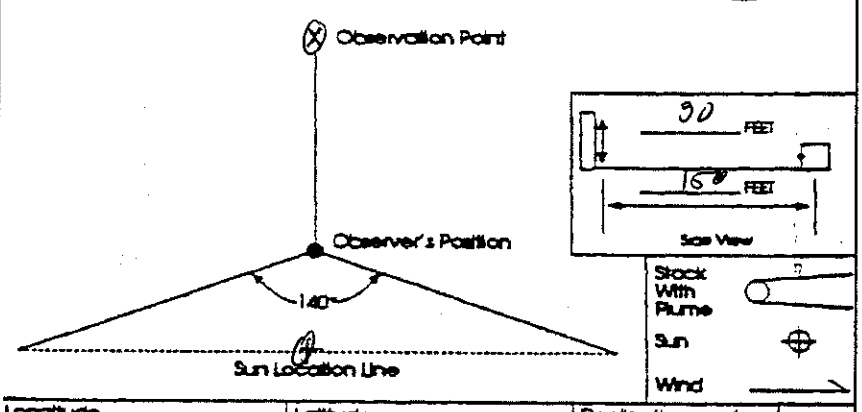
Sec.	0	15	30	45	Sec.	0	15	30	45
Min.									
0	5	5	5	5	30	5	5	5	5
1	5	10	5	0	31	5	0	0	5
2	5	5	10	10	32	5	5	5	5
3	5	5	5	5	33	5	5	5	5
4	5	10	5	10	34	5	0	5	10
5	5	5	5	5	35	5	10	10	5
6	5	5	5	10	36	5	10	5	10
7	5	10	10	5	37	5	10	5	0
8	5	5	5	5	38	0	5	5	5
9	5	5	5	5	39	5	10	10	5
10	5	5	10	5	40	5	5	5	5
11	5	5	5	10	41	5	5	5	5
12	5	10	10	5	42	0	0	5	5
13	5	5	5	5	43	5	5	5	5
14	5	5	5	10	44	5	5	5	5
15	5	5	5	5	45	0	5	5	
16	5	10	10	10	46	5	5	5	5
17	5	5	5	5	47	5	5	5	10
18	5	5	10	5	48	5	5	5	5
19	0	0	5	0	49	5	10	5	10
20	0	5	5	0	50	5	5	5	5
21	0	5	5	5	51	5	5	5	5
22	5	5	5	5	52	5	5	10	10
23	0	5	5	5	53	5	5	5	5
24	10	5	5	5	54	0	5	5	0
25	5	5	5	5	55	5	10	10	10
26	5	5	5	5	56	5	5	5	10
27	5	5	5	10	57	10	5	5	0
28	5	5	5	5	58	5	5	10	5
29	10	5	10	10	59	5	5	5	5

Source Layout Sketch

See Run - 1

Draw North Arrow

☐ TN ☒ MN



Longitude W 81.864066	Latitude N 40.300934	Declination 7°47' W

Range of Opacity Readings	
Minimum	Maximum 5 (B)
Average Opacity for Highest Period	
Observer's Name (Print)	Tate Strickler
Observer's Signature	
Date	5/11/11
Organization	*Air Compliance Testing, Inc.*
Certified By **Eastern Technical Associates**	Date: 4/6

Job Number: 110504 B

Done By / Date: TS / 5/11/11

Checked By / Date: — / — : — / —

Final Check By / Date: SS / 6-2-11

Method 9 Visible Emissions Observation Form-2

Company Name	~~Quality Castings~~ Clow Water Systems	Observation Date 5/11/11	Run No. 2
Facility Name	~~Quality Castings~~ Clow Water Systems	Start Time 0740	(2 of 2)
Street Address	~~1200 N Main St~~ South 6th St.	End Time 0940	
City ~~Zanesville~~ Coshocton	State OH	Zip ~~#N/A~~ 43812	

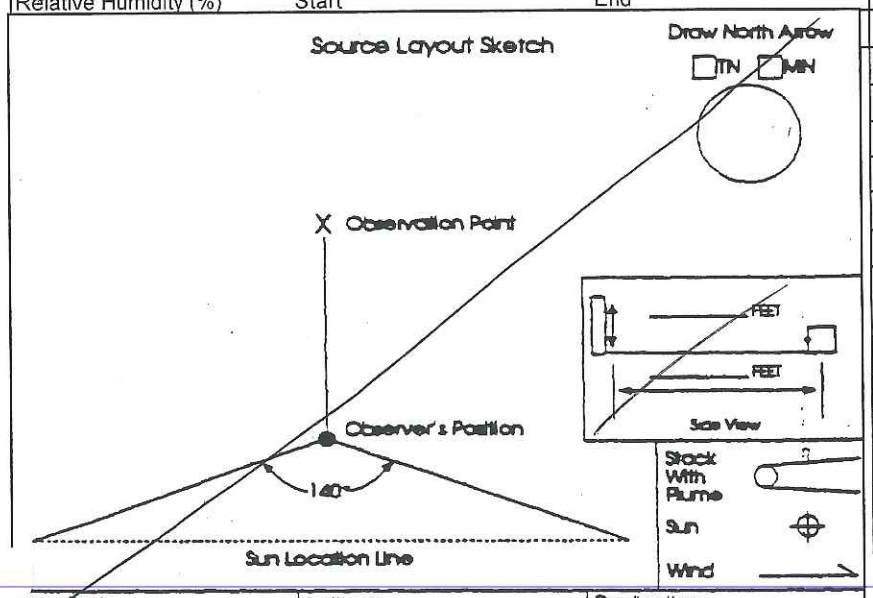
Process & Unit #	/	Operating Mode	/
Control Equipment	/	Operating Mode	/

Describe Emission Point		
Height of Emission Point	Start	End
Height Relative to Observer	Start	End
Distance from Observer	Start	End
Direction from Observer (°)	Start	End
Vertical Angle to Observation Point (°)	Start	End
Distance and Direction to Observation Point from Emission Point		
Start		
End		

Describe Emissions	Start	End
Emission Color	Start	End
If Water Droplet Plume	Attached	Detached
Point in the Plume at which Opacity was Determined		
Start		
End		

Describe Plume Background	Start	End
Background Color	Start	End
Sky Conditions	Start	End
Wind Speed (mph)	Start	End
Wind Direction (From)	Start	End
Ambient Temperature (°F)	Start	End
Relative Humidity (%)	Start	End

Sec.	0	15	30	45	Sec.	0	15	30	45
Min.									
0	5	5	10	10	30	0	5	5	5
1	5	5	5	10	31	5	5	5	5
2	5	5	5	5	32	5	5	10	10
3	0	5	5	5	33	5	5	5	5
4	5	5	5	5	34	5	10	10	5
5	5	5	10	10	35	5	5	5	5
6	5	10	5	5	36	5	5	5	5
7	5	5	5	10	37	0	0	5	5
8	5	5	10	5	38	10	5	5	5
9	5	10	10	5	39	5	5	5	5
10	5	10	10	10	40	0	5	0	0
11	5	5	5	5	41	5	5	5	5
12	5	5	5	5	42	5	5	5	5
13	5	5	10	10	43	5	0	0	5
14	0	0	5	5	44	5	5	5	5
15	0	5	0	5	45	5	5	0	5
16	5	5	5	10	46	0	5	0	0
17	5	5	5	0	47	5	0	5	5
18	5	5	5	5	48	5	5	5	5
19	5	5	5	5	49	5	10	10	5
20	5	5	10	5	50	10	5	5	5
21	5	5	5	5	51	5	5	10	5
22	5	10	5	5	52	5	5	10	10
23	5	5	5	5	53	5	5	5	5
24	10	5	10	10	54	5	10	10	10
25	5	5	10	5	55	5	5	5	5
26	5	10	10	5	56	5	5	5	5
27	0	5	5	5	57	0	0	5	10
28	5	10	10	5	58	5	5	5	5
29	10	10	10	5	59	5	5	5	5



Longitude	Latitude	Declination

Range of Opacity Readings	
Minimum	Maximum
Average Opacity for Highest Period	
Observer's Name (Print)	
Observer's Signature	
Date	
Organization	*Air Compliance Testing, Inc.*
Certified By **Eastern Technical Associates**	Date:

Job Number: 110504B
Done By / Date: TS / 5/11/11
Checked By / Date: ___ / ___ : ___ / ___
Final Check By / Date: SS / 6-2-11

Method 9 Visible Emissions Observation Form-3

Company Name	~~Quality Castings~~ Clow Water Systems	Observation Date 5/11/11	Run No. 3
Facility Name	~~Quality Castings~~ Clow Water Systems	Start Time 1044	(1 of 2)
Street Address	~~1200 N Main St~~ South 6th St	End Time 1244	
City ~~Orrville~~ Coshocton	State OH	Zip ~~#N/A~~ 43812	

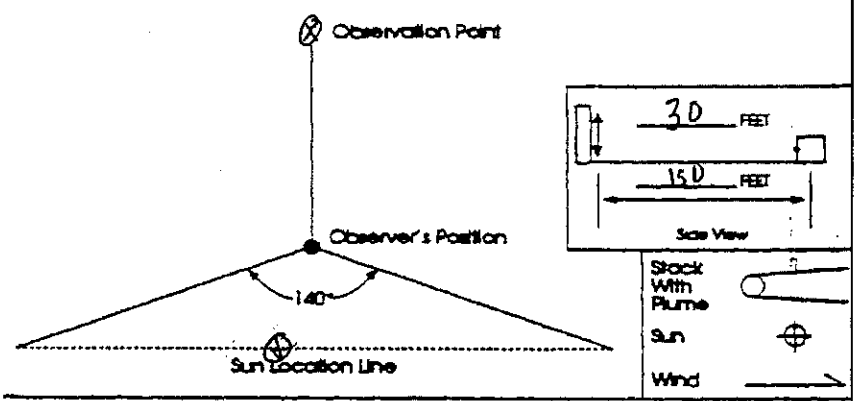
Process & Unit #	Cupola Emission System	Operating Mode	Maximum Achievable
Control Equipment	NA	Operating Mode	NA

Describe Emission Point	Shroud Area		
Height of Emission Point	Start 70'	End Same	
Height Relative to Observer	Start 30'	End Same	
Distance from Observer	Start 150'	End Same	
Direction from Observer (°)	Start 260'	End Same	
Vertical Angle to Observation Point (°)	Start 5	End 5	
Distance and Direction to Observation Point from Emission Point	Start 6" above emission point	End Same	
Describe Emissions	Start Lofting Plume	End Same	
Emission Color	Start Grey	End Same	
If Water Droplet Plume	Attached N/A	Detached N/A	
Point in the Plume at which Opacity was Determined	Start 6" above emission point	End Same	
Describe Plume Background	Start Sky / Metal Structure	End Same	
Background Color	Start Blue / Grey / Brown	End Blue / Grey / Brown	
Sky Conditions	Start Clear	End Clear	
Wind Speed (mph)	Start Calm	End Calm	
Wind Direction (From)	Start —	End —	
Ambient Temperature (°F)	Start 65	End 73	
Relative Humidity (%)	Start 76	End 70	

Sec.	0	15	30	45	Sec.	0	15	30	45
Min.									
0	5	0	0	5	30	5	5	10	10
1	5	5	5	5	31	5	5	0	0
2	5	10	10	5	32	5	5	5	5
3	5	10	10	5	33	10	5	5	10
4	10	5	5	5	34	10	5	5	10
5	5	5	5	5	35	5	0	0	5
6	5	5	5	5	36	5	5	5	5
7	5	10	10	10	37	5	5	0	0
8	10	5	5	0	38	0	5	5	10
9	0	5	5	10	39	5	5	5	10
10	5	10	5	10	40	10	10	5	5
11	5	5	10	5	41	5	5	5	5
12	5	5	5	5	42	5	5	5	5
13	5	5	10	10	43	5	5	0	5
14	10	10	10	5	44	0	0	5	5
15	10	5	10	5	45	10	10	5	
16	5	5	0	0	46	10	5	5	
17	10	10	10	5	47	5	5	10	10
18	5	5	10	5	48	5	0	5	0
19	5	5	5	10	49	5	5	10	10
20	5	5	5	5	50	5	0	10	10
21	10	5	5	5	51	5	10	5	5
22	0	5	10	5	52	5	5	5	5
23	5	5	5	5	53	5	5	5	5
24	0	0	5	5	54	10	10	5	5
25	5	10	5	5	55	10	10	5	0
26	10	10	5	5	56	0	5	10	0
27	5	5	5	5	57	5	5	5	5
28	0	0	5	5	58	5	5	5	5
29	0	0	5	10	59	5	5	5	5

Source Layout Sketch — See Run-1

Draw North Arrow: ☐ TN ☒ MN



Longitude	Latitude	Declination
W 81.864066	N 40.300934	7°47' W

Range of Opacity Readings	
Minimum	Maximum
Average Opacity for Highest Period	
Observer's Name (Print)	TATE STRICKLER
Observer's Signature	[signature]
Date	5/11/11
Organization	*Air Compliance Testing, Inc.*
Certified By **Eastern Technical Associates**	Date: 4/6/11

Job Number: 110504B
Done By / Date: TS / 5/11/11
Checked By / Date: — / — : — / —
Final Check By / Date: SS / 6-2-11

Method 9 Visible Emissions Observation Form-4

Company Name	~~Quality Castings~~ Clow Water Systems	Observation Date 5/11/11	Run No. 3
Facility Name	~~Quality Castings~~ Clow Water Systems	Start Time 1244	(2 of 2)
Street Address	~~1200 N Main St~~ South 6th St	End Time 1244	
y ~~Orrville~~ Coshocton	State OH	Zip #N/A 43812	

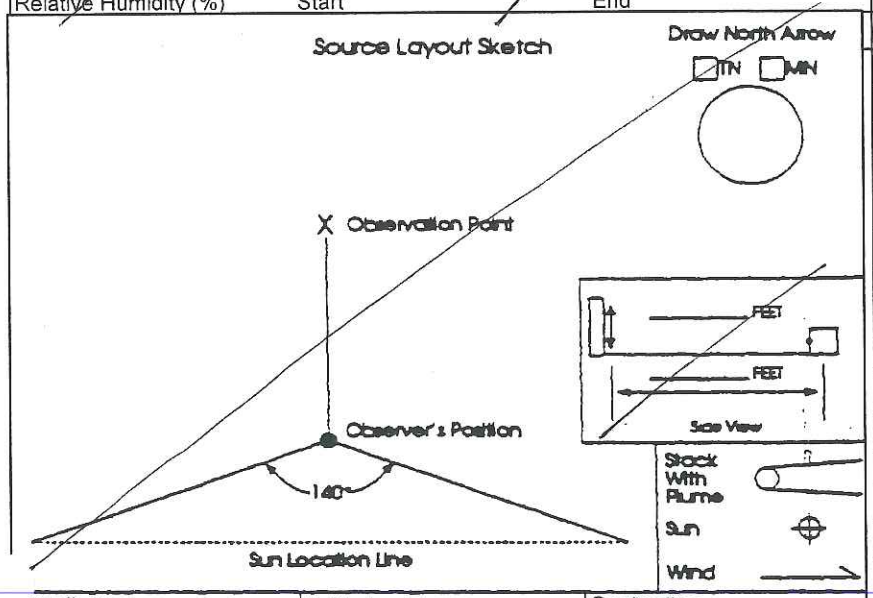
TS

Process & Unit #	Operating Mode
Control Equipment	Operating Mode

Describe Emission Point		
Height of Emission Point	Start	End
Height Relative to Observer	Start	End
Distance from Observer	Start	End
Direction from Observer (°)	Start	End
Vertical Angle to Observation Point (°)	Start	End
Distance and Direction to Observation Point from Emission Point		
Start		
End		
Describe Emissions	Start	End
Emission Color	Start	End
If Water Droplet Plume	Attached	Detached
Point in the Plume at which Opacity was Determined		
Start		
End		
Describe Plume Background	Start	End
Background Color	Start	End
Sky Conditions	Start	End
Wind Speed (mph)	Start	End
Wind Direction (From)	Start	End
Ambient Temperature (°F)	Start	End
Relative Humidity (%)	Start	End

Sec.	0	15	30	45	Sec.	0	15	30	45
Min.									
0	5	5	5	5	30	5	5	5	5
1	5	5	0	5	31	10	5	5	10
2	5	5	10	10	32	5	5	5	0
3	0	5	5	5	33	0	0	0	5
4	5	5	5	5	34	5	5	5	5
5	5	5	5	5	35	5	5	10	10
6	5	5	5	5	36	5	5	5	5
7	5	10	10	10	37	5	5	0	0
8	10	5	5	5	38	5	10	5	5
9	5	5	10	5	39	0	0	5	5
10	5	5	5	5	40	5	5	0	5
11	5	10	10	5	41	5	5	5	5
12	5	5	5	5	42	5	5	5	0
13	5	10	10	5	43	5	10	5	0
14	0	0	5	0	44	5	5	0	0
15	0	5	5	5	45	5	0	10	10
16	5	0	5	0	46	5	5	0	5
17	5	10	10	5	47	5	10	5	5
18	0	5	5	10	48	10	0	10	5
19	0	5	5	10	49	5	5	0	0
20	5	10	10	5	50	5	0	5	5
21	5	5	10	10	51	5	5	5	5
22	10	0	10	5	52	5	5	10	10
23	5	5	5	5	53	5	10	10	5
24	0	5	5	10	54	0	5	0	0
25	5	10	5	10	55	5	10	5	10
26	5	5	5	10	56	5	5	5	5
27	5	5	5	5	57	5	10	10	5
28	5	5	0	10	58	0	0	0	0
29	5	0	0	5	59	5	5	10	5

5



Longitude —	Latitude —	Declination —

Range of Opacity Readings	
Minimum	Maximum
Average Opacity for Highest Period	
Observer's Name (Print)	
Observer's Signature	
Date	
Organization	*Air Compliance Testing, Inc.*
Certified By **Eastern Technical Associates**	Date:

Job Number: 110584B
Done By / Date: 5/11/11 TS
Checked By / Date: — / — : — / —
Final Check By / Date: SS / 6-2-11

Method 4 Moisture Recovery

Company Name Clow Water Systems Co. Location P901 Exhaust Stack (A)

Prepared By AP Date 5·9·11 Shop Balance ID A.BAL.008 Field Balance ID 005

Run Number	1	2	3	4
Run Date	5/11/11	5/11/11	5/11/11	
Recovery Date	5/11/11	5/11/11	5/11/11	
Recovery Time	0715	1000	1300	
Recovered By	TS	TS	CG	
Impinger Box No.	001	007	003	
Turbidity / Color (Clear, Cloudy, Suspended Particulates, etc.)	slight/clear	slight/clear	SLIGHT/CLEAR	
Knockout Impinger (optional)				
Final Weight (g)				
Tared Weight (g)				
Condensed H_2O (g)				
Impinger #1				
Final Weight (g)	755.6	771.4	814.9	
Tared Weight (g)	690.4	687.3	673.5 ~~715.0~~ CG	
Condensed H_2O (g)	65.2	84.1	141.4	
Impinger #2				
Final Weight (g)	720.3 TS ~~720.3~~	736.6	710.9	
Tared Weight (g)	676.6	698.2	682.8	
Condensed H_2O (g)	43.7	38.4	28.1	
Impinger #3				
Final Weight (g)	572.0	567.5	588.9	
Tared Weight (g)	554.0	557.0	582.9	
Condensed H_2O (g)	18	10.5	6.0	
Total Condensed (g)	126.9	133.0	175.5	
SILICA GEL				
Final Weight (g)	883.5	921.4	864.1	
Tared Weight (g)	858.9	895.9	848.1	
Adsorbed H_2O (g)	24.6	25.5	16	
Total H_2O Collected (g)	151.5	158.5	191.5	

Job Number: 110504 A
Done By / Date: TS / 5/11/11
Final Check By / Date: SS / 6-2-11

Plant Name Clow Water Systems Co. Location P901

Reagents Prepared By AB / Date 5/9/2011

	Run 1	Run 2	Run 3
Run Date	5/11/11	5/11/11	5/11/11
Analysis Date	5/11/11	5/11/11	5/11/11
Time of Analysis	7:15	10:00	13:00
IMPINGER #1			
Final Weight (g)	755.6	771.4	814.9
Tared Weight (g)	690.4	687.3	673.5
Condensed H_2O (ml,g)	65.2	84.1	141.4
IMPINGER #2			
Final Weight (g)	720.3	736.6	710.9
Tared Weight (g)	676.6	698.2	682.8
Condensed H_2O (ml,g)	43.7	38.4	28.1
IMPINGER #3			
Final Weight (g)	572.0	567.5	588.9
Tared Weight (g)	554.0	557.0	582.9
Condensed H_2O (ml,g)	18.0	10.5	6.0
Total Condensed (ml,g)	126.9	133.0	175.5
SILICA GEL			
Final Weight (g)	883.5	921.4	864.1
Tared Weight (g)	858.9	895.9	848.1
Adsorbed H_2O (ml,g)	24.6	25.5	16.0
Total H_2O Collected (ml,g)	151.5	158.5	191.5

Shop Balance	A - BAL -	008
Field Balance	A - BAL -	005

Method 3 Fyrite Field Data

Plant Name: Clow Water Systems Co.

Test Location: P901 Exhaust Stack (A)

CO_2 Zero: (Y) N O_2 Zero: (Y) N

Run Number: 1			Operator: CG	
Time of Sample Collection	Time of Analysis	%CO_2 (A)	%O_2 (B)	%N_2 (100 - (A + B))
6:03 - 7:07	250	14.0	10.0	76.0
	252	14.0	10.0	76.0
	257	14.0	10.0	76.0
	Average	14.0	10.0	76.0

Analyzer I.D. - A - FYR - 005 Tedlar Bag I.D. - 110504A-1

Run Number: 2			Operator: CG	
Time of Sample Collection	Time of Analysis	%CO_2 (A)	%O_2 (B)	%N_2 (100 - (A + B))
7:38 - 9:42	948	15.0	9.0	76.0
	950	15.0	9.0	76.0
	952	15.0	9.0	76.0
	Average	15.0	9.0	76.0

Analyzer I.D. - A - FYR - 005 Tedlar Bag I.D. - 110504A-2

Run Number: 3			Operator: CG	
Time of Sample Collection	Time of Analysis	%CO_2 (A)	%O_2 (B)	%N_2 (100 - (A + B))
10:44 - 12:48	1205	15.0	9.0	76.0
	1307	15.0	9.0	76.0
	1309	15.0	9.0	76.0
	Average	15.0	9.0	76.0

Analyzer I.D. - A - FYR - 005 Tedlar Bag I.D. - 110504A-3

Job Number: 110504 A

Done By / Date: CG / 5/11/11

Checked By / Date: — / — : — / —

Final Check By / Date: SS / 6-2-11

Method 3 Dry Molecular Weight Calculation

Run 1

	%CO2	%O2	%N2	Molecular Weight	Mean Difference
	14.0	10.0	76.0	30.64	0.000
	14.0	10.0	76.0	30.64	0.000
	14.0	10.0	76.0	30.64	0.000
Average	14.00	10.00	76.00	30.64	

Run 2

	%CO2	%O2	%N2	Molecular Weight	Mean Difference
	15.0	9.0	76.0	30.76	0.000
	15.0	9.0	76.0	30.76	0.000
	15.0	9.0	76.0	30.76	0.000
Average	15.00	9.00	76.00	30.76	

Run 3

	%CO2	%O2	%N2	Molecular Weight	Mean Difference
	15.0	9.0	76.0	30.76	0.000
	15.0	9.0	76.0	30.76	0.000
	15.0	9.0	76.0	30.76	0.000
Average	15.00	9.00	76.00	30.76	

Method 1 Preliminary Field Data-Round - Round Stack

Plant: Clow Water Systems Co.
City, State: Coshocton, OH
Location: P901 Exhaust Stack (A)

Duct Depth (Inner Diameter):	Port 1	Port 2	Port 3	Port 4
Relative Location	NW	SW		
From Far Inside Wall to Outside of Port (in.)	69.25	69.5		
Nipple Length and/or Wall Thickness (in.)	6.5	6.5		
Nipple Protrusion (in.)	0.25	0.20		
Stack or Duct Depth (Inner Diameter) (in.)	63.0	63.2		
Stack Outer Circumference (in.)	-	-		
Port Hole Inner Diameter (in.)	6	6		

Sample Port Access	Manlift
Elevation of Meter Box from Ground Level (ft)	(14) 50 6
Elevation of Ports from Ground Level (ft)	50
Number of Ports	2
Direction of Flow	↑
Isokinetic Sample (Yes / No)	Yes
Stack Particulate Build-up (Yes / No)	No

Distance Upstream from Flow Disturbance (in.)	122.0
Diameters Upstream from Flow Disturbance (≥ 0.5 D_e)	1.93
Minimum Traverse Points Needed *	12

Distance Downstream from Flow Disturbance (in.)	286.0
Diameters Downstream from Flow Disturbance (≥ 2 D_e)	4.53
Minimum Traverse Points Needed *	24

*Circle Larger of the Two

Stack or Duct Area = 3127.15 in.^{2}

Location of Points in Circular Stacks or Ducts

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

Note:
1) Stacks having a diameter greater than 24in, shall have no traverse points located within 1.0in of the Stack walls.

2) Stacks having a diameter less than or equal to 24in, shall have no traverse points located within .50in of the Stack walls.

3) Add nipple protrusion length to Point 1 only. Actual nipple length = (length - protrusion)

Relocate to a distance equal to the inside diameter of the nozzle being used or to the above minimum distances, whichever is larger.

110504A
Job Number: ~~101033-A~~
Done By / Date: TH / 10.26.10
Checked By / Date: - / - : - / -
Final Check By / Date: SC / 11.2.10

Port Number	1	2
Relative Location	NW	SW
From Far Wall to Outside of Port (in.)	69.25	69.50
Nipple Length or Wall Thickness (in.)	6.50	6.50
Port Protrusion Length (opt) (in.)	0.25	0.20
Depth of Stack or Duct (in.)	63.00	63.20
Stack or Duct Type	Elliptical	
Port Hole Inner Diameter (in.)	6.0	
Stack or Duct Width (If Rectangular) (in.)		
Stack Outer Circumference (in.)		
Number of Ports	2.0	
Elevation of Ports from Ground Level (ft)	30.0	

#N/A

Equivalent Diameter = D_e (in.)

$$De = \frac{2 \times (\text{Depth} \times \text{Width})}{(\text{Depth} + \text{Width})} = \text{-----}$$

"Velocity" or "Particulate" Traverse	Particulate

Distance Upstream from Flow Disturbance (in.)	122.0
Diameters Upstream from Flow Disturbance (≥ 0.5 De)	1.93
Minimum Traverse Points Needed for a Velocity Traverse *	12
Minimum Traverse Points Needed for a Particulate Traverse *	12

Distance Downstream from Flow Disturbance (in.)	286.0
Diameters Downstream from Flow Disturbance (≥ 2 De)	4.53
Minimum Traverse Points Needed for a Velocity Traverse *	16
Minimum Traverse Points Needed for a Particulate Traverse *	24

Minimum Traverse Points	24
Traverse Point Overide	
Duct Area - in^2	3127.15
Duct Area - ft^2	21.7163
Diameter Check via Circumference (in.)	0.0000

Location of Points in Circular Stacks or Ducts

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

Location of Points in Rectangular Stacks or Ducts

Note:

1) Stacks having a diameter greater than 24in, shall have no traverse points located within 1.0in of the Stack walls.

2) Stacks having a diameter less than or equal to 24in, shall have no traverse points located within .50in of the Stack walls.

3) Add nipple protrusion length to Point 1 only. Actual nipple length = (length - protrusion)

Relocate to a distance equal to the inside diameter of the nozzle being used or to the above minimum distances, whichever is larger.

Number of Ports:	2
Direction of Flow:	Up
Isokinetic Sample: Yes	Yes
Stack Build-up: Yes / N	No

Port	Point	% of Duct Depth	Dist. From Inside Wall (Decimal)	Dist. From Outside Wall (Decimal)
1	1	2.1	1.3	7.8
1	2	6.7	4.2	10.5
1	3	11.8	7.4	13.7
1	4	17.7	11.2	17.4
1	5	25	15.8	22.0
1	6	35.6	22.4	28.7
1	7	64.4	40.6	46.8
1	8	75	47.3	53.5
1	9	82.3	51.8	58.1
1	10	88.2	55.6	61.8
1	11	93.3	58.8	65.0
1	12	97.9	61.7	67.9
2	1	2.1	1.3	7.8
2	2	6.7	4.2	10.5
2	3	11.8	7.5	13.8
2	4	17.7	11.2	17.5
2	5	25	15.8	22.1
2	6	35.6	22.5	28.8
2	7	64.4	40.7	47.0
2	8	75	47.4	53.7
2	9	82.3	52.0	58.3
2	10	88.2	55.7	62.0
2	11	93.3	59.0	65.3
2	12	97.9	61.9	68.2

Method 4 Pre-Test Orifice Meter Check

✓ Assemble meter box - level / zero the manometer

✓ Operate the meter box at the ΔH@ pressure differential for at least **10 minutes**.

The ΔH@ number is taken from the meter console calibration sheet or the tag.

✓ *During the warm-up period, verify flow through the Method 3 flowmeter.*

✓ Record the dry gas meter volume, meter temperatures and barometric pressure (in.Hg).

Meter Box No. 015 | Calibration Date 3-11-11

Pump No. 012 | Barometric Pressure (in.Hg) 28.88

Gamma (γ) 1.0059 | Initial Dry Gas Meter Volume (cf) ~~297.4~~ 310.58

ΔH@ 2.202 | Final Dry Gas Meter Volume (cf) 318.053

Time (min)	Meter In (°F)	Meter Out (°F)	
2	—	~~84~~	86
4	—	~~84~~	87
6	—	~~85~~	87
8	—	~~86~~	87
10	—	87	
Avg.	86.8		

_____ Calculate the Dry Gas Meter Calibration Value (γ_c) and compare γ_c against the Dry Gas Meter Calibration Factor (γ) to determine if $\gamma_c = \gamma \pm 3\%$

_____ If the γ_c is not within this range, the Meter Box should be investigated before beginning the test.

PASS

Job Number: 110504 A

Done By / Date: 87 / 5-10-11

Checked By / Date: _____ / _____ : _____ / _____

Final Check By / Date: _____ / _____

_____ Operate the Dry Gas Meter at the ΔH@ pressure differential for 10 minutes.
The ΔH@ number is taken from the Meter Console Calibration Sheet or the tag.
_____ Record the Dry Gas Meter Volume (CF), Meter Temperatures (°R = 460 + °F) and Barometric Pressure (in.Hg).

Meter Box: T-MTB-	**015**	Initial Dry Gas Meter Volume	**310.500**
Calibration Date	**3/11/2011**	Final Dry Gas Meter Volume	**318.053**
		Net Dry Gas Meter Volume	**7.553**
γ =	**1.0059**		
ΔH@ =	**2.202**	Barometric Pressure (inHg)	**28.900**

Time (min)	Meter In (°F)	Meter Out (°F)
2	**86**	**86**
4	**87**	**87**
6	**87**	**87**
8	**87**	**87**
10	**87**	**87**
Avg.	86.8	86.8
Avg. of Avgs.	**86.8**	

_____ Calculate the Dry Gas Meter Calibration Value (γ_c)

$$\gamma_c = (10 / Vm) * [0.0319 (Tm/Pbar]^{1/2}$$

_____ Compare the γ_c value with the Dry Gas Meter Calibration Factor γ to determine if:

$$0.97(\gamma) < \gamma_c < 1.03(\gamma)$$

Calculate

0.9757	<	**1.0286**	<	1.0361	PASS

_____ If the γ_c is not within this range, the Dry Gas Meter should be investigated before beginning the test.

Method 5 Probe Nozzle Inspection

The sampling nozzle must be calibrated before use in a source experiment. Calibration should be done in the laboratory and checked just before use in the field. Inside / outside calipers are used to measure the interior nozzle diameter to the nearest 0.025mm (0.001 inch).

The calipers are inserted as close to the edge of the nozzle opening as possible; readings are taken on three separate diameters and recorded. The average of the three readings will be the Assignied Nozzle Size. Each reading must agree within 0.1 mm (0.004 inch), or the nozzle must be reshaped. Any nozzle that has been nicked, dented, or corroded must be reshaped and recalibrated. All calibrated nozzles should be permanently identified.

Run # 1
Nozzle ID # S-8-6

Measured Nozzle Size (inches)	Assigned Nozzle Size (inches)	Difference Between High and Low Measurements	
.246			
.245	.245	.002	<= 0.004in
.244			

Run # 2
Nozzle ID # S-8-5

Measured Nozzle Size (inches)	Assigned Nozzle Size (inches)	Difference Between High and Low Measurements	
.245			
.245	.245	.001	<= 0.004in
.244			

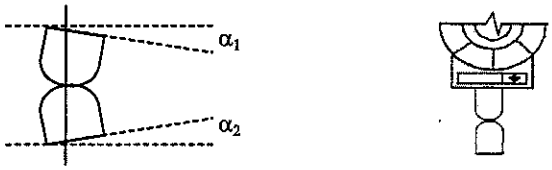
Run # SEE RUN 1
Nozzle ID #

Measured Nozzle Size (inches)	Assigned Nozzle Size (inches)	Difference Between High and Low Measurements	
			<= 0.004in

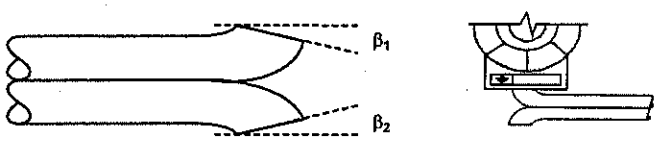
Job Number: 110504 A
Done By / Date: CG / 5/11/11
Final Check By / Date: SS / 6-2-11

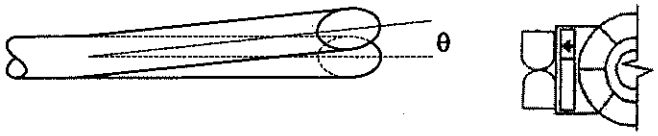
Type S Pitot Tube Inspection

Alignment and Tubing Dimensions

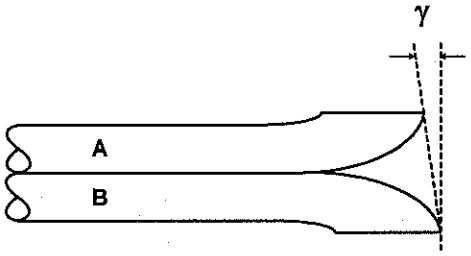


Degree indicating level position for determining α_1 and α_2.



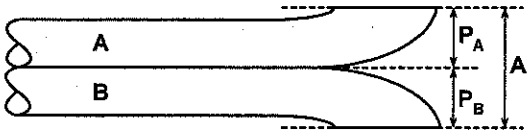


Degree indicating level position for determining θ.

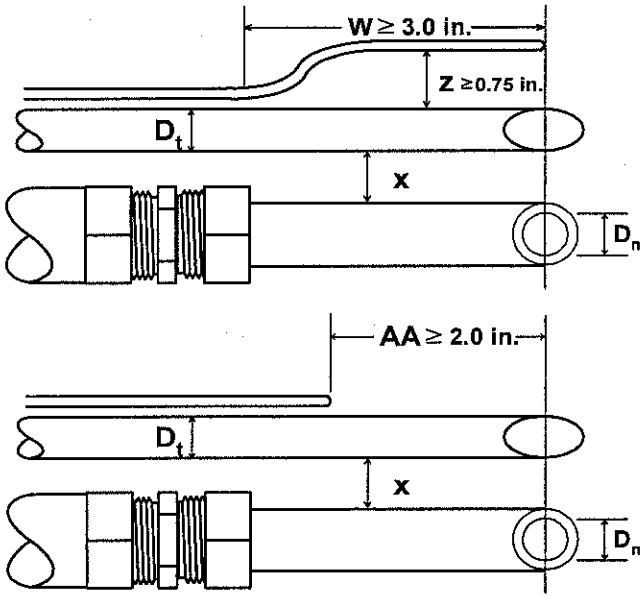


Degree indicating level position for determining γ then calculating Z.

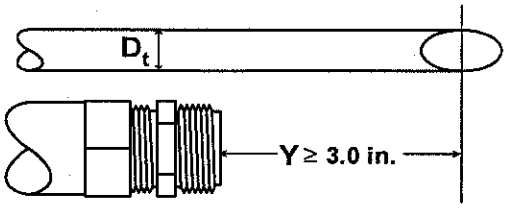
Probe / Pitot Number	T-PRB-808
Level and Perpendicular	☑
No Obstructions	☑
No Damage	☑
α_1 $(-10° < \alpha_1 < +10°)$	0.0
α_2 $(-10° < \alpha_2 < +10°)$	0.0
β_1 $(-5° < \beta_1 < +5°)$	0.0
β_2 $(-5° < \beta_2 < +5°)$	0.0
γ	0.00
θ	0.00
A	0.950
z= A tan γ (< 0.125")	0.000
w= A tan θ (< 0.03125")	0.000
D_t (0.1875" < D_t < 0.375")	0.375
P_A $(1.05D_t < P_A < 1.5D_t)$	0.470
P_B $(1.05D_t < P_B < 1.5D_t)$	0.480
$P_A = P_B \pm 0.0625$	-0.010



Assembly Inter-Component Spacing Requirements

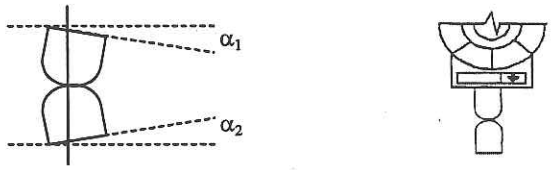


Effective Length (in.)	86.80
W (≥ 3.0")	7.450
-or- AA (≥ 2.0")	
X	1.920
D_n	0.493
X / D_n (≥ 1.5)	3.895
Y (≥ 3.0")	3.800
Z ≥ 0.75"	1.400

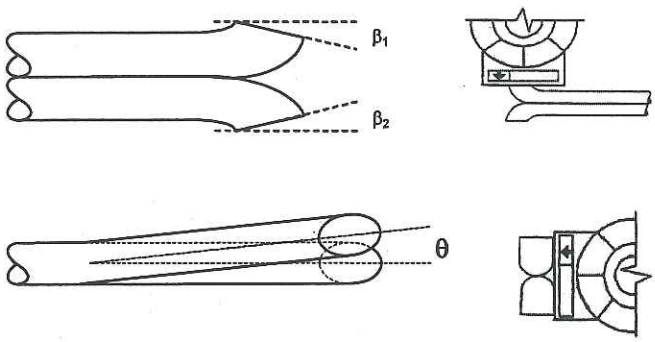


Type S Pitot Tube Inspection

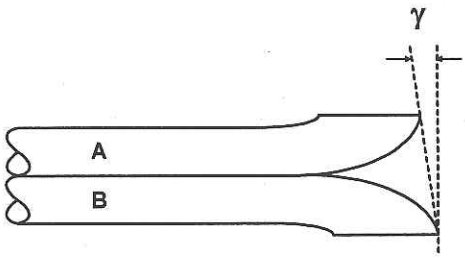
Alignment and Tubing Dimensions



Degree indicating level position for determining α_1 and α_2.

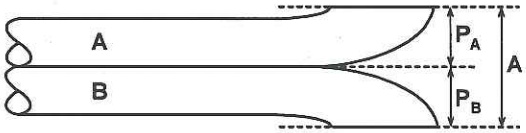


Degree indicating level position for determining θ.

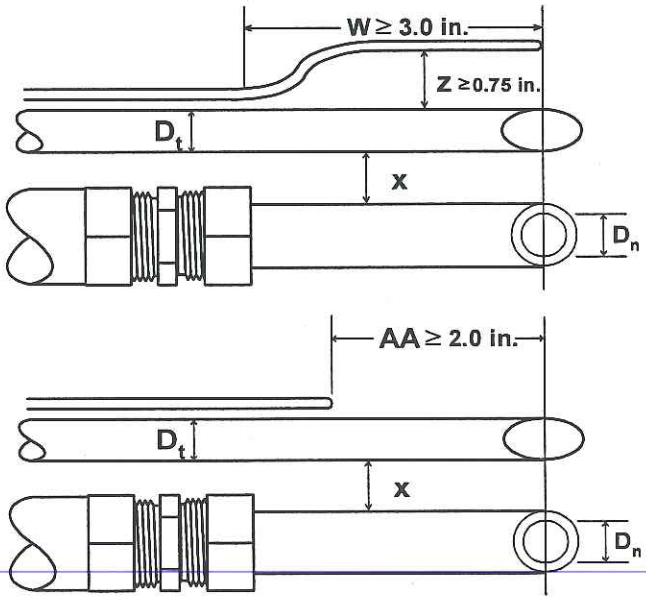


Degree indicating level position for determining γ then calculating Z.

Probe / Pitot Number	T-PRB-810
Level and Perpendicular	☑
No Obstructions	☑
No Damage	☑
α_1 $(-10° < \alpha_1 < +10°)$	0.0
α_2 $(-10° < \alpha_2 < +10°)$	0.0
β_1 $(-5° < \beta_1 < +5°)$	0.0
β_2 $(-5° < \beta_2 < +5°)$	0.0
γ	0.00
θ	0.00
A	0.915
z= A tan γ (< 0.125")	0.000
w= A tan θ (< 0.03125")	0.000
D_t (0.1875" < D_t < 0.375")	0.370
P_A $(1.05D_t < P_A < 1.5D_t)$	0.460
P_B $(1.05D_t < P_B < 1.5D_t)$	0.455
$P_A = P_B \pm 0.0625$	0.005



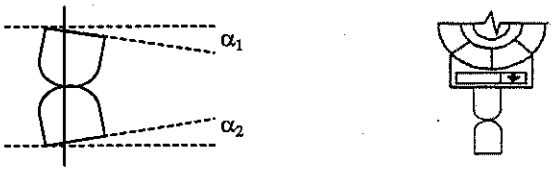
Assembly Inter-Component Spacing Requirements



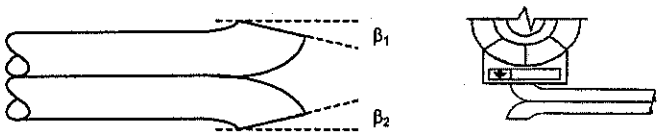
Effective Length (in.)	85.50
W (≥ 3.0")	7.250
-or- AA (≥ 2.0")	n/a
X	0.750
D_n	0.493
X / D_n (≥ 1.5)	1.521
Y (≥ 3.0")	3.550
Z ≥ 0.75"	1.100

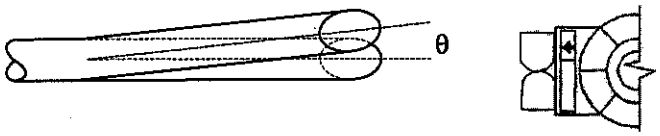
Type S Pitot Tube Inspection

Alignment and Tubing Dimensions

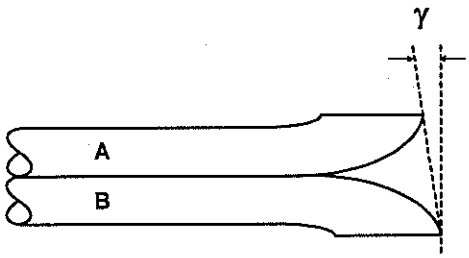


Degree indicating level position for determining α_1 and α_2.



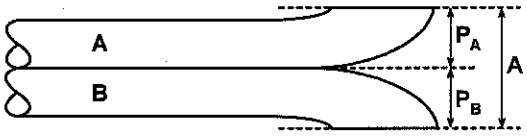


Degree indicating level position for determining θ.

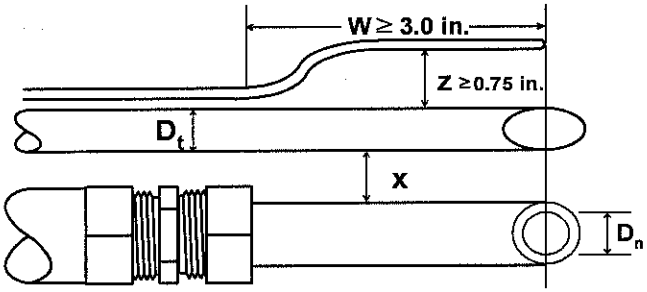


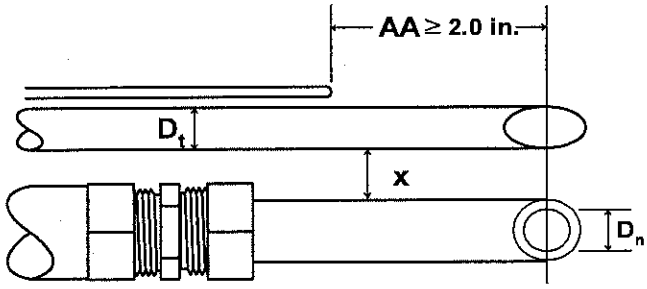
Degree indicating level position for determining γ then calculating Z.

Probe / Pitot Number	T-PRB-808
Level and Perpendicular	☑
No Obstructions	☑
No Damage	☑
α_1 $(-10° < \alpha_1 < +10°)$	0.0
α_2 $(-10° < \alpha_2 < +10°)$	0.0
β_1 $(-5° < \beta_1 < +5°)$	0.0
β_2 $(-5° < \beta_2 < +5°)$	0.0
γ	0.00
θ	0.00
A	0.924
z= A tan γ (< 0.125")	0.000
w= A tan θ (< 0.03125")	0.000
D_t (0.1875" < D_t < 0.375")	0.375
P_A $(1.05D_t < P_A < 1.5D_t)$	0.487
P_B $(1.05D_t < P_B < 1.5D_t)$	0.437
$P_A = P_B \pm 0.0625$	0.050

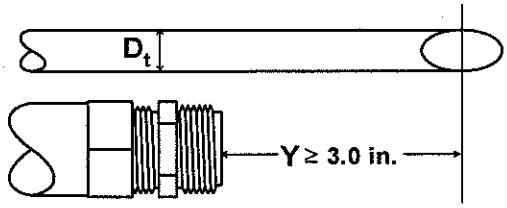


Assembly Inter-Component Spacing Requirements



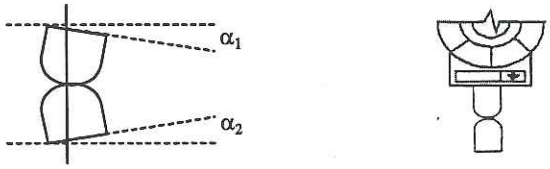


Effective Length (in.)	86.50
W (≥ 3.0")	7.200
-or- AA (≥ 2.0")	
X	1.920
D_n	0.640
X / D_n (≥ 1.5)	3.000
Y (≥ 3.0")	3.400
Z ≥ 0.75"	1.400

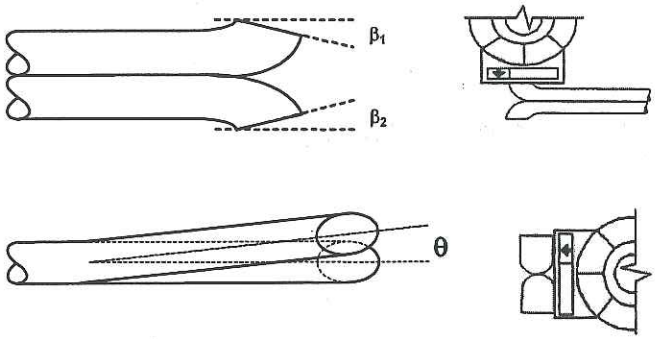


Type S Pitot Tube Inspection

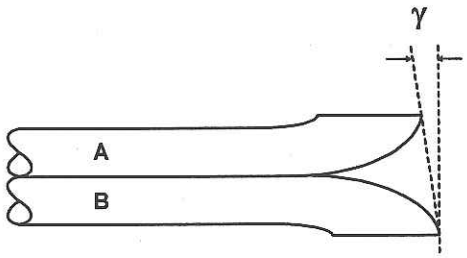
Alignment and Tubing Dimensions



Degree indicating level position for determining α_1 and α_2.

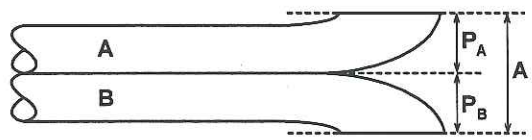


Degree indicating level position for determining θ.

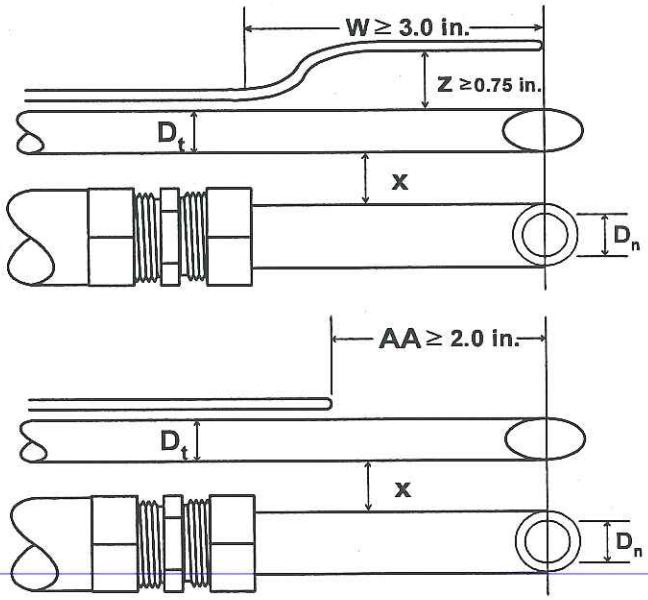


Degree indicating level position for determining γ then calculating Z.

Probe / Pitot Number	T-PRB-810
Level and Perpendicular	☑
No Obstructions	☑
No Damage	☑
α_1 $(-10° < \alpha_1 < +10°)$	0.0
α_2 $(-10° < \alpha_2 < +10°)$	0.0
β_1 $(-5° < \beta_1 < +5°)$	0.0
β_2 $(-5° < \beta_2 < +5°)$	0.0
γ	0.00
θ	0.00
A	0.895
z= A tan γ (< 0.125")	0.000
w= A tan θ (< 0.03125")	0.000
D_t (0.1875" < D_t < 0.375")	0.370
P_A $(1.05D_t < P_A < 1.5D_t)$	0.460
P_B $(1.05D_t < P_B < 1.5D_t)$	0.435
$P_A = P_B \pm 0.0625$	0.025



Assembly Inter-Component Spacing Requirements



Effective Length (in.)	86.00
W (≥ 3.0")	7.200
-or- AA (≥ 2.0")	n/a
X	0.850
D_n	0.512
X / D_n (≥ 1.5)	1.660
Y (≥ 3.0")	3.550
Z ≥ 0.75"	1.100

Method 4 Thermocouple System Audit

Run 1	Probe No. - T-PRB-301			Umbilical Adapter No. - T-UMA-015	
	Meter Box No. - T-MTB-015			Filter Exit No. - T-FXT-201	
	Umbilical No. - T-UMC-305			Filter Box No. - -	
Reference Thermometer °F	Stack °F	Meter In °F	Meter Out °F	Filter Exit °F	Impinger Exit °F
60.0	59.0	-	60.0	59.0	61.0

Run 2	Probe No. - T-PRB-302			Umbilical Adapter No. - T-UMA-016	
	Meter Box No. - T-MTB-015			Filter Exit No. - -	
	Umbilical No. - T-UMC-305			Filter Box No. - -	
Reference Thermometer °F	Stack °F	Meter In °F	Meter Out °F	Filter Exit °F	Impinger Exit °F
60.0	58.0	-	-	-	61.0

Run 3	Probe No. - -			Umbilical Adapter No. - -	
	Meter Box No. - -			Filter Exit No. - -	
	Umbilical No. - -			Filter Box No. - -	
Reference Thermometer °F	Stack °F	Meter In °F	Meter Out °F	Filter Exit °F	Impinger Exit °F
-	-	-	-	-	-

Thermocouple	Primary Meter Box No. - T-MTB-015		
Simulator Setting °F	Stack °F	Filter Exit °F	Impinger Exit °F
50	48.0	49.0	49.0
100	98.0	98.0	99.0
200	200.0	200.0	
300	300.0	301.0	
400	399.0		
600	600.0		
800	801.0		
1000	1002.0		
1500	1501.0		

Tolerance Ranges

Stack ± 8.0°F or ± 1.5% absolute

Filter Exit ± 5.4°F

Meter Box ± 5.4°F

Impinger Exit ± 2.0°F

Thermocouple Simulator: Omega Model CL23A - Type K - Range -328 to 2502°F

Serial # T-229854 Serial # T-200458

Method 2 Post-Test Thermocouple Check

ALT-011 Post-Test Stack Thermocouple System Check Procedure

Reference Thermometer I.D.	T-THC-010
Umbilical Cord I.D.	T-UMC-106
Umbilical Cord I.D.	
Umbilical Cord I.D.	
Temperature Display I.D.	T-MTB-015
Continuity Check Performed	☑

	Run 1	Run 2	Run 3	Run 4
Probe I.D.	T-PRB-808	T-PRB-810	T-PRB-808	
Reference Thermometer Ambient Readout (°F)	62.0	62.0	62.0	
Stack Temperature Thermocouple Ambient Readout (°F)	62.0	62.0	62.0	
Temperature Difference (must be ±2°F)	0.0	0.0	0.0	

Job Number: 110504
Done By: KL / Date: 5/16/2011 10:09

ALT-009 Post-Test Leak Check

NOTE: Do not perform leak check if meter failed ALT-009 requirements.

- [x] Remove the front panel from the meter box
- [x] Disconnect the fan
- [x] Hook up the proper pump to the meter box
- [x] Close both the fine and coarse adjustment valves
- [x] Connect the DH hoses on the front of the meter box
- [x] Remove the copper elbow from stainless tube at the exit side of gas meter
- [x] Stopper the stainless tube with a rubber stopper
- [x] Disconnect the DH static line from the orifice (bottom)
- [x] Plug in leak check tube into the static side of the orifice
- [x] Blowing into the leak check tube, pressurize the system to 5-7 inches and clamp off
- [x] Hold for one minute
- [x] No leakage should occur.
- [x] Affix (w/ electrical tape) the copper elbow onto the stainless tube at the exit side of gas meter
- [x] Reassemble meter box

Meter Box Number MTB- 015

Pump Number PMP- 011

Method 4 DGM Calibration History

Type	Date	Standard Meter Serial #	Meter Box #	Delta H	Delta H@	Delta H	Delta H@	Delta H	Delta H@	Gamma	Average Delta H@	By
Pre	1/5/2010	1512377	010	1.00	1.774	2.00	1.743	3.00	1.764	0.9866	1.760	JB
Pre	1/5/2010	1512377	003	1.00	1.757	2.00	1.852	3.00	1.832	1.0004	1.814	JB
Pre	2/3/2010	1512377	014	1.00	1.785	2.00	1.904	3.00	1.871	1.0001	1.853	JB
Pre	2/3/2010	1512377	015	1.00	2.141	2.00	2.211	3.00	2.239	1.0142	2.199	JB
Pre	2/3/2010	1512377	012	1.00	1.889	2.00	1.913	3.00	1.872	1.0060	1.891	JB
Pre	2/3/2010	1512377	006	1.00	2.039	2.00	2.105	3.00	2.049	1.0014	2.064	JB
Pre	2/3/2010	1512377	002	1.00	1.792	2.00	1.856	3.00	1.829	0.9833	1.825	JB
Post	2/16/2010	1512377	011	1.34	1.916	1.34	1.931	1.34	1.910	1.0136	1.919	JB
Pre	2/28/2010	1512377	009	1.00	1.869	2.00	1.808	3.00	1.831	0.9976	1.836	JB
Pre	2/28/2010	1512377	008	1.00	1.664	2.00	1.699	3.00	1.677	0.9947	1.680	JB
Pre	3/2/2010	1512377	003	1.00	1.737	2.00	1.845	3.00	1.838	1.0017	1.807	JB
Pre	3/2/2010	1512377	011	1.00	1.867	2.00	1.934	3.00	1.878	1.0102	1.893	JB
Pre	4/2/2010	1512377	011	1.00	1.876	2.00	1.942	3.00	1.948	1.0071	1.922	JB
Post	4/2/2010	1512377	011	0.66	1.927	0.66	1.891	0.66	1.905	1.0303	1.908	JB
Pre	4/2/2010	1512377	012	1.00	1.909	2.00	1.927	3.00	1.940	0.9990	1.925	JB
Pre	4/2/2010	1512377	015	1.00	2.224	2.00	2.288	3.00	2.299	0.9999	2.270	JB
Pre	4/5/2010	1512377	002	1.00	1.837	2.00	1.815	3.00	1.810	0.9912	1.821	JB
Pre	4/9/2010	1512377	006	1.00	2.056	2.00	2.058	3.00	2.104	1.0073	2.073	JB
Pre	4/9/2010	1512377	014	1.00	1.455	2.00	1.503	3.00	1.513	1.0014	1.490	JB
Post	5/5/2010	1512377	003	1.76	1.835	1.76	1.838	1.76	1.834	0.9985	1.836	JB
Pre	5/5/2010	1512377	009	1.00	1.869	2.00	1.876	3.00	1.819	0.9990	1.855	JB
Pre	5/5/2010	1512377	003	1.00	1.770	2.00	1.825	3.00	1.807	1.0103	1.801	JB
Pre	5/6/2010	1512377	008	1.00	1.679	2.00	1.712	3.00	1.682	0.9952	1.691	JB
Post	5/7/2010	1512377	002	1.20	1.868	1.20	1.828	1.20	1.835	0.9898	1.844	JB
Post	5/24/2010	1512377	006	1.50	2.180	1.50	2.180	1.50	2.180	1.0103	2.190	JB
Post	5/24/2010	1512377	006	1.35	2.086	1.35	2.107	1.35	2.105	1.0144	2.099	JB
Pre	5/25/2010	1512377	006	1.00	2.075	2.00	2.171	3.00	2.102	1.0074	2.116	JB
Pre	5/28/2010	1512377	014	1.00	1.641	2.00	1.762	3.00	1.739	1.0102	1.714	JB
Pre	5/26/2010	1512377	011	1.00	1.891	2.00	1.866	3.00	1.883	1.0128	1.880	BI
Pre	5/26/2010	1512377	002	1.00	1.848	2.00	1.811	3.00	1.800	0.9877	1.820	bi
Pre	5/26/2010	1512377	015	1.00	2.184	2.00	2.188	3.00	2.199	1.0139	2.190	bi
Pre	6/9/2010	1512377	012	1.00	1.774	2.00	1.815	3.00	1.806	1.0030	1.798	JB
Pre	6/25/2010	1512377	017	1.00	1.889	2.00	1.850	3.00	1.860	0.9988	1.866	JG
Pre	6/25/2010	1512377	018	1.00	1.912	2.00	1.880	3.00	1.834	1.0075	1.875	JG
Pre	6/25/2010	1512377	019	1.00	1.876	2.00	1.858	3.00	1.872	1.0148	1.876	JG
Pre	7/15/2010	1512377	003	1.00	1.765	2.00	1.835	3.00	1.806	1.0165	1.802	JG
Pre	7/15/2010	1512377	009	1.00	1.896	2.00	1.891	3.00	1.860	1.0012	1.882	JG
Pre	7/15/2010	1512377	006	1.00	2.056	2.00	2.139	3.00	2.088	1.0077	2.094	JG
Pre	7/15/2010	1512377	011	1.00	1.842	2.00	1.921	3.00	1.915	1.0183	1.893	JG
Pre	7/16/2010	1512377	014	1.00	1.588	2.00	1.700	3.00	1.651	1.0074	1.646	JG
Pre	7/16/2010	1512377	002	1.00	1.849	2.00	1.878	3.00	1.858	0.9940	1.862	JG
Pre	7/16/2010	1512377	015	1.00	2.189	2.00	2.264	3.00	2.262	1.0095	2.238	BI
Pre	7/21/2010	1512377	008	1.00	1.709	2.00	1.707	3.00	1.689	1.0020	1.702	ES
Pre	9/2/2010	1512377	012	1.00	1.778	2.00	1.780	3.00	1.772	1.0085	1.777	BI
Post	9/2/2010	1512377	015	1.46	2.311	1.46	2.299	1.46	2.302	1.0103	2.304	JB
Pre	9/3/2010	1512377	015	1.00	2.197	2.00	2.270	3.00	2.243	1.0135	2.360	JB
Pre	9/3/2010	1512377	009	1.00	1.840	2.00	1.851	3.00	1.854	0.9938	1.848	JB
Pre	9/3/2010	1512377	003	1.00	1.749	2.00	1.834	3.00	1.851	1.0173	1.812	JB
Pre	9/7/2010	1512377	002	1.00	1.856	2.00	1.834	3.00	1.843	0.9828	1.845	JB
Pre	9/13/2010	1512377	017	1.00	1.905	2.00	1.883	3.00	1.877	0.9912	1.889	MC
Pre	9/19/2010	1512377	011	1.00	1.892	2.00	2.077	3.00	1.971	1.0178	1.980	ES
Pre	9/19/2010	1512377	014	1.00	1.628	2.00	1.708	3.00	1.727	1.0022	1.688	ES
Pre	9/19/2010	1512377	019	1.00	1.891	2.00	1.866	3.00	1.843	1.0153	1.867	ES
Pre	10/24/2010	1512377	018	1.00	1.936	2.00	1.949	3.00	1.882	1.0036	1.922	JG
Pre	10/30/2010	1512377	003	1.00	1.715	2.00	1.750	3.00	1.744	1.0099	1.736	BI
Pre	10/30/2010	1512377	012	1.00	1.749	2.00	1.759	3.00	1.758	1.0027	1.755	BI
Pre	10/30/2010	1512377	009	1.00	1.770	2.00	1.785	3.00	1.761	0.9852	1.772	BI
Post	10/30/2010	1512377	003	1.35	1.835	1.35	1.816	1.35	1.821	1.0017	1.824	JG
Pre	10/31/2010	1512377	002	1.00	1.852	2.00	1.881	3.00	1.823	0.9849	1.852	JG
Pre	10/31/2010	1512377	015	1.00	2.173	2.00	2.294	3.00	2.238	1.0069	2.235	JG
Pre	11/13/2010	1512377	011	1.00	1.828	2.00	1.898	3.00	1.871	1.0117	1.866	BI
pre	11/13/2010	1512377	014	1.00	1.543	2.00	1.628	3.00	1.659	1.0037	1.610	BI
post	11/22/2010	1512377	003	1.26	1.819	1.26	1.809	1.26	1.822	1.0141	1.817	MC
Post	11/23/2010	1512377	014	1.36	1.575	1.36	1.578	1.36	1.578	1.0081	1.577	JG
POST	11/24/2010	1512377	012	1.50	1.991	1.50	1.993	1.50	1.959	1.0095	1.981	MC
pre	11/24/2010	1512377	019	1.00	1.925	2.00	1.864	3.00	1.876	1.0106	1.888	mc
pre	11/24/2010	1512377	017	1.00	1.909	2.00	1.866	3.00	1.900	0.9964	1.891	mc
Post	12/1/2010	1512377	014	1.17	0.994	1.17	1.008	1.17	1.009	1.0037	1.763	mc
Pre	1/3/2011	1512377	015	1.00	2.199	2.00	2.331	3.00	2.286	0.9982	2.272	JG

Method 4 DGM Calibration History

Type	Date	Standard Meter Serial #	Meter Box #	Delta H	Delta H@	Delta H	Delta H@	Delta H	Delta H@	Gamma	Average Delta H@	By
Pre	1/4/2011	1512377	002	1.00	1.878	2.00	1.896	3.00	1.840	0.9986	1.871	JG
Pre	1/4/2011	1512377	003	1.00	1.768	2.00	1.852	3.00	1.830	1.0123	1.817	JG
Pre	1/4/2011	1512377	009	1.00	1.847	2.00	1.844	3.00	1.815	0.9956	1.835	JG
Pre	1/4/2011	1512377	012	1.00	1.830	2.00	1.887	3.00	1.852	1.0091	1.856	JG
Post	1/6/2011	1512377	011	1.75	1.959	7.75	1.954	7.75	1.947	1.0233	1.954	MC
PRE	1/6/2011	1512377	008	1.00	1.646	2.00	1.718	3.00	1.678	1.0014	1.681	JG
PRE	1/7/2011	1512377	011	1.00	1.897	2.00	1.942	3.00	1.926	1.0145	1.921	MC
pre	1/13/2011	1512377	014	1.00	1.004	2.00	1.002	3.00	1.000	1.0018	1.830	mc
pre	1/13/2011	1512377	018	1.00	1.007	2.00	1.000	3.00	1.000	1.0025	1.896	mc
Post	1/22/2011	1512377	003	1.27	1.870	1.27	1.732	1.27	1.861	1.0028	1.821	JG
PRE	1/27/2011	1512377	006	1.00	2.104	2.00	2.137	3.00	2.142	0.9968	2.128	mc
PRE	1/27/2011	1512377	010	1.00	1.933	2.00	1.967	3.00	1.971	0.9975	1.957	mc
pre	1/27/2011	1512377	017	1.00	1.880	2.00	1.847	3.00	1.847	0.9973	1.858	mc
Post	1/28/2011	1512377	008	1.26	1.721	1.26	1.713	1.26	1.727	1.0535	1.720	JG
Post	1/28/2011	1512377	011	1.37	1.982	1.37	1.983	1.37	1.982	1.0454	1.982	JG
Post	2/7/2011	1512377	011	1.92	1.938	1.92	1.907	1.92	1.932	1.0259	1.926	MC
PRE	3/11/2011	1512377	012	1.00	1.930	2.00	2.020	3.00	1.951	1.0074	1.967	KL
PRE	3/11/2011	1512377	009	1.00	1.686	2.00	1.716	3.00	1.691	1.0005	1.698	KL
PRE	3/11/2011	1512377	015	1.00	2.165	2.00	2.239	3.00	2.201	1.0059	2.202	KL
PRE	3/11/2011	1512377	019	1.00	1.905	2.00	1.866	3.00	2.152	1.0189	1.974	KL
PRE	3/11/2011	1512377	002	1.00	1.848	2.00	1.920	3.00	1.920	0.9949	1.893	KL
PRE	3/11/2011	1512377	003	1.00	1.593	2.00	1.643	3.00	1.639	1.0048	1.625	KL
PRE	3/25/2011	1512377	011	1.00	1.885	2.00	2.001	3.00	1.959	1.0042	1.949	KL
PRE	4/15/2011	1512377	006	1.00	2.063	2.00	2.121	3.00	2.088	0.9963	2.091	MC
PRE	4/15/2011	1512377	014	1.00	1.705	2.00	1.786	3.00	1.800	1.0002	1.764	MC
PRE	4/21/2011	1512377	017	1.00	1.879	2.00	1.818	3.00	1.858	1.0013	1.852	MC
Post	5/2/2011	1512377	015	1.00	2.142	1.00	2.142	1.00	2.156	1.0000	2.147	MC
PRE	5/3/2011	1512377	018	1.00	1.942	2.00	1.909	3.00	1.852	1.0023	1.901	mc
PRE	5/17/2011	1512377	012	1.00	1.941	2.00	1.960	3.00	1.652	0.9981	1.851	mc
PRE	5/20/2011	1512377	002	1.00	1.002	2.00	1.001	3.00	1.002	1.0015	1.866	mc
pre	6/1/2011	1512377	010	1.00	1.980	2.00	2.001	3.00	1.939	1.0085	1.973	mc
pre	6/1/2011	1512377	012	1.00	1.846	2.00	1.849	3.00	1.826	1.0125	1.836	mc

Barometer Calibration History

Aneroid Barometer #	("Hg) Mercury Barometer	("Hg) Anaroid Barometer	("Hg) Difference	(<.10" Hg) Pass/Fail	By whom	Date	Adjusted?	(°F) Temp.
T-BAR-001	29.30	29.30	0.00	Pass	JG	01/19/10	No	63
T-BAR-004	29.30	29.18	0.12		JG	01/10/10	Yes	63
T-BAR-001	29.48	29.50	-0.02	Pass	MC	03/26/10	NO	58
T-BAR-001	29.35	29.35	0.00	Pass	BI	04/23/10	No	60
T-BAR-002	29.32	29.32	0.00	Pass	JB	04/29/10	No	62
T-BAR-001	29.44	29.45	-0.01	Pass	JB	05/14/10	No	72
T-BAR-001	29.46	29.43	0.03	Pass	JG	6.21.10	No	78
T-BAR-004	29.46	29.50	-0.04	Pass	JG	6.21.10	No	78
T-BAR-001	29.39	29.45	-0.06	Pass	JB	07/06/10	No	82
T-BAR-001	29.09	29.02	0.07	Pass	JG	7.12.10	No	84
T-BAR-004	29.09	29.00	0.09	Pass	JG	7.12.10	No	84
T-BAR-001	29.32	29.25	0.07	Pass	bi	09/02/10	No	85
T-BAR-001	29.17	29.15	0.02	Pass	bi	10/15/10	No	62
T-BAR-001	29.60	29.57	0.03	Pass	bi	10/29/10	No	60
T-BAR-001	29.45	29.44	0.01	Pass	bi	11/13/10	no	67
T-BAR-001	29.26	29.28	-0.02	Pass	MC	12/07/10	no	64
T-BAR-001	29.26	29.31	-0.05	Pass	JG	12/14/10	yes	58
T-BAR-004	29.26	29.23	0.03	Pass	JG	12/14/10	no	58
T-BAR-001	29.44	29.41	0.03	Pass	JG	01/03/11	No	62
T-BAR-004	29.44	29.44	0.00	Pass	JG	01/03/11	No	62
T-BAR-001	29.51	29.51	0.00	Pass	JG	02/04/11	No	58
T-BAR-004	29.51	29.55	-0.04	Pass	JG	02/04/11	No	58
T-BAR-001	29.39	29.38	0.01	Pass	MC	02/24/11	NO	59
T-BAR-004	29.41	29.41	0.00	Pass	JG	04/07/11	NO	63
T-BAR-001	29.40	29.30	0.10	Pass	MC	04/08/11	no	62
T-BAR-003	29.08	29.02	0.06	Pass	KL	04/11/11	no	68
T-BAR-001	29.40	29.40	0.00	Pass	BI	04/22/11	No	68
T-BAR-001	29.13	29.05	0.08	Pass	DT	05/16/11	No	62

Method 5 Acetone Residuals History

DATE	VOL (ml)	RESIDUAL (g/ml)	DATE	VOL (ml)	RESIDUAL (g/ml)	DATE	VOL (ml)	RESIDUAL (g/ml)
10/09/09	200	0.0000008	10/14/10	200	0.0000015			
10/12/09	200	0.0000015	10/15/10	200	0.0000053			
10/14/09	200	0.0000000	10/22/10	200	0.0000000			
10/14/09	200	0.0000005	10/24/10	200	0.0000025			
10/20/09	200	0.0000005	10/29/10	200	0.0000000			
10/20/09	200	0.0000008	11/02/10	200	0.0000000			
10/26/09	200	0.0000079	11/05/10	200	0.0000000			
11/04/09	200	0.0000010	11/13/10	200	0.0000000			
11/30/09	200	0.0000000	11/15/10	200	0.0000000			
11/30/09	200	0.0000000	11/23/10	200	0.0000000			
12/02/09	200	0.0000000	11/26/10	200	0.0000005			
01/04/10	200	0.0000010	12/10/10	200	0.0000000			
01/05/10	200	0.0000000	12/13/10	200	0.0000000			
01/11/10	200	0.0000000	12/17/10	200	0.0000018			
01/15/10	250	0.0000002	01/06/11	200	0.0000003			
01/20/10	200	0.0000030	01/07/11	200	0.0000075			
02/02/10	200	0.0000010	01/27/11	200	0.0000018			
02/11/10	200	0.0000060	01/28/11	200	0.0000000			
02/11/10	200	0.0000050	01/28/11	200	0.0000010			
02/12/10	200	0.0000000	01/28/11	200	0.0000020			
02/17/10	220	0.0000016	02/18/11	200	0.0000000			
03/02/10	200	0.0000027	02/28/11	200	0.0000000			
03/02/10	200	0.0000000	03/06/11	200	0.0000013			
03/29/10	300	0.0000012	03/06/11	200	0.0000008			
04/16/10	200	0.0000070	03/16/11	200	0.0000008			
04/16/10	200	0.0000005	03/23/11	200	0.0000000			
04/16/10	200	0.0000000	04/01/11	200	0.0000079			
04/20/10	200	0.0000013	04/01/11	200	0.0000048			
04/22/10	200	0.0000018	04/08/11	200	0.0000000			
05/12/10	200	0.0000018	04/22/11	200	0.0000015			
05/24/10	200	0.0000070	04/23/11	200	0.0000058			
05/24/10	200	0.0000079	04/24/11	200	0.0000000			
05/25/10	100	0.0000079	04/29/11	200	0.0000010			
06/04/10	100	0.0000050	05/08/11	200	0.0000005			
06/16/10	200	0.0000025	05/15/11	200	0.0000068			
06/29/10	200	0.0000033						
07/29/10	200	0.0000018						
07/29/10	200	0.0000033						
08/11/10	200	0.0000010						
08/12/10	200	0.0000079						
08/20/10	200	0.0000043						
08/21/10	200	0.0000079						
08/31/10	200	0.0000079						
08/31/10	200	0.0000010						
09/01/10	200	0.0000079						
09/01/10	200	0.0000063						
09/12/10	200	0.0000065						
09/21/10	200	0.0000079						
09/22/10	200	0.0000079						
10/01/10	200	0.0000079						
10/06/10	200	0.0000000						
10/14/10	200	0.0000015						

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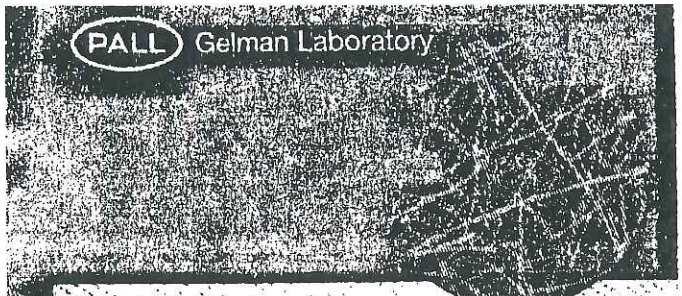

New! Pallflex® Filters

Wide range of filters uniquely suited for a broad range of air monitoring applications.

- Can be used for high temperature and hot gas air monitoring applications.

Applications

Tissuquartz™ Filters

- Heat treated for reduction of trace organics and superior chemical purity.
- High temperature use for analysis of acidic gases and stack sampling aerosols.
- High flow rate and filtration efficiency.
- Ultra-pure soft water processing to reduce residual ion content. Contact us for typical values.

Fiberfilm™ Filters

- Fiberfilm is well suited for a broad range of air sampling applications
- Moisture variations in air or gases during air sampling will not cause chemical reactions on the filter
- Heat-treated (HT) version available for reduction of trace organics.

Emfab™ Filters

- Withstands folding for weighing and transport
- Every filter flushed with DI water to remove any water-soluble residue
- Low air resistance for use in critical aerosol sampling tests such as diesel exhaust.

Complementary Products

For other products related to these applications see:

In-line Holders.....172-174
Open-face Holders.....175

Description	Tissuquartz	Emfab	Fiberfilm
Filter Media	Pure quartz, no binder	Borosilicate microfibers reinforced with woven glass cloth and bonded with PTFE	Heat resistant borosilicate glass fiber coated with fluorocarbon (TFE)
Diameter	25 - 90 mm (and 8 x 10 in.)	12 - 142 mm (and 8 x 10 in.)	25 - 100 mm (and 8 x 10 in.)
Typical Thickness	432 µm (17 mils)	178 µm (7 mils)	203 µm (8 mils)
Typical Filter Weight	5.8 mg/cm²	5.0 mg/cm²	3.4 mg/cm²
Typical Water Flow Rate at 0.35 bar (5 psi)	220 mL/min/cm²	32 mL/min/cm²	220 mL/min/cm²
Typical Air Flow Rate at 0.7 bar (10 psi)	73 L/min/cm²	68 L/min/cm²	180 L/min/cm²
Maximum Operating Temperature – Air	1093 °C (2000 °F)	260 °C (500 °F)	315.5 °C (600 °F)
Typical Aerosol Retention*	99.9%	99.9%	96.4%
pH in Boiled Water Extract	6.5 - 7.5	Not available	Not available

**Following ASTM D 2986-71 0.3 µm (DOP) at 32 L/min/100 cm² filter media*

Microfiltration

Filter Specifications

APEX INSTRUMENTS REFERENCE METER CALIBRATION
USING WET-TEST METER #11AE6
15-POINT ENGLISH UNITS

Calibration Meter Information	
Wet Test Meter Model #	AL-20
Wet Test Meter Serial #	11AE6
Wet Test Meter Gamma	0.9990

Calibration Conditions			
Date	Time	16-Apr-09	2.15
Barometric Pressure		29.9	in Hg
Calibration Technician		EW	
DGM Serial Number		S-120-1512377	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

Calibration Data												Results		
Run Time	Dry Gas Meter						Calibration Meter					Dry Gas Meter		
												Calibration Factor		Flowrate
Elapsed	Meter Pressure	Volume Initial	Volume Final	Sample Volume	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Sample Volume	Outlet Temp Initial	Outlet Temp Final	Value	Variation	Std & Corr
(θ)	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	(V_{wi})	(V_{wf})	(V_w)	(t_{wi})	(t_{wf})	(Y)	(ΔY)	($Q_{std/corr}$)
min	in H_2O	cubic feet	cubic feet	cubic feet	°F	°F	cubic feet	cubic feet	cubic feet	°F	°F			cfm
5.00	-5.5	474.747	480.983	6.236	84.2	84.2	868.400	874.380	5.980	73	73	0.9925	-0.00137	1.182
5.00	-5.5	480.983	487.223	6.240	84.2	86.0	874.380	880.360	5.980	73	73	0.9935	-0.00036	1.182
5.00	-5.5	487.223	493.460	6.237	86.0	87.8	880.360	886.330	5.970	73	73	0.9956	0.00173	1.180
										Passed Calibration Factor Var		0.9939	Averages	1.181
6.00	-4.2	511.684	517.728	6.044	86.0	86.0	904.035	909.850	5.815	73	73	0.9958	-0.00081	0.958
6.00	-4.2	517.728	523.804	6.076	86.0	87.8	909.850	915.695	5.845	73	73	0.9969	0.00023	0.962
6.00	-4.2	523.804	529.885	6.081	87.8	87.8	915.695	921.540	5.845	73	73	0.9972	0.00058	0.962
										Passed Calibration Factor Var		0.9966	Averages	0.961
7.00	-3.3	529.885	535.485	5.600	87.8	89.6	921.540	926.930	5.390	73	73	0.9980	-0.00016	0.760
7.00	-3.3	535.485	541.071	5.586	89.6	89.6	926.930	932.300	5.370	73	73	0.9984	0.00026	0.757
7.00	-3.3	541.071	546.659	5.588	89.6	89.6	932.300	937.670	5.370	73	73	0.9980	-0.00010	0.757
										Passed Calibration Factor Var		0.9981	Averages	0.758
10.00	-2.5	546.659	552.300	5.641	89.6	89.6	937.670	943.120	5.450	73	74	1.0009	0.00176	0.538
10.00	-2.5	552.300	557.928	5.628	89.6	89.6	943.120	948.545	5.425	74	74	0.9982	-0.00100	0.535
10.00	-2.5	557.928	563.565	5.637	89.6	89.6	948.545	953.980	5.435	74	74	0.9984	-0.00076	0.536
										Passed Calibration Factor Var		0.9992	Averages	0.536
15.00	-2.3	493.460	499.555	6.095	86.0	86.0	886.330	892.255	5.925	73	73	1.0014	0.00061	0.390
15.00	-2.3	499.555	505.615	6.060	86.0	86.0	892.255	898.140	5.885	73	73	1.0004	-0.00041	0.388
15.00	-2.3	505.615	511.684	6.069	86.0	86.0	898.140	904.035	5.895	73	73	1.0006	-0.00020	0.388
										Passed Calibration Factor Var		1.0008	Averages	0.389
											Overall Average Y	0.9977		

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature Eric Wate Date 4/16/09

APEX INSTRUMENTS REFERENCE METER VERIFICATION
USING WET-TEST METER #11AE6
2-POINT ENGLISH UNITS

Calibration Meter Information	
Wet Test Meter Model #	AL20
Wet Test Meter Serial #	11AE6
Wet Test Meter Gamma	0.9999

Calibration Conditions			
Date	Time	16-Feb	11:45
Barometric Pressure		30.00	in Hg
Calibration Tech		EW	
DGM Serial Number		S-110-1512377	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

Calibration Data												Results		
Run Time	Metering Console						Calibration Meter					Dry Gas Meter		
												Calibration Factor		Flowrate
Elapsed	DGM Input Pressure	Volume Initial	Volume Final	Volume Sample	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Volume Sample	Outlet Temp Initial	Outlet Temp Final	Previous	Current	Std & Corr
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	(Vw_i)	(Vw_f)	(V_m)	(t_{wi})	(t_{wf})	(Y)	(Y)	($Q_{m(std)(corr)}$)
min	in H_2O	cubic feet	cubic feet	cubic feet	°F	°F	cubic feet	cubic feet	cubic feet	°F	°F			cfm
6.00	-3.7	49.772	55.743	5.971	73.4	73.4	200.970	206.900	5.930	69	69	0.9966	1.0106	0.989
											Variation	1.40%	must be less than 1.5%	
10.00	-2.2	55.743	61.298	5.555	73.4	73.4	206.900	212.420	5.520	69	69	0.9992	1.0074	0.552
											Variation	0.82%	must be less than 1.5%	

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, App A, Method 5, Paragraph 7.1.2.2, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature Eric Watts Date 2/16/11

OMEGA ENGINEERING, INC.
One Omega Drive, Box 4047, Stamford, CT 06907
(203) 359-1660 – http://www.omega.com – e-mail: info@omega.com

CERTIFICATE OF CALIBRATION

Model CL 25 **Serial Number** T-286993

Omega Engineering, Inc., certifies that the above listed instrument has been calibrated using standards whose accuracy is traceable to the U.S. National Institute of Standards and Technology, and meets or exceeds its published specifications. Calibration traceability of the above listed instrument is in full compliance with ANSI/Z540-1-1994 standards and requirements.

2-15-11
DATE

DMP
TESTED BY

MCK
AUTHORIZED SIGNATURE

T-THC-010

MD-4 ©Copyright 1998 Omega Engineering, Inc.

Certificate of Calibration

OCS technologies, inc.

OCS Technologies, Inc.
1300 East Granger Road
Independence, Ohio 44131
1-800-362-0364

LABORATORY ACCREDITATION BUREAU ACCREDITED
CERT# L1152-1 Calibration

ASSET NUMBER:	**B26975**		
OWNER ASSET #:	BAL-008	**PERFORMED ON:**	**08 Apr 2011**
UNIT UNDER TEST:	A&D EK-1200I BALANCE, 1200G X 0.1G	**DATE DUE:**	**08 Apr 2012**
		TEST RESULT:	PASS
		DATA TYPE:	AS-LEFT
SERIAL NUMBER:	EP1861727	TEMPERATURE:	68.0 °F
PROCEDURE NAME:	NIST HANDBOOK 44,g,1 STD	HUMIDITY:	17 %RH
CALIBRATED BY:	VF230	LOCATION:	
CUSTOMER:	AIR COMPLIANCE TESTING, INC.	SERVICE SITE:	ON-SITE
	5525 CANAL ROAD	CERTIFICATE #:	03bc402c0225754a8813aa7e3d90 1495
	VALLEY VIEW, OH 44125	Approved By:	

Unless Otherwise Noted: OCS Technologies, Inc. certifies that the above listed instrument has been tested using standards with a Test Uncertainty Ratio of 2:1 or greater at a 95%confidence interval with a coverage factor of k=2. Standards are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or to another National Metrology Institute (NMI). The item tested meets or exceeds all specifications as stated in the referenced procedure solely at the time of calibration. Measurement uncertainty has been excluded from this Pass/Fail Result above. OCS is ISO/IEC 17025 accredited by the Laboratory Accreditation Bureau. Calibration performed in accordance with ISO 17025:2005 and ISO 10012:2003. This report may only be reproduced in full. Temperature and Humidity for on-site work may be reported above as the mean of high and low values recorded for all items on the day of service.

Remarks: . AFTER ADJUSTMENTS

Standards Used

Asset	Traceable Through	Description	Cal Date	Cal Due Date
5903	MI-04-11-10594	100G - 2# CLASS F WEIGHT KIT (4.75#, 500G TOTAL)	06 Apr 2011	06 Apr 2013

est Results

Test Description	Range	True Value	Test Result	Lower Limit	Upper Limit		%TOL	Status
TESTED IN ACCORDANCE WITH NIST Handbook 44-2011 Section 2.20 Paragraphs N1.1, N1.3, N1.11, N.2,N.3.2 T.N.5 & Tables 4, T.11, 7A as Applicable.								
REPEATABILITY VERIFICATION:								
Result of Operator Evaluation								Pass
SHIFT TEST VERIFICATION:								
Result of Operator Evaluation								Pass
LINEARITY:								
100.00 g		100.00	100.0	99.8	100.2	g	0	Pass
200.00 g		200.00	200.0	199.8	200.2	g	0	Pass
500.00 g		500.00	500.0	499.5	500.5	g	0	Pass

Uncertainty of Measurement is 0.15 G

Certificate of Calibration

OCS technologies, inc.

OCS Technologies, Inc.
1300 East Granger Road
Independence, Ohio 44131
1-800-362-0364

LABORATORY ACCREDITATION BUREAU ACCREDITED
CERT# L1152-1 Calibration

ASSET NUMBER:	**B26975**		
OWNER ASSET #:	BAL-008	**PERFORMED ON:**	**08 Apr 2011**
UNIT UNDER TEST:	A&D EK-1200I BALANCE, 1200G X 0.1G	**DATE DUE:**	**08 Apr 2011**
		TEST RESULT:	FAIL
		DATA TYPE:	AS-FOUND
SERIAL NUMBER:	EP1861727	TEMPERATURE:	68.0 °F
PROCEDURE NAME:	NIST HANDBOOK 44,g,1 STD	HUMIDITY:	17 %RH
CALIBRATED BY:	VF230	LOCATION:	
CUSTOMER:	AIR COMPLIANCE TESTING, INC.	SERVICE SITE:	ON-SITE
	5525 CANAL ROAD	CERTIFICATE #:	a7114a84ef4fcc4ba11b32188c7d5
	VALLEY VIEW, OH 44125	Approved By:	

Unless Otherwise Noted: OCS Technologies, Inc. certifies that the above listed instrument has been tested using standards with a Test Uncertainty Ratio of 2:1 or greater at a 95%confidence interval with a coverage factor of k=2. Standards are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or to another National Metrology Institute (NMI). The item tested meets or exceeds all specifications as stated in the referenced procedure solely at the time of calibration. Measurement uncertainty has been excluded from this Pass/Fail Result above. OCS is ISO/IEC 17025 accredited by the Laboratory Accreditation Bureau. Calibration performed in accordance with ISO 17025:2005 and ISO 10012:2003. This report may only be reproduced in full. Temperature and Humidity for on-site work may be reported above as the mean of high and low values recorded for all items on the day of service.

Remarks: . BEFORE ADJUSTMENTS

Standards Used

Asset	Traceable Through	Description	Cal Date	Cal Due Date
5903	MI-04-11-10594	100G - 2# CLASS F WEIGHT KIT (4.75#, 500G TOTAL)	06 Apr 2011	06 Apr 2013

Test Results

Test Description	Range	True Value	Test Result	Lower Limit	Upper Limit		%TOL	Status
TESTED IN ACCORDANCE WITH NIST Handbook 44-2011 Section 2.20 Paragraphs N1.1, N1.3, N1.11, N.2,N.3.2 T.N.5 & Tables 4, T.11, 7A as Applicable.								
REPEATABILITY VERIFICATION: Result of Operator Evaluation								Pass
SHIFT TEST VERIFICATION: Result of Operator Evaluation								Pass
LINEARITY:								
100.00 g		100.00	106.0	99.8	100.2	g	3e+0	Fail
200.00 g		200.00	207.0	199.8	200.2	g	3.5e	Fail
500.00 g		500.00	508.0	499.5	500.5	g	1.6e	Fail

Uncertainty of Measurement is 0.15 G

Certificate of Calibration

OCS technologies, inc.

OCS Technologies, Inc.
1300 East Granger Road
Independence, Ohio 44131
1-800-362-0364

LABORATORY ACCREDITATION BUREAU ACCREDITED
CERT# L1152-1 Calibration

ASSET NUMBER:	**B26978**		
OWNER ASSET #:	BAL-005	**PERFORMED ON:**	**18 Feb 2011**
UNIT UNDER TEST:	A&D EK-1200G BALANCE, 1200G X 0.1G	**DATE DUE:**	**18 Feb 2012**
		TEST RESULT:	PASS
SERIAL NUMBER:	J8084811	DATA TYPE:	FOUND-LEFT
PROCEDURE NAME:	NIST HANDBOOK 44,G,2 STDS	TEMPERATURE:	72.5 °F
CALIBRATED BY:	DL249	HUMIDITY:	23 %RH
CUSTOMER:	AIR COMPLIANCE TESTING, INC.	LOCATION:	
	5525 CANAL ROAD	SERVICE SITE:	ON-SITE
	VALLEY VIEW, OH 44125	CERTIFICATE #:	B26978:1298033536
		Approved By:	

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Remarks: .

Standards Used

set	Traceable Through	Description	Cal Date	Cal Due Date
946	CERT#: 160298	RICE LAKE 50g - 5kg CLASS 1 WEIGHT KIT (11000G TOTAL)	14 Apr 2010	14 Apr 2011
I784	CERT#: 160623	RICE LAKE 1MG - 100G CLASS 1 WEIGHT KIT (211.110G TOTAL)	14 Apr 2010	14 Apr 2011

Test Results

Test Description	Range	True Value	Test Result	Lower Limit	Upper Limit	%TOL	Status
TESTED IN ACCORDANCE WITH NIST Handbook 44-2011 Section 2.20 Paragraphs N1.1, N1.3, N1.11, N.2,N.3.2 T.N.5 & Tables 4, T.11, 7A as Applicable.							
REPEATABILITY VERIFICATION:							
Result of Operator Evaluation							Pass
SHIFT TEST VERIFICATION:							
Result of Operator Evaluation							Pass
LINEARITY:							
1.00 g		1.00	1.0	0.9	1.1	0	Pass
10.00 g		10.00	10.0	9.9	10.1	0	Pass
100.00 g		100.00	100.0	99.8	100.2	0	Pass
500.00 g		500.00	499.9	499.5	500.5	20	Pass
1000.00 g		1000.00	999.9	999.5	1000.5	20	Pass

Uncertainty of Measurement is 0.13 G

Certificate of Calibration

OCS technologies, inc.

OCS Technologies, Inc.
1300 East Granger Road
Independence, Ohio 44131
1-800-362-0364

LABORATORY ACCREDITATION BUREAU ACCREDITED
CERT# L1152-1 Calibration

ASSET NUMBER:	**B26977**		
OWNER ASSET #:		**PERFORMED ON:**	**18 Feb 2011**
UNIT UNDER TEST:	SARTORIUS 1602MP BALANCE, 160G X 0.0001G	**DATE DUE:**	**18 Feb 2012**
		TEST RESULT:	PASS
		DATA TYPE:	AS-LEFT
SERIAL NUMBER:	3004026	TEMPERATURE:	72.5 °F
PROCEDURE NAME:	NIST HANDBOOK 44,G,1 STD	HUMIDITY:	23 %RH
CALIBRATED BY:	DL249	LOCATION:	
CUSTOMER:	AIR COMPLIANCE TESTING, INC.	SERVICE SITE:	ON-SITE
	5525 CANAL ROAD	CERTIFICATE #:	B26977:1298033472
	VALLEY VIEW, OH 44125	Approved By:	

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Remarks: . AFTER ADJUSTMENTS

Standards Used

Asset	Traceable Through	Description	Cal Date	Cal Due Date
I784	CERT#: 160623	RICE LAKE 1MG - 100G CLASS 1 WEIGHT KIT (211.110G TOTAL)	14 Apr 2010	14 Apr 2011

Test Results

Test Description	Range	True Value	Test Result	Lower Limit	Upper Limit	%TOL	Status
TESTED IN ACCORDANCE WITH NIST Handbook 44-2011 Section 2.20 Paragraphs N1.1, N1.3, N1.11, N.2,N.3.2 T.N.5 & Tables 4, T.11, 7A as Applicable.							
REPEATABILITY VERIFICATION:							
Result of Operator Evaluation							Pass
SHIFT TEST VERIFICATION:							
Result of Operator Evaluation							Pass
LINEARITY:							
0.00100 g		0.00100	0.0010	0.0009	0.0011	0	Pass
0.01000 g		0.01000	0.0100	0.0099	0.0101	0	Pass
0.10000 g		0.10000	0.1001	0.0999	0.1001	100	Pass
10.00000 g		10.00000	10.0000	9.9998	10.0002	0	Pass
50.00000 g		50.00000	50.0001	49.9995	50.0005	20	Pass

Uncertainty of Measurement is 0.0002 G

Certificate of Calibration

OCS technologies, inc.

OCS Technologies, Inc.
1300 East Granger Road
Independence, Ohio 44131
1-800-362-0364

LABORATORY ACCREDITATION BUREAU ACCREDITED
CERT# L1152-1 Calibration

ASSET NUMBER:	**B26977**		
OWNER ASSET #:		**PERFORMED ON:**	**18 Feb 2011**
UNIT UNDER TEST:	SARTORIUS 1602MP BALANCE, 160G X 0.0001G	**DATE DUE:**	**18 Feb 2011**
		TEST RESULT:	FAIL
SERIAL NUMBER:	3004026	DATA TYPE:	AS-FOUND
PROCEDURE NAME:	NIST HANDBOOK 44,G,1 STD	TEMPERATURE:	72.5 °F
CALIBRATED BY:	DL249	HUMIDITY:	23 %RH
CUSTOMER:	AIR COMPLIANCE TESTING, INC.	LOCATION:	
	5525 CANAL ROAD	SERVICE SITE:	ON-SITE
	VALLEY VIEW, OH 44125	CERTIFICATE #:	B26977:1298033440
		Approved By:	

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Remarks: . BEFORE ADJUSTMENTS

Standards Used

set	Traceable Through	Description	Cal Date	Cal Due Date
/84	CERT#: 160623	RICE LAKE 1MG - 100G CLASS 1 WEIGHT KIT (211.110G TOTAL)	14 Apr 2010	14 Apr 2011

Test Results

Test Description	Range	True Value	Test Result	Lower Limit	Upper Limit	%TOL	Status
TESTED IN ACCORDANCE WITH NIST Handbook 44-2011 Section 2.20 Paragraphs N1.1, N1.3, N1.11, N.2,N.3.2 T.N.5 & Tables 4, T.11, 7A as Applicable.							
REPEATABILITY VERIFICATION:							
Result of Operator Evaluation							Pass
SHIFT TEST VERIFICATION:							
Result of Operator Evaluation							Pass
LINEARITY:							
0.00100 g		0.00100	0.0010	0.0009	0.0011	0	Pass
0.01000 g		0.01000	0.0100	0.0099	0.0101	0	Pass
0.10000 g		0.10000	0.1000	0.0999	0.1001	0	Pass
10.00000 g		10.00000	9.9998	9.9998	10.0002	100	Pass
50.00000 g		50.00000	49.9993	49.9995	50.0005	140	Fail

Uncertainty of Measurement is 0.0002 G

Astronomical Applications Dept.
U.S. Naval Observatory
Washington, DC 20392-5420

COSHOCTON, OHIO
W 81° 50', N40° 16'

Altitude and Azimuth of the Sun
May 11, 2011
Eastern Standard Time

h m	Altitude °	Azimuth (E of N) °
04:10	-11.7	54.2
04:20	-10.1	56.0
04:30	-8.5	57.8
04:40	-6.9	59.6
04:50	-5.2	61.3
05:00	-3.5	63.0
05:10	-1.8	64.6
05:20	0.4	66.2
05:30	2.0	67.9
05:40	3.7	69.4
05:50	5.4	71.0
06:00	7.2	72.5
06:10	9.0	74.1
06:20	10.8	75.6
06:30	12.7	77.1
06:40	14.5	78.7
06:50	16.4	80.2
07:00	18.3	81.7
07:10	20.2	83.2
07:20	22.0	84.8
07:30	23.9	86.3
07:40	25.9	87.9
07:50	27.8	89.5
08:00	29.7	91.1
08:10	31.6	92.7
08:20	33.5	94.4
08:30	35.4	96.2
08:40	37.3	98.0
08:50	39.1	99.8
09:00	41.0	101.7
09:10	42.9	103.7
09:20	44.7	105.8
09:30	46.6	108.0
09:40	48.4	110.3
09:50	50.1	112.7
10:00	51.9	115.3
10:10	53.6	118.0
10:20	55.2	120.9
10:30	56.8	124.1
10:40	58.4	127.4
10:50	59.9	131.1
11:00	61.3	135.0
11:10	62.6	139.2
11:20	63.8	143.8

11:30	64.8	148.7
11:40	65.7	153.9
11:50	66.5	159.5
12:00	67.1	165.4
12:10	67.5	171.4
12:20	67.6	177.7
12:30	67.6	183.9
12:40	67.4	190.1
12:50	67.0	196.1
13:00	66.3	201.9
13:10	65.5	207.4
13:20	64.6	212.6
13:30	63.5	217.4
13:40	62.3	221.9
13:50	61.0	226.1
14:00	59.5	229.9
14:10	58.0	233.5
14:20	56.5	236.8
14:30	54.9	239.9
14:40	53.2	242.8
14:50	51.5	245.5
15:00	49.7	248.0
15:10	47.9	250.4
15:20	46.1	252.7
15:30	44.3	254.8
15:40	42.5	256.9
15:50	40.6	258.8
16:00	38.7	260.7
16:10	36.8	262.6
16:20	34.9	264.3
16:30	33.0	266.1
16:40	31.1	267.8
16:50	29.2	269.4
17:00	27.3	271.0
17:10	25.4	272.6
17:20	23.5	274.2
17:30	21.6	275.7
17:40	19.7	277.3
17:50	17.9	278.8
18:00	16.0	280.3
18:10	14.1	281.8
18:20	12.3	283.3
18:30	10.4	284.9
18:40	8.6	286.4
18:50	6.8	287.9
19:00	5.1	289.5
19:10	3.3	291.1
19:20	1.7	292.7
19:30	0.1	294.3
19:40	-2.1	295.9
19:50	-3.8	297.6
20:00	-5.5	299.3
20:10	-7.2	301.0
20:20	-8.8	302.7
20:30	-10.4	304.5
20:40	-11.9	306.4

Back to form

NATIONAL GEOPHYSICAL DATA CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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Estimated Value of Magnetic Declination

To compute the magnetic declination, you must enter the location and date of interest.

If you are unsure about your city's latitude and longitude, look it up online! In the USA try entering your zip code in the box below or visit the U.S. Gazetteer. Outside the USA try the Getty Thesaurus.

Search for a place in the USA by Zip Code: Get Location

Enter Location: (latitude 90S to 90N, longitude 180W to 180E). See Instructions for details.

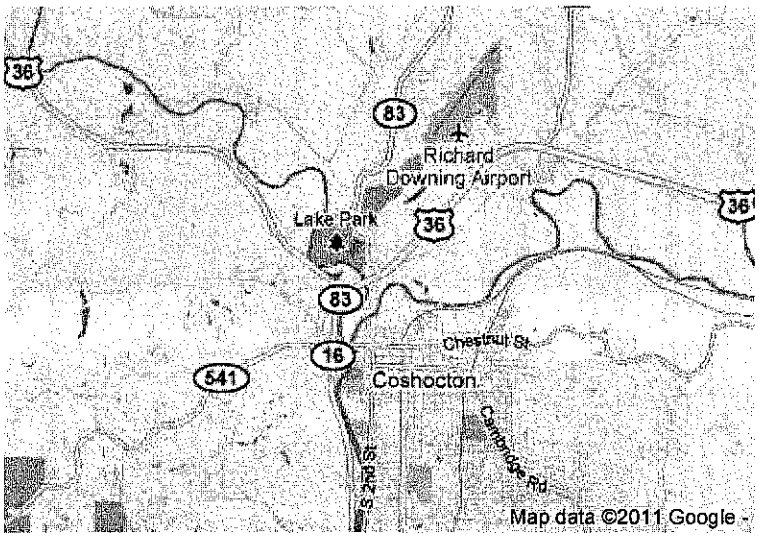
Latitude: 40.270198 N S **Longitude:** 81.86761 E W

Enter Date (1900-2015): Year: 2011 Month (1-12): 5 Day (1-31): 11

Compute Declination

Declination = 7° 46' W changing by 0° 2' W/year

For more information, visit:
Answers to some **frequently asked questions** | **Instructions** for use | **Today's Space Weather**



VISIBLE EMISSIONS EVALUATOR

This is to certify that

TATUM STRICKLER

STUDENT ID NUMBER STR80[illegible]

met the specifications of Federal Reference Method 9 and qualifies as a visible emissions evaluator. Maximum deviation on white and black errors did not exceed 7.5% opacity and no single error exceeding 15% opacity was incurred during the certification test conducted by Eastern Technical Associates of Raleigh, NC. This certificate is valid for six months from date of issue.

395555

CERT. NUMBER

4/6/201[illegible] PITTSBURGH, PA

DATE OF SCHOOL SCHOOL LOCATION

10/6/2011 AKRS02

CERTIFICATION EXP. DATE INSTRUCTOR

Judy Monk

Director of Training

Site-Specific Test Plan

Determination of Total Front Half Particulate Matter and Visible Emissions

Cupola Emission System (P901)

EPA Methods 1, 2, 3, 4, 5, 9, and 22

Clow Water Systems Company
Coshocton, Ohio

Date Scheduled: May 11, 2011
Job Number: 110504

Prepared by:

Air Compliance Testing, Inc.

PO Box 41156
Cleveland OH 44141-0156
Phone: (800) EPA-AIR1 (372-2471)

Revision Date: March 11, 2011

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1.0 INTRODUCTION

1.1 Summary of Test Program

Clow Water Systems Company (Clow), located in Coshocton, Ohio, is conducting compliance stack emissions testing for their Cupola Emissions System (P901).

The purpose of the testing project will be to satisfy the emission testing requirements pursuant to Appendix 3 Section III of the McWane, Inc. Consent Decree and the testing requirements outlined in 40 CFR Part 63, Subpart ZZZZZ.

This testing has been scheduled for completion on May 11, 2011.

The scope of this testing project is to simultaneously measure Total Front-Half Particulate Matter (PM) using EPA Method 5 at the Ringlet Scrubber Exhaust Stack from the Cupola Material Handling Process (P901), Visible Emissions (VEs) using EPA Method 9 from the Shroud Area, and VEs using EPA Method 22 from the Flange / Fabrication Building during Maximum Achievable Operations.

The Shroud Area is expected to be the highest emitting point of fugitive emissions from the building that houses metal melting, inoculation, pouring, cooling, shakeout, shot blasting, grinding, mold and core making, and other metal finishing operations.

Fugitive emissions are not expected from the Flange / Fabrication Building therefore Clow will be using EPA Method 22. This building houses metal finishing operations. A roof vent central to the building will be observed for fugitive emissions.

The test methods applied during this test will be EPA Methods 1, 2, 3, 4, 5, 9, and 22. All of the test stacks will be checked for the presence of cyclonic flow.

1.2 Key Personnel

The key personnel who will coordinate the test program and their phone numbers are:

George Czerniak, US EPA - Region 5, 312-886-6789
Marco Deshaies, Ohio EPA, SEDO DAPC, 740-380-5255
Philip Billick, Director of Testing, Air Compliance Testing, Inc. (ACT), 800-372-2471
Robert Lisy, Quality Assurance Manager, ACT, 800-372-2471
Tyson Houchin, Operations Director, ACT, 800-372-2471

2.0 TEST PROGRAM

2.1 Objectives

In order to provide this emissions information, the scope of work will be to simultaneously measure PM using EPA Method 5 at the Ringjet Scrubber Exhaust Stack from the Cupola Material Handling Process (P901), VEs using EPA Method 9 from the Shroud Area and VEs using EPA Method 22 from the Flange / Fabrication Building during Maximum Achievable Operations.

Because Clow's production schedule begins before daylight hours, it may not be feasible to conduct EPA Method 9 or EPA Method 22 sampling during the first test run. Clow and ACT will make every attempt to conduct both as soon as daylight breaks, but will complete this testing during runs 2 and 3 at a minimum.

The specific test objectives for this testing project at the P901 will be:

Measure PM from P901 during the aforementioned operating conditions at the Ringjet Scrubber Exhaust Stack.

Measure Stack Gas Velocity and Volumetric Flow Rate, Dry Molecular Weight, and Moisture Content from P901 during the aforementioned operating conditions at the Ringjet Scrubber Exhaust Stack.

Determine the mass emissions rates for the Ringjet Scrubber Exhaust associated with the P901 utilizing the variables above.

Observe VEs using EPA Method 9 from the Shroud Area.

Observe VEs using EPA Method 22 from the Flange / Fabrication Building.

2.2 Test Matrix

Table 2.1 presents the sampling and analytical matrix log for this test.

Table 2.2 presents all of the measurements that will be made at each test location.

Table 2.3 presents the Control Device Summary for this test.

Any field test changes or problems that occur during this test that would bias the accuracy of the results of this test will be presented in the final Test Report.

Any on site changes to this protocol or the conditions of the test, will be subject to the approval of the on site EPA representatives.

P901 Test Matrix							
Sampling Location	**No. of Runs**	**Sample Type / Pollutant**	**Sampling Method**	**Sampling Organization**	**Sample Run Time (min)**	**Analytical Method**	**Analytical Laboratory**
P901 Ringjet Scrubber Exhaust Stack	3	PM	EPA Method 5	Air Compliance Testing, Inc.	120	5	Air Compliance Testing, Inc.
Shroud Area	3 (if possible)	VEs	EPA Method 9	Air Compliance Testing, Inc.	120	N/A	N/A
Flange / Fabrication Building	3 (if possible)	VEs	EPA Method 22	Clow	120	N/A	N/A

Table 2.1 – Clow Water Systems Company Test Matrix

Runs 1, 2, and 3		
P901 Scrubber Exhaust Stack	**Shroud Area**	**Flange / Fabrication Building**
PM (M5)	VEs (M9)	VEs (M22)
Flow Rate (M2)		
O_2 / CO_2 (M3)		
Moisture (M4)		

Table 2.2 – Measurements at Each Test Location

Clow Control Device Summary		
Affected Process	**Control Device**	**Monitored Control Parameters**
P901	Venturi and Ringjet Scrubbers	Differential Pressure and Water Flow Rates

Table 2.3 – Clow Control Device Summary

3.0 SOURCE DESCRIPTION

3.1 Process Description and Operation

Clow melts scrap metal for the production of ductile iron pipe and fittings.

Clow will be responsible for providing to Air Compliance Testing, Inc. signed copies of the charge logs covering all testing time periods. Clow will also provide differential pressure and water flow rate data and EPA Method 22 documentation.

3.2 Control Equipment Description

The emissions from each charge are controlled by a capture and collection system. Emissions from the P901 are controlled primarily by the Venturi and Ringjet Scrubber System.

3.3 Stack Gas Sampling Locations

3.3.1 Scrubber Exhaust Stack

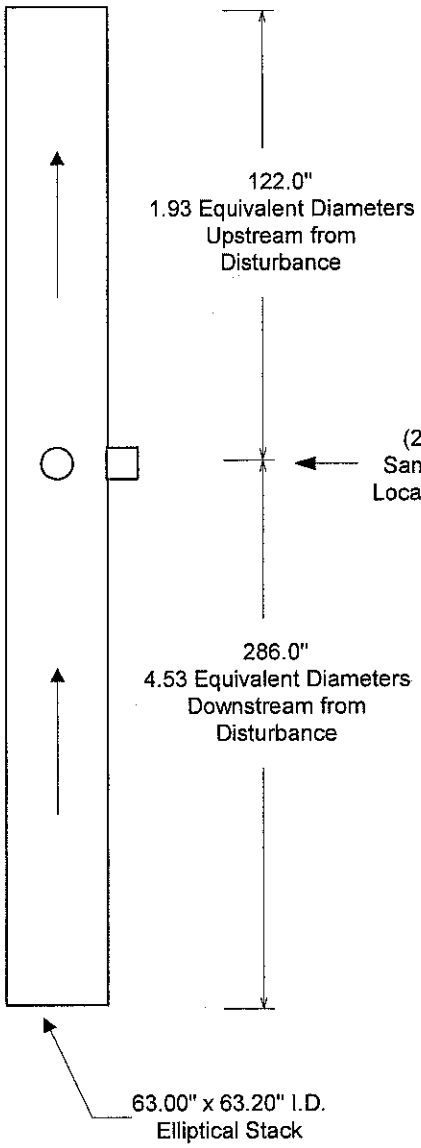
The Scrubber Exhaust Stack measures 63.0 inches in I.D., is oriented vertically, and will be accessed via a manlift. The sampling ports are located 90° apart from one another at a point which meets EPA Method 1 criteria. The stack will be traversed for Stack Gas Velocity and Volumetric Flow Rate, Molecular Weight, and Moisture Content determinations as well as PM concentrations.

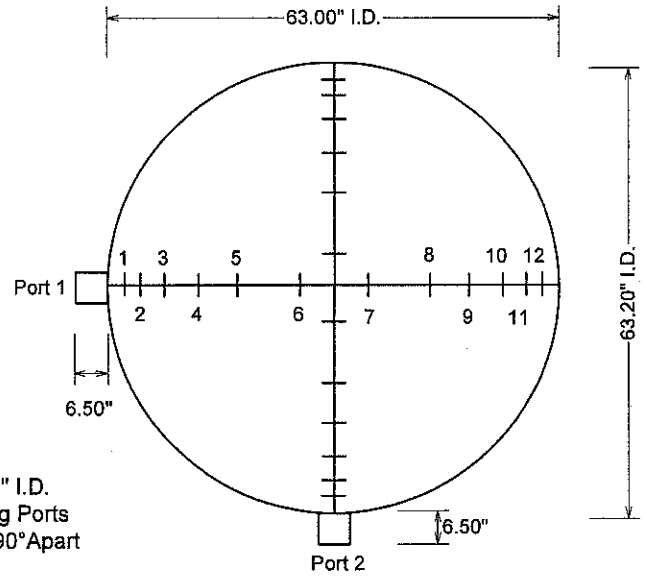
Figure 3.1 schematically illustrates the traverse point and sample port locations to be utilized. These measurements will be verified during this compliance testing event and may change pending that verification.

Figure 3.2 schematically illustrates the P901 process.

3.4 Process Sampling Locations

The EPA Reference Test Methods performed do not specifically require that process samples be taken during this testing event.





Point	% of Duct Depth	Distance From Inside Wall (in.) Port 1	Distance From Inside Wall (in.) Port 2
1	2.1	1.3	1.3
2	6.7	4.2	4.2
3	11.8	7.4	7.5
4	17.7	11.2	11.2
5	25.0	15.8	15.8
6	35.6	22.4	22.5
7	64.4	40.6	40.7
8	75.0	47.3	47.4
9	82.3	51.8	52.0
10	88.2	55.6	55.7
11	93.3	58.8	59.0
12	97.9	61.7	61.9

Figure 3.1 – P901 Scrubber Exhaust Stack Traverse Point Location Schematic

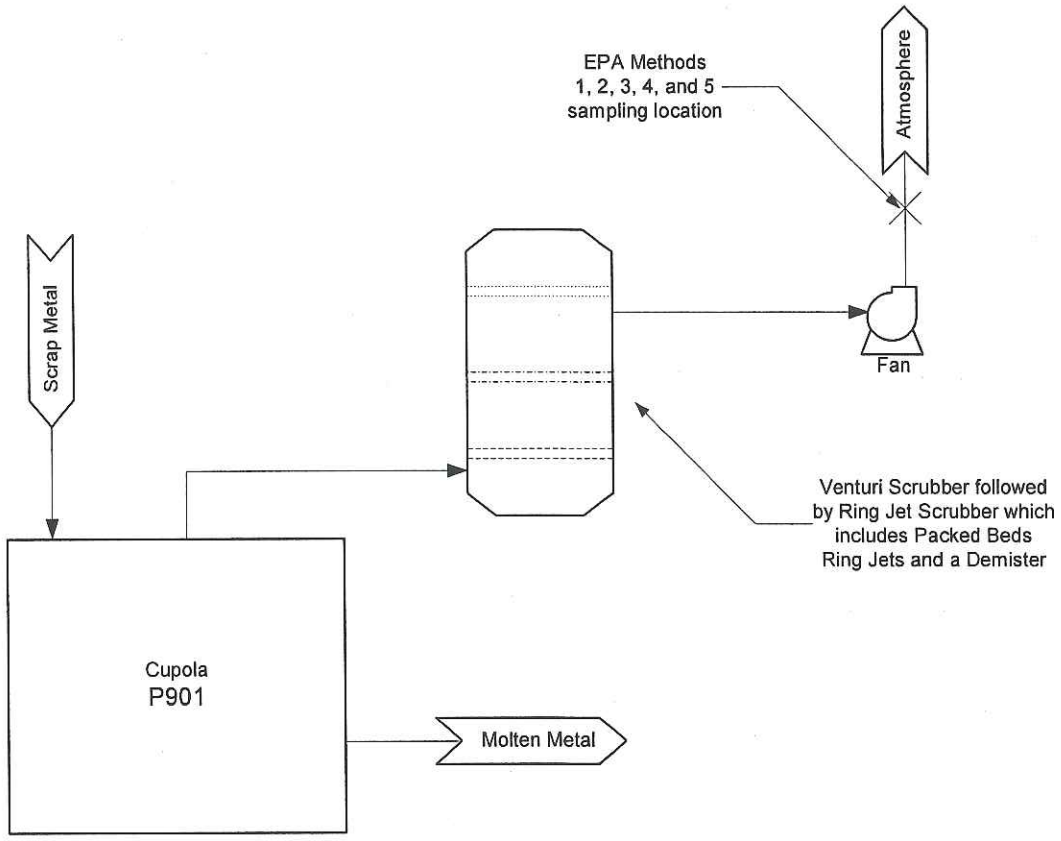


Figure 3.2 – P901 Process Schematic

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Test Methods

4.1.1 EPA Method 1: Sample and Velocity Traverses for Stationary Source
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.

4.1.2 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. Cyclonic flows will measured at each sampling location.

4.1.3 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 CO2, percent O2, and if necessary, for percent CO. For dry molecular weight determination, either an Orsat or a Fyrite analyzer may be used for the analysis.

4.1.4 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.

4.1.5 EPA Method 5: Determination of Particulate Emissions from Stationary Sources (Filterable PM only)
Principle: Particulate matter (PM) is withdrawn isokinetically from the source and collected on a quartz fiber filter maintained at a temperature in the range 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, U.S. Environmental Protection Agency, for a particular application. The PM mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after removal of uncombined water. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

The sampling train to be utilized during this testing project is depicted in Figure 4.1.

Figures 4.2 and 4.3 demonstrate a flow diagram of the sample recovery and analysis which will be utilized in this testing event.

4.2 Procedures for Obtaining Process Data

Clow will be responsible for providing production records for the test event.

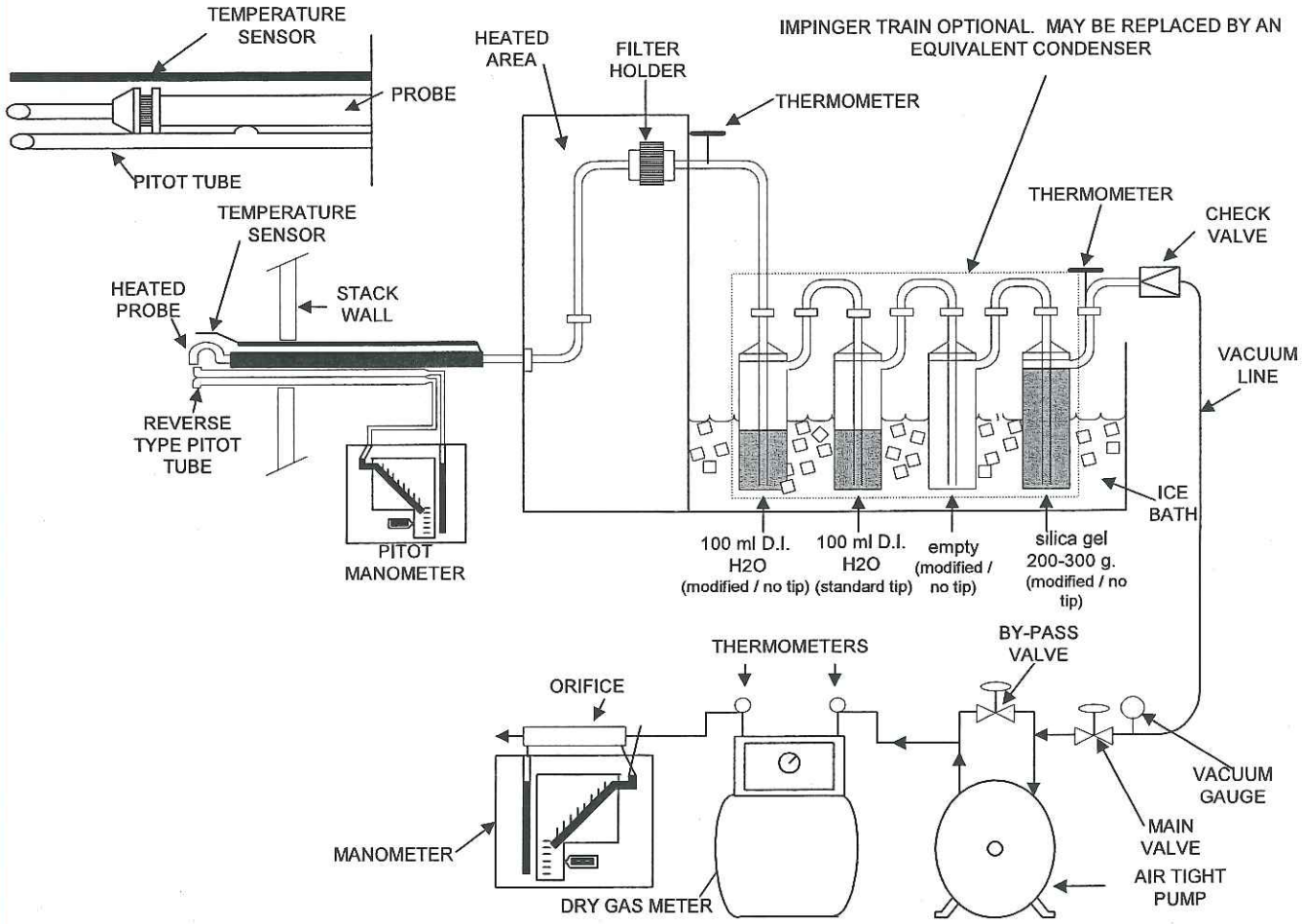


Figure 4.1 – EPA Method 5 Sample Train Schematic

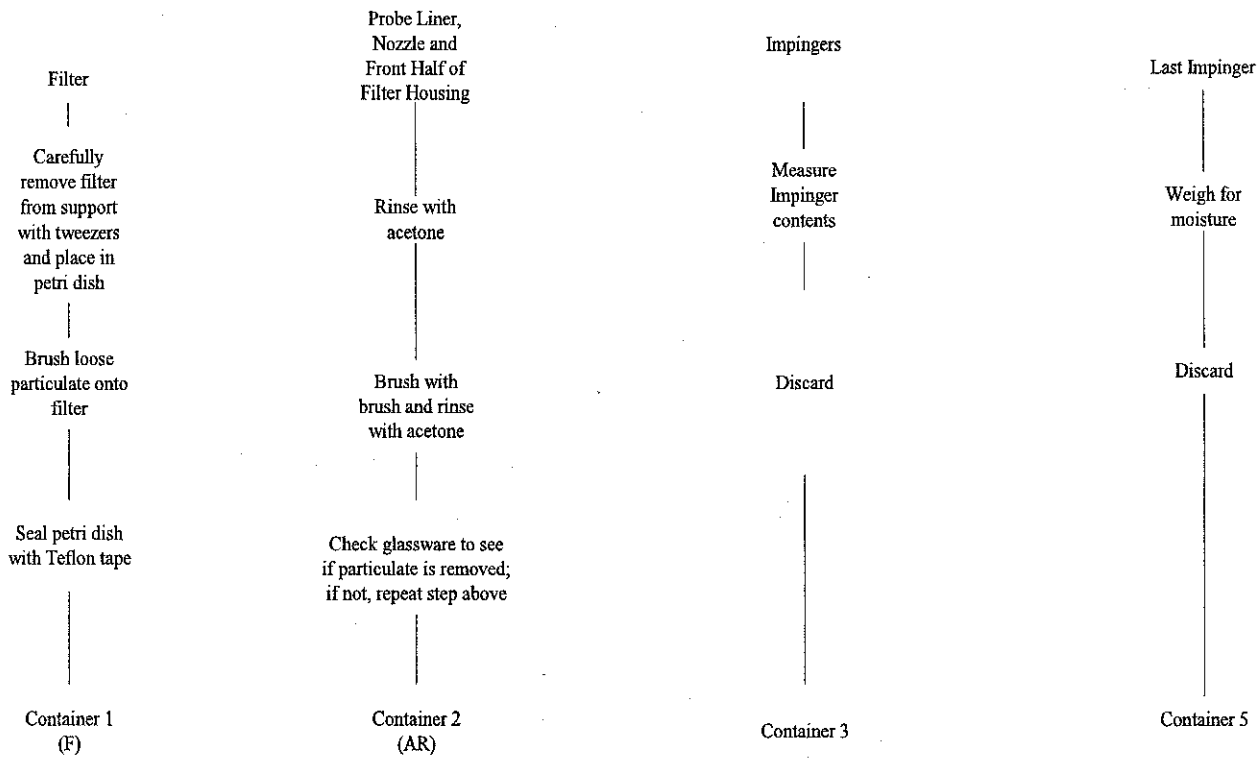


Figure 4.2 – Method 5 Sample Recovery Scheme

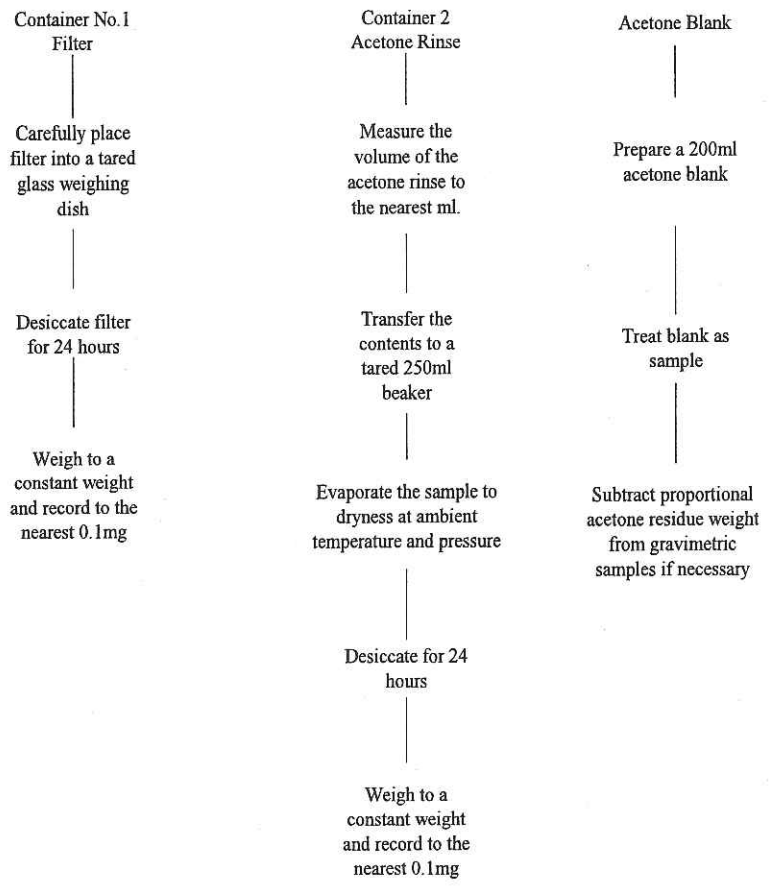


Figure 4.3 – PM Analytical Scheme

5.0 QA/QC PROCEDURES

5.1 Internal QA Audits

Each test event will consist of three sampling runs in order to obtain a representative sample and provide data duplication in the unforeseen event of a test run being invalidated. The Analytical Laboratories will perform the QA measures described in the specific methodologies utilized during this test event.

All meter boxes and sampling trains to be used during sampling will perform within the requirements of their respective methods and will be calibrated at least sixty days before their use in the field. All pre-test and post-test sample train leak checks will be below the 0.02 cfm limit. Minimum metered volumes and percent isokinetics will also be met where applicable.

Internal QA program: The following activities, at a minimum, will be performed for EPA Method 5.

Meter box calibration
Meter box thermometer calibration
Impinger thermocouple calibration
Stack thermometer calibration
Nozzle calibrations

5.2 External QA Audits

EPA and Clow Water Systems Company shall have the right to have an observer present to observe and evaluate all aspects of the performance test, including, but not limited to, instrument calibration, data validation, sample logging, and documentation of quality control data and field maintenance activities

Any QA/QC problems that occur during this test event will be presented in the final Test Report.

5.3 Data Quality Objectives

The expected precision shall be as described in the applicable methodology. Audit sample analysis will be within the tolerance of the applicable methodology. The data that is collected and incorporated into the report will be 100% complete and peer reviewed for accuracy

Figures 5.1 - 5.7 are some examples of the data sheets which will be utilized during this test event.

5.4 QA/QC of Data Reduction

The Quality Assurance Manager will verify the validated computer template is in place and setup properly prior to the test event. This will ensure that the calculations performed in the field are accurate. During sampling, the Test Team Leader will conduct spot checks of the Testing Technicians recording data to verify that the data being recorded is accurate and within the specifications set forth by the EPA test methods. The Test Team Leader will input then data in the field into the validated computer template and determine the percent isokinetics.

At the conclusion of the testing event, the data will undergo a peer review with the Quality Assurance Manger being the final check to verify the data's completeness and accuracy.

5.5 Sample Identification and Custody

The Field Laboratory Technician is responsible for ensuring all the samples are recovered and accounted for. The Field Laboratory Technician is also responsible for ensuring that the proper custody procedures are followed. The Project Manager will supply labels for each sample to ensure that each label is uniquely identified. Figures 5.8 - 5.9 are some examples of the forms and labels which will be utilized.

Method 1 Preliminary Field Data

Plant: Clow Water Systems Company
City, State: Coshocton, Ohio
Location: Scrubber Exhaust Stack

Duct Depth (Inner Diameter):

Relative Location		
From Far Inside Wall to Outside of Port		
Nipple Length and/or Wall Thickness		
Nipple Protrusion		
Stack or Duct Depth (Inner Diameter)		
Stack or Duct Width (Only If Rectangular)		
Stack Outer Circumference		
Port Hole Inner Diameter		

Equivalent Diameter = D_e

$$D_e = \frac{2 \times \text{Depth} \times \text{Width}}{\text{Depth} + \text{Width}} = \frac{2(\quad)(\quad)}{(\quad)+(\quad)} = ____$$

Distance Upstream from Flow Disturbance	
Diameters Upstream from Flow Disturbance (≥ 0.5 D_e)	
Minimum Traverse Points Needed *	

Distance Downstream from Flow Disturbance	
Diameters Downstream from Flow Disturbance (≥ 2 D_e)	
Minimum Traverse Points Needed *	

*Circle Larger of the Two

Stack or Duct Area = _____ in.^{2}

Location of Points in Circular Stacks or Ducts

	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.8	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75.0	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77.0
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											98.9

Location of Points in Rectangular Stacks or Ducts

	2	3	4	5	6	7	8	9	10	11	12
1	25.0	16.7	12.5	10.0	8.3	7.1	6.3	5.6	5.0	4.5	4.2
2	75.0	50.0	37.5	30.0	25.0	21.4	18.8	16.7	15.0	13.6	12.5
3		83.3	62.5	50.0	41.7	35.7	31.3	27.8	25.0	22.7	20.6
4			87.5	70.0	58.3	50.0	43.8	38.9	35.0	31.8	29.2
5				90.0	75.0	64.3	56.3	50.0	45.0	40.9	37.5
6					91.7	78.6	68.7	61.1	55.0	50.0	45.8
7						92.9	81.3	72.2	65.0	59.1	54.2
8							93.8	83.3	75.0	68.2	62.5
9								94.4	85.0	77.3	70.8
10									95.0	86.4	79.2
11										95.5	87.5
12											95.8

Note:

1) Stacks having a diameter greater than 24in, shall have no traverse points located within 1.0in of the Stack walls.

2) Stacks having a diameter less than or equal to 24in, shall have no traverse points located within .50in of the Stack walls.

Relocate to a distance equal to the inside diameter of the nozzle being used or to the above minimum distances, whichever is larger.

Stack Build-up $^{Y}/_{N}$ _____

Point	% of Duct Depth	Distance From Inside Wall (in.)	Distance From Outside of Port (in.)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Air Compliance Testing, Inc.

Job Number: _____
Done By / Date: _____ / _____
Checked By / Date: _____ / _____ : _____ / _____
Final Check By / Date: _____ / _____

Figure 5.1 – EPA Method 1 Field Data Sheet

Plant Name	Clow Water Systems Company		
City, State	Coshocton, Ohio		
Test Location	Scrubber Exhaust Stack		Run Number
Barometric Pressure (in.Hg)		Barometer I.D.	Stack Static Pressure (in.H_2O)
Pitot I.D.	Cp	Manometer I.D.	Umbilical I.D.
Thermocouple I.D.		Temp Display I.D.	Length / Dia Width
Start Time		Finish Time	Ambient Temperature (°F)

Relative Port Location

Test Point	Yaw Angle	ΔP (in.H_2O)	√ΔP	Temp (°F)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Total Points Used _____

Relative Port Location

Test Point	Yaw Angle	ΔP (in.H_2O)	√ΔP	Temp (°F)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
Sum				
Avg.				

Note: Yaw angle average is the sum of the absolute values divided by the number of measurements, and must be ≤ 20°. Yaw angle is the angle measured from the point where zero ΔP should be obtained to the point where zero ΔP is actually obtained.
ΔP average is the square of the average square root.

Moisture Data

Port	Time	Dry Bulb (°F)	Wet Bulb (°F)	% H_2O	%R.H.

Stack Gas Velocity (v_s), (ft/sec)

$(85.49)(C_p)(\sqrt{\Delta P})_{avg}$ sq.rt.$[(460+t_{savg})/(P_s)(M_s)]$

C_p - Pitot Coefficient (dimensionless)

t_{savg} - Stack Temperature (°F)

P_s - Stack Pressure (in.Hg)

M_s - Gas Wet Molecular Wt.(dimensionless)

v_s = (85.49) ( ) ( ) X sq.rt. (460 +)
( )( )

v_s =

Actual Volumetric Flow Rate (Q_{aw}), (acfm)

(60 / 144) (v_s) (A)

v_s - Stack Gas Velocity (ft/sec)

A - Stack Area (in^2)

Q_{aw} = (60 / 144) ( ) ( )

Q_{aw} =

Notes		
Apparatus Leak Check - Done By:		
	Pre-Test	Post-Test
Static Side:	Pass / Fail	Pass / Fail
Impact Side:	Pass / Fail	Pass / Fail

Air Compliance Testing, Inc.

Job Number: _____
Done By / Date: _____ / _____
Checked By / Date: _____ / _____ : _____ / _____
Final Check By / Date: _____ / _____

Figure 5.2 – EPA Method 2 Field Data Sheet

Method 3 Orsat Field Data Sheet

Plant Name: Clow Water Systems Company Fuel Type:
Sampling Location: Scrubber Exhaust Stack
Pre-Test Leak Check: Post-Test Leak Check:

Run Number:			Date:			Operator:	
Time of Sample Collection	Time of Analysis	CO_2 Reading (A)	O_2 Reading (B)	CO Reading (C)	$\%O_2$ (B-A)	%CO (C-B)	$\%N_2$ (100-C)
	Average		-	-			
Analyzer I.D. -			Tedlar Bag I.D. -			F_o =	

Run Number:			Date:			Operator:	
Time of Sample Collection	Time of Analysis	CO_2 Reading (A)	O_2 Reading (B)	CO Reading (C)	$\%O_2$ (B-A)	%CO (C-B)	$\%N_2$ (100-C)
	Average		-	-			
Analyzer I.D. -			Tedlar Bag I.D. -			F_o =	

Run Number:			Date:			Operator:	
Time of Sample Collection	Time of Analysis	CO_2 Reading (A)	O_2 Reading (B)	CO Reading (C)	$\%O_2$ (B-A)	%CO (C-B)	$\%N_2$ (100-C)
	Average		-	-			
Analyzer I.D. -			Tedlar Bag I.D. -			F_o =	

Air Compliance Testing, Inc.

Job Number: _____
Done By / Date: _____ / _____
Checked By / Date: _____ / _____ : _____ / _____
Final Check By / Date: _____ / _____

Figure 5.3 – EPA Method 3 Field Data Sheet

Method 4 Moisture Recovery

Plant Name Clow Water Systems Company Location Scrubber Exhaust Stack

Reagents Prepared By / Date _____ / _____

Run Number	1	2	3	4
Run Date				
Analysis Date				
Time of Analysis				
Turbidity / Color (Clear, Cloudy, Suspended Particulates, etc.)				
Impinger #1				
Final Weight (g)				
Tared Weight (g)				
Condensed H_2O (g)				
Impinger #2				
Final Weight (g)				
Tared Weight (g)				
Condensed H_2O (g)				
Impinger #3				
Final Weight (g)				
Tared Weight (g)				
Condensed H_2O (g)				
Total Condensed (g)				
SILICA GEL				
Final Weight (g)				
Tared Weight (g)				
Adsorbed H_2O (g)				
Total H_2O Collected (g)				

Analytical Balance ID A - BAL - 00

Air Compliance Testing, Inc.

Job Number: _____
Done By / Date: _____ / _____
Checked By / Date: _____ / _____ : _____ / _____
Final Check By / Date: _____ / _____

Figure 5.4 – EPA Method 4 Field Data Sheet

Plant	Clow Water Systems Company	Meter box no.	T-MTB-	Gamma	
Location	Scrubber Exhaust Stack	Pump no.	T-PMP-	K Factor	/ /
Run no.		Nomograph no.	T-NOM-	Nozzle Size, in.	
Test start time		Probe no.	T-PRB-	Barometric pressure, in.Hg	Barometer no. T - BAR -
Test stop time		Filter box no.	T-FLB-	Ambient temperature, °F	
Pre-test leak rate @ 15in.Hg		Impinger box no.	T-IMB-	Filter box temperature setting, °F	
Post-test leak rate @ in.Hg		Umbilical cord no.	T-UMC-	Probe temperature setting, °F	
Pre-test pitot leak check - total	static	Umbilical adapter no.	T-UMA-	Orsat flow rate setting, SCFH	
Post-test pitot leak check - total	static	Orsat bag no.		Meter box operator	Date

POINT	CLOCK TIME min	DRY GAS METER CF	PITOT In. H_2O ΔP	ORIFICE ΔH In. H_2O		PROBE TEMP °F	TACI TEMI °F	DRY GAS TEMP, °F		FILTER TEMP °F	IMPINGER TEMP °F	FILTER EXIT TEMP °F	PUMP VACUUM in.Hg	ORSAT FLOW SCFH	STATIC PRESSURE ± in.H_2O
				DESIRED	ACTUAL			INLET	OUTLET						
Final															

Nomograph Calibration Variables ΔH@ Cp Ts Tm Ps Pm Bws

Comments:

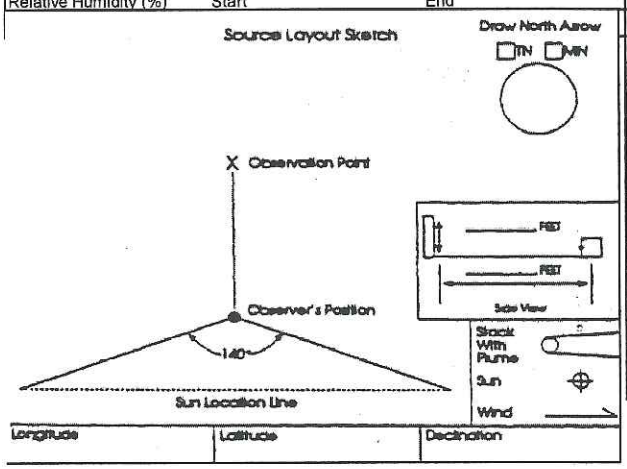
Test Observers -

Figure 5.5 – EPA Method 5 Field Data Sheet

Company Name	Clow Water Systems Company	Observation Date	Run No.
Facility Name	Shroud Area	Start Time	
Street Address		End Time	
City Hammond	State IN Zip		

Process & Unit #	Operating Mode
Control Equipment	Operating Mode

Describe Emission Point			Sec.	0	15	30	45	Sec.	0	15	30	45
			Min.									
Height of Emission Point	Start	End	0					30				
Height Relative to Observe	Start	End	1					31				
Distance from Observer	Start	End	2					32				
Direction from Observer (°)	Start	End	3					33				
Vertical Angle to Observation Point (°)	Start	End	4					34				
Distance and Direction to Observation Point from Emission Point			5					35				
Start			6					36				
End			7					37				
			8					38				
Describe Emissions	Start	End	9					39				
Emission Color	Start	End	10					40				
If Water Droplet Plume	Attached	Detached	11					41				
Point in the Plume at which Opacity was Determined			12					42				
Start			13					43				
End			14					44				
			15					45				
Describe Plume Backgrour	Start	End	16					46				
Background Color	Start	End	17					47				
Sky Conditions	Start	End	18					48				
Wind Speed (mph)	Start	End	19					49				
Wind Direction (From)	Start	End	20					50				
Ambient Temperature (°F)	Start	End	21					51				
Relative Humidity (%)	Start	End	22					52				
			23					53				
			24					54				
			25					55				
			26					56				
			27					57				
			28					58				
			29					59				



Range of Opacity Readings	
Minimum	Maximum
Average Opacity for Highest Period	
Observer's Name (Print)	
Observer's Signature	
Date	
Organization	*Air Compliance Testing, Inc.*
Certified By **Eastern Technical Associates** Date:	

Figure 5.6 – Method 9 Field Data Sheet

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FUGITIVE OR SMOKE EMISSION INSPECTION OUTDOOR LOCATION	
Company Location Company Rep.	Observer Affiliation Date
Sky Conditions Precipitation	Wind Direction Wind Speed
Industry	Process Unit

Sketch process unit: indicate observer position relative to source; indicate potential emission points and/or actual emission points.

OBSERVATIONS	Clock Time	Observation period duration, min:sec	Accumulated emission time, min:sec
Begin Observation			
End Observation			

Figure 22-1

Figure 5.7 – EPA Method 22 Field Data Sheet

Method 5 Record of Custody

Shipping/Transportation Container Number: _____

Seal I.D. No.		Full Signature	Date	Time	Reason for Breaking Seal	Final Vol. ml
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					
	S					
	B					

Were all seals intact?____Yes _____No (Describe seal and reasoning in the "Remarks")

Were all liquid levels at marked levels?_____Yes _____No (Estimate loss in the "Remarks")

Received By Sample Custodian_____ _____ _____

(Full Signature) (Date) (Time)

Remarks: _____

Air Compliance Testing, Inc.

Job Number: _____
Done By / Date: _____ / _____
Checked By / Date: _____ / _____ : _____ / _____
Final Check By / Date: _____ / _____

Figure 5.8 – EPA Method 5 Record of Custody Sheet

010800A Run 1 Impinger #1 100 ml H2O _____g Tare Wt	010800A Run 2 Impinger #1 100 ml H2O _____g Tare Wt	010800A Run 3 Impinger #1 100 ml H2O _____g Tare Wt	010800A Run 4 Impinger #1 100 ml H2O _____g Tare Wt
010800A Run 1 Impinger #2 100 ml H2O _____g Tare Wt	010800A Run 2 Impinger #2 100 ml H2O _____g Tare Wt	010800A Run 3 Impinger #2 100 ml H2O _____g Tare Wt	010800A Run 4 Impinger #2 100 ml H2O _____g Tare Wt
010800A Run 1 Impinger #3 Empty _____g Tare Wt	010800A Run 2 Impinger #3 Empty _____g Tare Wt	010800A Run 3 Impinger #3 Empty _____g Tare Wt	010800A Run 4 Impinger #3 Empty _____g Tare Wt
010800A Run 1 Impinger #4 _____g Silica Gel	010800A Run 2 Impinger #4 _____g Silica Gel	010800A Run 3 Impinger #4 _____g Silica Gel	010800A Run 4 Impinger #4 _____g Silica Gel
010800A- 1 - AR Acetone Rinse	010800A- 2 - AR Acetone Rinse	010800A- 3 - AR Acetone Rinse	
010800A- 4 - AR Acetone Rinse	010800A- BL - AR Acetone Rinse	010800A-1-F	010800A-2-F
010800A-3-F	010800A-4-F		

Figure 5.9 – Example Sample Labels

6.0 REPORTING AND DATA REDUCTION REQUIREMENTS

6.1 Report Format

Figure 6.1 demonstrates the typical Table of Contents utilized for a Compliance Stack Emission Test Report.

Figure 6.2 demonstrates the typical Emissions Results Table utilized in a Compliance Stack Emission Test Report.

Table of Contents

	Page
1.0 INTRODUCTION	2
1.1 Summary of Test Program	2
1.2 Key Personnel	2
2.0 SUMMARY AND DISCUSSION OF TEST RESULTS	3
2.1 Objectives and Test Matrix	3
2.2 Field Test Changes and Problems	3
2.3 Presentation of Results	4
3.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS	7
3.1 Process Description and Operation	7
3.2 Control Equipment Description	7
3.3 Flue Gas Sampling Locations	7
3.4 Process Sampling Location	7
4.0 SAMPLING AND ANALYTICAL PROCEDURES	12
4.1 Test Methods	12
4.2 Procedures for Obtaining Process Data	13
5.0 INTERNAL QA/QC ACTIVITIES	15
5.1 QA Audits	15
5.2 QA/QC Problems	15
6.0 APPENDIX	18

Figure 6.1 – Example Test Report Table of Contents

	Scrubber Exhaust Stack			
	Run 1	**Run 2**	**Run 3**	**Average**
Total Front Half Particulate Matter Mass Emission Rate (lb/hr)				
Total Front Half Particulate Matter Stack Gas Concentration (gr/dscf)				
Visible Emissions (% opacity)				
Stack Gas Average Flow Rate (acfm)				
Stack Gas Average Flow Rate (dscfm)				
Stack Gas Average Velocity (fpm)				
Stack Gas Average Static Pressure (in-H_2O)				
Stack Gas Average Temperature (°F)				
Stack Gas Percent by Volume Moisture (%H_2O)				
Measured Stack Inner Diameter (in)				
Percent by Volume Carbon Dioxide in Stack Gas (Dry Basis) (%CO_2)				
Percent by Volume Oxygen in Stack Gas (Dry Basis) (%O_2)				
Percent by Volume Carbon Monoxide in Stack Gas (Dry Basis) (%CO)				
Percent by Volume Nitrogen in Stack Gas (Dry Basis) (%N_2)				

The "<" symbol indicates that target pollutant was not detected above the Minimum Detection Limit of the analytical method.

Table 2.2 - Emission Results

Figure 6.2 – Example Emissions Results Table

7.0 PLANT ENTRY AND SAFETY

7.1 Safety Responsibilities

The Project Manager is responsible for ensuring compliance with plant entry, health, and safety requirements.

7.2 Safety Program

Air Compliance Testing has a comprehensive health and safety program that satisfies Federal OSHA requirements. The basic elements include: (1) written policies and procedures, (2) routine training of employees and supervisors, (3) use of personnel protective equipment, (5) hazard communication, (6) pre-mobilization meetings with facility personnel and Air Compliance Testing personnel, and (7) routine surveillance of the on-going work.

7.3 Safety Requirements

All of the test personnel will adhere to the following standard safety and precautionary measures:

Confine selves to authorized areas only.
Wear hard hats at all times on site, except in sample recovery trailers.
Wear steel toed boots at all times while on site.
Wear safety glasses with side shields that meet ANSI Z87.1 requirements at all times while on site.
Have first aid equipment and fire extinguishers readily available.
Hearing protection in designated areas.

8.0 PERSONNEL RESPONSIBILITIES AND TEST SCHEDULE

8.1 Test Site Organization

The key tasks and task leaders are:

Management: Charles Giffels / Rob Lisy / Tyson Houchin, ACT
Test Preparation: Charles Giffels / Rob Lisy / Tyson Houchin, ACT, Heather Klesch, Clow
Modifications to Facility / Services: Heather Klesch, Clow Water Systems Company
Sampling Site Accessibility: Charles Giffels / Rob Lisy / Tyson Houchin, ACT, Heather Klesch, Clow
Sample Recovery: Rob Lisy / Tyson Houchin, ACT
Daily Sampling Schedule: Rob Lisy / Tyson Houchin, ACT, Heather Klesch, Clow

8.2 Test Preparations

8.2.1 Construction of Special Sampling and Analytical Equipment
There are no equipment modifications or special analytical equipment required for this testing event.

8.2.2 Modification to Facility
All of the test locations already have test ports installed. The test ports at the Baghouse Exhaust Stacks are positioned at point which should meet EPA Method 1 criteria. These measurements will be verified on the set up day prior to the first test day.

8.2.3 Services Provided by Facility
Clow Water Systems Company will provide adequate power for all of the sampling locations. Air Compliance Testing will utilize their own extension cords as needed.

8.2.4 Access to the Sampling Sites
A manlift will be used to access the Ringjet Scrubber Exhaust Stack.

8.2.5 Sample Recovery Area
Air Compliance Testing will utilize their own sample recovery vehicle for this project.

8.3 Test Personnel Responsibilities and Detailed Schedule

ACT personnel will arrive on site the day before the scheduled test day in order to setup sampling equipment and be prepared for an **5:00 am** start on the following day. All sample trains will be leak checked that day to ensure no delays during the course of the sampling. During this "setup day", ACT will meet with the designated contact (Heather Klesch) to discuss the testing objectives and any necessary safety training.

On test day, ACT will arrive at least one hour before the scheduled start time to allow all of the sample train components (probe and filter) requiring heat to stabilize to their appropriate temperatures.

Figures 8.1 lists the test personnel and their responsibilities during this testing event.

Figure 8.2 presents a detailed test schedule of a typical compliance test.

Staff Assignment	Responsibility
1 Testing Director	Supervise the testing project to ensure QA/QC procedures are being maintained throughout the sampling event
2 Project Manager	Coordinate all testing activities. Maintain communications between all test participants, plant personnel, and the EPA representative.
3 Test Team Leader	Ensure all sampling locations are executing sampling according to the specified methods and report status of the testing to the Project Manager.
4 Testing Technician	Ensure assigned sampling site is sampling according to the specified test methods and reports status to the Test Team Leader. Manage the preparation and operation of the M5 sampling train.
5 Field Technician	Assist in the preparation and operation of the M5 sampling train.
6 Field Laboratory Technician	Coordinate preparation and recovery of sampling trains. Maintain sample chain of custody.
7 Process Data Collector (Clow)	Record the required process parameters at the appropriate intervals and perform EPA Method 22 measurements.
8 Test Team Liaison	Coordinate between test team and Clow Water Systems Company.

Figure 8.1 – Test Personnel and Responsibilities

Crew Member	Activity
Setup Day	
1-6	Travel to Clow Water Systems Company - Coshocton, Ohio
1	Establish communications between the Test Team and EPA representatives.
3	Organize stack lists and assign personnel to their appropriate test locations.
4 and 5	Utilize Stack List and begin setup of the Scrubber Exhaust Test Location
6	Unpack and prepare the sample recovery laboratory. Then, prepare the sample trains for the test locations.
6	Coordinate preparation and recovery of sampling trains. Maintain sample chain of custody.
7 and 8	Coordinate the process data gathering and discuss the procedures to be followed during test day.
Test Day	
8	Contact Clow Water Systems Company plant contact and EPA representative to review process status as well as update plant on test preparation status.
2-6	Perform any initial calibration requirements mandated by the EPA representative and heat up all of the required testing equipment.
4 and 5	Perform three Method 5 test runs at the Scrubber Exhaust test location.
3	Oversee the testing operations to ensure proper sampling technique. Review and enter field test data to ensure proper sampling technique.
8	Coordinate test runs with Clow Water Systems Company to ensure proper operating conditions during testing.
7	Record and monitor the required process data.
6	Recover samples and prepare sampling trains for Run No. 3.
8	At the end of the test, secure the test area and communicate with Clow Water Systems Company and EPA on the demobilization of the test team.

Figure 8.2 – Detailed Test Schedule

9.0 APPENDIX

Appendix attached.

APPENDIX

to

Site-Specific Test Plan

Determination of Total Front Half Particulate Matter and Visible Emissions

Cupola Emission System (P901)

EPA Methods 1, 2, 3, 4, 5, 9, and 22

Clow Water Systems Company
Coshocton, Ohio

Date To Be Conducted: May 11, 2011
Job Number: 110504

Prepared by:
Air Compliance Testing, Inc.
PO Box 41156
Cleveland OH 44141-0156
Phone: (800) EPA-AIR1 (372-2471)

Revision Date: March 11, 2011

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

Agency use only
Date Received
Assigned

Facility Premise No. 0616010006

Emissions Unit PTI No. PSD Permit No. 06-07432

SCC Number 30400301

Proposed Test Date May 11, 2011

Proposed Start Time 5:00 am

A. Facility Contact Information:

Name: Clow Water Systems Company

Address: PO Box 6001, Coshocton OH 43812-6001

Contact Person: Heather Klesch

Telephone (O): 740-291-1087 (Cell) 740-502-0577

E-Mail: heather.klesch@clowwater.com

Testing Firm Information:

Name: Air Compliance Testing, Inc.

Address: PO Box 41156, Cleveland OH 44141-0156

Contact Person: Tyson E. Houchin

Telephone (O): 216 525-0900 (Cell) 440-821-7805

E-Mail: tyson@aircomp.com

B. Test Location Information

Name: Clow Water Systems Co.

Contact Person: Heather Klesch

Address: S Sixth St, Coshocton OH 43812

Telephone (O): 740-291-1087 (Cell) 740-502-0577

C. Test Plan and Emissions Unit Information Table: List the applicable information under each respective column heading.

Emission Unit	StackID	Test Location	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method	Number of Sampling Points	Total Time per Test Run (min)	Number of Sampling Runs
Cupola Emission System (P901)	A	Scrubber System Exhaust Stack	Scrubber System	Pressure Drop and Water Flow Rates	Volumetric Flow Rate	1, 2, 3, and 4	24	120	3
					PM	5	24	120	3
	B	Shroud Area	None	N/A	VEs	9	24	120	3 (if possible)
Flange / Fabrication Building	C	Central Roof Vent	None	N/A	VEs	22	24	120	3 (if possible)

Are *any* modifications or alternatives as spelled within the test methods being proposed? Yes [ ] No [X] If "no", then no modifications or alternatives, however minor, will be accepted. If yes, list each test method and section being modified, and attach a detailed modification description and justification.

Source is testing to comply with (check all that apply): McWane Consent Decree Appendix 3 Section III and 40 CFR Part 63, Subpart ZZZZZ

D. What is the maximum rated capacity or throughput of the emissions unit given its permit-to-install or permit-to-operate? 85 Tons / hour

Has the facility scheduled production or throughput so that the emissions unit can be operated at the maximum capacity given its permit-to-install or permit-to-operate during the test? Yes [X] No [ ]

Specify how the operating rate will be demonstrated during the testing: Normal facility process and recordkeeping procedures

Sampling Location(s): Inlet [ ] Outlet [X] Simultaneous [ ]

Will cyclonic flow check(s) be conducted? Yes [ ] No [X] Measured during previous test event

Fuel Sampling: Coal-Proximate [ ] Ultimate [ ] Other [X] If other specify: N/A

Emission Rate to be calculated using: F-Factor [ ] Ultimate Coal Analysis [ ] Other [X] If other specify: As dictated by EPA Method 5 calculation algorithms in terms of lb/hr

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes [X] No [ ] Ringjets replaced on March 5, 2011

(Note: Some maintenance, such as installing new filter bags in a baghouse, or replacing the activated carbon in an adsorber, may disqualify the emissions unit from a performance test until a sufficient amount of time has elapsed to ensure a test which will be representative of normal operations.)

E. Sample Train Calibration: All affected measuring and monitoring equipment should be calibrated within 60 days of the scheduled testing.

THE FOLLOWING ADDITIONAL INFORMATION SHALL BE SUBMITTED AS ATTACHMENTS:

F. Sample Train Information:

1. A schematic diagram of each sampling train.
2. The type or types of capture media to be used to collect each gas stream pollutant. (Include filter specification sheets)
3. Sample tube type, (e.g., glass, teflon, stainless steel, etc.)
4. Probe cleaning method and solvent to be used, if applicable.

1. See attached Site-Specific Test Plan.

2. Type or types of capture media: M3 - Fyrite: The Fyrite analyzer utilizes a chromium chloride-zinc chloride-hydrochloric acid solution for O2 absorption and a potassium hydroxide solution for CO2 absorption. M4: Samples are condensed in H2O and adsorbed onto Silica Gel. M5: Samples are collected on Glass Filter (filter specification sheets attached). M9 / 22: N/A

3. Sample tube type: M3 - Fyrite: borosilicate glass or stainless steel with connecting borosilicate glassware. M4: borosilicate glass or stainless steel with connecting borosilicate glassware. M5: Probe liner is borosilicate glass or stainless steel with a borosilicate glass or stainless steel nozzle.

4. Probe cleaning method and solvent to be used: M1: N/A M2: N/A M3 - Fyrite: N/A M4: N/A M5: Reagent Grade Acetone. M9 / 22: N/A

G. Laboratory Analysis:

A description of the laboratory analysis methods to be used to determine the concentration of each pollutant.

M3 - Fyrite: A Fyrite analyzer will be used for the analysis in a manner consistent with manufacturer's specifications. M4: A gas sample is extracted at a constant rate (or isokinetically in conjunction with other methods) from the source; moisture is removed from the sample stream and determined either volumetrically or gravimetrically. M5: The analysis for Particulate Matter (PM) will be a gravimetric analysis. M9 / 22: N/A

H. Description of Operations:

- A description of any operation, process, or activity that could vent exhaust gases to the stack being tested. This shall include the description and feed rate of all materials capable of producing pollutant emissions used in each separate operation. Maximum process weight rate, or coating rate, and parameters such as line speed, VOC content etc. should be specifically documented with calculations to confirm worst case scenario emissions.

Note 1: All compliance demonstration testing shall be performed at maximum rate capacity as specified by the equipment manufacturer or at the maximum rate actually used in the emissions unit operation, whichever is greater, or at any other rate as agreed upon with Ohio EPA.

Note 2: If the emissions unit is not operated at maximum capacity, or as close as possible thereto, the emissions unit might be derated to the production capacity achieved during the test.

The only operations, processes, and/or activities that could vent exhaust gases to the test stack are those described above in this document.

I. Stack and Vent Description:

- A dimensional sketch or sketches showing the plan and elevation view of the entire ducting and stack arrangement. The sketch should include the relative position of all processes or operations venting to the stack or vent to be tested. It should also include the position of the ports relative to the nearest upstream and downstream gas flow disturbance or duct dimensional change. The sketches should include the relative position, type, and manufacturer's claimed efficiency of all gas cleaning equipment.
- A cross sectional dimensional sketch of the stack or duct at the sampling ports, showing the position of sampling points. In case of a rectangular duct, show division of duct into equal areas.
- For Fugitive emissions testing, a sketch illustrating the specific emissions points to be observed must be included.

See attached Site-Specific Test Plan

J. Safety:

Describe all possible safety hazards including such items as the presence of toxic fumes, high noise levels, areas where eye protection is required, etc. Note: Conditions considered unsafe at the time of the test will cause postponement.

The Plant requires the use of safety glasses, safety shoes, hard hats, and hearing protection (in designated areas). At this time, and to the best of our belief and knowledge, there are no toxic fumes or other hazards expected to be on site at this facility that would cause you to formally prepare for your exposure to them. It is our recommendation however, to consult plant personnel regarding its safety policies before accessing the production areas on this site. Air Compliance Testing personnel will be required to wear safety shoes and safety glasses at all times while on site at the facility to comply with our own company policy.

Air Compliance Testing, Inc.

P.O. Box 41156
Cleveland, Ohio 44141-0156

1-800-EPA-AIR1

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