OWENS CORNING
MEDINA ROOFING PLANT TEST REPORT

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TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1
1.1 PROJECT OVERVIEW 1
1.2 TEST PROGRAM ORGANIZATION 1
1.3 SOURCE DESCRIPTION 2
1.4 TEST PLAN 3
1.5 OBJECTIVE 3
1.6 TEST NARRATIVE 3

2.0 SAMPLING AND ANALYTICAL PROCEDURES 4
2.1 TEST SITE DESCRIPTION AND SAMPLING PORT LOCATION 4
2.2 STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE (RM 2) 4
2.3 GAS ANALYSIS FOR CO2, AND O2 (RM 3) 5
2.4 MOISTURE DETERMINATION (RM 4) 5
2.5 PARTICULATE MATTER DETERMINATION (RM 5/202) 5
2.6 OPACITY (RM 9) 5

3.0 QUALITY ASSURANCE AND QUALITY CONTROL 6
3.1 EQUIPMENT AND SAMPLING PREPARATION 6
3.2 LEAK CHECKS 6
3.2.1 ISOKINETIC AND NON-ISOKINETIC TRAINS 6
3.2.2 PITOT LEAK CHECK 7
3.3 CALIBRATIONS 7
3.3.1 METER BOX CALIBRATION 7
3.3.2 PITOT CALIBRATION 7
3.3.3 THERMOCOUPLE CALIBRATION 8
3.3.4 BAROMETER CALIBRATION 8
3.5 DATA REDUCTION 8

4.0 RESULTS 9

LIST OF TABLES
(Following Text)

TABLE 1.1	TEST SUMMARY - 3-WIDE COATER EXHAUST AND FOUR WIDE COATER EXHAUST
TABLE 1.2	TEST SUMMARY 3-WIDE LOWER SURGE BIN STACK, FOUR WIDE COATER DUST COLLECTOR
TABLE 1.3	TEST SUMMARY – ALL OTHER SOURCES
TABLE 2.1	TEST SITE SUMMARY
TABLE 4.1	SUMMARY OF RESULTS – THREE WIDE SHINGLE LINE
TABLE 4.2	SUMMARY OF RESULTS – FOUR WIDE SHINGLE LINE
TABLE 4.3	SUMMARY OF RESULTS – THREE WIDE COATER EXHAUST
TABLE 4.4	SUMMARY OF RESULTS – FOUR WIDE COATER EXHAUST
TABLE 4.5	SUMMARY OF RESULTS – MLA SYSTEM STACK
TABLE 4.6	SUMMARY OF RESULTS – MSA #1 SYSTEM STACK
TABLE 4.7	SUMMARY OF RESULTS – THREE WIDE LOWER SURGE BIN EXHAUST
TABLE 4.8	SUMMARY OF RESULTS – FOUR WIDE DUST COLLECTOR

LIST OF APPENDICES

APPENDIX A	CRA FIELD OPERATING PROCEDURES
APPENDIX B	FIELD DATA AND CALCULATION SHEETS
APPENDIX C	CALIBRATION DATA
APPENDIX D	OHIO EPA INTENT TO TEST FORMS
APPENDIX E	PROCESS DATA

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

Owens Corning has contracted Conestoga-Rovers & Associates, Inc. (CRA) to conduct a compliance emission test program at the Owens Corning Medina, Ohio, roofing products plant. The objective of this test program is to demonstrate compliance with the facilities MACT requirements.

Emission testing at the facility on all sites took place on August 15 through 19, 2006.

1.2 TEST PROGRAM ORGANIZATION

The primary contacts for this project are as follows:

Owens Corning's contact is:
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1.3 SOURCE DESCRIPTION

The plant manufactures asphalt roofing products. Multiple sources/sites were tested.

The sources are as follows:

1. The Three Wide Shingle Line, Asphalt Filler Mixer #1, which includes sources:
   A. P917 – Three Wide Lower Surge Bin
   B. P906 – Three Wide Coater
   C. P913 – MSA #1
   D. P912 - MLA
2. The Four Wide Shingle Line, Asphalt Filler Mixer #2, which includes sources:
   A. P907 – Four Wide Dust Collector
   B. P908 – Four Wide Coater
   C. P915 – MSA #2 (exhausts through the Four Wide Dust Collector)

Sites include:

3. The Four Wide Dust Collector Stack (Stack 4WDC, P907)

4. The Three Wide Lower Surge Bin Stack (Stack R91I, P917)

5. The Three Wide Coater/Surge Tank (Stack R41A, P906)

6. The Four Wide Coater/Surge Tank (Stack R92, P908)

7. The MLA Stack (P912)

8. The MSA #1 Stack (P913)

1.4 TEST PLAN

Testing was conducted according to United States Environmental Protection Agency (USEPA) Reference Methods (RM) outlined in Title 40 of the Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A. A summary of the test program is presented in Tables 1.1 to 1.2. Copies of the Ohio EPA Intent to Test forms (ITT) are included in Appendix D.

1.5 OBJECTIVE

The objective of this test program was to determine the particulate matter (PM) emission rate from the multiple sites. Copies of all applicable plant data showing line speeds are included in Appendix E.

1.6 TEST NARRATIVE

This section will identify anomalies that occurred during testing that were previously unknown, site by site.

Four Wide Dust Collector – During previous setup and initial measurements at this site, it was discovered that the entire length of the outlet stack was filled with baffles and noise dampening material. Of the five ports installed, only first, third, and fifth ports could be tested, the second and fourth ports were completely blocked by noise dampening material, which could not be removed. The ports could not be moved because the baffles ran the entire length of the duct. It was not possible to determine the amount of duct area that was blocked by this material. Therefore, the volumetric flow rate was calculated by multiplying the velocity measured during the traverse by the entire duct area. This resulted in a conservatively high emission rate.

2.0 SAMPLING AND ANALYTICAL PROCEDURES

This section provides a brief overview of the specific test methods that were used to determine the emission rates. All test methods were performed in accordance with the Reference Methods (RMs) provided in 40 CFR 60 Appendix A. Copies of all field spreadsheets and data sheets can be found in Appendix B. Details of each method are given in the following sections.

2.1 TEST SITE DESCRIPTION AND SAMPLING PORT LOCATION

Representative measurement of pollutant emissions and total volumetric flow rate from a stationary source requires a measurement site where the effluent stream is flowing in a known direction and cyclonic flow conditions are not present.

According to RM 1, the cross section of the stack is divided into equal areas and a traverse point is then located within each of these areas. The number of duct diameters upstream and downstream from the test location to a flow disturbance determines the number of traverse points in a cross section.

Table 2.1 lists diameters and configurations of the stacks.

2.2 STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE (RM 2)

According to RM 2, the gas velocity in a stack is determined from the average velocity head with a type-S pitot tube, gas density, stack temperature, and stack pressure.

The average velocity head is determined using an inclined manometer and a type-S pitot tube with a known coefficient of 0.84 that is determined geometrically by standards set forth in RM 2. Stack temperature is taken at each traverse point using a type-K thermocouple. Static pressure is determined using a straight tap and an inclined manometer. A copy of the CRA field operating procedure for RM 2 is included in Appendix A.

2.3 GAS ANALYSIS FOR CO_2, AND O_2 (RM 3)

A gas sample is collected according to the analytical method detailed in RM 3. A minimum of 3 grab samples per hour of testing will be obtained. Each sample will be analyzed using a Fyrite Gas Analyzer for CO_2 and O_2. The CRA-E_3 field operating procedure for RM 3 can be found in Appendix A.

2.4 MOISTURE DETERMINATION (RM 4)

The determination of effluent moisture is performed as part of each isokinetic sample train where appropriate; otherwise a separate RM 4 train will be run. The CRA field operating procedure for RM 4 is included in Appendix A.

2.5 PARTICULATE MATTER DETERMINATION (RM 5/202)

Filterable and Total PM in the exhaust stream was collected isokinetically following the procedures outlined in RM 5. This method incorporates gas velocity and volumetric flow measurement (RM 2) and moisture content measurement (RM 4). PM was analyzed gravimetrically utilizing the procedures in RM 5 for the filterable portion, and RM 202 for the total portion. Three, 1-hour runs was performed at the MLA, MSA, 3-Wide Lower Surge Bin and 4-Wide Dust Collector Stacks. Three, 2-hour runs were performed at the 3-Wide and 4-Wide Coater stacks. The CRA field operating procedure for RM 5/202 is included in Appendix A.

2.6 OPACITY (RM 9)

VE observations were performed according to RM 9. Three, 60-minute observations were performed at each site requiring VEs. The CRA field procedure for RM 9 is included in Appendix A.

3.0 QUALITY ASSURANCE AND QUALITY CONTROL

The test program was designed and implemented with emphasis on completeness and data quality. Comprehensive QA/QC is built into CRA's program to ensure data collection is of known precision and accuracy and is complete, representative, and comparable. Data comparability is achieved by the use of standard units of measure as specified by the test methods.

3.1 EQUIPMENT AND SAMPLING PREPARATION

Sampling equipment was cleaned and functions were checked and calibrated prior to use in the field. Each parameter sampling method requires specific cleaning methods of the glassware, train components, and recovery containers. These materials were then sealed prior to shipment to the field.

The QA/QC procedures for sampling operations include performing leak checks before and after each sample run. These were performed on all train components including vacuum sample trains, pitot lines, and gas bag systems. If pre-test leak checks do not meet the criteria, the trains were adjusted to do so. Post-test leak checks were performed and recorded on field data sheets.

3.2 LEAK CHECKS

3.2.1 ISOKINETIC AND NON-ISOKINETIC TRAINS

Both pre- and post-run leak checks were conducted. A pre-test leak check is performed to verify integrity of the vacuum system. A leak check is mandatory at the conclusion of each isokinetic sampling run. The leak check was conducted in accordance with the procedures outlined in RM 5, Section 4.1.4.1, except that it was conducted at a vacuum equal to or greater than the maximum value reached during the sampling run. If the leakage rate is found to be no greater than 0.02 cubic feet per minute (cfm), the results are acceptable and no correction is applied to the total volume of dry gas metered.

3.2.2 PITOT LEAK CHECK

The pitot tubes used during the test program are leak checked prior to the test series and following each traverse set. The leak check was performed by placing flexible tubing over one side of the pitot tube tip. The tubing is pinched off when the pitot is pressurized to greater than 3 inches of water. No loss of pressure for 15 seconds indicated a successful leak check. This procedure was repeated for the other side of the pitot tube as well.

3.3 CALIBRATIONS

All affected equipment used for measuring in the stack was calibrated within 60 days of the scheduled testing. All calibration data was available on site. Copies of all calibration data are included in Appendix C.

3.3.1 METER BOX CALIBRATION

Following the procedures outlined in EPA Method 5, Section 5.3.1, a standard dry gas meter was substituted for a wet test meter per EPA Method 5, Section 7.1. Primarily, the meter calibration factors (Y and ΔH@) are determined at multipoint calibration runs at a variety of flow rates. Factors calculated at the individual runs must agree within 2% of each other. The factors are then averaged and that average was posted on the meter box.

After each field sampling project, a post-test calibration was made. This consists of three calibration runs at the average sampling rate seen for that project. The factors calculated from the three individual runs must agree to within 2% of each other and are averaged. That average must agree to within 5% of the factor posted on the meter box.

3.3.2 PITOT CALIBRATION

Pitot tubes were calibrated following the procedures outlined in EPA Method 2, Section 4. Pitot tubes were given a baseline coefficient when they met certain geometrically measured angles and dimensions as set forth in the method.

3.3.3 THERMOCOUPLE CALIBRATION

Thermocouples were calibrated according to the *Approved Alternative Method (ALT-011), Alternative Method 2 Thermocouple Calibration Procedure.* This alternative method utilizes single-point calibration procedure at room temperature.

3.3.4 BAROMETER CALIBRATION

Prior to being sent in the field, CRA's barometer was compared to the barometer from the National Weather Service (NWS) located at the Buffalo Niagara International Airport. If the CRA barometer disagreed by more than ±2.3 mm (0.1 in.) of Hg from the barometer located at the airport, the CRA barometer was adjusted until it agrees with the NWS barometer.

CRA and the NWS elevations are within ten feet of each other, thus eliminating the need for any elevation correction.

When in the field, barometer readings were taken from the CRA barometer. At the conclusion of fieldwork, the barometer was brought back, checked against the NWS barometer, and corrected if necessary. Readings taken in the field were corrected based on the degree of error between the CRA barometer and the NWS barometer.

3.5 DATA REDUCTION

The QA/QC procedure for data reduction includes using computer spreadsheet programs to generate tables of results. Data input files and equations were double-checked by a second person, and tables were checked for transposition errors with spot calculations being performed by hand.

4.0 RESULTS

Summary tables of all results are included as Tables 4.1 to 4.8. Tables 4.1 and 4.2 are summary tables of the sources compared to various limits found within the Operating Permit. Tables 4.3 through 4.8 are summary tables for each site tested. Copies of all field spreadsheets and data sheets can be found in Appendix B.

TABLE 1.1

TEST SUMMARY
OWENS CORNING, MEDINA ROOFING PLANT
3-WIDE COATER EXHAUST AND 4-WIDE COATER EXHAUST

Parameter	*Test Method*	*Location*	*No. of Test Runs*	*Run Duration*	*Comments*
Gas Flow Rate	RM 1&2	Outlet	3	n/a	
Gas Molecular Weight CO_2 & O_2	RM 3	Outlet	N/A	Grab	
Moisture	RM 4	Outlet	3	120 minutes	Incorporated in RM5/202 test
Particulate Matter	RM 5/202	Outlet	3	120 minutes	
Visible Emission	RM 9	Outlet	3	60 minutes	

TABLE 1.2

TEST SUMMARY
OWENS CORNING, MEDINA ROOFING PLANT
3-WIDE LOWER SURGE BIN STACK
4-WIDE DUST COLLECTOR
MSA STACK
MLA STACK

Parameter	*Test Method*	*Location*	*No. of Test Runs*	*Run Duration*	*Comments*
Gas Flow Rate	RM 1&2	Outlet	3	1 hour	
Gas Molecular Weight	RM 3	Outlet	N/A	Grab	
Particulate Matter	RM 5/202	Outlet	3	1 hour	

TABLE 2.1

TEST SITE SUMMARY
OWENS CORNING
MEDINA ROOFING PLANT
MEDINA, OHIO

Stack ID	*Stack Shape*	*Stack Orientation*	*Stack Diameter (inches)*	*Upstream Distance (Diameters)*	*Downstream Distance (Diameters)*
4-Wide Dust Collector	Rectangular	Vertical	36"x 49"	2.21	2.31
MLA Stack	Circular	Vertical	12"	>2	> .5
MSA Stack	Circular	Vertical	12"	>2	> .5
3-Wide Coater/Surge Tank	Circular	Vertical	23"	>6	>2
4-Wide Coater/Surge Tank	Circular	Vertical	25"	>8	>2
3-Wide Lower Surge Bin *	Rectangular	Horizontal	7"x6"	1.92	1.92

*Site known not to meet EPA RM1 minimum requirements

Table 4.1
Summary of Results
Three Wide Shingle Line
Owens Corning Medina Roofing Plant

Individual Source Limits

Source	*Average Filterable PM Emissions (lbs/hr)*	*Filterable PM Permit Limit (lbs/hr)*	*Average PM10 Emissions (lbs/hr)*	*PM10 Permit Limit (lbs/hr)*
P917 Asphalt Filler Mixer #1 (exhausts through 3-Wide Lower Surge Bin)	0.016		0.028	0.050
P906 3-Wide Coater	0.45		0.70	2.6
P913 MSA #1	0.043	0.045		
P912 MLA	0.039	4.94		

Three Wide Shingle Line Total MACT Limit

	Average Total PM Emissions (lbs/hr)	**Total Permit Limit (lbs/hr)**
Three Wide Shingle Line (All sources addes together)	0.548	4.985

Average PM Emissions (lbs/ton of product)*	**Total Permit Limit (lbs/ton of product)**
0.011	0.08

* Based on calculated rate of 50.93 tons/hr

Table 4.2
Summary of Results
Four Wide Shingle Line
Owens Corning Medina Roofing Plant

Individual Source Limits

Source	*Average PM10 Emissions (lbs/hr)*	*PM10 Permit Limit (lbs/hr)*	*Average Filterable PM Emissions (lbs/hr)*	*Filterable PM Permit Limit (lbs/hr)*
P907 Asphalt Filler Mixer #2 * (exhausts through 4-Wide Dust Collector)	0.20	1.14	0.12	2.55
P908 4-Wide Coater	1.87	3.7		

Four Wide Shingle Line Total MACT Limit

	Average Total PM Emissions (lbs/hr)	**Total Permit Limit (lbs/hr)**
Four Wide Shingle Line (All sources added together)	2.07	4.84

Average PM Emissions (lbs/ton of product)**	**Total Permit Limit (lbs/ton of product)**
0.026	0.08

* Based on a contribution of 10.95% to the total 4-Wide Dust Collector emissions.
** Based on calculated rate of 79.8 tons/hr

Table 4.3
Summary of Results
Three Wide Coater Exhaust
Owens Corning Medina Roofing Plant

Filterable PM

Test Date	*Run*	*Start Time*	*Stop Time*	*Temp. (F)*	*Moisture (%)*	*Actual Flowrate (acfm)*	*Dry Std. Flowrate (dscfm)*	*Sample Volume (dscf)*	*TCE Rinse (g)*	*Filter Catch (g)*	*Filterable Catch (g)*	*Filterable PM Concentration (gr/dscf)*	*Filterable PM Emission Rate (lb/hr)*	*Visible Emissions (Opacity %)*
8/15/2006	1	13:00	16:21	113.4	1.5	9,618	8,605	74.902	0.0315	0.0001	0.0316	0.0065	0.48	0
8/15/2006	2	17:04	19:43	116.5	2.0	9,538	8,447	73.479	0.0367	0.0003	0.0370	0.0078	0.56	0
8/16/2006	3	9:57	12:19	112.9	1.8	9,390	8,450	73.688	0.0211	0.0002	0.0213	0.0045	0.32	0
	Avg			**114.3**	**1.8**	**9,515**	**8,501**					**0.0062**	**0.45**	**0**

Table 4.4
Summary of Results
Four Wide Coater
Owens Corning Medina Roofing Plant

									Filterable PM					
Test Date	*Run*	*Start Time*	*Stop Time*	*Temp. (F)*	*Moisture (%)*	*Actual Flowrate (acfm)*	*Dry Std. Flowrate (dscfm)*	*Sample Volume (dscf)*	*TCE Rinse (g)*	*Filter Catch (g)*	*Filterable Catch (g)*	*Filterable PM Concentration (gr/dscf)*	*Filterable PM Emission Rate (lb/hr)*	*Visible Emissions (Opacity %)*
8/17/2006	1	11:15	14:38	119.0	1.7	5,515	4,906	77.960	0.0593	0.0054	0.0647	0.0128	0.54	0
8/18/2006	2	8:31	11:19	116.5	2.3	5,655	5,004	79.368	0.0721	0.0045	0.0766	0.0149	0.64	0
8/18/2006	3	11:51	14:04	118.4	1.3	5,511	4,911	76.023	0.0365	0.0042	0.0407	0.0083	0.35	0
	Avg			**118.0**	**1.8**	**5,560**	**4,940**					**0.0120**	**0.51**	0

Table 4.5
Summary of Results
MLA System Stack
Owens Corning Medina Roofing Plant

Filterable PM

Test Date	*Run*	*Start Time*	*Stop Time*	*Temp. (F)*	*Moisture (%)*	*Actual Flowrate (acfm)*	*Dry Std. Flowrate (dscfm)*	*Sample Volume (dscf)*	*TCE Rinse (g)*	*Filter Catch (g)*	*Filterable Catch (g)*	*Filterable PM Concentration (gr/dscf)*	*Filterable PM Emission Rate (lb/hr)*
8/16/2006	1	15:14	16:18	100.0	0.9	577	535	33.867	0.0162	0.0012	0.0174	0.0079	0.036
8/16/2006	2	16:51	18:00	100.2	1.0	555	513	32.375	0.0209	0.0011	0.0220	0.0105	0.046
8/16/2006	3	18:47	20:09	95.7	1.0	566	528	33.359	0.0157	0.0013	0.0170	0.0079	0.036
	Avg			**98.6**	**1.0**	**566**	**526**					**0.0088**	**0.039**

Table 4.6
Summary of Results
MSA #1 System Stack
Owens Corning Medina Roofing Plant

									Filterable PM				
Test Date	*Run*	*Start Time*	*Stop Time*	*Temp. (F)*	*Moisture (%)*	*Actual Flowrate (acfm)*	*Dry Std. Flowrate (dscfm)*	*Sample Volume (dscf)*	*TCE Rinse (g)*	*Filter Catch (g)*	*Filterable Catch (g)*	*Filterable PM Concentration (gr/dscf)*	*Filterable PM Emission Rate (lb/hr)*
8/16/2006	1	15:15	16:19	93.5	1.0	579	540	34.101	0.0209	0.0003	0.0212	0.0096	0.044
8/16/2006	2	16:52	18:01	94.6	1.0	599	557	33.844	0.0196	0.0001	0.0197	0.0090	0.043
8/16/2006	3	18:48	20:10	94.0	1.0	612	573	36.573	0.0191	0.0013	0.0204	0.0086	0.042
	Avg			**94.1**	**1.0**	**597**	**557**					**0.0091**	**0.043**

Table 4.7
Summary of Results
Three Wide Lower Surge Bin Exhaust
Oweus Corning Medina Roofing Plant

									Filterable PM				
Test Date	Run	Start Time	Stop Time	Temp. (F)	Moisture (%)	Actual Flowrate (acfm)	Dry Std. Flowrate (dscfm)	Sample Volume (dscf)	TCE Rinse (g)	Filter Catch (g)	Filterable Catch (g)	Filterable PM Concentration (gr/dscf)	Filterable PM Emission Rate (lb/hr)
8/19/2006	1	17:35	18:35	193.8	4.9	289	218	34.491	0.0171	0.0017	0.0188	0.0084	0.016
8/19/2006	2	19:03	20:03	195.4	4.8	295	222	35.227	0.0134	0.0009	0.0143	0.0063	0.012
8/19/2006	3	20:28	21:28	195.4	4.2	290	219	34.332	0.0233	0.0011	0.0244	0.0110	0.021
	Avg			**194.9**	**4.6**	**291**	**219**					**0.0085**	**0.016**

Table 4.8
Summary of Results
Four Wide Dust Collector
Owens Corning Medina Roofing Plant

									Filterable PM				
Test Date	*Run*	*Start Time*	*Stop Time*	*Temp. (F)*	*Moisture (%)*	*Actual Flowrate (acfm)*	*Dry Std. Flowrate (dscfm)*	*Sample Volume (dscf)*	*TCE Rinse (g)*	*Filter Catch (g)*	*Filterable Catch (g)*	*Filterable PM Concentration (gr/dscf)*	*Filterable PM Emission Rate (lb/hr)*
8/18/2006	1	8:31	11:00	122.2	3.8	19,261	16,554	34.843	0.0176	0.0001	0.0177	0.0078	1.11
8/19/2006	2	11:31	12:58	125.5	4.0	19,651	16,735	35.299	0.0150	0.0002	0.0152	0.0066	0.95
8/19/2006	3	13:36	15:42	127.4	2.1	19,205	16,603	33.977	0.0197	0.0001	0.0198	0.0090	1.28
	Avg			**125.0**	**3.3**	**19,372**	**16,631**					**0.0078**	**1.11**

APPENDIX A

CRA FIELD OPERATING PROCEDURES

FIELD PROCEDURE - REFERENCE METHOD 1 (001)
Test Procedures

A. Applicability

The purpose of the method is to provide guidance for the selection of sampling ports and traverse points at which sampling for air pollutants will be performed.

B. Procedures

1. Sample/velocity measurements are performed at least 8 stack diameters downstream and two diameters upstream from any flow disturbance. (*Alternative methods are available if this criteria cannot be met).
2. Traverse Points (*May not be applicable, Refer to protocol).
   a. 12 points for circular ducts greater than 24 in.
   b. 8 points for circular ducts between 12 and 24 in.
   c. 9 for rectangular diameters between 12 and 24 in.
3. Refer to appropriate tables and figures in the Reference Method to determine exact location of points.
4. Cyclonic Flow Determination
   a. Level and zero the manometer.
   b. Connect S-type pitot to the manometer and leak-check the system.
   c. Note the differential pressure (delta p) at each traverse point when the pitot is at zero degrees reference angle.
   d. Record the rotational angle of the pitot used to obtain zero degrees reference.
   e. If the overall angle is greater than 20 degrees the conditions are unacceptable and an alternative method must be used.

References

1. Title 40 of Code of Federal Regulations, Part 60 Appendix A

FIELD PROCEDURE - REFERENCE METHOD 2 (002)
Test Procedures

A. Applicability

This method is applicable for the measurement of the average velocity of a gas stream and for quantifying gas flow.

B. Preliminary Determinations

1. Select the sampling site and the number of sampling points according to USEPA Reference Method 1.
2. Set up pitot tube/manometer apparatus.

C. Procedures

1. Set Up
   a. Connect positive leg of pitot tube (impact opening) to inclined side of inclined manometer.
   b. Connect negative leg of pitot tube (static pressure side) to straight side of inclined manometer.
   c. Level and zero manometer. Because the manometer level and zero may drift due to vibrations and temperature changes, make periodic checks during the traverse.
2. Pre-Test Leak Check
   a. Blow through pitot tube impact opening until at least 3 in. H_2O velocity pressure registers on the manometer. Immediately close off the impact opening.
   b. Observe pressure. The pressure shall remain stable for at least 15 seconds.
   c. On static pressure side of pitot tube, use suction until at least 3 in. H_2O vacuum registers on the manometer. Immediately close off the static opening.
   d. Observe pressure. The pressure shall remain stable for at least 15 seconds.
3. Measurement at Each Traverse Point
   a. Record differential pressure (Δp) reading and stack temperature.
   b. All data in the field will be recorded on a spreadsheet electronically.
4. Post-Test Leak Check
   a. Blow through pitot tube impact opening until at least 3 in. H_2O velocity pressure registers on the manometer. Immediately close off the impact opening.
   b. Observe pressure. The pressure shall remain stable for at least 15 seconds.
   c. On static pressure side of the pitot tube, use suction until at least 3 in. H_2O vacuum registers on the manometer. Immediately close off the static opening.
   d. Observe pressure. The pressure shall remain stable for at least 15 seconds.

FIELD PROCEDURE - REFERENCE METHOD 2 (002)
Test Procedures

5. Static Pressure Check

   a. Rotate pitot tube until both pitot tube openings are perpendicular to the direction of flow.

   b. Detach negative side of pitot tube from manometer, then record the reading on the manometer.

   c. Record the atmospheric pressure from a barometer.

6. References

   a. Title 40 of Code of Federal Regulations, Part 60 Appendix A.

FIELD PROCEDURE - REFERENCE METHOD 3 (003grab)
Dry Molecular Weight
Single-Point, Grab Sampling, Fyrite Analysis

A. Applicability

This method is applicable for the determination of CO_2 and O_2 concentrations and dry molecular weight.

B. Preliminary Procedures

1. Fyrites are refilled regularly. The Fyrite refill date is located on the inside of the fyrite case.
2. Fyrite fluid is only opened once and the excess fyrite fluid is discarded under proper waste disposal procedures.

C. Procedure:

1. Zero the fyrite fluid by depressing the button on the top of the fyrite column.
2. Hook the squeeze bulb up to the fyrite column and place the nozzle end of the fyrite setup in the stack.
3. Squeeze the bulb approximately twenty times.
4. Unhook squeeze bulb from fyrite column
5. Turn the fyrite column upside down and let all the fluid from the top of the column run to the bottom.
6. Repeat step 5 three times
7. Read the percentage of either CO_2 or O_2 off of the scale

D. References

1. Title 40 of Code of Federal Regulations, Part 60 Appendix A

FIELD PROCEDURE - REFERENCE METHOD 4 (004)
Moisture Determination

A. Applicability

This method is applicable for determination of moisture content of a stack gas.

B. Pretest Preparation

1. Place 700-800 grams of Silica Gel in an impinger and weigh to the nearest 0.5 grams.
2. Check filters visually against light for irregularities and flaws or pinhole leaks.
3. Wash all glassware with soap and hot tap water and then rinse with DI water and acetone.
4. Either gravimetrically or volumetrically determine the weight/volume of the impinger assembly to the nearest 0.5 g/mL

C. Preliminary Determinations

1. Select the sampling site and the number of sampling points according to USEPA Reference Method 1.
2. Set up pitot tube/manometer apparatus.
3. Leak-check the pitot tube setup.
   a. Blow into the pitot impact opening until at least 3 in. H_2O velocity pressure registers on the manometer, and close off the impact opening.
   b. Observe the time (pressure must remain stable for at least 15 seconds).
   c. Do the same for the static pressure side, except use suction to obtain -3in. H_2O.
4. Level and zero the manometer.
5. Determine the stack pressure, temperature, and the range of velocity heads by previous test data or follow Steps B.6 - B.7.
6. Measure the velocity head and temperature.
7. Measure the static pressure in the stack.
8. Determine the atmospheric pressure.
9. Determine the moisture content by previous test data or measurement.

   Determine or estimate the dry molecular weight.

11. Select a nozzle size based on preliminary stack data. Do NOT change nozzle size during the sampling run.
12. Select a suitable probe liner and probe length such that all traverse points can be sampled.
13. Select the total sampling time and standard sample volume specified in the test procedures for the specific industry. Select equal sampling times of ≥ 2 min per point.

FIELD PROCEDURE - REFERENCE METHOD 4 (004)
Moisture Determination

D. Preparation of Collection Train

1. During the preparation and assembly of the sampling train, keep all openings covered to avoid contamination. Use parafilm to close the openings.
2. Prepare impingers according to Figure 1.
3. Tare the sample train by either:
4. Weigh the silica gel, attach it to the other impingers and then weigh the whole train to the nearest 0.5g.
5. Volumetrically measuring the liquid in each impinger and gravimetrically weighing the silica gel impinger.
6. Using a tweezer or clean disposable surgical gloves, place filter in the filter holder. Check the filter for tears after assembly.
7. Mark the probe with "White Out" (or other) to denote the proper distance into the stack or duct for each sampling point.
8. Set up the train. Turn on and set probe and filter box heaters. Place crushed ice around the impingers.
9. Leak-Check the sampling train
   a. Allow time for train temperatures to stabilize.
   b. Plug the nozzle. Fully open the bypass valve and close the coarse adjust valve. Then start the pump.
   c. Slowly close the bypass valve until the desired vacuum is reached (≥ 15 in. Hg or ≥ maximum vacuum reached during the test run.) Do not reverse direction of bypass valve; this will cause water to back up into the filter holder. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak-check as shown in Step 7e, and start over.
   d. Allow the flow rate to stabilize, then determine the leakage rate using DGM readings and a watch. Record the leakage rate. Leakage rate must be ≤ 0.02 cfm or ≤ 4% of average sampling rate, whichever is less.
   e. End the leak-check as follows: first slowly remove the plug from the inlet to the probe, and immediately turn off the vacuum pump.. This prevents the water in the impingers from being forced backward into the filter holder and silica gel from being entrained backward into the third impinger.

E. Sampling

1. Record the initial dry gas meter (DGM) reading.
2. Clean the portholes.
3. Remove the nozzle cap; verify that the filter and probe heating systems are up to temperature, and check pitot tube, temperature gauge, and probe alignments and clearances.

4. Close the coarse adjust valve. If necessary to overcome high negative stack pressure, turn on the pump. Position the nozzle at the first traverse point. Immediately start the pump, and adjust the flow to isokinetic conditions.
5. When the probe is in position, block off the openings around the probe and porthole.
6. Traverse the stack cross-section. *Do not bump the probe nozzle into the stack walls.*
   a. Keep the temperature around the filter holder (probe outlet or filter outlet, if applicable) at the proper level.
   b. Add more ice and, if necessary, salt to maintain a temperature of <68°F at the condenser / silica gel outlet.
   c. Periodically check the level and zero of the manometer.
   d. Record DGM readings at the beginning and end of each sampling time increment, before and after each leak-check, and when sampling is halted.
   e. Take other readings shown in field data sheet at least once at each sample point during each time increment and additional readings when significant changes (20% variation in Δp readings) necessitate additional adjustments in flow rate.
7. At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final DGM meter reading.
8. Leak-check the sampling train (see Step D.7).
9. Leak-check the pitot lines (see Step C.3).
10. Allow the probe to cool. Then, wipe off all external PM near the tip of the probe nozzle, and place a cap over it.

    Before moving the sampling train to the recovery site, remove the probe from the sampling train and cap the open outlet of the probe. Do not lose any condensate that might be present. Cap the filter inlet.

12. Remove the umbilical cord from the last impinger, and cap the impinger. Cap off the filter holder outlet and impinger inlet.
13. Transfer the probe and filter-impinger assembly to the recovery area that is clean and protected from the wind.

F. Sample Recovery

1. (Silica Gel)

   Determine whether silica gel has been completely spent, and note on field data sheet its condition.

   Weigh the silica gel impinger with the other impingers to the nearest 0.5 g.

2. Impinger Water

   a. Note on field data sheet any color or film in the liquid catch.

   b. Weigh Impingers 1, 2, 3 and the silica gel impinger to within ±0.5g [or measure the liquid volume in impingers 1, 2 and 3 to within ± 1 mL (with a graduated cylinder)].

   c. Discard the liquid, unless analysis of the impinger catch is required. Store as is appropriate.

G. REFERENCES

1. Title 40 of Code of Federal Regulations, Part 60 Appendix A.

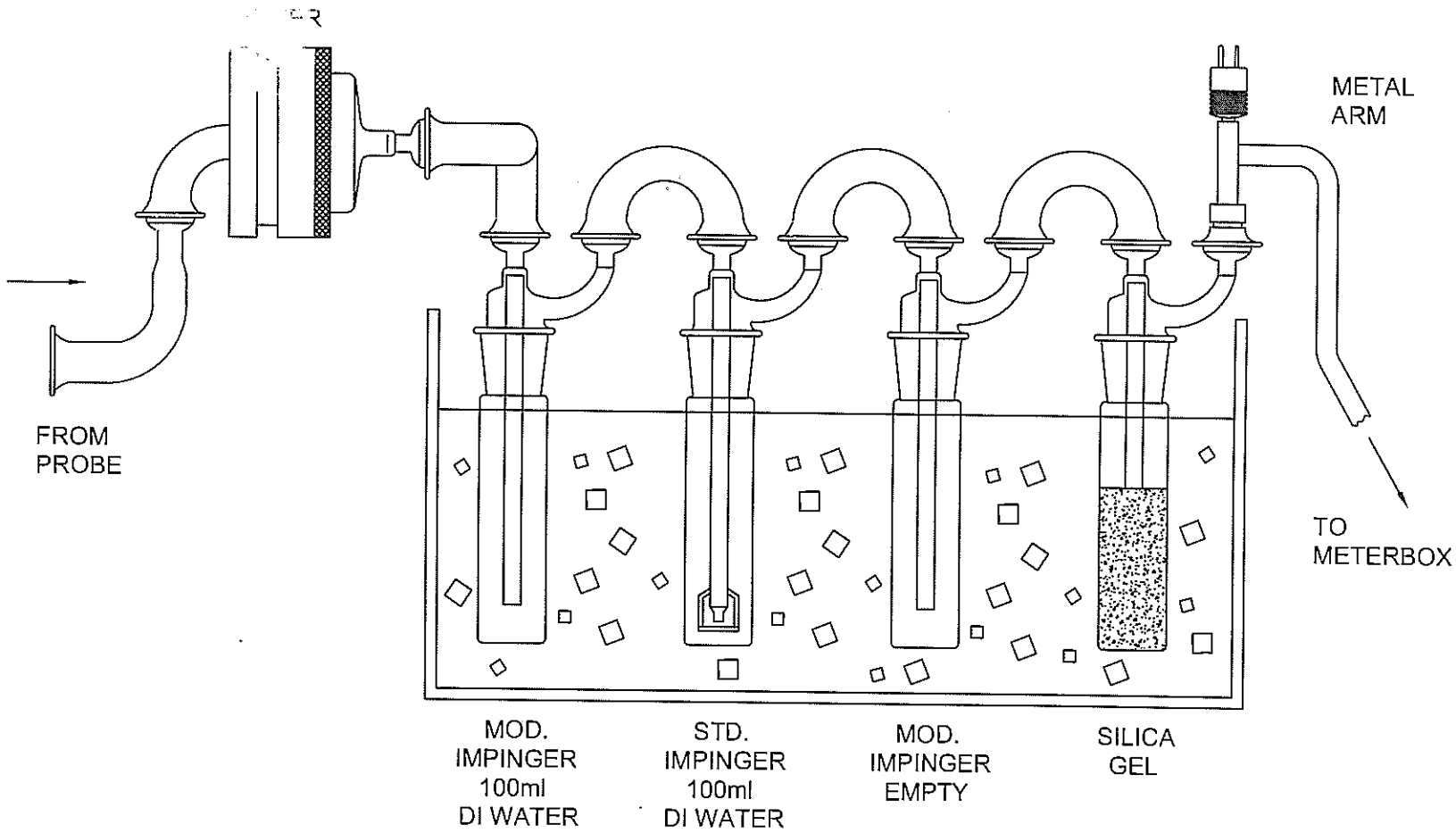


figure 1

METHOD 4
MOISTURE
SAMPLING TRAIN

METHOD 5A - DETERMINATION OF PARTICULATE MATTER EMISSIONS FROM THE ASPHALT PROCESSING AND ASPHALT ROOFING INDUSTRY

NOTE: This method does not include all of the specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test methods: Method 1, Method 2, Method 3, and Method 5.

1.0 Scope and Applications.

1.1 Analyte. Particulate matter (PM). No CAS number assigned.

1.2 Applicability. This method is applicable for the determination of PM emissions from asphalt roofing industry process saturators, blowing stills, and other sources as specified in the regulations.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method.

Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 42 ± 10 °C (108 ± 18 °F). The PM mass, which includes any material that condenses at or above the

filtration temperature, is determined gravimetrically after the removal of uncombined water.

3.0 Definitions. [Reserved]

4.0 Interferences. [Reserved]

5.0 Safety.

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to performing this test method.

6.0 Equipment and Supplies.

6.1 Sample Collection. Same as Method 5, Section 6.1, with the following exceptions and additions:

6.1.1 Probe Liner. Same as Method 5, Section 6.1.1.2, with the note that at high stack gas temperatures greater than 250 °C (480 °F), water-cooled probes may be required to control the probe exit temperature to 42 ± 10 °C (108 ± 18 °F).

6.1.2 Precollector Cyclone. Borosilicate glass following the construction details shown in Air Pollution Technical Document (APTD)-0581, "Construction Details of

Isokinetic Source-Sampling Equipment" (Reference 2 in Method 5, Section 17.0).

NOTE: The cyclone shall be used when the stack gas moisture is greater than 10 percent, and shall not be used otherwise.

6.1.3 Filter Heating System. Any heating (or cooling) system capable of maintaining a sample gas temperature at the exit end of the filter holder during sampling at 42 ± 10 °C (108 ± 18 °F).

6.2 Sample Recovery. The following items are required for sample recovery:

6.2.1 Probe-Liner and Probe-Nozzle Brushes, Graduated Cylinder and/or Balance, Plastic Storage Containers, and Funnel and Rubber Policeman. Same as in Method 5, Sections 6.2.1, 6.2.5, 6.2.6, and 6.2.7, respectively.

6.2.2 Wash Bottles. Glass.

6.2.3 Sample Storage Containers. Chemically resistant 500-ml or 1,000-ml borosilicate glass bottles, with rubber-backed Teflon screw cap liners or caps that are constructed so as to be leak-free, and resistant to chemical attack by 1,1,1-trichloroethane (TCE). (Narrow-mouth glass bottles have been found to be less prone to leakage.)

6.2.4 Petri Dishes. Glass, unless otherwise specified by the Administrator.

6.2.5 Funnel. Glass.

6.3 Sample Analysis. Same as Method 5, Section 6.3, with the following additions:

6.3.1 Beakers. Glass, 250-ml and 500-ml.

6.3.2 Separatory Funnel. 100-ml or greater.

7.0. Reagents and Standards.

7.1 Sample Collection. The following reagents are required for sample collection:

7.1.1 Filters, Silica Gel, Water, and Crushed Ice. Same as in Method 5, Sections 7.1.1, 7.1.2, 7.1.3, and 7.1.4, respectively.

7.1.2 Stopcock Grease. TCE-insoluble, heat-stable grease (if needed). This is not necessary if screw-on connectors with Teflon sleeves, or similar, are used.

7.2 Sample Recovery. Reagent grade TCE, ≤0.001 percent residue and stored in glass bottles. Run TCE blanks before field use, and use only TCE with low blank values (≤0.001 percent). In no case shall a blank value of greater than 0.001 percent of the weight of TCE used be subtracted from the sample weight.

7.3 Analysis. Two reagents are required for the analysis:

7.3.1 TCE. Same as in Section 7.2.

7.3.2 Desiccant. Same as in Method 5, Section 7.3.2.

8.0. Sample Collection, Preservation, Storage, and Transport.

8.1. Pretest Preparation. Unless otherwise specified, maintain and calibrate all components according to the procedure described in APTD-0576, "Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment" (Reference 3 in Method 5, Section 17.0).

8.1.1 Prepare probe liners and sampling nozzles as needed for use. Thoroughly clean each component with soap and water followed by a minimum of three TCE rinses. Use the probe and nozzle brushes during at least one of the TCE rinses (refer to Section 8.7 for rinsing techniques). Cap or seal the open ends of the probe liners and nozzles to prevent contamination during shipping.

8.1.2 Prepare silica gel portions and glass filters as specified in Method 5, Section 8.1.

8.2 Preliminary Determinations. Select the sampling site, probe nozzle, and probe length as specified in Method 5, Section 8.2. Select a total sampling time greater than or equal to the minimum total sampling time specified in the "Test Methods and Procedures" section of the applicable subpart of the regulations. Follow the guidelines outlined in Method 5, Section 8.2 for sampling time per point and total sample volume collected.

8.3 Preparation of Sampling Train. Prepare the sampling train as specified in Method 5, Section 8.3, with the addition of the precollector cyclone, if used, between the probe and filter holder. The temperature of the precollector cyclone, if used, should be maintained in the same range as that of the filter, *i.e.*, 42 ± 10 °C (108 ± 18 °F). Use no stopcock grease on ground glass joints unless grease is insoluble in TCE.

8.4 Leak-Check Procedures. Same as Method 5, Section 8.4.

8.5 Sampling Train Operation. Operate the sampling train as described in Method 5, Section 8.5, except maintain the temperature of the gas exiting the filter holder at 42 ± 10 °C (108 ± 18 °F).

8.6 Calculation of Percent Isokinetic. Same as Method 5, Section 8.6.

8.7 Sample Recovery. Same as Method 5, Section 8.7.1 through 8.7.6.1, with the addition of the following:

8.7.1 Container No. 2 (Probe to Filter Holder).

8.7.1.1 Taking care to see that material on the outside of the probe or other exterior surfaces does not get into the sample, quantitatively recover PM or any condensate from the probe nozzle, probe fitting, probe liner, precollector cyclone and collector flask (if used), and

front half of the filter holder by washing these components with TCE and placing the wash in a glass container. Carefully measure the total amount of TCE used in the rinses. Perform the TCE rinses as described in Method 5, Section 8.7.6.2, using TCE instead of acetone.

8.7.1.2 Brush and rinse the inside of the cyclone, cyclone collection flask, and the front half of the filter holder. Brush and rinse each surface three times or more, if necessary, to remove visible PM.

8.7.2 Container No. 3 (Silica Gel). Same as in Method 5, Section 8.7.6.3.

8.7.3 Impinger Water. Same as Method 5, Section 8.7.6.4.

8.8 Blank. Save a portion of the TCE used for cleanup as a blank. Take 200 ml of this TCE directly from the wash bottle being used, and place it in a glass sample container labeled "TCE Blank."

9.0 Quality Control.

9.1 Miscellaneous Quality Control Measures.

Section	Quality Control Measure	Effect
8.4, 10.0	Sampling equipment leak check and calibration	Ensures accurate measurement of stack gas flow rate, sample volume

9.2 A quality control (QC) check of the volume metering system at the field site is suggested before

collecting the sample. Use the procedure outlined in Method 5, Section 9.2.

10.0 Calibration and Standardization.

Same as Method 5, Section 10.0.

11.0 Analytical Procedures.

11.1 Analysis. Record the data required on a sheet such as the one shown in Figure 5A-1. Handle each sample container as follows:

11.1.1 Container No. 1 (Filter). Transfer the filter from the sample container to a tared glass weighing dish, and desiccate for 24 hours in a desiccator containing anhydrous calcium sulfate. Rinse Container No. 1 with a measured amount of TCE, and analyze this rinse with the contents of Container No. 2. Weigh the filter to a constant weight. For the purpose of this analysis, the term "constant weight" means a difference of no more than 10 percent of the net filter weight or 2 mg (whichever is greater) between two consecutive weighings made 24 hours apart. Report the "final weight" to the nearest 0.1 mg as the average of these two values.

11.1.2 Container No. 2 (Probe to Filter Holder).

11.1.2.1 Before adding the rinse from Container No. 1 to Container No. 2, note the level of liquid in Container No. 2, and confirm on the analysis sheet whether leakage

occurred during transport. If noticeable leakage occurred, either void the sample or take steps, subject to the approval of the Administrator, to correct the final results.

11.1.2.2 Add the rinse from Container No. 1 to Container No. 2 and measure the liquid in this container either volumetrically to ±1 ml or gravimetrically to ±0.5 g. Check to see whether there is any appreciable quantity of condensed water present in the TCE rinse (look for a boundary layer or phase separation). If the volume of condensed water appears larger than 5 ml, separate the oil-TCE fraction from the water fraction using a separatory funnel. Measure the volume of the water phase to the nearest ml; adjust the stack gas moisture content, if necessary (see Sections 12.3 and 12.4). Next, extract the water phase with several 25-ml portions of TCE until, by visual observation, the TCE does not remove any additional organic material. Transfer the remaining water fraction to a tared beaker and evaporate to dryness at 93 °C (200 °F), desiccate for 24 hours, and weigh to the nearest 0.1 mg.

11.1.2.3 Treat the total TCE fraction (including TCE from the filter container rinse and water phase extractions) as follows: Transfer the TCE and oil to a tared beaker, and evaporate at ambient temperature and pressure. The evaporation of TCE from the solution may take several days. Do not desiccate the sample until the solution reaches an

apparent constant volume or until the odor of TCE is not detected. When it appears that the TCE has evaporated, desiccate the sample, and weigh it at 24-hour intervals to obtain a "constant weight" (as defined for Container No. 1 above). The "total weight" for Container No 2 is the sum of the evaporated PM weight of the TCE-oil and water phase fractions. Report the results to the nearest 0.1 mg.

11.1.3 Container No. 3 (Silica Gel). This step may be conducted in the field. Weigh the spent silica gel (or silica gel plus impinger) to the nearest 0.5 g using a balance.

11.1.4 "TCE Blank" Container. Measure TCE in this container either volumetrically or gravimetrically. Transfer the TCE to a tared 250-ml beaker, and evaporate to dryness at ambient temperature and pressure. Desiccate for 24 hours, and weigh to a constant weight. Report the results to the nearest 0.1 mg.

NOTE: In order to facilitate the evaporation of TCE liquid samples, these samples may be dried in a controlled temperature oven at temperatures up to 38 °C (100 °F) until the liquid is evaporated.

12.0 Data Analysis and Calculations.

Carry out calculations, retaining at least one extra significant figure beyond that of the acquired data. Round

off figures after the final calculation. Other forms of the equations may be used as long as they give equivalent results.

12.1 Nomenclature. Same as Method 5, Section 12.1, with the following additions:

C_t = TCE blank residue concentration, mg/g.

m_t = Mass of residue of TCE blank after evaporation, mg.

V_{pc} = Volume of water collected in precollector, ml.

V_t = Volume of TCE blank, ml.

V_{tw} = Volume of TCE used in wash, ml.

W_t = Weight of residue in TCE wash, mg.

$_t$ = Density of TCE (see label on bottle), g/ml.

12.2 Dry Gas Meter Temperature, Orifice Pressure Drop, and Dry Gas Volume. Same as Method 5, Sections 12.2 and 12.3, except use data obtained in performing this test.

12.3 Volume of Water Vapor.

$$V_{w(std)} = K_2 (V_{lc} + V_{pc})$$ **Eq. 5A-1**

where:

K_2 = 0.001333 m^3/ml for metric units.

= 0.04706 ft^3/ml for English units.

12.4 Moisture Content.

$$B_{ws} = \frac{V_{w(std)}}{V_{m(std)} + V_{w(std)}} \qquad \textbf{Eq. 5A-2}$$

NOTE: In saturated or water droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one from the impinger and precollector analysis (Equations 5A-1 and 5A-2) and a second from the assumption of saturated conditions. The lower of the two values of moisture content shall be considered correct. The procedure for determining the moisture content based upon assumption of saturated conditions is given in Section 4.0 of Method 4. For the purpose of this method, the average stack gas temperature from Figure 5-3 of Method 5 may be used to make this determination, provided that the accuracy of the in-stack temperature sensor is within 1 °C (2 °F).

12.5 TCE Blank Concentration.

$$C_t = \frac{m_t}{V_t \, \rho_t} \qquad \textbf{Eq. 5A-3}$$

NOTE: In no case shall a blank value of greater than 0.001 percent of the weight of TCE used be subtracted from the sample weight.

12.6 TCE Wash Blank.

$$W_t = C_t V_{tw} \rho_t \qquad \textbf{Eq. 5A-4}$$

12.7 Total PM Weight. Determine the total PM catch from the sum of the weights obtained from Containers 1 and 2, less the TCE blank.

12.8 PM Concentration.

$$c_s = K_3 \frac{m_n}{V_{m(std)}} \qquad \textbf{Eq. 5A-5}$$

where: K_3 = 0.001 g/mg for metric units

= 0.0154 gr/mg for English units

12.9 Isokinetic Variation. Same as in Method 5, Section 12.11.

13.0 Method Performance. [Reserved]

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management. [Reserved]

16.0 References.

Same as Method 5, Section 17.0.

17.0 Tables, Diagrams, Flowcharts, and Validation Data.

FIGURE 5A-1 - ANALYTICAL DATA

Plant _____
Date _____
Run No. _____
Filter No. _____
Amount liquid lost during transport _____
TCE blank volume, ml _____
TCE blank concentration, mg/g _____
TCE wash blank, mg _____

Container number	Weight of particulate collected, mg		
	Final weight	Tare weight	Weight gain
1.			
2.			
Total			
Less TCE blank			
Weight of particulate matter			

	Volume of liquid water collected	
	Impinger volume, ml	Silica gel weight, g
Final.....		
Initial.....		
Liquid collected		
Total volume collected....		g* ml

*Convert weight of water to volume by dividing total weight increase by density of water (1 g/ml).

$$\frac{\text{Increase, g}}{(1\text{g/ml})} = \text{Volume water, ml}$$

FIELD PROCEDURE – REFERENCE METHOD 9 (009)
Opacity – Visible Observations

A. Certification

1. Attend classroom training seminar, once every three years (recommended).
2. Demonstrate ability to assign opacity readings in 5 percent increments to 25 different black plumes and 25 different white plumes, with an error not to exceed 15 percent opacity on any one reading. Certification renewed every 6 months.

B. Observations

1. Position self at sufficient distance from emissions to obtain clear, unobstructed view. Sun oriented at 140° sector to back.
2. Observe at point where line of vision is approximately perpendicular to the plume direction. If observations are on a rectangular outlet, perpendicular to the longer axis of the outlet.
3. Observer's line of vision should include only one plume at a time.
4. All pertinent data is filled out on a Method 9 observation data sheet. See attached form.
5. Make observations at point of greatest opacity where condensed water vapor is not present.
6. Record observations at 15-second intervals to the nearest 5 percent. A minimum of 24 observations shall be recorded.
7. Opacity is determined as an average of 24 consecutive observations recorded at 15-second intervals. Divide the observations recorded on the data sheet into sets of 24 consecutive observations. A set is composed of any 24 consecutive observations. Sets need not be consecutive in time and in no case shall two sets overlap. For each set of 24 observations, calculate the average by summing the opacity of the 24 observations and dividing by 24. If an applicable standard specifies an averaging time requiring more than 24 observations, calculate the average for all observations made during the specified time period. Record the arithmetic average opacity on observation data sheet.

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

FIELD PROCEDURE - REFERENCE METHOD 201A/202
PM_{10} Emission Determination

A. Pretest Preparation

1. Weigh several 200- to 300-g portions of silica gel in airtight containers to ± 0.5g. Record the total weight of the silica gel plus container on each container.

2. Check filters visually against light for irregularities and flaws or pinhole leaks. Label the filters on the back side near the edge using numbering machine ink.

3. Desiccate the filters at 20 ± 5.6 °C and ambient pressure for ≥ 24 hr, and weigh at intervals of ≥ 6 hr to a constant weight, i.e., ≤ 0.5 mg change from previous weighing; record results to ±0.1 mg. During each weighing, do not expose the filter to the laboratory atmosphere for > 2 min and a relative humidity > 50%.

B. Preliminary Determinations

1. Select the sampling site and the number of sampling points according to USEPA Reference Method 1. The maximum number of sampling points for method 201A is 12.

2. Set up pitot tube/manometer apparatus.

3. Leak-check the pitot tube setup.

   a. Blow into the pitot impact opening until at least 3 in. H_2O velocity pressure registers on the manometer, and close off impact opening.
   b. Observe the time (pressure must remain stable for at least 15 seconds).
   c. Do the same for the static pressure side, except use suction to obtain -3in. H_2O.

4. Level and zero the manometer.

5. Determine the stack pressure, temperature, and the range of velocity heads by previous test data or follow Steps B.6 - B.8.

6. Measure the velocity head and temperature at each sample point.

7. Measure the static pressure in the stack.

8. Determine the atmospheric pressure.

9. Determine the moisture content by previous test data or measurement.

10. Determine or estimate the dry molecular weight.

11. Select a nozzle size based on preliminary stack data. Pick a nozzle that can be used for all sampling points if possible.

12. Use a probe assembly that can be altered to adjust the pitot tube to the cyclone head.

13. Select a suitable probe liner and probe length such that all traverse points can be sampled.

14. Select the total sampling time and standard sample volume specified in the test procedures for the specific industry.

FIELD PROCEDURE - REFERENCE METHOD 201A/202
PM_{10} Emission Determination

C. Preparation of Collection Train

1. During the preparation and assembly of the sampling train, keep all openings covered to avoid contamination. Use parafilm to close the openings.

2. Prepare impingers according to method 202 section 3.1.3. DO NOT use any silicone grease in this sample train.

3. Tare the sample train by volumetrically measuring the liquid in each impinger and gravimetrically weighing the silica gel impinger.

4. Using tweezers or clean disposable surgical gloves, place filter in the filter holder. Check the filter for tears after assembly.

5. Mark the probe with heat resistant tape (or other) to denote the proper distance into the stack or duct for each sampling point.

6. Set up the train. Turn on and set probe heaters. Place crushed ice around the impingers.

7. Leak-Check the sampling train

   a. Allow time for train temperatures to stabilize.
   b. Plug the nozzle. Fully open the bypass valve and close the coarse adjust valve. Then start the pump.
   c. Slowly close the bypass valve until the desired vacuum is reached (≥ 15 in. Hg or ≥ maximum vacuum reached during the test run.) Do not reverse direction of bypass valve; this will cause water to back up into the filter holder. If the desired vacuum is exceeded, either leak-check at this higher vacuum or end the leak-check as shown in Step 7e, and start over.
   d. Allow the flow rate to stabilize, then determine the leakage rate using DGM readings and a watch. Record the leakage rate. Leakage rate must be ≤ 0.02 cfm or ≤ 4% of average sampling rate, whichever is less.
   e. End the leak-check as follows: first slowly remove the plug from the inlet to the probe, and immediately turn off the vacuum pump. This prevents the water in the impingers from being forced backward into the filter holder and silica gel from being entrained backward into the third impinger.

D. Sampling

1. Record data shown on field data sheet. Record the initial dry gas meter (DGM) reading.

2. Clean the portholes.

3. Remove the nozzle cap, verify that the filter and probe heating systems are up to temperature, check pitot tube, temperature gauge, and probe alignments and clearances.

4. Place the cyclone at the first sampling point and let the cyclone heat up to stack temperature, approximately 15 min.

5. Close the coarse adjust valve. If necessary to overcome high negative stack pressure, turn on the pump. Position the nozzle at the first traverse point. Immediately start the pump, and adjust the flow to isokinetic conditions.

6. When the probe is in position, block off the openings around the probe and porthole.

7. Traverse the stack cross-section. *Do not bump the probe nozzle into the stack walls.*

   a. Keep the temperature around the filter holder (probe outlet or filter outlet, if applicable) at the proper level.
   b. Add more ice and, if necessary, salt to maintain a temperature of <68°F at the condenser / silica gel outlet.
   c. Periodically check the level and zero of the manometer.
   d. Record DGM readings at the beginning and end of each sampling time increment, before and after each leak-check, and when sampling is halted.

e. Take other readings shown in field data sheet at least once at each sample point during each time increment and additional readings when significant changes (20% variation in Δp readings) necessitate additional adjustments in flow rate.

f. If train components are replaced, conduct leak-check according to Step C.7.

7. At the end of the sample run, turn off the coarse adjust valve, remove the probe and nozzle from the stack, turn off the pump, record the final DGM meter reading.
8. Remove the cyclone from the probe.

9. Leak-check the sampling train from the probe. (see Step C.7).

10. Leak-check the pitot lines (see Step B.3).

11. Allow the probe to cool. Then, wipe off all external PM near the tip of the probe nozzle, and place a cap over it.

12. Before moving the sampling train to the cleanup site, remove the probe from the sampling train, and cap the open outlet of the probe. Do not lose any condensate that might be present.

13. Remove the umbilical cord from the last impinger, and cap the impinger.
14. Transfer the probe, cyclone, and filter-impinger assembly to the cleanup area that is clean and protected from the wind.

E. Sample Recovery

1. Inspect the train prior to and during disassembly, and note any abnormal conditions.

2. **Container No. 1** (Filter)

   a. Using a pair of tweezers and/or clean disposable surgical gloves, carefully remove the filter from the filter holder, and place it in its identified petri dish container. If necessary, fold the filter such that the PM cake is inside the fold.
   b. Using a dry Nylon bristle brush and/or a sharp-edged blade, carefully transfer any PM and/or filter fibers that adhere to the filter holder gasket into the petri dish. Seal the container.

4. **Container No. 2** (Front ½ Acetone Rinse)

Recover particulate matter from the cyclone turn around cap, and the exit tube, and recover all rinses in a polypropylene or glass container as follows;

   a. Rinse with acetone, brush with a non-metallic Nylon bristle brush, and rinse with acetone until there are no visible particles. Make a final acetone rinse.
   b. After completing the rinse, tighten the lid on the sample container. Mark the height of the fluid level. Label the container.

5. **Container No. 3** (Back Half Impinger Contents, DI water, and Methlyene Chloride Rinse)

   Volumetrically recover the impinger contents for moisture determination. Then rinse all glassware from the probe liner back including all connecting glassware with Distilled Water then Methylene Chloride three times. Place rinses and the impinger contents into a clean glass sample container, tighten on lid, and mark level of sample, and clearly label.

6. **Container No. 6** (Silica Gel)

   Gravimetrically determine the weight of the silica gel impinger to the nearest 0.5g, and record on the recovery data sheet.

7. **Container No. 7** (DI Water Blank)

   Place a 100ml portion of the DI Water used in the sample recovery process into a container, seal, mark level, and label.

8. **Container No.8** (Methylene Chloride Blank)

   Place a 100ml portion of the Methylene Chloride used in the sample recovery process into a container, seal, mark level, and label.

APPENDIX B

FIELD DATA AND CALCULATION SHEETS

3 WIDE COATER

ISOKINETIC DATA SUMMARY

Client: Owens Corning | **Plant: Medina** | **Method: 5A/202**
Project #: 045396 | **Source: 3 Wide Coater** | **Location: Outlet**

RUN INFORMATION				
Run Number	1	2	3	
Test Date	8/15/2006	8/15/2006	8/16/2006	
Start Time	13:00:00	17:04:00	9:57:00	
End Time	16:21:00	19:43:00	12:19:00	
RESULTS				**AVERAGE**
PM Conc. gr/DSCF	6.51E-03	7.77E-03	4.46E-03	6.25E-03
PM Emission Rate lbs./hour	4.80E-01	5.62E-01	3.23E-01	4.55E-01
FIELD MEASURMENTS				
Ambient Temperature, °F	82	82	76	80.0
P_{bar}, in. Hg	29.56	29.56	29.77	29.63
P_{static}, in. H_2O	-0.40	-0.40	-0.40	
Stack Absolute Pressure, in. Hg	29.53	29.53	29.74	29.60
CO_2, %				
O_2, %	20.80	20.60	20.70	20.70
N_2, %	79.20	79.40	79.30	79.30
SAMPLING DATA				
Average Stack Temperature, °F	113	117	113	114
Average Meter Temperature, °F	85	94	85	88
Average Filter Temperature, °F	120	113	111	115
Average Probe Temperature, °F	112	112	111	112
Average Exit Temperature, °F	62	57	55	58
Average ΔP, in. H_2O	0.89	0.87	0.85	0.87
ΔH Avg., in H_2O	1.21	1.19	1.16	1.19
Meter Volume Sum, cf	78.093	77.882	76.321	77.432
Maximum Vacuum, in. Hg	5.0	1.0	1.0	5.0
STACK CALCULATIONS				
Isokinetic, %	100.91	100.84	101.09	100.95
Stack Velocity, ft/sec.	55.56	55.10	54.24	54.97
Volume Flow Rate/Actual, ACFM	9617.8	9538.0	9390.4	9515.4
Volume Flow Rate/Dry Std, DSCFM	8604.9	8447.4	8450.4	8500.9
Dry Molecular Weight, lb/lb-mole	28.83	28.82	28.83	28.83
Sample Volume - Dry Std, DSCF	74.902	73.479	73.688	74.023
Stack Moisture Content, %	1.55	2.01	1.76	1.77
EQUIPMENT INFORMATION				
Nozzle I.D.	QB-22	QB-23	QB-22	varies
Nozzle Diameter, in.	0.1950	0.1950	0.1950	0.1950
Pitot I.D.	2P-1	2P-7	2P-1	varies
Thermocouple I.D.	2T-1	2T-7	2T-1	varies
Barometer I.D.	BEO4921	BEO4921	BEO4921	BEO4921
Meter Box I.D.	BEO4906	BEO4906	BEO4906	BEO4906
Leak Check Pitot	OK	OK	OK	OK
Meter Box Post Leak Check	OK	OK	OK	OK
ANALYTICAL INFORMATION INPUT				
F Factor, DSCF/10^6 BTU				
Filter I.D.	Q791B	Q787B	Q789B	
Filter Gross Weight, g	0.3535	0.3425	0.3175	
Filter Tare Weight, g	0.3534	0.3422	0.3173	
TCE Beaker ID	D840	D841	D836	
TCE Beaker Gross Weight, g	109.6225	111.6571	109.1023	
TCE Beaker Tare Weight, g	109.591	111.6204	109.0812	
TCE Blank Correction, g				
Filter Weight Gain, g	0.0001	0.0003	0.0002	
TCE Beaker Weight Gain, g	0.0315	0.0367	0.0211	
Total Weight Gain, g	0.0316	0.0370	0.0213	

Operators: **Checked by:** **Review Date:**

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	3 Wide Coater	Date:	8/15/2006
Plant:	Medina	Location:	Outlet	Run #:	1
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q791B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	82	(°F)	Area:	2.89	(ft^2)
T-Couple:	2T-1	ΔH @:	1.7195	$P_{Bar.}$:	29.56	(in. Hg.)	Diameter:	23.00	(in.)
Probe ID:	2P-1	Nozzle ID:	QB-22	P_{Static}:	-0.40	(in. H_2O.)			
Probe Con.#:	BEO4182A	Nozzle Con. #:	BEO4968						
C_P:	0.84	Dn (in.) :	0.1950						

LEAK CHECK - ANALYSIS					RUN ESTIMATES					TEST INFORMATION		
Meter Initial:	0.003	cfm @	17.0	(in. Hg.)	Bws:	0.020	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	2
Meter Final:	0.002	cfm @	6.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.62	Points / Port:	12
Pitot (-):	ok	@	4.3	(in. H_2O)	ACTUAL VALUES						Reads / Point	1
Pitot (+):	ok	@	5.5	(in. H_2O)	Bws:	0.015	$\%CO_2$:	0.00	$\%O_2$:	20.80	Time/Reading:	5.0 (min.)
					$\%N_2/CO$:	79.20	M_D:	28.83	M_S:	28.66	Total Time (Θ):	120 (min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	13:00:00	1.00	1.36	340.839	78	78	104	117	112	102	84	5.0
2	0:05:00	13:05:00	1.09	1.48	344.350	79	78	108	109	103	114	61	5.0
3	0:10:00	13:10:00	1.10	1.48	347.950	81	78	113	107	102	115	57	5.0
4	0:15:00	13:15:00	1.02	1.38	351.500	83	79	113	114	107	100	56	5.0
5	0:20:00	13:20:00	0.94	1.27	354.900	84	79	113	135	124	98	57	4.0
6	0:25:00	13:25:00	0.75	1.02	358.200	86	80	113	175	141	93	56	3.0
7	0:30:00	13:30:00	0.70	0.95	361.200	84	81	111	153	130	95	65	2.0
8	0:35:00	13:35:00	0.80	1.08	364.200	84	81	112	150	120	91	55	2.0
9	0:40:00	13:40:00	0.85	1.16	367.300	86	82	112	130	118	92	54	2.0
10	0:45:00	13:45:00	0.83	1.13	370.700	88	82	112	106	115	100	55	2.0
11	0:50:00	13:50:00	0.81	1.10	373.700	87	83	113	99	109	120	55	2.0
12	0:55:00	13:55:00	0.74	1.00	376.850	85	83	114	108	106	94	64	2.0
	1:00:00	14:00:00			379.867								
1	1:00:00	15:21:00	0.75	1.02	379.867	85	83	113	141	106	120	75	2.0
2	1:05:00	15:26:00	0.88	1.19	383.000	86	83	115	120	103	119	59	1.0
3	1:10:00	15:31:00	0.99	1.34	385.900	86	84	115	107	101	110	62	2.0
4	1:15:00	15:36:00	0.90	1.22	389.300	87	83	115	107	101	100	59	2.0
5	1:20:00	15:41:00	0.82	1.11	392.600	89	84	115	121	111	116	62	2.0
6	1:25:00	15:46:00	0.65	0.88	395.750	90	84	115	113	112	105	63	2.0
7	1:30:00	15:51:00	0.87	1.18	398.600	91	84	116	115	112	117	64	2.0
8	1:35:00	15:56:00	0.90	1.23	401.800	92	85	116	111	111	117	65	2.0
9	1:40:00	16:01:00	0.92	1.25	405.200	92	85	116	107	111	112	66	2.0
10	1:45:00	16:06:00	0.92	1.25	408.500	93	86	116	114	111	118	62	2.0
11	1:50:00	16:11:00	1.00	1.36	411.900	93	86	116	111	111	117	60	2.0
12	1:55:00	16:16:00	1.09	1.49	415.350	93	86	116	112	112	117	60	2.0
	2:00:00	16:21:00			418.932								

Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
0.89	1.21	78.093	87	82	113	120	112	107.6	62	2.6
Avg. Sqrt.			Avg. Tm.		SVP					Max.
0.94			84.6		2.8310					5.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	3 Wide Coater	Date:	8/15/2006
Plant:	Medina	Location:	Outlet	Run #:	2
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q787B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	82	(°F)	Area:	2.89	(ft^2)
T-Couple:	2T-7	ΔH @:	1.7195	$P_{Bar.}$:	29.56	(in. Hg.)	Diameter:	23.00	(in.)
Probe ID:	2P-7	Nozzle ID:	QB-23	P_{Static}:	-0.40	(in. H_20.)			
Probe Con.#:	4183G	Nozzle Con. #:	BEO4968						
C_P:	0.84	Dn (in.) :	0.1950	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.020	%CO_2: 0.00	%O_2:	21.00	Number of Ports: 2
Meter Initial:	0.002	cfm @	15.0 (in. Hg.)	%N_2/CO:	79.00	Md: 28.84	Ms:	28.62	Points / Port: 12
Meter Final:	0.001	cfm @	2.0 (in. Hg.)	ACTUAL VALUES					Reads / Point 1
Pitot (-):	ok	@	4.9 (in. H_2O)	Bws:	0.020	%CO_2: 0.00	%O_2:	20.60	Time/Reading: 5.0 (min.)
Pitot (+):	ok	@	5.6 (in. H_2O)	%N_2/CO:	79.40	M_D: 28.82	M_S:	28.61	Total Time (Θ): 120 (min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	17:04:00	0.98	1.34	419.423	89	87	113	114	111	105	78	1.0
2	0:05:00	17:09:00	1.00	1.36	422.800	89	87	117	115	111	106	54	1.0
3	0:10:00	17:14:00	1.00	1.36	426.300	91	86	117	112	111	109	50	1.0
4	0:15:00	17:19:00	0.97	1.32	429.750	92	86	117	112	111	110	50	1.0
5	0:20:00	17:24:00	0.96	1.30	433.100	88	87	116	112	112	110	55	1.0
6	0:25:00	17:29:00	0.97	1.32	436.500	89	87	116	113	111	112	51	1.0
7	0:30:00	17:34:00	0.79	1.07	439.800	91	87	117	112	112	113	51	1.0
8	0:35:00	17:39:00	0.64	0.87	443.000	93	87	117	112	112	111	54	1.0
9	0:40:00	17:44:00	0.60	0.82	445.750	94	87	117	112	111	112	55	1.0
10	0:45:00	17:49:00	0.66	0.90	448.500	95	88	118	112	112	110	57	1.0
11	0:50:00	17:54:00	0.76	1.04	451.400	96	89	117	113	112	111	57	1.0
12	0:55:00	17:59:00	0.78	1.07	454.400	97	90	117	112	112	111	56	1.0
	1:00:00	18:04:00			457.436								
1	1:00:00	18:43:00	0.79	1.09	457.436	94	92	115	112	112	109	67	1.0
2	1:05:00	18:48:00	0.86	1.19	460.550	99	93	116	113	112	114	53	1.0
3	1:10:00	18:53:00	1.01	1.40	463.800	100	94	116	113	113	114	53	1.0
4	1:15:00	18:58:00	0.89	1.23	467.300	102	95	116	113	113	114	54	1.0
5	1:20:00	19:03:00	0.85	1.18	470.700	103	96	117	113	113	114	55	1.0
6	1:25:00	19:08:00	0.70	0.97	473.950	103	96	116	113	113	114	56	1.0
7	1:30:00	19:13:00	0.85	1.18	476.900	103	97	117	114	119	114	58	1.0
8	1:35:00	19:18:00	0.88	1.22	480.200	103	97	117	113	113	114	58	1.0
9	1:40:00	19:23:00	0.89	1.23	483.400	98	97	117	113	112	111	67	1.0
10	1:45:00	19:28:00	0.93	1.28	486.750	98	96	117	113	112	114	58	1.0
11	1:50:00	19:33:00	0.99	1.37	490.100	97	96	117	113	112	112	59	1.0
12	1:55:00	19:38:00	1.08	1.49	493.700	97	94	117	112	112	115	60	1.0
	2:00:00	19:43:00			497.305								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.87	1.19	77.882	96	91	117	113	112	112	57	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.93			93.6		3					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	3 Wide Coater	Date:	8/16/2006
Plant:	Medina	Location:	Outlet	Run #:	3
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q789B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	76	(°F)	Area:	2.89	(ft^2)
T-Couple:	2T-1	ΔH @:	1.7195	$P_{Bar.}$:	29.77	(in. Hg.)	Diameter:	23.00	(in.)
Probe ID:	2P-1	Nozzle ID:	QB-22	P_{Static}:	-0.40	(in. H_2O.)			
Probe Con.#:	BEO4182A	Nozzle Con. #:	BEO4968						
C_P:	0.84	Dn (in.) :	0.1950						

LEAK CHECK - ANALYSIS					RUN ESTIMATES						TEST INFORMATION		
Meter Initial:	0.005	cfm @	16.0	(in. Hg.)	Bws:	0.020	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	2	
Meter Final:	0.003	cfm @	2.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.62	Points / Port:	12	
Pitot (-):	ok	@	6.0	(in. H_2O)	ACTUAL VALUES						Reads / Point	1	
Pitot (+):	ok	@	5.3	(in. H_2O)	Bws:	0.018	$\%CO_2$:	0.00	$\%O_2$:	20.70	Time/Reading:	5.0	(min.)
					$\%N_2/CO$:	79.30	M_D:	28.83	M_S:	28.64	Total Time (Θ):	120	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	9:57:00	1.03	1.38	498.436	76	75	110	112	110	106	64	1.0
2	0:05:00	10:02:00	1.02	1.37	501.900	78	76	111	112	110	114	45	1.0
3	0:10:00	10:07:00	1.00	1.35	505.250	80	76	111	111	111	114	45	1.0
4	0:15:00	10:12:00	1.01	1.36	508.600	82	76	111	110	110	113	48	1.0
5	0:20:00	10:17:00	0.99	1.34	512.000	82	79	112	111	111	113	52	1.0
6	0:25:00	10:22:00	0.98	1.33	515.400	84	79	112	111	111	113	50	1.0
7	0:30:00	10:27:00	0.77	1.04	518.700	86	79	112	110	111	113	52	1.0
8	0:35:00	10:32:00	0.60	0.81	521.800	87	79	112	110	111	113	52	1.0
9	0:40:00	10:37:00	0.58	0.79	524.500	87	80	112	111	112	111	52	1.0
10	0:45:00	10:42:00	0.64	0.87	527.150	88	81	113	111	111	109	52	1.0
11	0:50:00	10:47:00	0.71	0.97	530.000	89	81	113	111	111	112	52	1.0
12	0:55:00	10:52:00	0.81	1.10	533.000	90	81	113	111	112	113	52	1.0
	1:00:00	10:57:00			535.986								
1	1:00:00	11:19:00	0.72	0.98	535.986	87	83	112	111	112	111	59	1.0
2	1:05:00	11:24:00	0.80	1.09	538.800	90	83	115	111	112	113	53	1.0
3	1:10:00	11:29:00	0.95	1.29	541.900	91	83	114	111	111	114	51	1.0
4	1:15:00	11:34:00	0.88	1.20	545.200	92	84	114	111	111	114	51	1.0
5	1:20:00	11:39:00	0.87	1.19	548.500	93	84	114	112	112	114	55	1.0
6	1:25:00	11:44:00	0.70	0.96	551.750	93	85	115	111	112	113	58	1.0
7	1:30:00	11:49:00	0.83	1.14	555.000	93	85	114	111	112	114	56	1.0
8	1:35:00	11:54:00	0.84	1.15	558.200	93	85	114	111	112	115	59	1.0
9	1:40:00	11:59:00	0.87	1.19	561.450	94	85	114	111	112	115	60	1.0
10	1:45:00	12:04:00	0.90	1.23	564.700	94	86	114	111	112	116	62	1.0
11	1:50:00	12:09:00	0.97	1.33	568.000	94	86	114	112	112	116	64	1.0
12	1:55:00	12:14:00	1.04	1.42	571.300	88	86	114	112	112	115	67	1.0
	2:00:00	12:19:00			574.757								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.85	1.16	76.321	88	82	113	111	111	113	55	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.92			85		3					1.0

Particulate Matter Emission Test Results with Condensable Fraction
3-Wide Coater
Owens Corning Medina Roofing Plant
8/15-16/06

Test Date	Run	Start Time	Stop Time	Temp. (F)	Moisture (%)	Actual Flowrate (acfm)	Dry Std. Flowrate (dscfm)	Sample Volume (dscf)	Filterable PM		Organic Condensable Catch (g)	Inorganic Condensable Catch (g)	Total Catch (g)	Total Concentration gr/dscf	Total Emission Rate (lb/hr)
									TCE Rinse (g)	Filter Catch (g)					
8/15/2006	1	13:00	16:21	113.4	1.5	9,618	8,605	74.902	0.0315	0.0001	0.0035	0.0086	0.0351	0.0072	0.53
8/15/2006	2	17:04	19:43	116.5	2.0	9,538	8,447	73.479	0.0367	0.0003	0.0081	0.0115	0.0451	0.0095	0.69
8/16/2006	3	9:57	12:19	112.9	1.8	9,390	8,450	73.688	0.0211	0.0002	0.0067	0.0100	0.0280	0.0059	0.42
	Avg			**114.3**	**1.8**	**9,515**	**8,501**							**0.0075**	**0.55**

3-Wide Coater

Run #	MeCl Beaker ID	MeCl Beaker Tare	MeCl Beaker Gross	Water Beaker ID
1	D876	60.3005	60.304	D877
2	D878	112.7283	112.7364	D879
3	D880	104.1303	104.137	D881

	MeCl Total Gain
Run #1	0.0035
Run #2	0.0081
Run #3	0.0067

Water Beaker Tare	Water Beaker Gross	Total Weight Gain
111.2512	111.2598	0.0121
96.902	96.9135	0.0196
104.712	104.722	0.0167

Water Total Gain
0.0086
0.0115
0.0100

Variable Definitions

% CO2 = Percent CO2 by volume, dry basis
% N2 = Percent N2 by volume, dry basis
% O2 = Percent O2 by volume, dry basis
%CO = Percent CO by volume, dry basis
□P = Velocity head of stack gas, in. H2O
0.04707 ft3 0.04715 ft3 35.31 ft3/m3
0.280 = Molecular weight of N2 and CO, divided by 100
0.320 = Molecular weight of O2, divided by 100
0.440 = Molecular weight of CO2, divided by 100
AS = Cross-sectional area of stack, ft2
Bws = Water vapor in the gas stream, proportion by volume
Bwm = Approximate proportion by volume of water vapor in the gas stream leaving the second impinger, .025
Cp = Pitot tube coefficient, dimensionless
Cst = Stack concentration, µg/dry standard cubic meter
Kp = Pitot tube constant
MD = Dry molecular weight, lb/lb - mole
ml = Mass of compound in, µg
Ms = Molecular weight of stack gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pm = Absolute pressure at the dry gas meter, in. Hg
Pmrt= Emission Rate lb/hr
Ps = Absolute stack gas pressure, in. Hg
Pstd = Standard absolute pressure, 29.92 in. Hg
Pw = Density of water, 0.002201 lb/ml
Qsd= Dry volumetric stack gas flow rate, dry standard ft3/minute
R= Ideal Gas Constant, 21.85 (in. Hg)*(ft3)/(lb-mole)*(R)
Tm = Absolute temperature at meter, □R
Ts = Stack gas temperature, □ R
Tstd = Standard absolute temperature, 528□ R
Vf = Final volume of impinger train, ml.
Vi = Initial volume of impinger train, ml.
Vm = Dry gas volume measured by dry gas meter, dcf
Vm(std) = Dry gas volume measured by dry gas meter, corrected to standard conditions, dscf
Vm(std) = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscf
Vs = Average stack gas velocity, ft/sec
Vwc(std) = Volume of water vapor condensed corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions
Wf = Final weight of impinger train, g.
Wi = Initial weight of impinger train, g.
Y = Dry gas meter calibration factor

Client: Owens Corning
Project #: 045396

Plant: Medina
Source: 3 Wide Coater

Location: Outlet

Reference Method No. 2 Calculations

Average Stack Gas Velocity	$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{S(avg)}}{P_S M_S}}$	v_S=	55.5574	ft/sec.
Average Stack Volumetric Flow Rate	$Q_a = 60 v_s A_s$	Q_A=	9617.8	ACFM
Average Stack Gas Dry Standard Flow Rate	$Q_{sd} = 60(1 - B_{ws}) v_s A_s \left(\frac{T_{std} P_s}{T_s P_{std}}\right)$	Q_{SD}=	8604.9	DSCFM

Reference Method No. 3 Calculations

Molecular Weight, Dry	$M_D = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + CO)$	M_D=	28.83	lb/lb-mole
Molecular Weight, Wet	$M_S = M_D(1 - B_{ws}) + 18B_{ws}$	M_S=	28.66	lb/lb-mole

Reference Method No. 4 Calculations

Sample Gas Volume, Standard Conditions	$V_{m(std)} = V_m Y \frac{P_m T_{std}}{P_{std} T_m}$	$V_{m(std)}$=	74.902	DSCF
Volume of Water Vapor Condensed	$V_{wc(std)} = 0.04707\,(V_f - V_i)$	$V_{wc(std)}$=	0.000	ft^3/ml
Volume of Water Vapor Condensed in Silica Gel	$V_{wsg(std)} = 0.04715\,(W_f - W_i)$	$V_{wsg(std)}$=	1.179	ft^3/g
Moisture Volume Fraction of Stack Gas	$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$	B_{ws}=	0.015	
Vapor Pressure of Stack H_2O	$V_p = SVP - 0.000367\,(P_S)(1 + \frac{T_S - 32}{1571})$	VP=	2.820	
Bws VP	$B_{ws}\,VP = \frac{VP}{P_S}$	B_{ws}VP=	0.095	
		MIN B_{ws} or B_{ws}VP=	0.015	

Reference Method No. 5 Calculations

Percent Isokinetic	$I = \frac{100 T_s V_{m(std)} P_{std}}{60 T_{std} v_s \theta A_n P_s (1 - B_{ws})}$	I=	100.9	%
Mass Emissions Rate	$E = \frac{m_t}{V_{m(std)}} Q_{sd}$	E=	3.6303	g/min
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{hour} * \frac{1lbs}{454g}$		0.4798	lbs/hour
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{1\,\text{min}}{60\text{sec}}$		0.0605	g/second
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{1hour} * \frac{1Kg}{1{,}000g}$		0.2178	kg/hour
	$E = C_d F_d \frac{20.9}{20.9 - \%O_{2d}} * \frac{1lbs}{454\,g}$		0.0000	lbs/mmBTU
Stack Concentration	$C_{ST} = \frac{m_t}{V_{m(std)}}$	C_{st}=	0.0004	g/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{15.43gr}{1g}$		0.0065	gr/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM}$		14899	ug/DSCM
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM} * \frac{T_{Normal}}{T_{std}}$		15989	ug/DNCM
Stack Concentration Corrected to 7% O_2	$C_{STO_2} = C_{ST} \frac{20.9 - 7.0}{20.9 - \%O_2}$	C_{stO2}=	0.9048	gr/DSCF @7%O_2
			2070903	ug/DSCM @7%O_2
			2222534	ug/DNCM @7%O_2
Stack Concentration Corrected to 12% CO_2	$C_{STCO_2} = C_{ST} \frac{12.0}{\%CO_2}$	C_{stCO2}=	#DIV/0!	gr/DSCF @12% CO_2

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RMSA/202 Run: 1
Site: 3-Wide Coater (OUT) Recovery Technician: AK Date: 8·15·06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	—		
Final Vol. (ml)	98	96	2	—		
Rinse Vol. (ml)				—		
Comments Filter I.D. Q791B						

Train Initial Weight (g): 3493.5 Final Weight (g): 3518.5
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

Purge Start: 17:14
Purge End: 18:14

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM5A/202 Run: 2
Site: 3-Wide Coater (OUT) Recovery Technician: AK Date: 8·15·06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	100	97		–		
Rinse Vol. (ml)				–		
Comments Filter I.D. Q787B						

Train Initial Weight (g): 3565.0 Final Weight (g): 3597.0
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start: 20:00
Purge End: 21:00

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM5A/202 Run: 3
Site: 3 Wide Coater (OUY) Recovery Technician: AK Date: 8-16-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	102	100	0	–		
Rinse Vol. (ml)				–		
Comments Filter I.D Q 789B						

Train Initial Weight (g): 3447.5 Final Weight (g): 3475.5
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start: 13:08
Purge End: 14:08

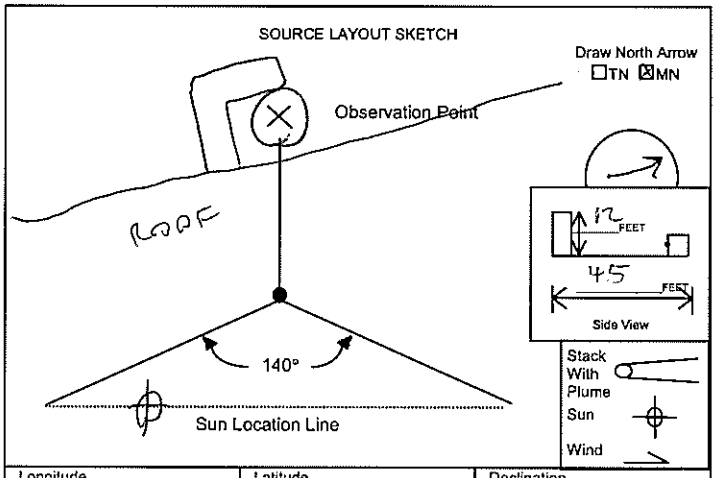
Notes/Comments:	

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name	OWENS CORNING
Facility Name	TRUMBULL
Street Address	570 W. SMITH
City	MEDINA
State	OH
Zip	44256
Process	3-WIDE STACK
Unit #:	
Operating Mode	NORMAL
Control Equipment	
Operating Mode	
Describe Emission Point	ROUND GREY STACK
Height of Emiss. Pt.	Start 60 End SAME
Height of Emiss. Pt. Rel. to Observer	Start 12 End SAME
Distance to Emiss. Pt.	Start 45 End SAME
Direction to Emiss. Pt. (Degrees)	Start 289 End 332
Vertical Angle to Obs. Pt.	Start 90 End SAME
Direction to Obs. Pt. (Degrees)	Start 289 End 332
Distance and Direction to Observation Point from Emission Point	Start SAME End SAME
Describe Emissions	Start CLEAR End SAME
Emission Color	Start CLEAR End SAME
Water Droplet Plume	Attached ~ Detached ~ (None)
Describe Plume Background	Start SKY/SILO End SAME
Background Color	Start BLUE/WHITE End SAME
Sky Conditions	Start PTLY CLDY End SAME
Wind Speed	Start 6-8 End SAME
Wind Direction	Start N End SAME
Ambient Temp	Start 80 End SAME
Wet Bulb Temp	79
Rh, Percent	95

SOURCE LAYOUT SKETCH



Longitude	Latitude	Declination

Additional Information: RUN 1

Continued on VEO Form Number						

Observation Date	Start Time	End Time
8/15/06	1:21	1:5

Sec / Min	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print)	JASON REVRE
Observer's Signature	Jason Revre
Date	8-15-06
Organization	CRA
Certified By	ETA
Date	4/20/06

Form Number						Page	Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name	OWENS CORNING
Facility Name	TRUMBULL
Street Address	870 W. SMITH
City	MEDINA
State	OH
Zip	44256

Process: 3 WIDE STACK	Unit #:	Operating Mode
Control Equipment		Operating Mode

Describe Emission Point

Height of Emiss. Pt. Start End	Height of Emiss. Pt. Rel. to Observer Start End
Distance to Emiss. Pt. Start End	Direction to Emiss. Pt. (Degrees) Start End

Vertical Angle to Obs. Pt. Start End	Direction to Obs. Pt. (Degrees) Start End
Distance and Direction to Observation Point from Emission Point Start End	

Describe Emissions Start End

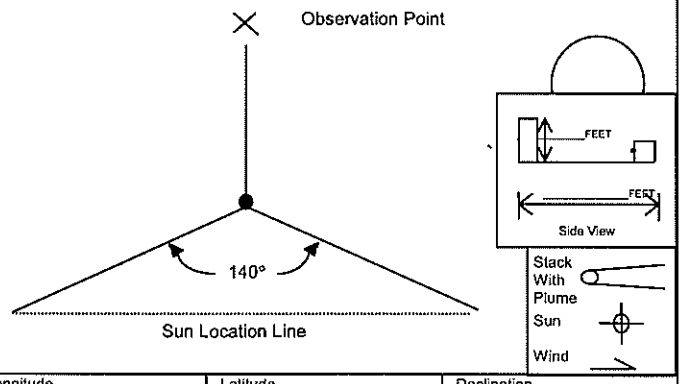
Emission Color Start End	Water Droplet Plume Attached ~ Detached ~ None ~

Describe Plume Background Start End

Background Color Start End	Sky Conditions Start End	
Wind Speed Start End	Wind Direction Start End	
Ambient Temp Start End	Wet Bulb Temp	Rh, Percent

SOURCE LAYOUT SKETCH

Draw North Arrow ☐TN ☐MN



Longitude	Latitude	Declination

Additional Information: RUN 1

Continued on VEO Form Number						

Observation Date	Start Time	End Time
8/15/06	3:24	3:54

Min \ Sec	0	15	30	45	Comments
31	0	0	0	0	
32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	0	0	
42	0	0	0	0	
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
55	0	0	0	0	
56	0	0	0	0	
57	0	0	0	0	
58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Observer's Name (Print)	JASON REVILLE
Observer's Signature	Jason Reville
Date	8·15·06
Organization	CRA
Certified By	ETA
Date	4/20/06

Form Number						Page	Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: OWENS CORNING

Facility Name: TRUMBULL

Street Address: 870 W. SMITH

City: Medina | State: OH | Zip: 44256

Process: 3-Wide Coater | Unit #: R-2 | Operating Mode:

Control Equipment: | Operating Mode:

Describe Emission Point: 3-Wide Coater Outlet Stack

Height of Emiss. Pt. Start 25' End | Height of Emiss. Pt. Rel. to Observer Start 25 End

Distance to Emiss. Pt. Start 725' End | Direction to Emiss. Pt. (Degrees) Start 136 End " "

Vertical Angle to Obs. Pt. Start 5° End 5° | Direction to Obs. Pt. (Degrees) Start 316 NW End " "

Distance and Direction to Observation Point from Emission Point Start 725' NW End "

Describe Emissions Start none End none

Emission Color Start none End | Water Droplet Plume Attached ~ Detached ~ (None)

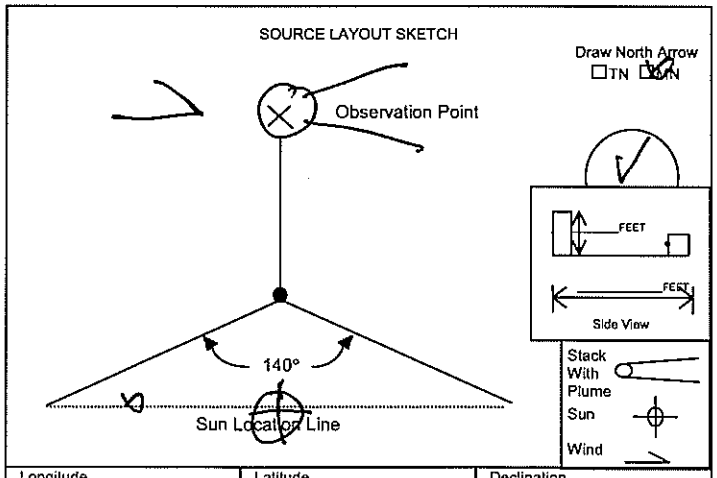
Describe Plume Background Start building End " "

Background Color Start beige End same | Sky Conditions Start clear End clear

Wind Speed Start 3-5 End 3-5 mph | Wind Direction Start NE End NE

Ambient Temp Start 75° End 75° | Wet Bulb Temp 65° | Rh, Percent 52%

SOURCE LAYOUT SKETCH



Longitude | Latitude | Declination

Additional Information

Continued on VEO Form Number

Observation Date 8-15-06 | Start Time 19:00 | End Time 19:41

Min \ Sec	0	15	30	45	Comments
31	0	0	0	0	
32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	0	0	
42	0	0	0	0	
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
55	0	0	0	0	
56	0	0	0	0	
57	0	0	0	0	
58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Observer's Name (Print): Alexander Krause

Observer's Signature: [signature] | Date: 8.15.06

Organization: Conestoga Rovers & Associates

Certified By: E.T.A | Date: 4/20/06

(@ 19:21 down) (@ 19:32 up)

Form Number | Page | Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: Owens Corning
Facility Name: Trumbull
Street Address: 870 W. Smith
City: Medina | State: OH | Zip:

Process: 3-Wide Coater | Unit #: R-2 | Operating Mode:
Control Equipment: | Operating Mode:

Describe Emission Point: 3-Wide Coater outlet Stack

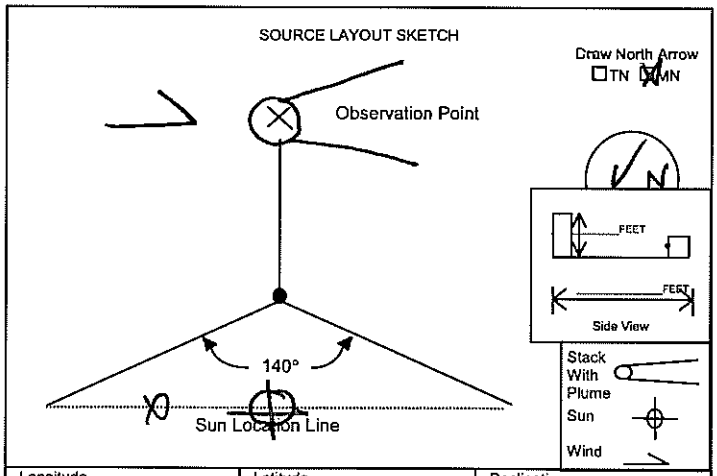
Height of Emiss. Pt. Start 25' End | Height of Emiss. Pt. Rel. to Observer Start 25' End " "
Distance to Emiss. Pt. Start 725' End 725' | Direction to Emiss. Pt. (Degrees) Start 136° SE End same

Vertical Angle to Obs. Pt. Start 5° End 5° | Direction to Obs. Pt. (Degrees) Start 316 NW End same
Distance and Direction to Observation Point from Emission Point Start 725' NW End same

Describe Emissions Start none End none
Emission Color Start none End none | Water Droplet Plume Attached ~ Detached ~ (None)

Describe Plume Background Start building End Same
Background Color Start beige End same | Sky Conditions Start clear End same
Wind Speed Start 3-5 mph End 3-5 mph | Wind Direction Start NE End NE
Ambient Temp Start 77° End 75° | Wet Bulb Temp 65° | Rh, Percent 52%

SOURCE LAYOUT SKETCH



Longitude | Latitude | Declination

Additional Information

Continued on VEO Form Number

Observation Date 8-15-06 | Start Time 18:24 | End Time 18:54

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): Alexander Krause
Observer's Signature: | Date 8-15-06
Organization: Conestoga-Rovers and Associates
Certified By: E.T. & Services | Date 4/20/06

(P.C. @ 18:43)

Form Number | Page Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: OWENS CORNING
Facility Name: TRUMBULL
Street Address: 870 W. SMITH
City: MEDINA | State: OH | Zip: 44256

Process: 3-WIDE STACK | Unit #: | Operating Mode:
Control Equipment: | Operating Mode:

Describe Emission Point: GREY STACK ON EDGE OF ROOF

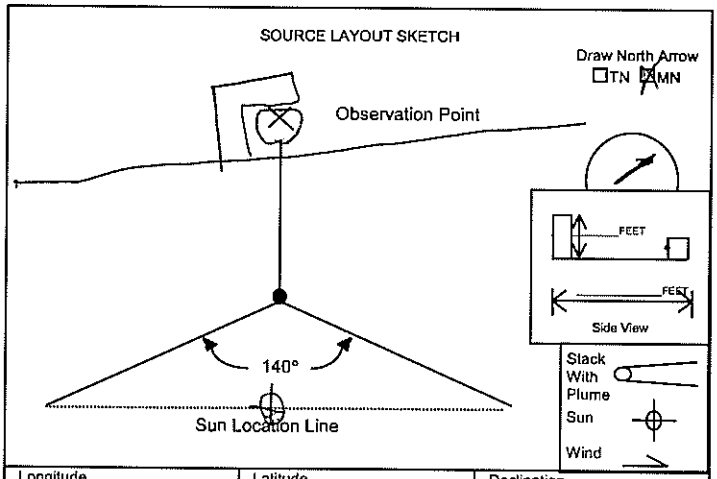
Height of Emiss. Pt. Start 60 End SAME
Height of Emiss. Pt. Rel. to Observer Start 12 End SAME
Distance to Emiss. Pt. Start 45 End SAME
Direction to Emiss. Pt. (Degrees) Start 289 End SAME

Vertical Angle to Obs. Pt. Start 11 End SAME
Direction to Obs. Pt. (Degrees) Start 289 End SAME
Distance and Direction to Observation Point from Emission Point Start SAME End SAME

Describe Emissions Start CLEAR End SAME
Emission Color Start CLEAR End SAME
Water Droplet Plume: Attached – Detached – (None)

Describe Plume Background Start SKY End SAME
Background Color Start BLUE End SAME
Sky Conditions Start CLEAR End SAME
Wind Speed Start 0 End SAME
Wind Direction Start N/A End SAME
Ambient Temp Start 74 End 80
Wet Bulb Temp 65
Rh, Percent 62

SOURCE LAYOUT SKETCH



Longitude | Latitude | Declination

Additional Information: RUN 3

Continued on VEO Form Number						

Observation Date: 8/16/06 | Start Time: 10:32 | End Time: 11:37

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): JASON REVICLE
Observer's Signature: [signature] | Date: 8/16/06
Organization: CRA
Certified By: ETA | Date: 4/20/06

Form Number | Page Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name	OWENS CORNING
Facility Name	TRUMBULL
Street Address	870 W. SMITH
City	MEDINA
State	OH
Zip	44256

Process: 3-WIDE STACK	Unit #:	Operating Mode
Control Equipment		Operating Mode

Describe Emission Point

Height of Emiss. Pt. Start End	Height of Emiss. Pt. Rel. to Observer Start End
Distance to Emiss. Pt. Start End	Direction to Emiss. Pt. (Degrees) Start End
Vertical Angle to Obs. Pt. Start End	Direction to Obs. Pt. (Degrees) Start End
Distance and Direction to Observation Point from Emission Point Start End	

Describe Emissions Start End

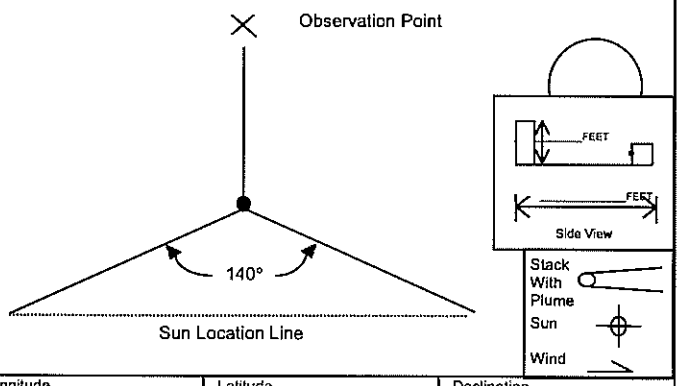
Emission Color Start End	Water Droplet Plume Attached ~ Detached ~ None ~

Describe Plume Background Start End

Background Color Start End	Sky Conditions Start End	
Wind Speed Start End	Wind Direction Start End	
Ambient Temp Start End	Wet Bulb Temp	Rh, Percent

SOURCE LAYOUT SKETCH

Draw North Arrow ☐TN ☐MN



Longitude	Latitude	Declination

Additional Information: RUN 3

Continued on VEO Form Number					

Observation Date	Start Time	End Time
8/16/06	10:32	11:32

Min \ Sec	0	15	30	45	Comments
31	0	0	0	0	
32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	0	0	
42	0	0	0	0	
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
55	0	0	0	0	
56	0	0	0	0	
57	0	0	0	0	
58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Observer's Name (Print)	JASON REVILLE
Observer's Signature	Jason Reville
Date	8/16/06
Organization	CRA
Certified By	ETA
Date	4/20/06

Form Number						Page	Of

4 WIDE COATER

ISOKINETIC DATA SUMMARY

Client: Owens Corning **Plant: Medina** **Method: 5A/202**
Project #: 045396 **Source: 4 Wide Coater** **Location: Outlet**

RUN INFORMATION				
Run Number		1	2	3
Test Date		8/17/2006	8/18/2006	8/18/2006
Start Time		11:15:00	8:31:00	11:51:00
End Time		14:38:00	11:19:00	14:04:00
RESULTS				**AVERAGE**
PM Conc.	gr/DSCF	1.28E-02	1.49E-02	8.26E-03	**1.20E-02**
PM Emission Rate	lbs./hour	5.38E-01	6.38E-01	3.47E-01	**5.08E-01**
FIELD MEASURMENTS				
Ambient Temperature, °F		90	94	100	**94.7**
P_{bar}, in. Hg		29.71	29.59	29.59	**29.63**
P_{static}, in. H_2O		-0.08	-0.08	-0.08	
Stack Absolute Pressure, in. Hg		29.70	29.58	29.58	**29.62**
CO_2, %					
O_2, %		20.40	20.80	20.60	**20.60**
N_2, %		79.60	79.20	79.40	**79.40**
SAMPLING DATA				
Average Stack Temperature, °F		119	116	118	**118**
Average Meter Temperature, °F		101	100	104	**102**
Average Filter Temperature, °F		105	103	104	**104**
Average Probe Temperature, °F		103	102	105	**103**
Average Exit Temperature, °F		58	62	59	**60**
Average ΔP, in. H_2O		0.21	0.22	0.21	**0.21**
ΔH Avg., in H_2O		1.16	1.22	1.12	**1.17**
Meter Volume Sum, cf		83.673	85.389	82.312	**83.791**
Maximum Vacuum, in. Hg		2.0	1.0	2.0	**2.0**
STACK CALCULATIONS				
Isokinetic, %		98.96	98.79	98.50	**98.75**
Stack Velocity, ft/sec.		26.96	27.65	26.95	**27.19**
Volume Flow Rate/Actual, ACFM		5515.1	5654.8	5511.2	**5560.3**
Volume Flow Rate/Dry Std, DSCFM		4906.4	5003.5	4911.4	**4940.4**
Dry Molecular Weight, lb/lb-mole		28.82	28.83	28.82	**28.82**
Sample Volume - Dry Std, DSCF		77.960	79.368	76.023	**77.784**
Stack Moisture Content, %		1.72	2.29	1.26	**1.76**
EQUIPMENT INFORMATION				
Nozzle I.D.		GW-18	GW-18	GW-17	**varies**
Nozzle Diameter, in.		0.2800	0.2800	0.2770	**0.2790**
Pitot I.D.		3P-9	3P-6	3P-9	**varies**
Thermocouple I.D.		3T-9	3T-6	3T-9	**varies**
Barometer I.D.		BEO4921	BEO4921	BEO4921	**BEO4921**
Meter Box I.D.		BEO4907	BEO4907	BEO4907	**BEO4907**
Leak Check Pitot		OK	OK	OK	**OK**
Meter Box Post Leak Check		OK	OK	OK	**OK**
ANALYTICAL INFORMATION INPUT				
F Factor, DSCF/10^6 BTU				
Filter I.D.		Q803B	Q802B	Q805B	
Filter Gross Weight, g		0.3471	0.3485	0.3446	
Filter Tare Weight, g		0.3417	0.344	0.3404	
Acetone Beaker ID		D843	D844	D839	
TCE Beaker Gross Weight, g		108.8496	100.5319	109.5184	
TCE Beaker Tare Weight, g		108.7903	100.4598	109.4819	
TCE Blank Correction, g					
Filter Weight Gain, g		**0.0054**	**0.0045**	**0.0042**	
TCE Beaker Weight Gain, g		**0.0593**	**0.0721**	**0.0365**	
Total Weight Gain, g		**0.0647**	**0.0766**	**0.0407**	

Operators: **Checked by:** **Review Date:**

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Coater	Date:	8/17/2006
Plant:	Medina	Location:	Outlet	Run #:	1
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q803B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	90	(°F)	Area:	3.41	(ft^2)
T-Couple:	3T-9	ΔH @:	1.6522	$P_{Bar.}$:	29.71	(in. Hg.)	Diameter:	25.00	(in.)
Probe ID:	3P-9	Nozzle ID:	GW-18	P_{Static}:	-0.08	(in. H_20.)			
Probe Con.#:	4183I	Nozzle Con. #:	BEO4961						
C_P:	0.84	Dn (in.) :	0.2800	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.030	%CO_2: 0.00 %O_2: 21.00	Number of Ports:	2	
Meter Initial:	0.002	cfm @ 15.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84 Ms: 28.51	Points / Port:	8	
Meter Final:	0.001	cfm @ 5.0	(in. Hg.)	ACTUAL VALUES			Reads / Point	2	
Pitot (-):	ok	@ 4.9	(in. H_2O)	Bws:	0.017	%CO_2: 0.00 %O_2: 20.40	Time/Reading:	4.0	(min.)
Pitot (+):	ok	@ 6.1	(in. H_2O)	%N_2/CO:	79.60	M_D: 28.82 M_S: 28.63	Total Time (Θ):	128	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	Temperatures (°F) Outlet	Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	11:15:00	0.22	1.22	104.008	92	91	112	114	110	108	87	1.0
1	0:04:00	11:19:00	0.22	1.22	106.700	94	92	115	101	97	103	59	1.0
2	0:08:00	11:23:00	0.23	1.27	109.550	95	93	115	100	98	103	56	2.0
2	0:12:00	11:27:00	0.24	1.33	112.100	96	93	117	100	98	102	52	2.0
3	0:16:00	11:31:00	0.23	1.27	114.850	98	94	118	106	104	103	51	2.0
3	0:20:00	11:35:00	0.23	1.27	117.500	98	97	119	105	102	105	60	2.0
4	0:24:00	11:39:00	0.21	1.16	120.250	99	97	119	105	102	106	53	2.0
4	0:28:00	11:43:00	0.21	1.16	122.850	100	97	119	105	101	106	52	2.0
5	0:32:00	11:47:00	0.21	1.16	125.400	101	97	120	105	101	106	52	2.0
5	0:36:00	11:51:00	0.21	1.17	128.100	103	98	117	103	103	106	51	2.0
6	0:40:00	11:55:00	0.22	1.22	130.700	104	98	120	105	102	104	55	2.0
6	0:44:00	11:59:00	0.22	1.22	133.300	104	98	120	105	102	104	56	2.0
7	0:48:00	12:03:00	0.23	1.28	136.000	105	99	120	106	102	105	57	2.0
7	0:52:00	12:07:00	0.23	1.28	138.800	106	99	120	106	103	105	57	2.0
8	0:56:00	12:11:00	0.19	1.06	141.550	107	100	120	105	103	105	58	2.0
8	1:00:00	12:15:00	0.19	1.06	144.100	107	100	120	106	103	105	59	2.0
	1:04:00	12:19:00			146.532								
1	0:00:00	13:34:00	0.15	0.84	146.532	102	102	114	105	102	107	62	2.0
1	0:04:00	13:38:00	0.15	0.84	148.800	102	101	115	105	102	107	67	2.0
2	0:08:00	13:42:00	0.17	0.96	151.050	102	101	114	106	102	107	65	2.0
2	0:12:00	13:46:00	0.17	0.95	153.500	103	101	120	106	103	107	66	2.0
3	0:16:00	13:50:00	0.18	1.00	155.850	102	101	120	105	102	107	62	2.0
3	0:20:00	13:54:00	0.18	1.00	158.300	103	101	120	106	102	107	61	2.0
4	0:24:00	13:58:00	0.18	1.00	160.800	104	102	120	105	102	107	63	2.0
4	0:28:00	14:02:00	0.18	1.00	163.300	105	102	121	106	102	107	64	2.0
5	0:32:00	14:06:00	0.20	1.12	165.750	106	102	120	105	102	107	60	2.0
5	0:36:00	14:10:00	0.19	1.06	168.320	107	103	122	105	103	107	57	2.0
6	0:40:00	14:14:00	0.22	1.23	170.868	108	102	122	105	104	107	55	2.0
6	0:44:00	14:18:00	0.22	1.23	173.500	108	103	122	105	104	107	53	2.0
7	0:48:00	14:22:00	0.24	1.34	176.250	109	103	122	105	105	107	52	2.0
7	0:52:00	14:26:00	0.26	1.45	179.100	109	103	122	106	105	108	51	2.0
8	0:56:00	14:30:00	0.24	1.34	182.100	110	104	122	105	106	108	51	2.0
8	1:00:00	14:34:00	0.24	1.34	184.900	110	104	122	106	106	108	51	2.0
	1:04:00	14:38:00			187.681								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.21	1.16	83.673	103	99	119	105	103	106.0	58	1.9
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.46			101.2		3.3530					2.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Coater	Date:	8/18/2006
Plant:	Medina	Location:	Outlet	Run #:	2
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO			
Filter:	Q802B	Meter Con. #:	BEO4907
Bar. Con.#:	BEO4921	Meter Y:	0.9945
T-Couple:	3T-6	ΔH @:	1.6522
Probe ID:	3P-6	Nozzle ID:	GW-18
Probe Con.#:	4183F	Nozzle Con. #:	BEO4961
C_P:	0.84	Dn (in.) :	0.2800

LEAK CHECK - ANALYSIS				
Meter Initial:	0.003	cfm @	15.0	(in. Hg.)
Meter Final:	0.002	cfm @	3.0	(in. Hg.)
Pitot (-):	ok	@	5.3	(in. H_2O)
Pitot (+):	ok	@	5.0	(in. H_2O)

TEMPERATURE / PRESSURE		
T_{STD}:	68	(°F)
$T_{AMBIENT}$:	94	(°F)
$P_{Bar.}$:	29.59	(in. Hg.)
P_{Static}:	-0.08	(in. H_2O.)

RUN ESTIMATES					
Bws:	0.030	$\%CO_2$:	0.00	$\%O_2$:	21.00
$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.51

ACTUAL VALUES					
Bws:	0.023	$\%CO_2$:	0.00	$\%O_2$:	20.80
$\%N_2/CO$:	79.20	M_D:	28.83	M_S:	28.58

STACK DATA		
Shape:	Circle	
Area:	3.41	(ft^2)
Diameter:	25.00	(in.)

TEST INFORMATION		
Number of Ports:	2	
Points / Port:	8	
Reads / Point	2	
Time/Reading:	4.0	(min.)
Total Time (Θ):	128	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	8:31:00	0.23	1.29	239.248	94	94	107	111	103	115	97	1.0
1	0:04:00	8:35:00	0.23	1.29	242.000	95	95	110	98	99	105	67	1.0
2	0:08:00	8:39:00	0.22	1.23	244.550	96	95	110	97	98	103	67	1.0
2	0:12:00	8:43:00	0.22	1.22	247.150	96	96	117	96	97	100	75	1.0
3	0:16:00	8:47:00	0.23	1.28	249.800	97	96	117	101	105	103	67	1.0
3	0:20:00	8:51:00	0.23	1.28	252.550	98	96	117	102	104	106	65	1.0
4	0:24:00	8:55:00	0.23	1.28	255.250	99	96	118	101	102	105	64	1.0
4	0:28:00	8:59:00	0.22	1.22	257.950	99	96	118	102	102	105	62	1.0
5	0:32:00	9:03:00	0.24	1.33	260.600	101	97	118	100	102	105	59	1.0
5	0:36:00	9:07:00	0.24	1.34	263.400	102	97	118	102	102	105	57	1.0
6	0:40:00	9:11:00	0.24	1.34	266.200	103	97	118	103	102	106	56	1.0
6	0:44:00	9:15:00	0.24	1.34	269.000	104	97	118	102	102	106	56	1.0
7	0:48:00	9:19:00	0.25	1.39	271.800	104	98	118	101	102	106	56	1.0
7	0:52:00	9:23:00	0.25	1.40	274.600	105	98	118	102	102	105	56	1.0
8	0:56:00	9:27:00	0.21	1.17	277.550	105	98	118	100	102	105	55	1.0
8	1:00:00	9:31:00	0.21	1.18	280.200	105	99	117	102	102	106	56	1.0
	1:04:00	9:35:00			282.825								
1	0:00:00	10:15:00	0.16	0.90	282.825	101	99	110	100	101	104	70	1.0
1	0:04:00	10:19:00	0.16	0.90	285.200	103	99	112	103	102	106	60	1.0
2	0:08:00	10:23:00	0.17	0.96	287.500	103	99	112	105	101	109	58	1.0
2	0:12:00	10:27:00	0.17	0.96	289.800	103	99	113	105	102	108	57	1.0
3	0:16:00	10:31:00	0.18	1.01	292.300	104	100	116	104	102	108	56	1.0
3	0:20:00	10:35:00	0.18	1.01	294.800	105	100	118	104	102	108	57	1.0
4	0:24:00	10:39:00	0.18	1.01	297.300	105	100	118	103	102	107	58	1.0
4	0:28:00	10:43:00	0.18	1.01	299.750	105	100	118	106	102	109	59	1.0
5	0:32:00	10:47:00	0.20	1.12	302.300	106	100	118	105	102	109	60	1.0
5	0:36:00	10:51:00	0.20	1.12	304.800	106	100	119	105	102	106	60	1.0
6	0:40:00	10:55:00	0.23	1.29	307.400	106	100	119	104	102	108	59	1.0
6	0:44:00	10:59:00	0.24	1.34	310.100	107	101	119	103	102	107	59	1.0
7	0:48:00	11:03:00	0.26	1.45	313.000	103	101	119	104	102	107	66	1.0
7	0:52:00	11:07:00	0.26	1.45	315.850	106	101	119	104	103	107	59	1.0
8	0:56:00	11:11:00	0.27	1.51	318.800	106	101	120	103	103	107	60	1.0
8	1:00:00	11:15:00	0.27	1.51	321.800	106	101	120	103	102	107	62	1.0
	1:04:00	11:19:00			324.637								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.22	1.22	85.389	102	98	116	103	102	106	62	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.47			100		3					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Coater	Date:	8/18/2006
Plant:	Medina	Location:	Outlet	Run #:	3
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q805B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	100	(°F)	Area:	3.41	(ft^2)
T-Couple:	3T-9	ΔH @:	1.6522	$P_{Bar.}$:	29.59	(in. Hg.)	Diameter:	25.00	(in.)
Probe ID:	3P-9	Nozzle ID:	GW-17	P_{Static}:	-0.08	(in. H_20.)			
Probe Con.#:	4183I	Nozzle Con. #:	BEO4961						
C_P:	0.84	Dn (in.) :	0.2770	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.030	%CO_2: 0.00	%O_2:	21.00	Number of Ports: 2
Meter Initial:	0.004	cfm @ 16.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84	Ms:	28.51	Points / Port: 8
Meter Final:	0.002	cfm @ 4.0	(in. Hg.)	ACTUAL VALUES					Reads / Point 2
Pitot (-):	ok	@ 4.5	(in. H_2O)	Bws:	0.013	%CO_2: 0.00	%O_2:	20.60	Time/Reading: 4.0 (min.)
Pitot (+):	ok	@ 6.0	(in. H_2O)	%N_2/CO:	79.40	M_D: 28.82	M_S:	28.69	Total Time (Θ): 128 (min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	11:51:00	0.15	0.81	325.112	102	101	113	101	101	96	89	1.0
1	0:04:00	11:55:00	0.15	0.81	327.400	102	101	114	102	102	98	68	1.0
2	0:08:00	11:59:00	0.16	0.86	329.550	102	101	114	102	105	99	63	1.0
2	0:12:00	12:03:00	0.17	0.91	331.900	103	101	118	104	104	101	62	1.0
3	0:16:00	12:07:00	0.17	0.91	334.200	104	101	118	104	105	103	58	1.0
3	0:20:00	12:11:00	0.17	0.91	336.600	104	101	120	103	105	104	57	1.0
4	0:24:00	12:15:00	0.18	0.96	338.900	105	101	119	103	105	105	56	1.0
4	0:28:00	12:19:00	0.18	0.96	341.350	106	101	119	103	105	105	59	1.0
5	0:32:00	12:23:00	0.20	1.07	343.750	106	101	119	103	108	105	56	1.0
5	0:36:00	12:27:00	0.20	1.07	346.200	106	101	119	103	105	106	56	1.0
6	0:40:00	12:31:00	0.24	1.29	348.800	107	101	119	103	105	106	55	2.0
6	0:44:00	12:35:00	0.24	1.29	351.500	107	101	119	102	106	106	55	2.0
7	0:48:00	12:39:00	0.26	1.39	354.300	108	102	120	103	105	107	54	2.0
7	0:52:00	12:43:00	0.26	1.39	357.100	108	102	120	103	105	107	54	2.0
8	0:56:00	12:47:00	0.23	1.23	360.000	109	102	120	103	105	107	56	2.0
8	1:00:00	12:51:00	0.23	1.23	362.750	109	102	120	103	105	107	57	2.0
	1:04:00	12:55:00			365.412								
1	0:00:00	13:00:00	0.19	1.03	365.412	104	103	111	103	104	104	67	1.0
1	0:04:00	13:04:00	0.19	1.03	367.900	107	103	113	104	105	106	59	1.0
2	0:08:00	13:08:00	0.21	1.14	370.400	107	103	113	104	104	106	58	1.0
2	0:12:00	13:12:00	0.22	1.18	373.100	107	103	119	104	105	105	58	1.0
3	0:16:00	13:16:00	0.22	1.18	375.700	108	103	119	103	105	106	60	1.0
3	0:20:00	13:20:00	0.22	1.18	378.300	108	103	120	105	107	105	61	1.0
4	0:24:00	13:24:00	0.20	1.07	381.000	108	103	120	109	105	107	62	1.0
4	0:28:00	13:28:00	0.21	1.13	383.500	108	103	120	107	105	107	60	1.0
5	0:32:00	13:32:00	0.23	1.23	386.200	108	103	120	107	105	107	59	2.0
5	0:36:00	13:36:00	0.23	1.23	388.800	102	102	120	104	105	101	69	2.0
6	0:40:00	13:40:00	0.24	1.28	391.500	103	102	120	104	105	106	55	2.0
6	0:44:00	13:44:00	0.24	1.28	394.300	103	102	120	104	105	106	53	2.0
7	0:48:00	13:48:00	0.23	1.23	397.000	104	102	121	104	105	106	54	2.0
7	0:52:00	13:52:00	0.23	1.23	399.700	105	102	121	104	105	105	54	2.0
8	0:56:00	13:56:00	0.20	1.07	402.400	106	102	121	104	105	106	58	2.0
8	1:00:00	14:00:00	0.20	1.07	405.000	106	102	121	104	105	106	59	2.0
	1:04:00	14:04:00			407.424								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.21	1.12	82.312	106	102	118	104	105	105	59	1.4
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.45			104		3					2.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Coater	Date:	8/17/2006
Plant:	Medina	Location:	Outlet	Run #:	2
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q804B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	98	(°F)	Area:	3.41	(ft^2)
T-Couple:		ΔH @:	1.6522	$P_{Bar.}$:	29.62	(in. Hg.)	Diameter:	25.00	(in.)
Probe ID:		Nozzle ID:	GW-17	P_{Static}:	-0.08	(in. H_2O.)			
Probe Con.#:		Nozzle Con. #:	BEO4961						
C_P:	0.84	Dn (in.) :	0.2770	RUN ESTIMATES			TEST INFORMATION		

LEAK CHECK - ANALYSIS					RUN ESTIMATES						TEST INFORMATION		
Meter Initial:	0.005	cfm @	15.0	(in. Hg.)	Bws:	0.030	%CO_2:	0.00	%O_2:	21.00	Number of Ports:	2	
Meter Final:		cfm @		(in. Hg.)	%N_2/CO:	79.00	Md:	28.84	Ms:	28.51	Points / Port:	8	
Pitot (-):	ok	@	5.0	(in. H_2O)	ACTUAL VALUES						Reads / Point	2	
Pitot (+):	ok	@	4.8	(in. H_2O)	Bws:	######	%CO_2:		%O_2:		Time/Reading:	4.0	(min.)
					%N_2/CO:	100.00	M_D:	28.00	M_S:	######	Total Time (Θ):	128	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	15:39:00	0.17	0.92	188.044	105	104	114	106	101	104	90	1.0
1	0:04:00	15:43:00	0.17	0.91	190.400	105	104	118	106	102	104	61	1.0
2	0:08:00	15:47:00	0.18	0.97	192.700	105	104	118	106	102	106	65	1.0
2	0:12:00	15:51:00	0.18	0.96	195.100	105	104	122	106	102	106	52	1.0
3	0:16:00	15:55:00	0.18	0.96	197.550	106	104	122	106	103	106	51	1.0
3	0:20:00	15:59:00	0.18	0.96	199.900	105	104	123	107	103	108	61	1.0
4	0:24:00	16:03:00	0.20	1.07	202.300	106	104	123	106	103	108	52	1.0
4	0:28:00	16:07:00	0.20	1.07	204.800	107	104	124	106	103	108	51	1.0
5	0:32:00	16:11:00	0.21	1.12	207.750	108	105	124	106	103	108	52	1.0
5	0:36:00	16:15:00	0.21	1.12	210.000	109	105	124	106	104	108	52	1.0
6	0:40:00	16:19:00	0.25	1.34	212.600	110	105	124	106	104	108	52	1.0
6	0:44:00	16:23:00	0.25	1.34	215.400	111	105	125	106	105	108	52	1.0
7	0:48:00	16:27:00	0.26	1.39	218.250	111	105	125	106	105	108	53	1.0
7	0:52:00	16:31:00	0.26	1.39	221.200	112	106	125	106	105	109	52	1.0
8	0:56:00	16:35:00	0.20	1.07	224.000	112	106	125	106	105	109	51	1.0
8	1:00:00	16:39:00	0.20	1.07	226.500	112	106	124	106	105	109	52	1.0
	1:04:00	16:43:00			228.941								
1	0:00:00	17:56:00	0.20	1.08	228.941	108	106	118	107	104	109	69	1.0
1	0:04:00	18:00:00	0.20	1.08	231.500	103	103	115	106	102	110	59	1.0
2	0:08:00	18:04:00	0.22	1.19	234.000	103	103	115	106	102	110	54	1.0
2	0:12:00	18:08:00	0.22	1.18	236.750	104	103	120	106	102	109	53	1.0
3	0:16:00	18:12:00	0.22	1.17		103	103	121	106	102	109	66	1.0
3	0:20:00	18:16:00		0.00									
4	0:24:00	18:20:00		0.00									
4	0:28:00	18:24:00		0.00									
5	0:32:00	18:28:00		0.00									
5	0:36:00	18:32:00		0.00									
6	0:40:00	18:36:00		0.00									
6	0:44:00	18:40:00		0.00									
7	0:48:00	18:44:00		0.00									
7	0:52:00	18:48:00		0.00									
8	0:56:00	18:52:00		0.00									
8	1:00:00	18:56:00		0.00									
	1:04:00	19:00:00											
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.21	0.73	48.706	107	104	121	106	103	108	57	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.30			105.8		4					1.0

VOID DUE TO LINE UPSETS + TIME CONSTRAINTS.

Particulate Matter Emission Test Results with Condensable Fraction
4-Wide Coater
Owens Corning Medina Roofing Plant
8/17-18/06

Test Date	Run	Start Time	Stop Time	Temp. (F)	Moisture (%)	Actual Flowrate (acfm)	Dry Std. Flowrate (dscfm)	Sample Volume (dscf)	Filterable PM		Organic Condensable Catch (g)	Inorganic Condensable Catch (g)	Total Catch (g)	Total Concentration gr/dscf	Total Emission Rate (lb/hr)
									TCE Rinse (g)	Filter Catch (g)					
8/17/2006	1	11:15	14:38	119.0	1.7	5,515	4,906	77.960	0.0593	0.0054	0.0084	0.0066	0.0731	0.0145	0.61
8/18/2006	2	8:31	11:19	116.5	2.3	5,655	5,004	79.368	0.0721	0.0045	0.0070	0.0087	0.0836	0.0163	0.70
8/18/2006	3	11:51	14:04	118.4	1.3	5,511	4,911	76.023	0.0365	0.0042	0.0071	0.0077	0.0478	0.0097	0.41
	Avg			**118.0**	**1.8**	**5,560**	**4,940**							**0.0135**	**0.57**

4-Wide Coater

Run #	MeCl Beaker ID	MeCl Beaker Tare	MeCl Beaker Gross	Water Beaker ID
1	D870	111.422	111.4304	D871
2	D872	113.5292	113.5362	D873
3	D874	98.8659	98.873	D875

	MeCl Total Gain
Run #1	0.0084
Run #2	0.0070
Run #3	0.0071

Water Beaker Tare	Water Beaker Gross	Total Weight Gain
104.1763	104.1829	0.015
110.1964	110.2051	0.0157
104.3427	104.3504	0.0148

Water Total Gain
0.0066
0.0087
0.0077

Variable Definitions

% CO2 = Percent CO2 by volume, dry basis
% N2 = Percent N2 by volume, dry basis
% O2 = Percent O2 by volume, dry basis
%CO = Percent CO by volume, dry basis
□P = Velocity head of stack gas, in. H2O
0.04707 ft3 0.04715 ft3 35.31 ft3/m3
0.280 = Molecular weight of N2 and CO, divided by 100
0.320 = Molecular weight of O2, divided by 100
0.440 = Molecular weight of CO2, divided by 100
AS = Cross-sectional area of stack, ft2
Bws = Water vapor in the gas stream, proportion by volume
Bwm = Approximate proportion by volume of water vapor in the gas stream leaving the second impinger, .025
Cp = Pitot tube coefficient, dimensionless
Cst = Stack concentration, µg/dry standard cubic meter
Kp = Pitot tube constant
MD = Dry molecular weight, lb/lb - mole
ml = Mass of compound in, µg
Ms = Molecular weight of stack gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pm = Absolute pressure at the dry gas meter, in. Hg
Pmrt= Emission Rate lb/hr
Ps = Absolute stack gas pressure, in. Hg
Pstd = Standard absolute pressure, 29.92 in. Hg
Pw = Density of water, 0.002201 lb/ml
Qsd= Dry volumetric stack gas flow rate, dry standard ft3/minute
R= Ideal Gas Constant, 21.85 (in. Hg)*(ft3)/(lb-mole)*(R)
Tm = Absolute temperature at meter, □R
Ts = Stack gas temperature, □ R
Tstd = Standard absolute temperature, 528□ R
Vf = Final volume of impinger train, ml.
Vi = Initial volume of impinger train, ml.
Vm = Dry gas volume measured by dry gas meter, dcf
Vm(std) = Dry gas volume measured by dry gas meter, corrected to standard conditions, dscf
Vm(std) = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscf
Vs = Average stack gas velocity, ft/sec
Vwc(std) = Volume of water vapor condensed corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions
Wf = Final weight of impinger train, g.
Wi = Initial weight of impinger train, g.
Y = Dry gas meter calibration factor

Client: Owens Corning Project #: 045396	Plant: Medina Source: 4 Wide Coater	Location: Outlet		

Reference Method No. 2 Calculations

Average Stack Gas Velocity	$v_s = K_P C_P (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{S(avg)}}{P_S M_S}}$	v_S=	26.9645	ft/sec.
Average Stack Volumetric Flow Rate	$Q_a = 60 v_s A_s$	Q_A=	5515.1	ACFM
Average Stack Gas Dry Standard Flow Rate	$Q_{sd} = 60(1-B_{ws}) v_s A_s \left(\frac{T_{std} P_s}{T_s P_{std}}\right)$	Q_{SD}=	4906.4	DSCFM

Reference Method No. 3 Calculations

Molecular Weight, Dry	$M_D = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + CO)$	M_D=	28.82	lb/lb-mole
Molecular Weight, Wet	$M_S = M_D(1-B_{ws}) + 18B_{ws}$	M_S=	28.63	lb/lb-mole

Reference Method No. 4 Calculations

Sample Gas Volume, Standard Conditions	$V_{m(std)} = V_m Y \frac{P_m T_{std}}{P_{std} T_m}$	$V_{m(std)}$=	77.960	DSCF
Volume of Water Vapor Condensed	$V_{wc(std)} = 0.04707\,(V_f - V_i)$	$V_{wc(std)}$=	0.000	ft^3/ml
Volume of Water Vapor Condensed in Silica Gel	$V_{wsg(std)} = 0.04715\,(W_f - W_i)$	$V_{wsg(std)}$=	1.367	ft^3/g
Moisture Volume Fraction of Stack Gas	$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$	B_{ws}=	0.017	
Vapor Pressure of Stack H_2O	$V_P = SVP - 0.000367\,(P_S)(1 + \frac{T_S - 32}{1571})$	VP=	3.341	
Bws VP	$B_{ws}VP = \frac{VP}{P_S}$	B_{ws}VP=	0.112	
		MIN B_{ws} or B_{ws}VP=	0.017	

Reference Method No. 5 Calculations

Percent Isokinetic	$I = \frac{100 T_s V_{m(std)} P_{std}}{60 T_{std} v_s \theta A_n P_s (1-B_{ws})}$	I=	99.0	%
Mass Emissions Rate	$E = \frac{m_t}{V_{m(std)}} Q_{sd}$	E=	4.0719	g/min
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\min}{hour} * \frac{1lbs}{454g}$		0.5381	lbs/hour
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{1\min}{60\sec}$		0.0679	g/second
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\min}{1hour} * \frac{1Kg}{1{,}000g}$		0.2443	kg/hour
	$E = C_d F_d \frac{20.9}{20.9 - \%O_{2d}} * \frac{1lbs}{454\,g}$		0.0000	lbs/mmBTU
Stack Concentration	$C_{ST} = \frac{m_t}{V_{m(std)}}$	C_{st}=	0.0008	g/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{15.43gr}{1g}$		0.0128	gr/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM}$		29308	ug/DSCM
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM} * \frac{T_{Normal}}{T_{std}}$		31454	ug/DNCM
Stack Concentration Corrected to 7% O_2	$C_{STO_2} = C_{ST} \frac{20.9 - 7.0}{20.9 - \%O_2}$	C_{stO2}=	0.3560	gr/DSCF @7%O_2
			814758	ug/DSCM @7%O_2
			874414	ug/DNCM @7%O_2
Stack Concentration Corrected to 12% CO_2	$C_{STCO_2} = C_{ST} \frac{12.0}{\%CO_2}$	C_{stCO2}=	#DIV/0!	gr/DSCF @12% CO_2

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM5A/202 Run: 1
Site: 4 Wide Coater Recovery Technician: AK Date: 8-17-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	0		
Final Vol. (ml)	113	102	8	–		
Rinse Vol. (ml)				–		
Comments Q803B						

Train Initial Weight (g): 3604.0 Final Weight (g): 3633.0
Silica Gel Initial Weight (g): Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start - 15:28
Purge End. 16:28

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396
Site: 4 Wide Coater
Sample Type: RM5A/202
Recovery Technician: AK
Run: 2
Date: 8-18-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	106	98		–		
Rinse Vol. (ml)				–		
Comments Q 862 B						

Train Initial Weight (g): 3380.0
Final Weight (g): 3419.5
Silica Gel Initial Weight (g):
Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start - 11:49
Purge End - 12:49

Notes/Comments:	

I:\Technical\Labsheets\Sample Recovery Sheet.doc

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM5A/202 Run: 3
Site: 4 Wide Coater Recovery Technician: AK Date: 8-18-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	110	90	7	–		
Rinse Vol. (ml)						
Comments Q805B						

Train Initial Weight (g): 3614.5 Final Weight (g): 3635.0
Silica Gel Initial Weight (g): Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start. 16:20
Purge End 17:20

Notes/Comments:	

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name	OWENS CORNING
Facility Name	TRUMBULL
Street Address	870 W. SMITH
City	MEDINA
State	OH
Zip	44256

Process: 4 WIDE STACK	Unit #:	Operating Mode
Control Equipment		Operating Mode

Describe Emission Point: SILVER STACK WITH BLACK BOTTOM

Height of Emiss. Pt. Start 250 End SAME	Height of Emiss. Pt. Rel. to Observer Start 250 End SAME
Distance to Emiss. Pt. Start 700 End SAME	Direction to Emiss. Pt. (Degrees) Start 227° End SAME
Vertical Angle to Obs. Pt. Start 13 End SAME	Direction to Obs. Pt. (Degrees) Start 227° End SAME

Distance and Direction to Observation Point from Emission Point: Start SAME End SAME

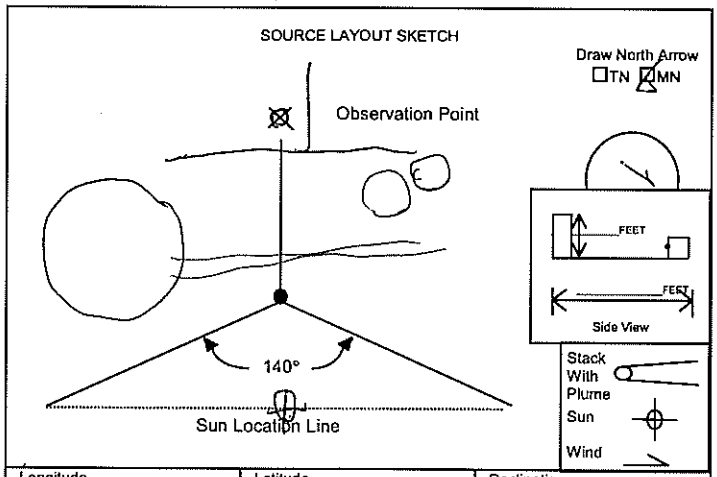
Describe Emissions: Start CLEAR End SAME

Emission Color Start CLEAR End WHITE	Water Droplet Plume Attached ~ Detached ~ (None) ~

Describe Plume Background: Start SKY End SAME

Background Color Start BLUE End SAME	Sky Conditions Start PTLY CLDY End SAME
Wind Speed Start 0-1 End SAME	Wind Direction Start SE End SAME
Ambient Temp Start 80 End 85	Wet Bulb Temp 70 / Rh, Percent 61

SOURCE LAYOUT SKETCH



Longitude	Latitude	Declination

Additional Information: RUN 1

Continued on VEO Form Number						

Observation Date	Start Time	End Time
8/17/06	12:01	12:31

Min \ Sec	0	15	30	45	Comments
1	0	5	0	0	
2	0	0	5	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	5	
21	0	5	5	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print)	JASON REVILLE
Observer's Signature	Jason Reville
Date	8/17/06
Organization	CRA
Certified By	EJA
Date	4/20/06

Form Number						Page	Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name	OWENS CORNING
Facility Name	TRUMBULL
Street Address	870 W. SMITH
City	MEDINA
State	OH
Zip	44256

Process: 4 WIDE STACK	Unit #:	Operating Mode
Control Equipment		Operating Mode

Describe Emission Point

Height of Emiss. Pt. Start End	Height of Emiss. Pt. Rel. to Observer Start End
Distance to Emiss. Pt. Start End	Direction to Emiss. Pt. (Degrees) Start End
Vertical Angle to Obs. Pt. Start End	Direction to Obs. Pt. (Degrees) Start End
Distance and Direction to Observation Point from Emission Point Start End	

Describe Emissions Start End

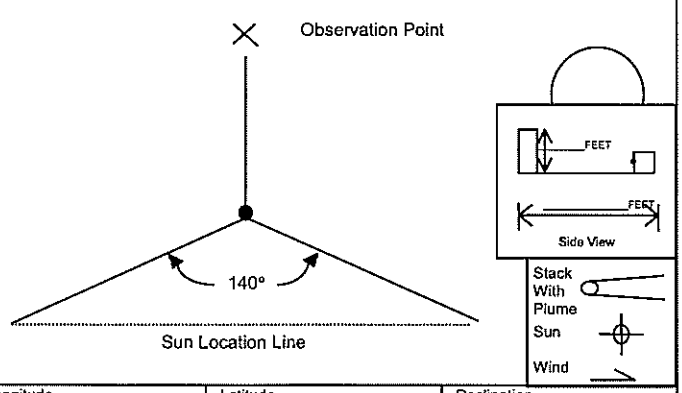
Emission Color Start End	Water Droplet Plume Attached ~ Detached ~ None ~

Describe Plume Background Start End

Background Color Start End	Sky Conditions Start End	
Wind Speed Start End	Wind Direction Start End	
Ambient Temp Start End	Wet Bulb Temp	Rh, Percent

SOURCE LAYOUT SKETCH

Draw North Arrow ☐TN ☐MN



Longitude	Latitude	Declination

Additional Information: RUN 1

Continued on VEO Form Number					

Observation Date	Start Time	End Time
8/17/06	2:14	1:44

Sec / Min	0	15	30	45	Comments
31	0	0	0	0	
32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	0	0	
42	0	0	0	0	
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
55	0	0	0	0	
56	0	0	0	0	
57	0	0	0	0	
58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Observer's Name (Print)	JASON REVILLE
Observer's Signature	Jason Reville
Date	8/17/06
Organization	CRA
Certified By	ETA
Date	4/20/06

Form Number						Page	Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): Method 9 (circled) | 203A | 203B | Other: _____

Company Name	OWENS CORNING
Facility Name	TRUMBULL
Street Address	870 W. SMITH
City	MEDINA
State	OH
Zip	44256

Process: 4 WIDE STACK	Unit #:	Operating Mode: NORMAL
Control Equipment		Operating Mode

Describe Emission Point: SILVER STACK BLACK BOTTOM

Height of Emiss. Pt. Start 250 End SAME	Height of Emiss. Pt. Rel. to Observer Start 250 End SAME
Distance to Emiss. Pt. Start 900 End SAME	Direction to Emiss. Pt. (Degrees) Start 229 End SAME
Vertical Angle to Obs. Pt. Start 13 End SAME	Direction to Obs. Pt. (Degrees) Start 229 End SAME

Distance and Direction to Observation Point from Emission Point: Start SAME End SAME

Describe Emissions: Start CLEAR End SAME

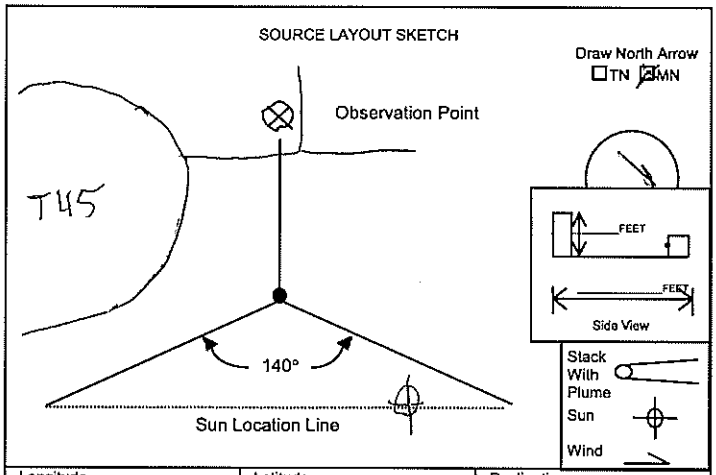
Emission Color Start CLEAR End SAME	Water Droplet Plume: Attached ~ Detached ~ None ~

Describe Plume Background: Start SKY End SAME

Background Color Start GREY End SAME	Sky Conditions: Start OVERCAST End SAME
Wind Speed Start 6-7 End 3-5	Wind Direction Start E End SAME

Ambient Temp Start 73 End 75	Wet Bulb Temp 67	Rh, Percent 73

SOURCE LAYOUT SKETCH



Longitude	Latitude	Declination

Additional Information: RUN 2

Continued on VEO Form Number						

Observation Date 8/18/06	Start Time 8:42	End Time 9:12

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print) JASON REVILLE	
Observer's Signature [signature]	Date 8/18/06
Organization CRA	
Certified By EPA	Date 4/20/06

Form Number						Page	Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: OWENS CORNING
Facility Name: TRUMBULL
Street Address: 870 W SMITH
City: MEDINA State: OH Zip: 44256

Process: 4 WIDE STACK Unit #: Operating Mode:
Control Equipment: Operating Mode:

Describe Emission Point:

Height of Emiss. Pt. Start End | Height of Emiss. Pt. Rel. to Observer Start End
Distance to Emiss. Pt. Start End | Direction to Emiss. Pt. (Degrees) Start End

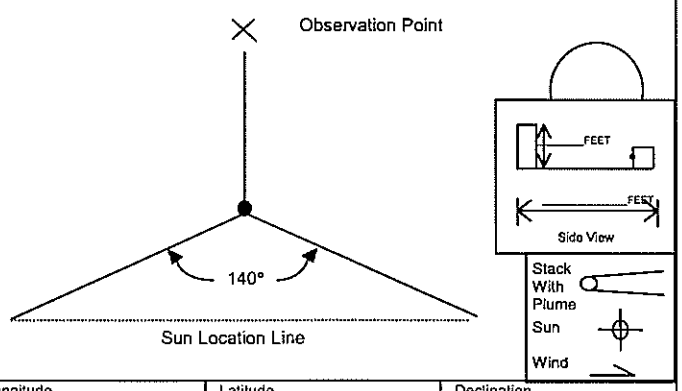
Vertical Angle to Obs. Pt. Start End | Direction to Obs. Pt. (Degrees) Start End
Distance and Direction to Observation Point from Emission Point Start End

Describe Emissions Start End
Emission Color Start End | Water Droplet Plume Attached ~ Detached ~ None ~

Describe Plume Background Start End
Background Color Start End | Sky Conditions Start End
Wind Speed Start End | Wind Direction Start End
Ambient Temp Start End | Wet Bulb Temp | Rh, Percent

SOURCE LAYOUT SKETCH

Draw North Arrow ☐TN ☐MN



Longitude | Latitude | Declination

Additional Information: RUN 2

Continued on VEO Form Number

Observation Date: 8/18/06 Start Time: 9:40 End Time: 10:10

Min \ Sec	0	15	30	45	Comments
31	0	0	0	0	
32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	0	0	
42	0	0	0	0	
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
55	0	0	0	0	
56	0	0	0	0	
57	0	0	0	0	
58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Observer's Name (Print): JASON REVILLE
Observer's Signature: [signature] Date: 8/18/06
Organization: CRA
Certified By: ETA Date: 4/20/06

Form Number | Page Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name: OWENS CORNING
Facility Name: TRUMBULL
Street Address: 870 W. SMITH
City: MEDINA State: OH Zip: 44256

Process: 4 WIDE STACK Unit #: Operating Mode:
Control Equipment: Operating Mode:

Describe Emission Point: TALL SILVER STACK BLACK BOTTOM

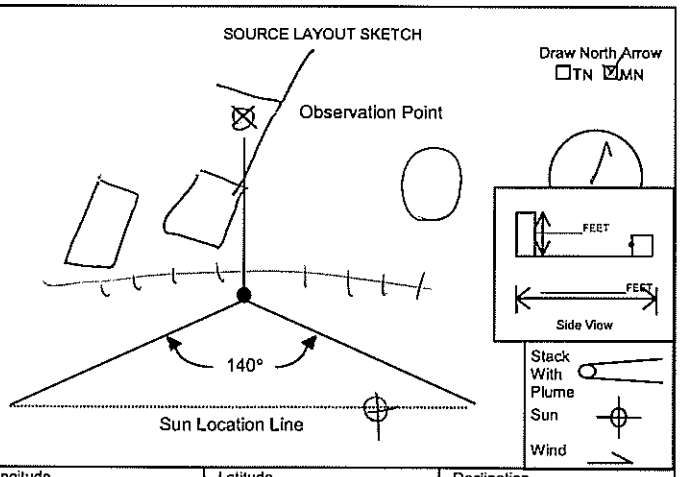
Height of Emiss. Pt. Start 250 End SAME
Height of Emiss. Pt. Rel. to Observer Start 250 End SAME
Distance to Emiss. Pt. Start 1500 End SAME
Direction to Emiss. Pt. (Degrees) Start 342 End SAME

Vertical Angle to Obs. Pt. Start 6 End SAME
Direction to Obs. Pt. (Degrees) Start 342 End SAME
Distance and Direction to Observation Point from Emission Point Start SAME End SAME

Describe Emissions Start CLEAR End SAME
Emission Color Start CLEAR End BLACK
Water Droplet Plume: Attached ~ Detached ~ (None)

Describe Plume Background Start SKY End SAME
Background Color Start GREY End SAME
Sky Conditions Start OVERCAST End SAME
Wind Speed Start 0-3 End SAME
Wind Direction Start SE End SAME
Ambient Temp Start 77 End 77
Wet Bulb Temp 70
Rh, Percent 71

SOURCE LAYOUT SKETCH



Longitude | Latitude | Declination

Additional Information: RUN 3

Continued on VEO Form Number

Observation Date 8/18/06 Start Time 12:22 End Time 12:52

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	5	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	5	
11	5	5	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print): JASON REVILLE
Observer's Signature: [signature] Date 8/18/06
Organization: CRA
Certified By: ETA Date 4/20/06

Form Number | Page Of

EPA
VISIBLE EMISSION OBSERVATION FORM 1

Method Used (Circle One): (Method 9) 203A 203B Other: _____

Company Name	OWENS CORNING
Facility Name	TRUMBULL
Street Address	870 W. SMITH
City	MEDINA
State	OH
Zip	44256

Process: 4 WIDE STACK	Unit #:	Operating Mode
Control Equipment		Operating Mode

Describe Emission Point

Height of Emiss. Pt. Start End	Height of Emiss. Pt. Rel. to Observer Start End
Distance to Emiss. Pt. Start End	Direction to Emiss. Pt. (Degrees) Start End
Vertical Angle to Obs. Pt. Start End	Direction to Obs. Pt. (Degrees) Start End

Distance and Direction to Observation Point from Emission Point: Start End

Describe Emissions: Start End

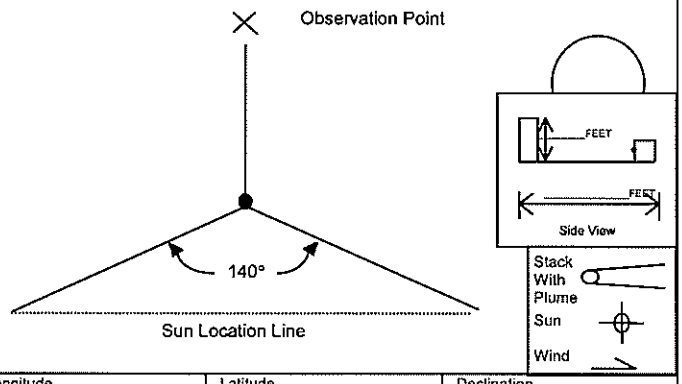
Emission Color Start End	Water Droplet Plume Attached ~ Detached ~ None ~

Describe Plume Background: Start End

Background Color Start End	Sky Conditions Start End	
Wind Speed Start End	Wind Direction Start End	
Ambient Temp Start End	Wet Bulb Temp	Rh, Percent

SOURCE LAYOUT SKETCH

Draw North Arrow ☐TN ☐MN



Longitude	Latitude	Declination

Additional Information: RUN 3

Continued on VEO Form Number						

Observation Date 8/18/06					Start Time 1252	End Time 1322
Sec / Min	0	15	30	45	Comments	
31	0	0	0	0		
32	0	0	0	0		
33	0	0	0	0		
34	0	0	0	0		
35	0	0	0	0		
36	0	0	0	0		
37	0	0	0	0		
38	0	0	0	0		
39	0	0	0	0		
40	0	0	0	0		
41	0	0	0	0		
42	0	0	0	0		
43	0	0	0	0		
44	0	0	0	0		
45	0	5	5	0		
46	5	0	0	0		
47	0	0	0	0		
48	0	5	0	0		
49	0	0	0	0		
50	0	0	0	0		
51	0	0	0	0		
52	0	0	0	0		
53	0	0	0	0		
54	0	0	0	0		
55	0	0	0	0		
56	0	0	0	0		
57	0	0	0	0		
58	0	0	0	0		
59	0	0	0	0		
60	0	0	0	0		

Observer's Name (Print)	JASON REVILLE
Observer's Signature	[signature] Date 8/18/06
Organization	CRA
Certified By	ETA Date 4/20/06

Form Number						Page	Of

3 WIDE LOWER SURGE BIN

ISOKINETIC DATA SUMMARY

Client: Owens Corning **Plant: Medina** **Method: 5A/202**
Project #: 045396 **Source: 3 Wide Lower Surge Bin** **Location: Outlet**

RUN INFORMATION				
Run Number		1	2	3
Test Date		8/19/2006	8/19/2006	8/19/2006
Start Time		17:35:00	19:03:00	20:28:00
End Time		18:35:00	20:03:00	21:28:00
RESULTS				**AVERAGE**
PM Conc.	gr/DSCF	8.41E-03	6.26E-03	1.10E-02	8.55E-03
PM Emission Rate	lbs./hour	1.57E-02	1.19E-02	2.06E-02	1.60E-02
FIELD MEASURMENTS				
Ambient Temperature, °F		111	111	112	111.3
P_{bar}, in. Hg		29.35	29.32	29.35	29.34
P_{static}, in. H_2O		0.04	0.04	0.04	0.04
Stack Absolute Pressure, in. Hg		29.35	29.32	29.35	29.34
CO_2, %				
O_2, %		20.70	20.70	20.80	20.73
N_2, %		79.30	79.30	79.20	79.27
SAMPLING DATA				
Average Stack Temperature, °F		194	195	195	195
Average Meter Temperature, °F		111	115	113	113
Average Filter Temperature, °F		109	113	99	107
Average Probe Temperature, °F		130	131	121	127
Average Exit Temperature, °F		61	61	65	62
Average ΔP, in. H_2O		0.07	0.07	0.07	0.07
ΔH Avg., in H_2O		1.12	1.17	1.13	1.14
Meter Volume Sum, cf		37.991	39.067	37.961	38.340
Maximum Vacuum, in. Hg		1.0	1.0	1.0	1.0
STACK CALCULATIONS				
Isokinetic, %		100.44	100.23	99.29	99.99
Stack Velocity, ft/sec.		16.52	16.84	16.54	16.63
Volume Flow Rate/Actual, ACFM		289.0	294.8	289.5	291.1
Volume Flow Rate/Dry Std, DSCFM		217.7	221.6	219.1	219.5
Dry Molecular Weight, lb/lb-mole		28.83	28.83	28.83	28.83
Sample Volume - Dry Std, DSCF		34.491	35.227	34.332	34.683
Stack Moisture Content, %		4.94	4.78	4.21	4.64
EQUIPMENT INFORMATION				
Nozzle I.D.		GE-36	GE-33	GE-36	varies
Nozzle Diameter, in.		0.3750	0.3760	0.3750	0.3753
Pitot I.D.		2P-1	2P-7	2P-1	varies
Thermocouple I.D.		2T-1	2T-7	2T-1	varies
Barometer I.D.		BEO4921	BEO4921	BEO4921	BEO4921
Meter Box I.D.		BEO4906	BEO4906	BEO4906	BEO4906
Leak Check Pitot		OK	OK	OK	OK
Meter Box Post Leak Check		OK	OK	OK	OK
ANALYTICAL INFORMATION INPUT				
F Factor, DSCF/10^6 BTU				
Filter I.D.		Q826B	Q793B	Q665B
Filter Gross Weight, g		0.3627	0.3531	0.365
Filter Tare Weight, g		0.3610	0.3522	0.3639
TCE Beaker ID		D830	D826	D827
TCE Beaker Gross Weight, g		106.6883	115.9644	109.8432
TCE Beaker Tare Weight, g		106.6712	115.9510	109.8199
TCE Blank Correction, g				
Filter Weight Gain, g		0.0017	0.0009	0.0011
TCE Beaker Weight Gain, g		0.0171	0.0134	0.0233
Total Weight Gain, g		0.0188	0.0143	0.0244

Operators: **Checked by:** **Review Date:**

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	3 Wide Lower Surge Bin	Date:	8/19/2006
Plant:	Medina	Location:	Outlet	Run #:	1
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q826B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Rectangle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	111	(°F)	Area:	0.29	(ft^2)
T-Couple:	2T-1	ΔH @:	1.7195	$P_{Bar.}$:	29.35	(in. Hg.)	Width:	6.00	(in.)
Probe ID:	2P-1	Nozzle ID:	GE-36	P_{Static}:	0.04	(in. H_20.)	Length:	7.00	(in.)
Probe Con.#:	BEO4182A	Nozzle Con. #:	BEO4963						
C_P:	0.84	Dn (in.) :	0.3750	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.040	$\%CO_2$: 0.00	$\%O_2$:	21.00	Number of Ports: 1
Meter Initial:	0.012	cfm @	15.0 (in. Hg.)	$\%N_2$/CO:	79.00	Md: 28.84	Ms:	28.41	Points / Port: 5
Meter Final:	0.007	cfm @	3.0 (in. Hg.)	ACTUAL VALUES					Reads / Point 2
Pitot (-):	ok	@	4.7 (in. H_2O)	Bws:	0.049	$\%CO_2$: 0.00	$\%O_2$:	20.70	Time/Reading: 6.0 (min.)
Pitot (+):	ok	@	5.0 (in. H_2O)	$\%N_2$/CO:	79.30	M_D: 28.83	M_S:	28.29	Total Time (Θ): 60 (min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	Temperatures (°F) Outlet	Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	17:35:00	0.08	1.33	683.356	110	109	190	111	123	110	98	1.0
1	0:06:00	17:41:00	0.08	1.32	687.500	109	108	190	113	128	115	50	1.0
2	0:12:00	17:47:00	0.09	1.49	691.700	110	108	191	115	131	119	51	1.0
2	0:18:00	17:53:00	0.09	1.49	695.800	113	108	191	111	133	117	54	1.0
3	0:24:00	17:59:00	0.06	0.99	700.200	114	108	193	108	134	116	56	1.0
3	0:30:00	18:05:00	0.06	0.99	703.800	115	108	193	105	133	116	58	1.0
4	0:36:00	18:11:00	0.05	0.82	707.500	115	109	198	106	132	116	59	1.0
4	0:42:00	18:17:00	0.05	0.82	710.900	115	109	198	107	130	115	60	1.0
5	0:48:00	18:23:00	0.06	0.99	714.300	117	110	197	108	127	116	60	1.0
5	0:54:00	18:29:00	0.06	0.99	717.800	117	110	197	107	124	116	60	1.0
	1:00:00	18:35:00			721.347								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.07	1.12	37.991	114	109	194	109	130	115.6	61	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.26			111.1		20.7000					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	3 Wide Lower Surge Bin	Date:	8/19/2006
Plant:	Medina	Location:	Outlet	Run #:	2
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q793B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Rectangle	
Bar. Con.#:	BEO4921	Meter Y:	0.998	$T_{AMBIENT}$:	111	(°F)	Area:	0.29	(ft^2)
T-Couple:	2T-7	ΔH @:	1.7195	$P_{Bar.}$:	29.32	(in. Hg.)	Width:	6.00	(in.)
Probe ID:	2P-7	Nozzle ID:	GE-33	P_{Static}:	0.04	(in. H_20.)	Length:		(in.)
Probe Con.#:	BEO4182G	Nozzle Con. #:	BEO4963						
C_P:	0.84	Dn (in.) :	0.3760	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.040	%CO_2: 0.00	%O_2: 21.00	Number of Ports:	1
Meter Initial:	0.018	cfm @ 15.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84	Ms: 28.41	Points / Port:	5
Meter Final:	0.013	cfm @ 4.0	(in. Hg.)	ACTUAL VALUES				Reads / Point	2
Pitot (-):	ok	@ 6.0	(in. H_2O)	Bws:	0.048	%CO_2: 0.00	%O_2: 20.70	Time/Reading:	6.0 (min.)
Pitot (+):	ok	@ 4.5	(in. H_2O)	%N_2/CO:	79.30	M_D: 28.83	M_S: 28.31	Total Time (Θ):	60 (min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	19:03:00	0.08	1.34	722.247	113	112	193	99	123	108	82	1.0
1	0:06:00	19:09:00	0.08	1.34	726.200	114	112	193	96	123	108	60	1.0
2	0:12:00	19:15:00	0.08	1.35	730.300	117	111	193	115	134	115	59	1.0
2	0:18:00	19:21:00	0.08	1.35	734.400	118	111	193	118	133	117	59	1.0
3	0:24:00	19:27:00	0.07	1.18	739.000	119	112	195	117	133	118	59	1.0
3	0:30:00	19:33:00	0.07	1.18	743.000	120	112	195	118	134	119	59	1.0
4	0:36:00	19:39:00	0.06	1.01	746.800	119	112	197	118	133	119	60	1.0
4	0:42:00	19:45:00	0.06	1.00	750.500	116	112	197	114	131	115	60	1.0
5	0:48:00	19:51:00	0.06	1.00	754.100	117	112	199	118	133	117	58	1.0
5	0:54:00	19:57:00	0.06	1.00	757.700	118	113	199	117	132	118	58	1.0
	1:00:00	20:03:00			761.314								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.07	1.17	39.067	117	112	195	113	131	115	61	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.26			114.5		21					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	3 Wide Lower Surge Bin	Date:	8/19/2006
Plant:	Medina	Location:	Outlet	Run #:	3
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q665B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Rectangle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	112	(°F)	Area:	0.29	(ft^2)
T-Couple:	2T-1	ΔH @:	1.7195	$P_{Bar.}$:	29.35	(in. Hg.)	Width:	6.00	(in.)
Probe ID:	2P-1	Nozzle ID:	GE-36	P_{Static}:	0.04	(in. H_2O.)	Length:		(in.)
Probe Con.#:	BEO4182A	Nozzle Con. #:	BEO4963						
C_P:	0.84	Dn (in.) :	0.3750	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.040	%CO_2: 0.00	%O_2: 21.00	Number of Ports:	1
Meter Initial:	0.010	cfm @ 15.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84	Ms: 28.41	Points / Port:	5
Meter Final:	0.006	cfm @ 3.0	(in. Hg.)	ACTUAL VALUES				Reads / Point	2
Pitot (-):	ok	@ 5.1	(in. H_2O)	Bws:	0.042	%CO_2: 0.00	%O_2: 20.80	Time/Reading:	6.0 (min.)
Pitot (+):	ok	@ 5.0	(in. H_2O)	%N_2/CO:	79.20	M_D: 28.83	M_S: 28.38	Total Time (Θ):	60 (min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	20:28:00	0.07	1.16	761.858	114	113	194	97	115	97	96	1.0
1	0:06:00	20:34:00	0.07	1.16	765.600	115	112	194	99	123	104	65	1.0
2	0:12:00	20:40:00	0.08	1.33	769.700	115	112	194	99	123	105	60	1.0
2	0:18:00	20:46:00	0.08	1.33	773.800	115	111	194	97	124	108	60	1.0
3	0:24:00	20:52:00	0.08	1.33	777.900	116	111	195	97	125	111	61	1.0
3	0:30:00	20:58:00	0.08	1.33	782.000	117	111	195	98	126	112	60	1.0
4	0:36:00	21:04:00	0.06	0.99	786.000	117	111	197	100	121	115	61	1.0
4	0:42:00	21:10:00	0.06	0.99	789.400	117	111	197	103	122	116	59	1.0
5	0:48:00	21:16:00	0.05	0.82	793.100	113	111	197	98	113	110	62	1.0
5	0:54:00	21:22:00	0.05	0.82	796.400	114	110	197	99	116	113	63	1.0
	1:00:00	21:28:00			799.819								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.07	1.13	37.961	115	111	195	99	121	109	65	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.26			113		21					1.0

Particulate Matter Emission Test Results with Condensable Fraction
3-Wide Lower Surge Bin
Owens Corning Medina Roofing Plant
8/19/06

Test Date	Run	Start Time	Stop Time	Temp. (F)	Moisture (%)	Actual Flowrate (acfm)	Dry Std. Flowrate (dscfm)	Sample Volume (dscf)	Filterable PM		Organic Condensable Catch (g)	Inorganic Condensable Catch (g)	Total Catch (g)	Total Concentration gr/dscf	Total Emission Rate (lb/hr)
									TCE Rinse (g)	Filter Catch (g)					
8/19/2006	1	17:35	18:35	193.8	4.9	289	218	34.491	0.0171	0.0017	0.0064	0.0072	0.0252	0.0113	0.021
8/19/2006	2	19:03	20:03	195.4	4.8	295	222	35.227	0.0134	0.0009	0.0072	0.0072	0.0215	0.0094	0.018
8/19/2006	3	20:28	21:28	195.4	4.2	290	219	34.332	0.0233	0.0011	0.0067	0.0086	0.0311	0.0140	0.026
	Avg			**194.9**	**4.6**	**291**	**219**							**0.0116**	**0.022**

3-Wide Lower Surge Bin

Run #	MeCl Beaker ID	MeCl Beaker Tare	MeCl Beaker Gross
1	D858	105.3077	105.3141
2	D860	100.8603	100.8675
3	D862	106.2876	106.2943

	MeCl Total Gain
Run #1	0.0064
Run #2	0.0072
Run #3	0.0067

Water Beaker ID	Water Beaker Tare	Water Beaker Gross	Total Weight Gain
D859	111.146	111.1532	0.0136
D861	110.4299	110.4371	0.0144
D863	111.3241	111.3327	0.0153

Water Total Gain
0.0072
0.0072
0.0086

Variable Definitions

% CO2 = Percent CO2 by volume, dry basis
% N2 = Percent N2 by volume, dry basis
% O2 = Percent O2 by volume, dry basis
%CO = Percent CO by volume, dry basis
□P = Velocity head of stack gas, in. H2O
0.04707 ft3 0.04715 ft3 35.31 ft3/m3
0.280 = Molecular weight of N2 and CO, divided by 100
0.320 = Molecular weight of O2, divided by 100
0.440 = Molecular weight of CO2, divided by 100
AS = Cross-sectional area of stack, ft2
Bws = Water vapor in the gas stream, proportion by volume
Bwm = Approximate proportion by volume of water vapor in the gas stream leaving the second impinger, .025
Cp = Pitot tube coefficient, dimensionless
Cst = Stack concentration, µg/dry standard cubic meter
Kp = Pitot tube constant
MD = Dry molecular weight, lb/lb - mole
ml = Mass of compound in, µg
Ms = Molecular weight of stack gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pm = Absolute pressure at the dry gas meter, in. Hg
Pmrt= Emission Rate lb/hr
Ps = Absolute stack gas pressure, in. Hg
Pstd = Standard absolute pressure, 29.92 in. Hg
Pw = Density of water, 0.002201 lb/ml
Qsd= Dry volumetric stack gas flow rate, dry standard ft3/minute
R= Ideal Gas Constant, 21.85 (in. Hg)*(ft3)/(lb-mole)*(R)
Tm = Absolute temperature at meter, □R
Ts = Stack gas temperature, □ R
Tstd = Standard absolute temperature, 528□ R
Vf = Final volume of impinger train, ml.
Vi = Initial volume of impinger train, ml.
Vm = Dry gas volume measured by dry gas meter, dcf
Vm(std) = Dry gas volume measured by dry gas meter, corrected to standard conditions, dscf
Vm(std) = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscf
Vs = Average stack gas velocity, ft/sec
Vwc(std) = Volume of water vapor condensed corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions
Wf = Final weight of impinger train, g.
Wi = Initial weight of impinger train, g.
Y = Dry gas meter calibration factor

Client: Owens Corning	Plant: Medina	Location: Outlet
Project #: 045396	Source: 3 Wide Lower Surge Bin	

Reference Method No. 2 Calculations

Average Stack Gas Velocity	$v_s = K_P C_P (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{s(avg)}}{P_S M_S}}$	v_S=	16.5155	ft/sec.
Average Stack Volumetric Flow Rate	$Q_a = 60 v_s A_s$	Q_A=	289.0	ACFM
Average Stack Gas Dry Standard Flow Rate	$Q_{sd} = 60(1-B_{ws}) v_s A_s \left(\frac{T_{std} P_s}{T_s P_{std}}\right)$	Q_{SD}=	217.7	DSCFM

Reference Method No. 3 Calculations

Molecular Weight, Dry	$M_D = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + CO)$	M_D=	28.83	lb/lb-mole
Molecular Weight, Wet	$M_S = M_D(1-B_{ws}) + 18B_{ws}$	M_S=	28.29	lb/lb-mole

Reference Method No. 4 Calculations

Sample Gas Volume, Standard Conditions	$V_{m(std)} = V_m Y \frac{P_m T_{std}}{P_{std} T_m}$	$V_{m(std)}$=	34.491	DSCF
Volume of Water Vapor Condensed	$V_{wc(std)} = 0.04707\,(V_f - V_i)$	$V_{wc(std)}$=	0.000	ft^3/ml
Volume of Water Vapor Condensed in Silica Gel	$V_{wsg(std)} = 0.04715\,(W_f - W_i)$	$V_{wsg(std)}$=	1.792	ft^3/g
Moisture Volume Fraction of Stack Gas	$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$	B_{ws}=	0.049	
Vapor Pressure of Stack H_2O	$VP = SVP - 0.000367\,(P_S)(1 + \frac{T_S - 32}{1571})$	VP=	20.688	
Bws VP	$B_{ws}\ VP = \frac{VP}{P_S}$	B_{ws}VP=	0.705	
		MIN B_{ws} or B_{ws}VP=	0.049	

Reference Method No. 5 Calculations

Percent Isokinetic	$I = \frac{100 T_s V_{m(std)} P_{std}}{60 T_{std} v_s \theta A_n P_s (1-B_{ws})}$	I=	100.4	%
Mass Emissions Rate	$E = \frac{m_t}{V_{m(std)}} Q_{sd}$	E=	0.1186	g/min
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{hour} * \frac{1lbs}{454g}$		0.0157	lbs/hour
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{1\,\text{min}}{60\,\text{sec}}$		0.0020	g/second
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{1hour} * \frac{1Kg}{1{,}000g}$		0.0071	kg/hour
	$E = C_d F_d \frac{20.9}{20.9 - \%O_{2d}} * \frac{1lbs}{454\,g}$		0.0000	lbs/mmBTU
Stack Concentration	$C_{ST} = \frac{m_t}{V_{m(std)}}$	C_{st}=	0.0005	g/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{15.43gr}{1g}$		0.0084	gr/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM}$		19249	ug/DSCM
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM} * \frac{T_{Normal}}{T_{std}}$		20658	ug/DNCM
Stack Concentration Corrected to 7% O_2	$C_{ST7O_2} = C_{ST} \frac{20.9 - 7.0}{20.9 - \%O_2}$	C_{st7O2}=	0.5845	gr/DSCF @7%O_2
			1337777	ug/DSCM @7%O_2
			1435729	ug/DNCM @7%O_2
Stack Concentration Corrected to 12% CO_2	$C_{ST12CO_2} = C_{ST} \frac{12.0}{\%CO_2}$	$C_{st12CO2}$=	#DIV/0!	gr/DSCF @12% CO_2

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM5A/202 Run: 1
Site: Lower Surge Bin 3-wide Recovery Technician: AK Date: 8-19-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	-		
Final Vol. (ml)	120	110	0	-		
Rinse Vol. (ml)				-		
Comments						

Train Initial Weight (g): 3310.0 Final Weight (g): 3348.0
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.	Q 8 ~~MB~~ 26	
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start 19:09
Purge End 20:09

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396
Site: 3 wide Lower Surge Bin

Sample Type: PM
Recovery Technician: AK

Run: 2
Date: 8/19/06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	~~250~~ 140 ok	~~254~~ 60 ok	~~129~~ 0 ok	–		
Rinse Vol. (ml)				–		
Comments						

Train Initial Weight (g): 3500
Silica Gel Initial Weight (g):

Final Weight (g): 3537.5
Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.	Q793B	
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start 20:45
Purge End 21:45

Notes/Comments:

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RMSA/202 Run: 3
Site: Lower Surge Bin Recovery Technician: AK Date: 8-19-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	116	104	0	–		
Rinse Vol. (ml)				–		
Comments Q665B						

Train Initial Weight (g) : 3323.5 Final Weight (g): 3355.5
Silica Gel Initial Weight (g): Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start 22:06
Purge End 23:06

Notes/Comments:	

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4 WIDE DUST COLLECTOR

ISOKINETIC DATA SUMMARY

Client: Owens Corning **Plant: Medina** **Method: 5A/202**
Project #: 045396 **Source: 4 Wide Dust Collector** **Location: Outlet**

RUN INFORMATION					
Run Number	1	2	3	4	
Test Date	8/18/2006	8/18/2006	8/19/2006	8/19/2006	
Start Time	18:18:00	8:31:00	11:31:00	13:36:00	
End Time	19:26:00	11:00:00	12:58:00	15:42:00	
RESULTS					**AVERAGE**
PM Conc. gr/DSCF		7.84E-03	6.64E-03	8.99E-03	**5.87E-03**
PM Emission Rate lbs./hour		1.11E+00	9.52E-01	1.28E+00	**8.36E-01**
FIELD MEASURMENTS					
Ambient Temperature, °F	90	90	90	90	**90.0**
P_{bar}, in. Hg	29.59	29.53	29.47	29.44	**29.51**
P_{static}, in. H_2O	-0.57	-0.57	-0.57	-0.57	
Stack Absolute Pressure, in. Hg	29.55	29.49	29.43	29.40	**29.47**
CO_2 , %					
O_2 , %	20.70	20.90	20.70	20.90	**20.80**
N_2 , %	79.30	79.10	79.30	79.10	**79.20**
SAMPLING DATA					
Average Stack Temperature, °F	129	122	126	127	**126**
Average Meter Temperature, °F	89	85	89	91	**88**
Average Filter Temperature, °F	103	103	106	106	**104**
Average Probe Temperature, °F	105	104	105	105	**105**
Average Exit Temperature, °F	66	59	64	63	**63**
Average ΔP, in. H_2O	0.23	0.19	0.20	0.19	**0.20**
ΔH Avg., in H_2O	0.38	1.03	1.06	0.99	**0.87**
Meter Volume Sum, cf	22.605	36.524	37.389	36.137	**33.164**
Maximum Vacuum, in. Hg	1.0	1.0	1.0	1.0	**1.0**
STACK CALCULATIONS					
Isokinetic, %	101.32	101.95	102.17	99.12	**101.14**
Stack Velocity, ft/sec.	28.10	26.21	26.74	26.13	**26.79**
Volume Flow Rate/Actual, ACFM	20653.0	19261.1	19651.1	19204.7	**19692.5**
Volume Flow Rate/Dry Std, DSCFM	18274.4	16554.0	16734.9	16603.3	**17041.7**
Dry Molecular Weight, lb/lb-mole	28.83	28.84	28.83	28.84	**28.83**
Sample Volume - Dry Std, DSCF	21.399	34.843	35.299	33.977	**31.379**
Stack Moisture Content, %		3.84	3.98	2.11	**2.48**
EQUIPMENT INFORMATION					
Nozzle I.D.	GX-16	GW-20	GW-21	GW-20	**varies**
Nozzle Diameter, in.	0.2080	0.2780	0.2780	0.2780	**0.2605**
Pitot I.D.	5P-16	5P-10	5P-16	5P-10	**varies**
Thermocouple I.D.	5T-16	5T-10	5T-16	5T-10	**varies**
Barometer I.D.	BEO4921	BEO4921	BEO4921	BEO4921	**BEO4921**
Meter Box I.D.	BEO4907	BEO4907	BEO4907	BEO4907	**BEO4907**
Leak Check Pitot	OK	OK	OK	OK	**OK**
Meter Box Post Leak Check	OK	OK	OK	OK	**OK**
ANALYTICAL INFORMATION INPUT					
F Factor, DSCF/10^6 BTU					
Filter I.D.	Q824B	Q801B	Q831B	Q777B	
Filter Gross Weight, g		0.3525	0.3505	0.3528	
Filter Tare Weight, g		0.3524	0.3503	0.3527	
Acetone Beaker ID		D813	D814	D842	
TCE Beaker Gross Weight, g		98.1193	104.7233	112.4150	
TCE Beaker Tare Weight, g		98.1017	104.7083	112.3953	
TCE Blank Correction, g					
Filter Weight Gain, g		**0.0001**	**0.0002**	**0.0001**	
TCE Beaker Weight Gain, g		**0.0176**	**0.0150**	**0.0197**	
Total Weight Gain, g		**0.0177**	**0.0152**	**0.0198**	

Operators: **Checked by:** **Review Date:**

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Dust Collector	Date:	8/18/2006
Plant:	Medina	Location:	Outlet	Run #:	1
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q824B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Rectangle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	90	(°F)	Area:	12.25	(ft^2)
T-Couple:	5T-16	ΔH @:	1.6522	$P_{Bar.}$:	29.59	(in. Hg.)	Width:	36.00	(in.)
Probe ID:	5P-16	Nozzle ID:	GX-16	P_{Static}:	-0.57	(in. H_2O.)	Length:	49.00	(in.)
Probe Con.#:	BE04185P	Nozzle Con. #:	BEO4959						
C_P:	0.84	Dn (in.) :	0.2080						

LEAK CHECK - ANALYSIS					RUN ESTIMATES						TEST INFORMATION		
Meter Initial:	0.001	cfm @	15.0	(in. Hg.)	Bws:	0.020	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	3	
Meter Final:	0.000	cfm @	4.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.62	Points / Port:	5	
Pitot (-):	ok	@	5.0	(in. H_2O)	ACTUAL VALUES						Reads / Point	1	
Pitot (+):	ok	@	5.3	(in. H_2O)	Bws:	0.000	$\%CO_2$:	0.00	$\%O_2$:	20.70	Time/Reading:	4.0	(min.)
					$\%N_2/CO$:	79.30	M_D:	28.83	M_S:	28.83	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	18:18:00	0.15	0.25	407.744	88	87	129	108	105	99	90	1.0
2	0:04:00	18:22:00	0.14	0.23	409.000	88	87	129	103	105	100	67	1.0
3	0:08:00	18:26:00	0.16	0.26	410.100	88	87	130	103	104	100	65	1.0
4	0:12:00	18:30:00	0.12	0.20	411.500	88	87	130	103	106	101	63	1.0
5	0:16:00	18:34:00	0.11	0.18	412.650	89	87	130	103	104	101	68	1.0
	0:20:00	18:38:00			413.783								
1	0:20:00	18:42:00	0.21	0.35	413.783	89	87	126	103	105	102	69	1.0
2	0:24:00	18:46:00	0.20	0.33	415.200	90	88	131	103	105	102	65	1.0
3	0:28:00	18:50:00	0.20	0.33	416.700	90	88	130	103	104	102	65	1.0
4	0:32:00	18:54:00	0.25	0.41	418.150	91	88	131	103	105	103	65	1.0
5	0:36:00	18:58:00	0.34	0.56	419.650	91	89	131	101	104	103	63	1.0
	0:40:00	19:02:00			421.487								
1	0:40:00	19:06:00	0.31	0.52	421.487	91	89	127	103	106	103	66	1.0
2	0:44:00	19:10:00	0.31	0.51	423.200	92	89	130	103	104	103	63	1.0
3	0:48:00	19:14:00	0.30	0.50	424.900	92	89	130	103	105	103	62	1.0
4	0:52:00	19:18:00	0.33	0.55	426.900	93	89	130	103	104	103	62	1.0
5	0:56:00	19:22:00	0.30	0.50	428.600	91	90	125	103	105	103	64	1.0
	1:00:00	19:26:00			430.349								

VOID DUE TO INSUFFICIENT SAMPLE VOLUME

Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
0.23	0.38	22.605	90	88	129	103	105	101.9	66	1.0
Avg. Sqrt.			Avg. Tm.		SVP					Max.
0.47			89.1		4.4080					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Dust Collector	Date:	8/18/2006
Plant:	Medina	Location:	Outlet	Run #:	2
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q801B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Rectangle	
Bar. Con.#:	BEO4921	Meter Y:	0.995	$T_{AMBIENT}$:	90	(°F)	Area:	12.25	(ft^2)
T-Couple:	5T-10	ΔH @:	1.6522	$P_{Bar.}$:	29.53	(in. Hg.)	Width:	36.00	(in.)
Probe ID:	5P-10	Nozzle ID:	GW-20	P_{Static}:	-0.57	(in. H_20.)	Length:		(in.)
Probe Con.#:	4185J	Nozzle Con. #:	BEO4961						
C_P:	0.84	Dn (in.) :	0.2780	RUN ESTIMATES			TEST INFORMATION		

LEAK CHECK - ANALYSIS					RUN ESTIMATES						TEST INFORMATION		
Meter Initial:	0.005	cfm @	15.0	(in. Hg.)	Bws:	0.020	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	3	
Meter Final:	0.002	cfm @	3.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.62	Points / Port:	5	
Pitot (-):	ok	@	4.7	(in. H_2O)	ACTUAL VALUES						Reads / Point	1	
Pitot (+):	ok	@	4.2	(in. H_2O)	Bws:	0.038	$\%CO_2$:	0.00	$\%O_2$:	20.90	Time/Reading:	4.0	(min.)
					$\%N_2/CO$:	79.10	M_D:	28.84	M_S:	28.42	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	8:31:00	0.30	1.59	431.315	83	82	122	97	104	101	76	1.0
2	0:04:00	8:35:00	0.24	1.27	434.100	83	82	122	104	105	103	52	1.0
3	0:08:00	8:39:00	0.22	1.16	437.000	84	82	122	103	104	105	52	1.0
4	0:12:00	8:43:00	0.21	1.11	439.500	84	83	121	103	104	101	56	1.0
5	0:16:00	8:47:00	0.19	1.01	442.100	84	83	120	104	104	104	54	1.0
	0:20:00	8:51:00			444.388								
1	0:24:00	10:15:00	0.19	1.01	444.388	84	83	120	104	104	103	68	1.0
2	0:28:00	10:19:00	0.24	1.27	446.850	84	83	122	103	104	102	54	1.0
3	0:32:00	10:23:00	0.20	1.06	449.500	85	83	123	103	104	104	53	1.0
4	0:36:00	10:27:00	0.15	0.80	452.100	87	83	123	103	105	104	54	1.0
5	0:40:00	10:31:00	0.14	0.74	454.300	87	83	123	103	104	104	56	1.0
	0:44:00	10:35:00			456.404								
1	0:48:00	10:40:00	0.15	0.80	456.404	87	84	120	103	105	104	67	1.0
2	0:52:00	10:44:00	0.18	0.96	458.550	88	84	123	103	104	104	59	1.0
3	0:56:00	10:48:00	0.19	1.01	460.950	89	84	124	103	104	104	59	1.0
4	1:00:00	10:52:00	0.17	0.90	463.400	90	85	124	103	104	105	59	1.0
5	1:04:00	10:56:00	0.14	0.75	465.700	91	85	124	103	104	105	59	1.0
	1:08:00	11:00:00			467.839								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.19	1.03	36.524	86	83	122	103	104	104	59	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.44			84.6		4					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Dust Collector	Date:	8/19/2006
Plant:	Medina	Location:	Outlet	Run #:	3
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q831B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Rectangle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	90	(°F)	Area:	12.25	(ft^2)
T-Couple:	5T-16	ΔH @:	1.6522	$P_{Bar.}$:	29.47	(in. Hg.)	Width:	36.00	(in.)
Probe ID:	5P-16	Nozzle ID:	GW-21	P_{Static}:	-0.57	(in. H_20.)	Length:		(in.)
Probe Con.#:	BEO4185P	Nozzle Con. #:	BEO4961						
C_P:	0.84	Dn (in.) :	0.2780	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.020	%CO_2: 0.00 %O_2: 21.00	Number of Ports:	3	
Meter Initial:	0.003 cfm @	15.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84 Ms: 28.62	Points / Port:	5	
Meter Final:	0.001 cfm @	3.0	(in. Hg.)	ACTUAL VALUES			Reads / Point	1	
Pitot (-):	ok @	4.6	(in. H_2O)	Bws:	0.040	%CO_2: 0.00 %O_2: 20.70	Time/Reading:	4.0	(min.)
Pitot (+):	ok @	6.0	(in. H_2O)	%N_2/CO:	79.30	M_D: 28.83 M_S: 28.40	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	11:31:00	0.17	0.90	468.145	88	86	125	133	105	99	76	1.0
2	0:04:00	11:35:00	0.19	1.01	470.500	88	86	125	114	104	97	63	1.0
3	0:08:00	11:39:00	0.20	1.06	472.900	88	86	125	104	104	98	65	1.0
4	0:12:00	11:43:00	0.14	0.74	475.400	89	86	125	103	105	99	60	1.0
5	0:16:00	11:47:00	0.14	0.74	477.500	90	87	126	103	104	99	60	1.0
	0:20:00	11:51:00			479.767								
1	0:24:00	12:02:00	0.20	1.07	479.767	90	87	122	103	105	98	67	1.0
2	0:28:00	12:06:00	0.23	1.22	482.250	91	87	126	103	104	98	62	1.0
3	0:32:00	12:10:00	0.20	1.06	485.000	93	87	127	103	104	99	60	1.0
4	0:36:00	12:14:00	0.18	0.96	487.500	93	88	127	103	105	99	61	1.0
5	0:40:00	12:18:00	0.16	0.85	489.900	94	88	127	103	105	100	59	1.0
	0:44:00	12:22:00			492.132								
1	0:48:00	12:38:00	0.30	1.61	492.132	94	88	124	103	105	100	70	1.0
2	0:52:00	12:42:00	0.26	1.39	495.100	92	89	126	104	105	100	63	1.0
3	0:56:00	12:46:00	0.23	1.23	497.900	93	89	126	104	104	98	59	1.0
4	1:00:00	12:50:00	0.20	1.06	500.600	91	89	126	103	104	95	68	1.0
5	1:04:00	12:54:00	0.20	1.07	503.100	92	89	126	103	105	98	62	1.0
	1:08:00	12:58:00			505.534								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.20	1.06	37.389	91	87	126	106	105	98	64	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.44			89		4					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	4 Wide Dust Collector	Date:	8/19/2006
Plant:	Medina	Location:	Outlet	Run #:	4
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q777B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Rectangle	
Bar. Con.#:	BEO4921	Meter Y:	0.995	$T_{AMBIENT}$:	90	(°F)	Area:	12.25	(ft^2)
T-Couple:	5T-10	ΔH @:	1.6522	$P_{Bar.}$:	29.44	(in. Hg.)	Width:	36.00	(in.)
Probe ID:	5P-10	Nozzle ID:	GW-20	P_{Static}:	-0.57	(in. H_20.)	Length:		(in.)
Probe Con.#:	4185J	Nozzle Con. #:	BEO4961						
C_P:	0.84	Dn (in.) :	0.2780	RUN ESTIMATES			TEST INFORMATION		

LEAK CHECK - ANALYSIS					RUN ESTIMATES						TEST INFORMATION		
Meter Initial:	0.013	cfm @	16.0	(in. Hg.)	Bws:	0.040	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	3	
Meter Final:	0.009	cfm @	4.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.41	Points / Port:	5	
Pitot (-):	ok	@	5.0	(in. H_2O)	ACTUAL VALUES						Reads / Point	1	
Pitot (+):	ok	@	4.4	(in. H_2O)	Bws:	0.021	$\%CO_2$:	0.00	$\%O_2$:	20.90	Time/Reading:	4.0	(min.)
					$\%N_2/CO$:	79.10	M_D:	28.84	M_S:	28.61	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	13:36:00	0.32	1.65	505.942	90	89	126	124	105	97	72	1.0
2	0:04:00	13:40:00	0.26	1.33	509.000	91	89	128	110	104	99	62	1.0
3	0:08:00	13:44:00	0.21	1.08	511.900	92	89	127	107	104	101	59	1.0
4	0:12:00	13:48:00	0.20	1.03	514.350	93	89	127	105	104	102	58	1.0
5	0:16:00	13:52:00	0.22	1.13	516.800	94	90	127	105	105	103	57	1.0
	0:20:00	13:56:00			519.331								
1	0:20:00	14:00:00	0.20	1.04	519.331	94	90	125	104	105	104	70	1.0
2	0:24:00	14:04:00	0.19	0.98	521.800	94	90	129	104	105	102	60	1.0
3	0:28:00	14:08:00	0.16	0.82	524.200	95	90	130	103	105	103	60	1.0
4	0:32:00	14:12:00	0.16	0.82	526.500	95	90	130	104	104	103	60	1.0
5	0:36:00	14:16:00	0.15	0.77	528.700	96	91	129	103	105	104	61	1.0
	0:40:00	14:20:00			530.874								
1	0:40:00	15:22:00	0.16	0.82	530.874	89	89	126	103	103	104	74	1.0
2	0:44:00	15:26:00	0.17	0.87	533.100	89	89	126	104	105	102	63	1.0
3	0:48:00	15:30:00	0.17	0.87	535.400	90	89	127	104	105	103	61	1.0
4	0:52:00	15:34:00	0.16	0.82	537.700	91	89	127	104	105	104	62	1.0
5	0:56:00	15:38:00	0.15	0.77	539.900	91	89	127	103	105	104	62	1.0
	1:00:00	15:42:00			542.079								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.19	0.99	36.137	92	89	127	106	105	102	63	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.44			91		4					1.0

Particulate Matter Emission Test Results with Condensable Fraction
4-Wide Dust Collector
Owens Corning Medina Roofing Plant
8/18-19/06

Test Date	Run	Start Time	Stop Time	Temp. (F)	Moisture (%)	Actual Flowrate (acfm)	Dry Std. Flowrate (dscfm)	Sample Volume (dscf)	Filterable PM: TCE Rinse (g)	Filterable PM: Filter Catch (g)	Organic Condensable Catch (g)	Inorganic Condensable Catch (g)	Total Catch (g)	Total Concentration gr/dscf	Total Emission Rate (lb/hr)
8/18/2006	1	8:31	11:00	122.2	3.8	19,261	16,554	34.843	0.0176	0.0001	0.0077	0.0068	0.0254	0.0112	1.59
8/19/2006	2	11:31	12:58	125.5	4.0	19,651	16,735	35.299	0.0150	0.0002	0.0069	0.0055	0.0221	0.0097	1.38
8/19/2006	3	13:36	15:42	127.4	2.1	19,205	16,603	33.977	0.0197	0.0001	0.0026	0.0065	0.0224	0.0102	1.45
	Avg			**125.0**	**3.3**	**19,372**	**16,631**							**0.0104**	**1.48**

4-Wide Dust Collector

Run #	MeCl Beaker ID	MeCl Beaker Tare	MeCl Beaker Gross
1	D864	101.3866	101.3943
2	D866	106.4486	106.4555
3	D868	107.4006	107.4032

	MeCl Total Gain
Run #1	0.0077
Run #2	0.0069
Run #3	0.0026

Water Beaker ID	Water Beaker Tare	Water Beaker Gross	Total Weight Gain
D865	111.9159	111.9227	0.0145
D867	102.297	102.3025	0.0124
D869	109.4842	109.4907	0.0091

Water Total Gain
0.0068
0.0055
0.0065

Variable Definitions

% CO2 = Percent CO2 by volume, dry basis
% N2 = Percent N2 by volume, dry basis
% O2 = Percent O2 by volume, dry basis
%CO = Percent CO by volume, dry basis
□P = Velocity head of stack gas, in. H2O
0.04707 ft3 0.04715 ft3 35.31 ft3/m3
0.280 = Molecular weight of N2 and CO, divided by 100
0.320 = Molecular weight of O2, divided by 100
0.440 = Molecular weight of CO2, divided by 100
AS = Cross-sectional area of stack, ft2
Bws = Water vapor in the gas stream, proportion by volume
Bwm = Approximate proportion by volume of water vapor in the gas stream leaving the second impinger, .025
Cp = Pitot tube coefficient, dimensionless
Cst = Stack concentration, µg/dry standard cubic meter
Kp = Pitot tube constant
MD = Dry molecular weight, lb/lb - mole
ml = Mass of compound in, µg
Ms = Molecular weight of stack gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pm = Absolute pressure at the dry gas meter, in. Hg
Pmrt= Emission Rate lb/hr
Ps = Absolute stack gas pressure, in. Hg
Pstd = Standard absolute pressure, 29.92 in. Hg
Pw = Density of water, 0.002201 lb/ml
Qsd= Dry volumetric stack gas flow rate, dry standard ft3/minute
R= Ideal Gas Constant, 21.85 (in. Hg)*(ft3)/(lb-mole)*(R)
Tm = Absolute temperature at meter, □R
Ts = Stack gas temperature, □ R
Tstd = Standard absolute temperature, 528□ R
Vf = Final volume of impinger train, ml.
Vi = Initial volume of impinger train, ml.
Vm = Dry gas volume measured by dry gas meter, dcf
Vm(std) = Dry gas volume measured by dry gas meter, corrected to standard conditions, dscf
Vm(std) = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscf
Vs = Average stack gas velocity, ft/sec
Vwc(std) = Volume of water vapor condensed corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions
Wf = Final weight of impinger train, g.
Wi = Initial weight of impinger train, g.
Y = Dry gas meter calibration factor

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM 5A/202 Run: 1
Site: 4 Wide Dust Collector Recovery Technician: AK Date: 8-18-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	~~D.I. H_2O~~ 100	100	0	–		
Final Vol. (ml)	100	100	0	–		
Rinse Vol. (ml)						
Comments						

Train Initial Weight (g): 35630 Final Weight (g): 35810
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start - 20:01
Purge End - 21:01

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 645 396 Sample Type: RM 5A/202 Run: 2
Site: 4Wide Dust Collector Recovery Technician: AK Date: 8.19.06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	-		
Final Vol. (ml)	111	78	0	-		
Rinse Vol. (ml)				-		
Comments Q 801 B						

Train Initial Weight (g) : 3443.5 Final Weight (g): 3473.0
Silica Gel Initial Weight (g): Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start. 11:27
Purge End. 12:27

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 045 B'
Sample Type: RM 5A/202
Run: 3
Site: 4 Wide Dust Collector
Recovery Technician: AK
Date: 8.11.06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	95	94	0	–		
Rinse Vol. (ml)				–		
Comments Q831 B						

Train Initial Weight (g): 3542.0 ~~[illegible]~~
Final Weight (g): 3573.0
Silica Gel Initial Weight (g):
Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start. 13:37
Purge End 14:37

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM 5A/202 Run: 4
Site: 4 WIDE DUST COLLECTOR Recovery Technician: LR Date: 8-19-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	-		
Final Vol. (ml)	100	98	0	-		
Rinse Vol. (ml)				-		
Comments Q777B						

Train Initial Weight (g): 3436.5 (w/o L) Final Weight (g): 3452.0 (w/o L)
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start: 17:02
Purge End: 18:02

Notes/Comments:	

MLA

ISOKINETIC DATA SUMMARY

Client: Owens Corning **Plant: Medina** **Method: 5A/202**
Project #: 045396 **Source: MLA** **Location: Outlet**

RUN INFORMATION				
Run Number	1	2	3	
Test Date	8/16/2006	8/16/2006	8/16/2006	
Start Time	15:14:00	16:51:00	18:47:00	
End Time	16:18:00	18:00:00	20:09:00	

RESULTS					AVERAGE
PM Conc.	gr/DSCF	7.93E-03	1.05E-02	7.86E-03	8.76E-03
PM Emission Rate	lbs./hour	3.63E-02	4.61E-02	3.56E-02	3.93E-02

FIELD MEASURMENTS				
Ambient Temperature, °F	94	98	94	95.3
P_{bar}, in. Hg	29.71	29.68	29.68	29.69
P_{static}, in. H_2O	-0.02	-0.02	-0.02	
Stack Absolute Pressure, in. Hg	29.71	29.68	29.68	29.69
CO_2 , %				
O_2 , %	20.80	20.60	20.80	20.75
N_2 , %	79.20	79.40	79.20	79.27

SAMPLING DATA				
Average Stack Temperature, °F	100	100	96	99
Average Meter Temperature, °F	101	102	93	99
Average Filter Temperature, °F	103	103	103	103
Average Probe Temperature, °F	102	104	103	103
Average Exit Temperature, °F	62	62	63	62
Average ΔP, in. H_2O	0.04	0.04	0.04	0.04
ΔH Avg., in H_2O	1.02	0.93	0.99	0.98
Meter Volume Sum, cf	36.219	34.738	35.171	35.376
Maximum Vacuum, in. Hg	1.0	1.0	1.0	1.0

STACK CALCULATIONS				
Isokinetic, %	99.84	100.51	99.66	100.00
Stack Velocity, ft/sec.	12.24	11.77	12.02	12.01
Volume Flow Rate/Actual, ACFM	576.9	554.8	566.4	566.0
Volume Flow Rate/Dry Std, DSCFM	535.2	513.5	528.2	525.6
Dry Molecular Weight, lb/lb-mole	28.83	28.82	28.83	28.83
Sample Volume - Dry Std, DSCF	33.867	32.375	33.359	33.200
Stack Moisture Content, %	0.90	1.01	1.05	0.98

EQUIPMENT INFORMATION				
Nozzle I.D.	GZ-09	GZ-12	GZ-09	varies
Nozzle Diameter, in.	0.3900	0.3880	0.3900	0.3893
Pitot I.D.	2P-7	2P-7	2P-7	2P-7
Thermocouple I.D.	2T-7	2T-7	2T-7	2T-7
Barometer I.D.	BEO4921	BEO4921	BEO4921	BEO4921
Meter Box I.D.	BEO4906	BEO4906	BEO4906	BEO4906
Leak Check Pitot	OK	OK	OK	OK
Meter Box Post Leak Check	OK	OK	OK	OK

ANALYTICAL INFORMATION INPUT			
F Factor, DSCF/10^6 BTU			
Filter I.D.	Q795B	Q797B	Q800B
Filter Gross Weight, g	0.3518	0.3488	0.3598
Filter Tare Weight, g	0.3506	0.3477	0.3585
TCE Beaker ID	D833	D835	D845
TCE Beaker Gross Weight, g	110.5206	109.6365	109.3190
TCE Beaker Tare Weight, g	110.5044	109.6156	109.3033
TCE Blank Correction, g			
Filter Weight Gain, g	0.0012	0.0011	0.0013
TCE Beaker Weight Gain, g	0.0162	0.0209	0.0157
Total Weight Gain, g	0.0174	0.0220	0.0170

Operators: **Checked by:** **Review Date:**

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	MLA	Date:	8/16/2006
Plant:	Medina	Location:	Outlet	Run #:	1
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q795B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	94	(°F)	Area:	0.79	(ft^2)
T-Couple:	2T-7	ΔH @:	1.7195	$P_{Bar.}$:	29.71	(in. Hg.)	Diameter:	12.00	(in.)
Probe ID:	2P-7	Nozzle ID:	GZ-09	P_{Static}:	-0.02	(in. H_2O.)			
Probe Con.#:	BEO4182G	Nozzle Con. #:	BEO4964						
C_P:	0.84	Dn (in.) :	0.3900						

LEAK CHECK - ANALYSIS					RUN ESTIMATES						TEST INFORMATION		
Meter Initial:	0.000	cfm @	16.0	(in. Hg.)	Bws:	0.020	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	2	
Meter Final:	0.000	cfm @	3.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.62	Points / Port:	12	
Pitot (-):	ok	@	5.2	(in. H_2O)	ACTUAL VALUES						Reads / Point	1	
Pitot (+):	ok	@	5.5	(in. H_2O)	Bws:	0.009	$\%CO_2$:	0.00	$\%O_2$:	20.80	Time/Reading:	2.5	(min.)
					$\%N_2/CO$:	79.20	M_D:	28.83	M_S:	28.73	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	15:14:00	0.04	0.91	575.850	99	98	100	99	102	103	104	1.0
2	0:02:30	15:16:30	0.04	0.91	577.300	100	98	102	106	101	105	67	1.0
3	0:05:00	15:19:00	0.05	1.14	578.700	100	98	101	107	102	105	63	1.0
4	0:07:30	15:21:30	0.04	0.91	580.400	101	98	103	107	102	106	60	1.0
5	0:10:00	15:24:00	0.04	0.91	581.800	101	98	102	105	102	106	58	1.0
6	0:12:30	15:26:30	0.05	1.14	583.200	101	98	100	100	103	105	58	1.0
7	0:15:00	15:29:00	0.05	1.14	584.700	101	98	100	101	102	105	57	1.0
8	0:17:30	15:31:30	0.05	1.14	586.300	102	98	100	103	102	106	57	1.0
9	0:20:00	15:34:00	0.05	1.14	587.900	102	98	100	103	102	103	58	1.0
10	0:22:30	15:36:30	0.05	1.14	589.500	102	98	100	104	101	104	58	1.0
11	0:25:00	15:39:00	0.05	1.15	591.100	103	99	100	103	101	104	58	1.0
12	0:27:30	15:41:30	0.04	0.92	592.700	104	99	101	104	103	105	58	1.0
	0:30:00	15:44:00			594.124								
1	0:32:30	15:48:00	0.03	0.69	594.124	104	98	99	100	101	102	70	1.0
2	0:35:00	15:50:30	0.03	0.69	595.400	104	98	98	101	102	102	64	1.0
3	0:37:30	15:53:00	0.04	0.92	596.600	104	99	97	101	100	102	60	1.0
4	0:40:00	15:55:30	0.04	0.92	598.100	105	99	98	100	103	104	58	1.0
5	0:42:30	15:58:00	0.05	1.15	599.500	105	99	100	102	102	104	57	1.0
6	0:45:00	16:00:30	0.05	1.15	601.150	106	99	100	103	102	105	56	1.0
7	0:47:30	16:03:00	0.05	1.15	602.750	106	99	100	104	101	105	57	1.0
8	0:50:00	16:05:30	0.05	1.15	604.400	106	99	100	104	101	105	58	1.0
9	0:52:30	16:08:00	0.05	1.15	606.000	107	99	100	105	102	104	58	1.0
10	0:55:00	16:10:30	0.05	1.15	607.600	108	100	100	102	103	104	60	1.0
11	0:57:30	16:13:00	0.04	0.92	609.300	108	100	100	103	103	103	61	1.0
12	1:00:00	16:15:30	0.04	0.92	610.700	108	101	100	103	104	104	62	1.0
	1:02:30	16:18:00			612.069								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.04	1.02	36.219	104	99	100	103	102	104.2	62	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.21			101.1		1.9330					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	MLA	Date:	8/16/2006
Plant:	Medina	Location:	Outlet	Run #:	2
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q797B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	98	(°F)	Area:	0.79	(ft^2)
T-Couple:	2T-7	ΔH @:	1.7195	$P_{Bar.}$:	29.68	(in. Hg.)	Diameter:	12.00	(in.)
Probe ID:	2P-7	Nozzle ID:	GZ-12	P_{Static}:	-0.02	(in. H_2O.)			
Probe Con.#:	BEO4182G	Nozzle Con. #:	BEO4964						
C_P:	0.84	Dn (in.) :	0.3880	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.020	%CO_2: 0.00 %O_2: 21.00	Number of Ports:	2	
Meter Initial:	0.006	cfm @ 15.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84 Ms: 28.62	Points / Port:	12	
Meter Final:	0.003	cfm @ 3.0	(in. Hg.)	ACTUAL VALUES			Reads / Point	1	
Pitot (-):	ok	@ 4.7	(in. H_2O)	Bws:	0.010	%CO_2: 0.00 %O_2: 20.60	Time/Reading:	2.5	(min.)
Pitot (+):	ok	@ 5.2	(in. H_2O)	%N_2/CO:	79.40	M_D: 28.82 M_S: 28.71	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	Temperatures (°F) Outlet	Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	16:51:00	0.03	0.67	612.440	103	101	101	106	102	104	98	1.0
2	0:02:30	16:53:30	0.03	0.67	613.700	103	101	101	105	103	103	67	1.0
3	0:05:00	16:56:00	0.04	0.90	614.900	102	101	101	105	105	104	64	1.0
4	0:07:30	16:58:30	0.04	0.90	616.300	102	100	101	104	104	104	62	1.0
5	0:10:00	17:01:00	0.05	1.12	617.700	103	100	101	103	106	106	59	1.0
6	0:12:30	17:03:30	0.05	1.13	619.300	104	100	100	103	107	106	57	1.0
7	0:15:00	17:06:00	0.04	0.90	620.900	104	100	100	105	105	103	57	1.0
8	0:17:30	17:08:30	0.05	1.13	622.300	105	99	100	104	106	105	56	1.0
9	0:20:00	17:11:00	0.05	1.13	623.900	105	99	100	103	103	102	56	1.0
10	0:22:30	17:13:30	0.05	1.13	625.500	106	100	99	103	104	104	56	1.0
11	0:25:00	17:16:00	0.04	0.90	627.100	106	100	100	103	103	105	57	1.0
12	0:27:30	17:18:30	0.04	0.90	628.550	106	100	100	105	102	104	58	1.0
	0:30:00	17:21:00			629.954								
1	0:32:30	17:30:00	0.03	0.68	629.954	102	101	99	101	102	104	83	1.0
2	0:35:00	17:32:30	0.03	0.68	631.200	104	101	100	102	104	105	66	1.0
3	0:37:30	17:35:00	0.04	0.90	632.400	104	100	100	102	104	103	62	1.0
4	0:40:00	17:37:30	0.04	0.90	633.800	104	100	100	102	103	102	60	1.0
5	0:42:30	17:40:00	0.05	1.12	635.200	105	100	101	104	104	103	59	1.0
6	0:45:00	17:42:30	0.05	1.12	636.900	105	100	101	103	105	104	58	1.0
7	0:47:30	17:45:00	0.05	1.13	638.450	106	100	100	101	105	102	59	1.0
8	0:50:00	17:47:30	0.04	0.90	640.100	106	100	100	102	104	102	57	1.0
9	0:52:30	17:50:00	0.04	0.90	641.700	106	100	100	103	103	104	57	1.0
10	0:55:00	17:52:30	0.04	0.90	643.000	106	100	100	103	105	105	58	1.0
11	0:57:30	17:55:00	0.04	0.90	644.400	106	100	100	102	103	102	58	1.0
12	1:00:00	17:57:30	0.03	0.68	646.000	106	99	99	103	104	104	59	1.0
	1:02:30	18:00:00			647.178								

Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
0.04	0.93	34.738	105	100	100	103	104	104	62	1.0
Avg. Sqrt.			Avg. Tm.		SVP					Max.
0.20			102.3		2					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	MLA	Date:	8/16/2006
Plant:	Medina	Location:	Outlet	Run #:	3
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q800B	Meter Con. #:	BEO4906	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9983	$T_{AMBIENT}$:	94	(°F)	Area:	0.79	(ft^2)
T-Couple:	2T-7	ΔH @:	1.7195	$P_{Bar.}$:	29.68	(in. Hg.)	Diameter:	12.00	(in.)
Probe ID:	2P-7	Nozzle ID:	GZ-09	P_{Static}:	-0.02	(in. H_2O.)			
Probe Con.#:	BEO4182G	Nozzle Con. #:	BEO4964						
C_P:	0.84	Dn (in.) :	0.3900	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.020	%CO_2: 0.00 %O_2: 21.00	Number of Ports:	2	
Meter Initial:	0.000 cfm @	15.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84 Ms: 28.62	Points / Port:	12	
Meter Final:	0.000 cfm @	3.0	(in. Hg.)	ACTUAL VALUES			Reads / Point	1	
Pitot (-):	ok @	4.9	(in. H_2O)	Bws:	0.010	%CO_2: 0.00 %O_2: 20.80	Time/Reading:	2.5	(min.)
Pitot (+):	ok @	5.1	(in. H_2O)	%N_2/CO:	79.20	M_D: 28.83 M_S: 28.72	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	18:47:00	0.03	0.69	647.477	96	95	93	107	101	108	92	1.0
2	0:02:30	18:49:30	0.03	0.69	648.750	95	95	92	104	102	108	66	1.0
3	0:05:00	18:52:00	0.04	0.92	650.000	95	95	95	103	104	107	64	1.0
4	0:07:30	18:54:30	0.04	0.91	651.400	95	94	97	103	102	108	62	1.0
5	0:10:00	18:57:00	0.04	0.91	652.750	93	93	98	102	102	102	62	1.0
6	0:12:30	18:59:30	0.05	1.13	654.200	93	93	98	101	103	103	61	1.0
7	0:15:00	19:02:00	0.05	1.13	655.800	93	92	98	102	103	102	59	1.0
8	0:17:30	19:04:30	0.05	1.13	657.350	93	92	98	103	102	102	58	1.0
9	0:20:00	19:07:00	0.05	1.13	659.000	94	91	98	102	104	103	58	1.0
10	0:22:30	19:09:30	0.05	1.13	660.550	95	91	98	102	103	105	58	1.0
11	0:25:00	19:12:00	0.05	1.13	662.100	95	91	99	102	102	106	59	1.0
12	0:27:30	19:14:30	0.04	0.91	663.650	96	91	98	102	102	106	60	1.0
	0:30:00	19:17:00			665.056								
1	0:30:00	19:39:00	0.03	0.69	665.056	92	91	91	103	101	106	78	1.0
2	0:32:30	19:41:30	0.03	0.69	666.400	93	91	91	102	102	104	64	1.0
3	0:35:00	19:44:00	0.04	0.91	667.400	93	90	93	104	104	106	62	1.0
4	0:37:30	19:46:30	0.04	0.91	669.000	93	90	93	102	104	106	61	1.0
5	0:40:00	19:49:00	0.05	1.14	670.350	94	90	94	101	104	105	61	1.0
6	0:42:30	19:51:30	0.05	1.14	672.000	94	89	96	102	103	105	61	1.0
7	0:45:00	19:54:00	0.05	1.14	673.500	95	89	96	103	103	104	60	1.0
8	0:47:30	19:56:30	0.05	1.14	675.100	95	89	96	102	104	105	60	1.0
9	0:50:00	19:59:00	0.05	1.14	676.700	95	89	96	101	105	105	61	1.0
10	0:52:30	20:01:30	0.05	1.13	678.200	93	89	96	103	101	103	68	1.0
11	0:55:00	20:04:00	0.04	0.91	679.800	94	89	96	106	101	104	64	1.0
12	0:57:30	20:06:30	0.04	0.91	681.250	93	89	96	102	101	104	62	1.0
	1:00:00	20:09:00			682.648								
			Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
			0.04	0.99	35.171	94	91	96	103	103	105	63	1.0
			Avg. Sqrt.			Avg. Tm.		SVP					Max.
			0.21			93		2					1.0

Particulate Matter Emission Test Results with Condensable Fraction
MLA System
Owens Corning Medina Roofing Plant
8/16/06

Test Date	Run	Start Time	Stop Time	Temp. (F)	Moisture (%)	Actual Flowrate (acfm)	Dry Std. Flowrate (dscfm)	Sample Volume (dscf)	Filterable PM: TCE Rinse (g)	Filterable PM: Filter Catch (g)	Organic Condensable Catch (g)	Inorganic Condensable Catch (g)	Total Catch (g)	Total Concentration gr/dscf	Total Emission Rate (lb/hr)
8/16/2006	1	15:14	16:18	100.0	0.9	577	535	33.867	0.0162	0.0012	0.0069	0.0044	0.0243	0.0111	0.051
8/16/2006	2	16:51	18:00	100.2	1.0	555	513	32.375	0.0209	0.0011	0.0071	0.0034	0.0291	0.0139	0.061
8/16/2006	3	18:47	20:09	95.7	1.0	566	528	33.359	0.0157	0.0013	0.0032	0.0040	0.0202	0.0093	0.042
	Avg			**98.6**	**1.0**	**566**	**526**							**0.0114**	**0.051**

MLA

Run #	MeCl Beaker ID	MeCl Beaker Tare	MeCl Beaker Gross
1	D888	105.2563	105.2632
2	D890	111.1089	111.116
3	D892	118.8263	118.8295

	MeCl Total Gain
Run #1	0.0069
Run #2	0.0071
Run #3	0.0032

Water Beaker ID	Water Beaker Tare	Water Beaker Gross	Total Weight Gain
D889	108.2906	108.295	0.0113
D891	110.4655	110.4689	0.0105
D893	107.5805	107.5845	0.0072

Water Total Gain
0.0044
0.0034
0.0040

Variable Definitions

% CO2 = Percent CO2 by volume, dry basis
% N2 = Percent N2 by volume, dry basis
% O2 = Percent O2 by volume, dry basis
%CO = Percent CO by volume, dry basis
□P = Velocity head of stack gas, in. H2O
0.04707 ft3 0.04715 ft3 35.31 ft3/m3
0.280 = Molecular weight of N2 and CO, divided by 100
0.320 = Molecular weight of O2, divided by 100
0.440 = Molecular weight of CO2, divided by 100
AS = Cross-sectional area of stack, ft2
Bws = Water vapor in the gas stream, proportion by volume
Bwm = Approximate proportion by volume of water vapor in the gas stream leaving the second impinger, .025
Cp = Pitot tube coefficient, dimensionless
Cst = Stack concentration, µg/dry standard cubic meter
Kp = Pitot tube constant
MD = Dry molecular weight, lb/lb - mole
ml = Mass of compound in, µg
Ms = Molecular weight of stack gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pm = Absolute pressure at the dry gas meter, in. Hg
Pmrt= Emission Rate lb/hr
Ps = Absolute stack gas pressure, in. Hg
Pstd = Standard absolute pressure, 29.92 in. Hg
Pw = Density of water, 0.002201 lb/ml
Qsd= Dry volumetric stack gas flow rate, dry standard ft3/minute
R= Ideal Gas Constant, 21.85 (in. Hg)*(ft3)/(lb-mole)*(R)
Tm = Absolute temperature at meter, □R
Ts = Stack gas temperature, □ R
Tstd = Standard absolute temperature, 528□ R
Vf = Final volume of impinger train, ml.
Vi = Initial volume of impinger train, ml.
Vm = Dry gas volume measured by dry gas meter, dcf
Vm(std) = Dry gas volume measured by dry gas meter, corrected to standard conditions, dscf
Vm(std) = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscf
Vs = Average stack gas velocity, ft/sec
Vwc(std) = Volume of water vapor condensed corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions
Wf = Final weight of impinger train, g.
Wi = Initial weight of impinger train, g.
Y = Dry gas meter calibration factor

Client: Owens Corning
Project #: 045396

Plant: Medina
Source: MLA

Location: Outlet

Reference Method No. 2 Calculations

Average Stack Gas Velocity	$v_s = K_P C_P (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{S(avg)}}{P_S M_S}}$	v_S=	12.2432	ft/sec.
Average Stack Volumetric Flow Rate	$Q_a = 60 v_s A_s$	Q_A=	576.9	ACFM
Average Stack Gas Dry Standard Flow Rate	$Q_{sd} = 60(1 - B_{ws}) v_s A_s \left(\frac{T_{std} P_s}{T_s P_{std}}\right)$	Q_{SD}=	535.2	DSCFM

Reference Method No. 3 Calculations

Molecular Weight, Dry	$M_D = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + CO)$	M_D=	28.83	lb/lb-mole
Molecular Weight, Wet	$M_S = M_D(1 - B_{ws}) + 18 B_{ws}$	M_S=	28.73	lb/lb-mole

Reference Method No. 4 Calculations

Sample Gas Volume, Standard Conditions	$V_{m(std)} = V_m Y \frac{P_m T_{std}}{P_{std} T_m}$	$V_{m(std)}$ =	33.867	DSCF
Volume of Water Vapor Condensed	$V_{wc(std)} = 0.04707\,(V_f - V_i)$	$V_{wc(std)}$=	0.000	ft^3/ml
Volume of Water Vapor Condensed in Silica Gel	$V_{wsg(std)} = 0.04715\,(W_f - W_i)$	$V_{wsg(std)}$=	0.306	ft^3/g
Moisture Volume Fraction of Stack Gas	$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$	B_{ws}=	0.009	
Vapor Pressure of Stack H_2O	$VP = SVP - 0.000367\,(P_S)(1 + \frac{T_S - 32}{1571})$	VP=	1.922	
Bws VP	$B_{ws}\ VP = \frac{VP}{P_S}$	B_{ws}VP=	0.065	
		MIN B_{ws} or B_{ws}VP=	0.009	

Reference Method No. 5 Calculations

Percent Isokinetic	$I = \frac{100 T_s V_{m(std)} P_{std}}{60 T_{std} v_s \theta A_n P_s (1 - B_{ws})}$	I=	99.8	%
Mass Emissions Rate	$E = \frac{m_t}{V_{m(std)}} Q_{sd}$	E=	0.2750	g/min
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{hour} * \frac{1 lbs}{454 g}$		0.0363	lbs/hour
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{1\,\text{min}}{60\,\text{sec}}$		0.0046	g/second
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{1 hour} * \frac{1 Kg}{1{,}000 g}$		0.0165	kg/hour
	$E = C_d F_d \frac{20.9}{20.9 - \%O_{2d}} * \frac{1 lbs}{454 g}$		0.0000	lbs/mmBTU
Stack Concentration	$C_{ST} = \frac{m_t}{V_{m(std)}}$	C_{st}=	0.0005	g/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{15.43 gr}{1 g}$		0.0079	gr/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1 g} * \frac{1\,\text{SCF}}{0.028317\,\text{SCM}}$		18144	ug/DSCM
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1 g} * \frac{1\,\text{SCF}}{0.028317\,\text{SCM}} * \frac{T_{Normal}}{T_{std}}$		19472	ug/DNCM
Stack Concentration Corrected to 7% O_2	$C_{ST7O_2} = C_{ST} \frac{20.9 - 7.0}{20.9 - \%O_2}$	C_{st7O2}=	1.1019	gr/DSCF @7%O_2
			2521959	ug/DSCM @7%O_2
			2706616	ug/DNCM @7%O_2
Stack Concentration Corrected to 12% CO_2	$C_{ST12O_2} = C_{ST} \frac{12.0}{\%CO_2}$	C_{st12O2}=	#DIV/0!	gr/DSCF @12% CO_2

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM 5A/202 Run: 1
Site: MLA Recovery Technician: AK Date: 8.16.06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	88	95	0	–		
Rinse Vol. (ml)				-		
Comments Q795B						

Train Initial Weight (g): 3561.0 Final Weight (g): 3567.5
Silica Gel Initial Weight (g): Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start; 17:20

Purge End; 18:20

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM5A/202 Run: 2
Site: MLA Recovery Technician: AK Date: 8-16-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	93	96	0	–		
Rinse Vol. (ml)				–		
Comments Filter I.D. Q797B						

Train Initial Weight (g): 3535.0 Final Weight (g): 3542.0
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start 18:42
Purge End 19:42

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RMSA/202 Run: 3
Site: MLA Recovery Technician: AK Date: 8-16-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	–		
Final Vol. (ml)	103	101	0	–		
Rinse Vol. (ml)				–		
Comments Q800B						

Train Initial Weight (g): 3434.5 Final Weight (g): 3442.0
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start: 20:38
Purge End: 21:38

Notes/Comments:	

MSA

ISOKINETIC DATA SUMMARY

Client: Owens Corning **Plant: Medina** **Method: 5A/202**
Project #: 045396 **Source: MSA** **Location: Outlet**

RUN INFORMATION					
	Run Number	**1**	**2**	**3**	
	Test Date	8/16/2006	8/16/2006	8/16/2006	
	Start Time	15:15:00	16:52:00	18:48:00	
	End Time	16:19:00	18:01:00	20:10:00	
RESULTS					**AVERAGE**
PM Conc.	gr/DSCF	9.59E-03	8.98E-03	8.61E-03	**9.06E-03**
PM Emission Rate	lbs./hour	4.44E-02	4.29E-02	4.23E-02	**4.32E-02**
FIELD MEASURMENTS					
Ambient Temperature, °F		94	98	94	**95.3**
P_{bar}, in. Hg		29.71	29.68	29.68	**29.69**
P_{static}, in. H_2O		-0.03	-0.03	-0.03	
Stack Absolute Pressure, in. Hg		29.71	29.68	29.68	**29.69**
CO_2 , %					
O_2 , %		20.50	20.40	20.70	**20.53**
N_2 , %		79.50	79.60	79.30	**79.47**
SAMPLING DATA					
Average Stack Temperature, °F		94	95	91	**93**
Average Meter Temperature, °F		98	102	91	**97**
Average Filter Temperature, °F		101	103	103	**102**
Average Probe Temperature, °F		103	103	104	**103**
Average Exit Temperature, °F		58	62	59	**60**
Average ΔP, in. H_2O		0.05	0.05	0.05	**0.05**
ΔH Avg., in H_2O		1.03	1.00	1.14	**1.06**
Meter Volume Sum, cf		36.370	36.406	38.571	**37.116**
Maximum Vacuum, in. Hg		1.0	1.0	1.0	**1.0**
STACK CALCULATIONS					
Isokinetic, %		98.61	99.34	99.61	**99.19**
Stack Velocity, ft/sec.		12.29	12.71	12.98	**12.66**
Volume Flow Rate/Actual, ACFM		579.0	599.0	611.8	**596.6**
Volume Flow Rate/Dry Std, DSCFM		540.1	557.4	573.5	**557.0**
Dry Molecular Weight, lb/lb-mole		28.82	28.82	28.83	**28.82**
Sample Volume - Dry Std, DSCF		34.101	33.844	36.573	**34.839**
Stack Moisture Content, %		1.50	1.44	1.46	**1.47**
EQUIPMENT INFORMATION					
Nozzle I.D.		GZ-10	GZ-11	GZ-10	**varies**
Nozzle Diameter, in.		0.3920	0.3830	0.3920	**0.3890**
Pitot I.D.		2P-1	2P-3	2P-1	**varies**
Thermocouple I.D.		2T-1	2T-3	2T-1	**varies**
Barometer I.D.		BEO4921	BEO4921	BEO4921	**BEO4921**
Meter Box I.D.		BEO4907	BEO4907	BEO4907	**BEO4907**
Leak Check Pitot		OK	OK	OK	**OK**
Meter Box Post Leak Check		OK	OK	OK	**OK**
ANALYTICAL INFORMATION INPUT					
F Factor, DSCF/10^6 BTU					
Filter I.D.		Q799B	Q788B	Q741B	
Filter Gross Weight, g		0.35	0.3486	0.3433	
Filter Tare Weight, g		0.3497	0.3485	0.342	
TCE Beaker ID		D837	D838	D834	
TCE Beaker Gross Weight, g		109.4792	110.2995	106.8628	
TCE Beaker Tare Weight, g		109.4583	110.2799	106.8437	
TCE Blank Correction, g					
Filter Weight Gain, g		**0.0003**	**0.0001**	**0.0013**	
TCE Beaker Weight Gain, g		**0.0209**	**0.0196**	**0.0191**	
Total Weight Gain, g		**0.0212**	**0.0197**	**0.0204**	

Operators: **Checked by:** **Review Date:**

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	MSA	Date:	8/16/2006
Plant:	Medina	Location:	Outlet	Run #:	1
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q799B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	94	(°F)	Area:	0.79	(ft^2)
T-Couple:	2T-1	ΔH @:	1.6522	$P_{Bar.}$:	29.71	(in. Hg.)	Diameter:	12.00	(in.)
Probe ID:	2P-1	Nozzle ID:	GZ-10	P_{Static}:	-0.03	(in. H_20.)			
Probe Con.#:	BEO4182A	Nozzle Con. #:	BEO4964						
C_P:	0.84	Dn (in.) :	0.3920	RUN ESTIMATES			TEST INFORMATION		

LEAK CHECK - ANALYSIS					RUN ESTIMATES						TEST INFORMATION		
Meter Initial:	0.003	cfm @	15.0	(in. Hg.)	Bws:	0.020	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	2	
Meter Final:	0.000	cfm @	2.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.62	Points / Port:	12	
Pitot (-):	ok	@	5.0	(in. H_2O)	ACTUAL VALUES						Reads / Point	1	
Pitot (+):	ok	@	4.8	(in. H_2O)	Bws:	0.015	$\%CO_2$:	0.00	$\%O_2$:	20.50	Time/Reading:	2.5	(min.)
					$\%N_2/CO$:	79.50	M_D:	28.82	M_S:	28.66	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	15:15:00	0.04	0.90	990.122	94	91	93	88	100	100	83	1.0
2	0:02:30	15:17:30	0.04	0.91	991.600	96	95	91	89	101	99	56	1.0
3	0:05:00	15:20:00	0.03	0.68	993.000	97	95	91	95	102	100	55	1.0
4	0:07:30	15:22:30	0.04	0.90	994.200	97	95	93	100	102	101	56	1.0
5	0:10:00	15:25:00	0.05	1.13	995.600	96	95	93	100	101	100	55	1.0
6	0:12:30	15:27:30	0.05	1.13	997.200	96	95	93	101	104	102	55	1.0
7	0:15:00	15:30:00	0.06	1.35	998.800	96	95	94	102	104	102	54	1.0
8	0:17:30	15:32:30	0.06	1.35	1000.500	96	95	94	102	103	104	54	1.0
9	0:20:00	15:35:00	0.06	1.35	1002.200	97	95	94	104	103	103	54	1.0
10	0:22:30	15:37:30	0.05	1.13	1003.900	98	95	94	104	104	105	54	1.0
11	0:25:00	15:40:00	0.04	0.90	1005.550	99	95	94	103	104	104	55	1.0
12	0:27:30	15:42:30	0.04	0.90	1007.000	99	95	94	104	105	105	55	1.0
	0:30:00	15:45:00			1008.368								
1	0:32:30	15:49:00	0.03	0.68	1008.368	99	95	93	101	102	100	69	1.0
2	0:35:00	15:51:30	0.04	0.90	1009.600	99	95	94	101	101	103	62	1.0
3	0:37:30	15:54:00	0.04	0.90	1011.000	100	96	94	100	103	103	60	1.0
4	0:40:00	15:56:30	0.05	1.13	1012.400	100	96	94	102	103	105	58	1.0
5	0:42:30	15:59:00	0.05	1.13	1014.100	101	96	94	104	103	106	57	1.0
6	0:45:00	16:01:30	0.05	1.13	1015.650	101	97	94	104	100	104	57	1.0
7	0:47:30	16:04:00	0.05	1.13	1017.250	102	97	94	105	102	105	57	1.0
8	0:50:00	16:06:30	0.05	1.14	1018.900	103	98	94	104	103	104	57	1.0
9	0:52:30	16:09:00	0.04	0.91	1020.500	103	98	94	103	103	107	58	1.0
10	0:55:00	16:11:30	0.04	0.91	1022.000	104	98	94	101	104	106	58	1.0
11	0:57:30	16:14:00	0.05	1.14	1023.500	104	98	94	102	104	106	58	1.0
12	1:00:00	16:16:30	0.04	0.91	1025.000	104	99	94	102	105	106	59	1.0
	1:02:30	16:19:00			1026.492								

Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
0.05	1.03	36.370	99	96	94	101	103	103.3	58	1.0

Avg. Sqrt.	Avg. Tm.	SVP	Max.
0.21	97.5	1.6103	1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	MSA	Date:	8/16/2006
Plant:	Medina	Location:	Outlet	Run #:	2
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q788B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	98	(°F)	Area:	0.79	(ft^2)
T-Couple:	2T-3	ΔH @:	1.6522	$P_{Bar.}$:	29.68	(in. Hg.)	Diameter:	12.00	(in.)
Probe ID:	2P-3	Nozzle ID:	GZ-11	P_{Static}:	-0.03	(in. H_20.)			
Probe Con.#:	4183C	Nozzle Con. #:	BEO4964						
C_P:	0.84	Dn (in.) :	0.3830	RUN ESTIMATES			TEST INFORMATION		

LEAK CHECK - ANALYSIS					RUN ESTIMATES							
Meter Initial:	0.000	cfm @	15.0	(in. Hg.)	Bws:	0.020	$\%CO_2$:	0.00	$\%O_2$:	21.00	Number of Ports:	2
Meter Final:	0.000	cfm @	2.0	(in. Hg.)	$\%N_2/CO$:	79.00	Md:	28.84	Ms:	28.62	Points / Port:	12
Pitot (-):	ok	@	4.8	(in. H_2O)	ACTUAL VALUES						Reads / Point	1
Pitot (+):	ok	@	4.4	(in. H_2O)	Bws:	0.014	$\%CO_2$:	0.00	$\%O_2$:	20.40	Time/Reading:	2.5 (min.)
					$\%N_2/CO$:	79.60	M_D:	28.82	M_S:	28.66	Total Time (Θ):	60 (min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	16:52:00	0.03	0.62	26.915	101	99	94	103	103	106	90	1.0
2	0:02:30	16:54:30	0.04	0.83	28.200	101	99	95	102	104	106	65	1.0
3	0:05:00	16:57:00	0.04	0.83	29.500	101	99	95	102	104	107	60	1.0
4	0:07:30	16:59:30	0.05	1.03	31.000	101	99	95	104	103	107	60	1.0
5	0:10:00	17:02:00	0.05	1.03	32.350	101	99	95	103	103	105	57	1.0
6	0:12:30	17:04:30	0.05	1.03	33.950	102	99	95	104	100	103	55	1.0
7	0:15:00	17:07:00	0.06	1.24	35.500	103	99	95	102	100	104	54	1.0
8	0:17:30	17:09:30	0.06	1.24	37.150	104	99	94	103	101	104	56	1.0
9	0:20:00	17:12:00	0.05	1.04	38.850	104	100	95	105	103	105	57	1.0
10	0:22:30	17:14:30	0.05	1.04	40.400	104	100	95	104	103	104	57	1.0
11	0:25:00	17:17:00	0.05	1.04	41.950	105	100	95	105	100	102	59	1.0
12	0:27:30	17:19:30	0.04	0.83	43.500	106	100	94	106	102	103	60	1.0
	0:30:00	17:22:00			44.842								
1	0:32:30	17:31:00	0.04	0.83	44.842	102	100	94	100	101	99	84	1.0
2	0:35:00	17:33:30	0.04	0.83	46.200	104	100	95	100	103	101	68	1.0
3	0:37:30	17:36:00	0.05	1.04	47.650	104	100	94	103	103	100	64	1.0
4	0:40:00	17:38:30	0.05	1.04	49.200	104	100	95	102	104	101	62	1.0
5	0:42:30	17:41:00	0.05	1.04	50.800	104	100	94	103	101	99	60	1.0
6	0:45:00	17:43:30	0.05	1.04	52.250	105	100	94	105	102	102	60	1.0
7	0:47:30	17:46:00	0.06	1.25	53.900	105	101	94	104	104	101	61	1.0
8	0:50:00	17:48:30	0.05	1.04	55.500	105	101	94	103	104	100	59	1.0
9	0:52:30	17:51:00	0.05	1.04	57.150	105	101	95	103	105	102	58	1.0
10	0:55:00	17:53:30	0.05	1.04	58.700	105	100	95	102	104	101	60	1.0
11	0:57:30	17:56:00	0.05	1.04	60.200	105	100	95	104	103	102	62	1.0
12	1:00:00	17:58:30	0.05	1.04	61.700	105	100	95	104	103	103	63	1.0
	1:02:30	18:01:00			63.321								

Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
0.05	1.00	36.406	104	100	95	103	103	103	62	1.0
Avg. Sqrt.			Avg. Tm.		SVP					Max.
0.22			101.7		2					1.0

ISOKINETIC SAMPLING DATA SHEET

Client:	Owens Corning	Source:	MSA	Date:	8/16/2006
Plant:	Medina	Location:	Outlet	Run #:	3
Project #:	045396	Operator:	KWJ	Method:	5A/202

EQUIPMENT IDS AND INFO				TEMPERATURE / PRESSURE			STACK DATA		
Filter:	Q741B	Meter Con. #:	BEO4907	T_{STD}:	68	(°F)	Shape:	Circle	
Bar. Con.#:	BEO4921	Meter Y:	0.9945	$T_{AMBIENT}$:	94	(°F)	Area:	0.79	(ft^2)
T-Couple:	2T-1	ΔH @:	1.6522	$P_{Bar.}$:	29.68	(in. Hg.)	Diameter:	12.00	(in.)
Probe ID:	2P-1	Nozzle ID:	GZ-10	P_{Static}:	-0.03	(in. H_20.)			
Probe Con.#:	BEO4182A	Nozzle Con. #:	BEO4964						
C_P:	0.84	Dn (in.) :	0.3920	RUN ESTIMATES			TEST INFORMATION		
LEAK CHECK - ANALYSIS				Bws:	0.020	%CO_2: 0.00 %O_2: 21.00	Number of Ports:	2	
Meter Initial:	0.002 cfm @	15.0	(in. Hg.)	%N_2/CO:	79.00	Md: 28.84 Ms: 28.62	Points / Port:	12	
Meter Final:	0.000 cfm @	3.0	(in. Hg.)	ACTUAL VALUES			Reads / Point	1	
Pitot (-):	ok @	5.0	(in. H_2O)	Bws:	0.015	%CO_2: 0.00 %O_2: 20.70	Time/Reading:	2.5	(min.)
Pitot (+):	ok @	4.5	(in. H_2O)	%N_2/CO:	79.30	M_D: 28.83 M_S: 28.67	Total Time (Θ):	60	(min.)

Trvs. Pt. No.	Sample Time (H:MM:SS)	Clock Time (24Hr.)	ΔP (in. H_2O)	ΔH (in. H_2O)	Meter Vm(cf)	DGM Inlet	DGM Outlet	Temperatures (°F) Stack	Filter	Probe	Aux.	Exit	Vac. (in. Hg.)
1	0:00:00	18:48:00	0.04	0.91	65.015	96	95	88	100	102	108	73	1.0
2	0:02:30	18:50:30	0.04	0.90	66.450	94	94	90	106	104	106	59	1.0
3	0:05:00	18:53:00	0.05	1.13	67.950	94	94	90	104	103	105	58	1.0
4	0:07:30	18:55:30	0.05	1.13	69.400	94	94	90	103	103	105	58	1.0
5	0:10:00	18:58:00	0.05	1.12	71.100	92	92	92	105	104	102	65	1.0
6	0:12:30	19:00:30	0.06	1.35	72.800	92	92	92	103	104	103	57	1.0
7	0:15:00	19:03:00	0.06	1.35	74.500	92	91	92	103	105	103	57	1.0
8	0:17:30	19:05:30	0.06	1.35	76.300	92	91	92	103	103	103	57	1.0
9	0:20:00	19:08:00	0.06	1.35	78.050	93	91	92	102	105	104	57	1.0
10	0:22:30	19:10:30	0.06	1.35	79.700	93	91	92	103	104	104	58	1.0
11	0:25:00	19:13:00	0.05	1.12	81.450	93	90	92	102	104	105	59	1.0
12	0:27:30	19:15:30	0.05	1.12	83.100	93	90	92	102	104	104	58	1.0
	0:30:00	19:18:00			84.679								
1	0:30:00	19:40:00	0.04	0.90	84.679	90	89	88	103	105	103	70	1.0
2	0:32:30	19:42:30	0.04	0.90	86.100	90	89	89	102	104	103	57	1.0
3	0:35:00	19:45:00	0.05	1.12	87.600	91	88	89	104	103	101	57	1.0
4	0:37:30	19:47:30	0.05	1.12	89.050	91	88	90	102	104	103	57	1.0
5	0:40:00	19:50:00	0.06	1.35	90.700	91	88	89	103	103	102	57	1.0
6	0:42:30	19:52:30	0.06	1.34	92.400	91	88	91	104	104	100	58	1.0
7	0:45:00	19:55:00	0.06	1.34	94.200	91	88	91	105	102	101	58	1.0
8	0:47:30	19:57:30	0.05	1.12	96.000	91	88	91	104	103	102	59	1.0
9	0:50:00	20:00:00	0.05	1.12	97.600	91	88	91	103	105	102	59	1.0
10	0:52:30	20:02:30	0.05	1.12	99.100	91	87	91	103	103	102	58	1.0
11	0:55:00	20:05:00	0.04	0.90	100.700	89	87	90	102	104	102	57	1.0
12	0:57:30	20:07:30	0.04	0.89	102.150	88	86	90	103	104	103	58	1.0
	1:00:00	20:10:00			103.586								

Avg.	Avg.	Total Volume	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
0.05	1.14	38.571	92	90	91	103	104	103	59	1.0
Avg. Sqrt.			Avg. Tm.		SVP					Max.
0.22			91		1					1.0

Particulate Matter Emission Test Results with Condensable Fraction
MSA System
Owens Corning Medina Roofing Plant
8/16/06

Test Date	Run	Start Time	Stop Time	Temp. (F)	Moisture (%)	Actual Flowrate (acfm)	Dry Std. Flowrate (dscfm)	Sample Volume (dscf)	Filterable PM		Organic Condensable Catch (g)	Inorganic Condensable Catch (g)	Total Catch (g)	Total Concentration gr/dscf	Total Emission Rate (lb/hr)
									TCE Rinse (g)	Filter Catch (g)					
8/16/2006	1	15:15	16:19	93.5	1.0	579	540	34.101	0.0209	0.0003	0.0066	0.0095	0.0278	0.0126	0.058
8/16/2006	2	16:52	18:01	94.6	1.0	599	557	33.844	0.0196	0.0001	0.0061	0.0032	0.0258	0.0118	0.056
8/16/2006	3	18:48	20:10	94.0	1.0	612	573	36.573	0.0191	0.0013	0.0072	0.0102	0.0276	0.0116	0.057
	Avg			94.1	1.0	597	557							0.0120	0.057

MSA

Run #	MeCl Beaker ID	MeCl Beaker Tare	MeCl Beaker Gross
1	D882	104.9092	104.9158
2	D884	110.3697	110.3758
3	D886	116.4836	116.4908

	MeCl Total Gain
Run #1	0.0066
Run #2	0.0061
Run #3	0.0072

Water Beaker ID	Water Beaker Tare	Water Beaker Gross	Total Weight Gain
D883	117.2786	117.2881	0.0161
D885	112.3671	112.3703	0.0093
D887	113.7866	113.7968	0.0174

Water Total Gain
0.0095
0.0032
0.0102

Variable Definitions

% CO2 = Percent CO2 by volume, dry basis
% N2 = Percent N2 by volume, dry basis
% O2 = Percent O2 by volume, dry basis
%CO = Percent CO by volume, dry basis
□P = Velocity head of stack gas, in. H2O
0.04707 ft3 0.04715 ft3 35.31 ft3/m3
0.280 = Molecular weight of N2 and CO, divided by 100
0.320 = Molecular weight of O2, divided by 100
0.440 = Molecular weight of CO2, divided by 100
AS = Cross-sectional area of stack, ft2
Bws = Water vapor in the gas stream, proportion by volume
Bwm = Approximate proportion by volume of water vapor in the gas stream leaving the second impinger, .025
Cp = Pitot tube coefficient, dimensionless
Cst = Stack concentration, µg/dry standard cubic meter
Kp = Pitot tube constant
MD = Dry molecular weight, lb/lb - mole
ml = Mass of compound in, µg
Ms = Molecular weight of stack gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pm = Absolute pressure at the dry gas meter, in. Hg
Pmrt= Emission Rate lb/hr
Ps = Absolute stack gas pressure, in. Hg
Pstd = Standard absolute pressure, 29.92 in. Hg
Pw = Density of water, 0.002201 lb/ml
Qsd= Dry volumetric stack gas flow rate, dry standard ft3/minute
R= Ideal Gas Constant, 21.85 (in. Hg)*(ft3)/(lb-mole)*(R)
Tm = Absolute temperature at meter, □R
Ts = Stack gas temperature, □ R
Tstd = Standard absolute temperature, 528□ R
Vf = Final volume of impinger train, ml.
Vi = Initial volume of impinger train, ml.
Vm = Dry gas volume measured by dry gas meter, dcf
Vm(std) = Dry gas volume measured by dry gas meter, corrected to standard conditions, dscf
Vm(std) = Dry gas volume measured by the dry gas meter, corrected to standard conditions, dscf
Vs = Average stack gas velocity, ft/sec
Vwc(std) = Volume of water vapor condensed corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected corrected to standard conditions, scf
Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions
Wf = Final weight of impinger train, g.
Wi = Initial weight of impinger train, g.
Y = Dry gas meter calibration factor

Client: Owens Corning
Project #: 045396

Plant: Medina
Source: MSA

Location: Outlet

Reference Method No. 2 Calculations

Average Stack Gas Velocity	$v_s = K_P C_P (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{S(avg)}}{P_S M_S}}$	v_S=	12.2859	ft/sec.
Average Stack Volumetric Flow Rate	$Q_a = 60 v_s A_s$	Q_A=	579.0	ACFM
Average Stack Gas Dry Standard Flow Rate	$Q_{sd} = 60(1-B_{ws}) v_s A_s \left(\frac{T_{std} P_s}{T_s P_{std}}\right)$	Q_{SD}=	540.1	DSCFM

Reference Method No. 3 Calculations

Molecular Weight, Dry	$M_D = 0.440(\%CO_2) + 0.320(\%O_2) + 0.280(\%N_2 + CO)$	M_D=	28.82	lb/lb-mole
Molecular Weight, Wet	$M_S = M_D(1 - B_{ws}) + 18 B_{ws}$	M_S=	28.66	lb/lb-mole

Reference Method No. 4 Calculations

Sample Gas Volume, Standard Conditions	$V_{m(std)} = V_m Y \frac{P_m T_{std}}{P_{std} T_m}$	$V_{m(std)}$=	34.101	DSCF
Volume of Water Vapor Condensed	$V_{wc(std)} = 0.04707\ (V_f - V_i)$	$V_{wc(std)}$=	0.000	ft^3/ml
Volume of Water Vapor Condensed in Silica Gel	$V_{wsg(std)} = 0.04715\ (W_f - W_i)$	$V_{wsg(std)}$=	0.519	ft^3/g
Moisture Volume Fraction of Stack Gas	$B_{ws} = \frac{V_{wc(std)} + V_{wsg(std)}}{V_{wc(std)} + V_{wsg(std)} + V_{m(std)}}$	B_{ws}=	0.015	
Vapor Pressure of Stack H_2O	$VP = SVP - 0.000367\ (P_S)(1 + \frac{T_S - 32}{1571})$	VP=	1.599	
Bws VP	$B_{ws}\ VP = \frac{VP}{P_S}$	B_{ws}VP=	0.054	
		MIN B_{ws} or B_{ws}VP=	0.015	

Reference Method No. 5 Calculations

Percent Isokinetic	$I = \frac{100 T_s V_{m(std)} P_{std}}{60 T_{std} v_s \theta A_n P_s (1 - B_{ws})}$	I=	98.6	%
Mass Emissions Rate	$E = \frac{m_t}{V_{m(std)}} Q_{sd}$	E=	0.3358	g/min
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{hour} * \frac{1lbs}{454g}$		0.0444	lbs/hour
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{1\,\text{min}}{60\,\text{sec}}$		0.0056	g/second
	$E = \frac{m_t}{V_{m(std)}} Q_{sd} * \frac{60\,\text{min}}{1hour} * \frac{1Kg}{1{,}000g}$		0.0201	kg/hour
	$E = C_d F_d \frac{20.9}{20.9 - \%O_{2d}} * \frac{1lbs}{454\,g}$		0.0000	lbs/mmBTU
Stack Concentration	$C_{ST} = \frac{m_t}{V_{m(std)}}$	C_{st}=	0.0006	g/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{15.43gr}{1g}$		0.0096	gr/DSCF
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM}$		21954	ug/DSCM
	$C_{ST} = \frac{m_t}{V_{m(std)}} * \frac{10^6 \mu g}{1g} * \frac{1SCF}{0.028317SCM} * \frac{T_{Normal}}{T_{std}}$		23562	ug/DNCM
Stack Concentration Corrected to 7% O_2	$C_{STO_2} = C_{ST} \frac{20.9 - 7.0}{20.9 - \%O_2}$	C_{stO2}=	0.3333	gr/DSCF @7%O_2
			762916	ug/DSCM @7%O_2
			818777	ug/DNCM @7%O_2
Stack Concentration Corrected to 12% CO_2	$C_{STCO_2} = C_{ST} \frac{12.0}{\%CO_2}$	C_{stCO2}=	#DIV/0!	gr/DSCF @12% CO_2

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RM5A/202 Run: 1
Site: MSA Recovery Technician: AK Date: 8.16.06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0			
Final Vol. (ml)	90	98	0			
Rinse Vol. (ml)						
Comments Q799B						

Train Initial Weight (g): 3435.0 Final Weight (g): 3446.0
Silica Gel Initial Weight (g): Final Weight (g):

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start; 17:20
Purge End: 18:20

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 645396 Sample Type: RM5A/202 Run: 2
Site: MSA Recovery Technician: AK Date: 8.16.06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	—		
Final Vol. (ml)	93	97	0	—		
Rinse Vol. (ml)				—		
Comments Filter I.D. Q788B						

Train Initial Weight (g): 3551.0 Final Weight (g): 3561.5
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge Start. 18:42

Purge End. 19:42

Notes/Comments:	

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

SAMPLE RECOVERY SHEET

Project No.: 045396 Sample Type: RMSA/202 Run: 3
Site: MSA Recovery Technician: AK Date: 8-16-06

	Imp. 1	Imp. 2	Imp. 3	Imp. 4	Imp. 5	Imp. 6
Contents	D.I. H_2O	D.I. H_2O	Empty	Silica		
Initial Vol. (ml)	100	100	0	-		
Final Vol. (ml)	98	100	0	-		
Rinse Vol. (ml)				-		
Comments Q741B						

Train Initial Weight (g): 3513.5 Final Weight (g): 3525.0
Silica Gel Initial Weight (g): _____ Final Weight (g): _____

FRONT HALF

	Filter	Beaker
ID No.		
Contents		
Volume (ml)		
Gross (g)		
Tare (g)		
Blank (g)		
Comments		

Purge start. 20:38
Purge End . 21:38

Notes/Comments:	

APPENDIX C

CALIBRATION DATA

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

Method 5 Dry Gas Meter Annual Calibration

Meter Box ID: BE04906
Barometric Pressure, P_b, in. Hg: 29.94

Calibration Date: 06/05/06
Reference Meter ID: BE04899
Reference Meter posted Y: 0.990

Parameter	Units	Run 1	Run 2	Run 3	Average
Orfice Manometer Setting, ΔH	in. H_2O	0.50	1.50	3.00	
Elapsed Time	min.	12.0	8.0	6.0	
Reference Meter					
Initial Volume	ft^3	554.339	559.544	565.234	
Final Volume	ft^3	559.407	565.107	571.235	
Total Gas Volume, Vw	ft^3	5.0173	5.5074	5.9410	5.4886
Initial Temperature	F	73.00	74.00	76.00	
Final Temperature	F	73.00	76.00	78.00	
Average Temperature, Tw	F	73.00	75.00	77.00	75.00
Dry Gas Meter					
Initial Volume	ft^3	194.840	199.981	205.599	
Final Volume	ft^3	199.852	205.471	211.481	
Total Gas Volume, Vm	ft^3	5.0120	5.4900	5.8820	5.4613
Initial Temperature Inlet	F	69.00	73.00	79.00	
Final Temperature Inlet	F	73.00	80.00	84.00	
Initial Temperature Outlet	F	69.00	71.00	72.00	
Final Temperature Outlet	F	70.00	72.00	73.00	
Average Temperature, Tm	F	70.25	74.00	77.00	73.75
Results		**Be sure to post ΔH @ and Y on the meter box.**			
ΔH @	in. H_2O	1.6224	1.7962	1.7398	**1.7195**
ΔH @ within 0.20 of average?	Yes/No	YES	YES	YES	
Gamma, Y	unitless	0.9947	0.9976	1.0026	**0.9983**
Y for each run within 0.02 of average?	Yes/No	YES	YES	YES	

Calibrated by: _____ Calibration Reviewed by: _____

$$Y = \frac{V_w P_b (T_m + 460)}{V_m \left(P_b + \frac{\Delta H}{13.6}\right)(T_w + 460)}$$

$$\Delta H@ = \frac{0.0317 \times \Delta H}{P_b \times (T_m + 460)} \times \left[\frac{(T_w + 460) \times \Theta}{V_w}\right]^2$$

CRA METHOD 5 POST-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	BE04906
Console Serial Number	
DGM Model Number	
DGM Serial Number	

Calibration Conditions					Factors/Conversions		
Date	Time	09/13/06	8:21	Posted Y	Std Temp	528	°R
Barometric Pressure		29.9	in Hg	0.9983	Std Press	29.92	in Hg
Theoretical Critical Vacuum[1]		14.1	in Hg		K_1	17.647	oR/in Hg
Calibration Technician		SZ					

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 * °R^{1/2})/(in.Hg * min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{amb})	(t_{amb})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	1.1	928.465	934.658	69	70	55	0.4611	69	69	16
10.0	1.1	934.658	940.850	70	70	55	0.4611	69	69	16
10.0	1.1	940.850	947.061	70	72	55	0.4611	69	69	16

Results

Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vcr_{(std)}$)	($Q_{cr(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
6.190	0.619	5.996	0.600	0.969	0.000	0.600	1.726	0.002
6.183	0.618	5.996	0.600	0.970	0.001	0.600	1.724	0.001
6.191	0.619	5.996	0.600	0.969	0.000	0.600	1.721	-0.003
		Difference from posted Y	-0.02927	0.96903	Y Average		1.724	ΔH@ Average

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. And the difference from the posted Y must be less than 0.05.

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 [signature] Date 9/13/06

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

Method 5 Dry Gas Meter Annual Calibration

Meter Box ID: BE04907
Barometric Pressure, P_b, in. Hg: 29.94

Calibration Date: 06/05/06
Reference Meter ID: BE04899
Reference Meter posted Y: 0.990

Parameter	Units	Run 1	Run 2	Run 3	Average
Orfice Manometer Setting, ΔH	in. H_2O	0.50	1.50	3.00	
Elapsed Time	min.	12.0	8.0	5.0	
Reference Meter					
Initial Volume	ft^3	538.043	543.316	549.106	
Final Volume	ft^3	543.161	548.979	554.188	
Total Gas Volume, Vw	ft^3	5.0668	5.6064	5.0312	5.2348
Initial Temperature	F	69.00	69.00	71.00	
Final Temperature	F	69.00	71.00	72.00	
Average Temperature, Tw	F	69.00	70.00	71.50	70.17
Dry Gas Meter					
Initial Volume	ft^3	401.496	406.734	412.474	
Final Volume	ft^3	406.583	412.345	417.489	
Total Gas Volume, Vm	ft^3	5.0870	5.6110	5.0150	5.2377
Initial Temperature Inlet	F	65.00	69.00	73.00	
Final Temperature Inlet	F	70.00	75.00	78.00	
Initial Temperature Outlet	F	65.00	67.00	69.00	
Final Temperature Outlet	F	67.00	68.00	70.00	
Average Temperature, Tm	F	66.75	69.75	72.50	69.67
Results		**Be sure to post ΔH @ and Y on the meter box.**			
ΔH @	in. H_2O	1.5775	1.7147	1.6642	1.6522
ΔH @ within 0.20 of average?	Yes/No	YES	YES	YES	
Gamma, Y	unitless	0.9906	0.9950	0.9978	0.9945
Y for each run within 0.02 of average?	Yes/No	YES	YES	YES	

Calibrated by: _____ Calibration Reviewed by: _____

$$Y = \frac{V_w P_b (T_m + 460)}{V_m \left(P_b + \frac{\Delta H}{13.6}\right)(T_w + 460)}$$

$$\Delta H@ = \frac{0.0317 \times \Delta H}{P_b \times (T_m + 460)} \times \left[\frac{(T_w + 460) \times \Theta}{V_w}\right]^2$$

CRA METHOD 5 POST-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	BE04907
Console Serial Number	
DGM Model Number	
DGM Serial Number	

Calibration Conditions					Factors/Conversions		
Date	Time	09/13/06	9:27	Posted Y	Std Temp	528	°R
Barometric Pressure		29.9	in Hg	0.9945	Std Press	29.92	in Hg
Theoretical Critical Vacuum[1]		14.1	in Hg		K_1	17.647	oR/in Hg
Calibration Technician		SZ					

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 * °R^{1/2})/(in.Hg*min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{amb})	(t_{amb})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	1.1	934.340	940.364	65	65	55	0.4611	66	66	16
10.0	1.1	940.364	946.386	65	66	55	0.4611	66	66	16
10.0	1.1	946.386	952.433	66	67	55	0.4611	66	66	16

Results

Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vcr_{(std)}$)	($Q_{cr(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
6.073	0.607	6.013	0.601	0.990	0.000	0.601	1.731	0.002
6.065	0.606	6.013	0.601	0.991	0.001	0.601	1.729	0.001
6.079	0.608	6.013	0.601	0.989	-0.001	0.601	1.726	-0.003
		Difference from posted Y	-0.00417	0.99033	Y Average		1.729	ΔH@ Average

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. And the difference from the posted Y must be less than 0.05.

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 _____ Date 9/13/06

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

Method 5 Dry Gas Meter Annual Calibration

Meter Box ID: BE04908
Barometric Pressure, P_b, in. Hg: 29.94

Calibration Date: 06/05/06
Reference Meter ID: BE04899
Reference Meter posted Y: 0.990

Parameter	Units	Run 1	Run 2	Run 3	Average
Orfice Manometer Setting, ΔH	in. H_2O	0.50	1.50	3.00	
Elapsed Time	min.	14.0	8.0	6.0	
Reference Meter					
Initial Volume	ft^3	520.108	526.271	531.989	
Final Volume	ft^3	526.075	531.799	537.895	
Total Gas Volume, Vw	ft^3	5.9073	5.4727	5.8469	5.7423
Initial Temperature	F	68.00	69.00	71.00	
Final Temperature	F	68.00	70.00	72.00	
Average Temperature, Tw	F	68.00	69.50	71.50	69.67
Dry Gas Meter					
Initial Volume	ft^3	166.582	172.625	178.144	
Final Volume	ft^3	172.440	177.952	183.918	
Total Gas Volume, Vm	ft^3	5.8580	5.3270	5.7740	5.6530
Initial Temperature Inlet	F	66.00	70.00	73.00	
Final Temperature Inlet	F	70.00	75.00	80.00	
Initial Temperature Outlet	F	66.00	68.00	69.00	
Final Temperature Outlet	F	68.00	69.00	70.00	
Average Temperature, Tm	F	67.50	70.50	73.00	70.33
Results		**Be sure to post ΔH @ and Y on the meter box.**			
ΔH @	in. H_2O	1.5714	1.7936	1.7728	1.7126
ΔH @ within 0.20 of average?	Yes/No	YES	YES	YES	
Gamma, Y	unitless	1.0062	1.0255	1.0081	1.0133
Y for each run within 0.02 of average?	Yes/No	YES	YES	YES	

Calibrated by: _____ Calibration Reviewed by: _____

$$Y = \frac{V_w P_b (T_m + 460)}{V_m \left(P_b + \frac{\Delta H}{13.6}\right)(T_w + 460)}$$

$$\Delta H@ = \frac{0.0317 \times \Delta H}{P_b \times (T_m + 460)} \times \left[\frac{(T_w + 460) \times \Theta}{V_w}\right]^2$$

CRA METHOD 5 POST-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	BE04908
Console Serial Number	
DGM Model Number	
DGM Serial Number	

Calibration Conditions				
Date	Time	09/13/06	12:37	Posted Y
Barometric Pressure		29.9	in Hg	1.0133
Theoretical Critical Vacuum[1]		14.1	in Hg	
Calibration Technician		SZ		

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

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 \cdot {}^oR^{1/2})/(in.Hg \cdot min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{amb})	(t_{amb})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
10.0	1.1	597.978	603.719	67	68	55	0.4611	67	67	15
10.0	1.1	603.719	609.379	68	69	55	0.4611	67	68	15
10.0	1.1	609.379	615.086	69	70	55	0.4611	68	68	15

Results

Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vcr_{(std)}$)	($Q_{cr(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
5.754	0.575	6.002	0.600	1.043	-0.009	0.600	1.728	0.002
5.662	0.566	5.999	0.600	1.059	0.008	0.600	1.726	0.000
5.699	0.570	5.996	0.600	1.052	0.001	0.600	1.725	-0.002
		Difference from posted Y	0.03823	1.05153	Y Average		1.726	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual valuas from the average is +-0.02. And the difference from the posted Y must ba less than 0.05.

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 [signature] Date 9/13/06

Control #	Avg Diameter	Nozzle I.D.	Type	Diameter 1	Diameter 2	Diameter 3	Average Diameter	Cal Date	Calibrator
BE04952	F (7/16)	F-06	Steel	0.434	0.431	0.431	0.432	11/27/00	JRTJ
BE04952 Count	4								
BE04953	G (1/2)	G-01	Steel	0.498	0.497	0.499	0.498	05/21/01	JRTJ
BE04953	G (1/2)	G-04	Steel	0.496	0.498	0.495	0.496	10/31/00	KWJ
BE04953	G (1/2)	G-05	Steel	0.501	0.500	0.500	0.500	05/21/01	JRTJ
BE04953	G (1/2)	G-06	Steel	0.499	0.500	0.498	0.499	01/13/99	RCS
BE04953	G (1/2)	G-07	Steel	0.493	0.495	0.497	0.495	01/13/99	RCS
BE04953	G (1/2)	G-08	Steel	0.499	0.502	0.498	0.500	01/13/99	RCS
BE04953	G (1/2)	G-12	Steel	0.507	0.505	0.503	0.505	01/13/99	RCS
BE04953 Count	7								
BE04954	I (5/8)	I-01	Steel	0.624	0.625	0.625	0.625	01/13/99	RCS
BE04954	I (5/8)	I-02	Steel	0.620	0.621	0.624	0.622	02/07/00	JJC
BE04954	I (5/8)	I-03	Steel	0.624	0.623	0.620	0.622	05/21/01	JRTJ
BE04954	I (5/8)	I-04	Steel	0.625	0.624	0.620	0.623	05/21/01	JRTJ
BE04954	I (5/8)	I-05	Steel	0.625	0.620	0.622	0.622	05/21/01	JRTJ
BE04954 Count	5								
BE04955	K (3/4)	K-01	Steel	0.755	0.756	0.753	0.755	01/13/99	RCS
BE04955	K (3/4)	K-02	Steel	0.755	0.754	0.751	0.753	01/13/99	RCS
BE04955	K (3/4)	K-03	Steel	0.752	0.753	0.751	0.752	01/13/99	RCS
BE04955	K (3/4)	K-04	Steel	0.756	0.756	0.752	0.755	01/13/99	RCS
BE04955 Count	4								
BE04956	GY (7/64)	GY-03	Glass	0.115	0.113	0.115	0.114	12/03/01	LCE
BE04956	GY (7/64)	GY-05	Glass	0.114	0.114	0.114	0.114	01/13/99	RCS
BE04956	GY (7/64)	GY-06	Glass	0.114	0.111	0.110	0.112	01/13/99	RCS
BE04956	GY (7/64)	GY-07	Glass	0.114	0.114	0.113	0.114	01/13/99	RCS
BE04956 Count	4								
BE04957	GA- (5/32)	GA-03	Glass	0.154	0.155	0.155	0.155	01/16/02	KWJ
BE04957	GA- (5/32)	GA-04	Glass	0.156	0.154	0.155	0.155	01/16/02	KWJ
BE04957	GA- (5/32)	GA-06	Glass	0.153	0.151	0.151	0.152	04/12/04	JMO
BE04957	GA- (5/32)	GA-07	Glass	0.163	0.161	0.161	0.162	04/12/04	JMO
BE04957	GA- (5/32)	GA-08	Glass	0.150	0.148	0.149	0.149	04/12/04	JMO
BE04957	GA- (5/32)	GA-09	Glass	0.149	0.149	0.149	0.149	04/12/04	JMO
BE04957 Count	6								
BE04958	GB- (3/16)	GB-17	Glass	0.190	0.191	0.190	0.190	08/09/06	AGK
BE04958	GB- (3/16)	GB-18	Glass	0.191	0.190	0.190	0.190	08/09/06	AGK
BE04958	GB- (3/16)	GB-19	Glass	0.193	0.191	0.192	0.192	08/09/06	AGK
BE04958	GB- (3/16)	GB-20	Glass	0.192	0.192	0.192	0.192	08/09/06	AGK
BE04958	GB- (3/16)	GB-21	Glass	0.191	0.192	0.192	0.192	08/09/06	AGK
BE04958	GB- (3/16)	GB-22	Glass	0.192	0.194	0.193	0.193	08/09/06	AGK
BE04958 Count	1								
BE04959	GX (7/32)	GX-11	Glass	0.219	0.219	0.219	0.219	06/30/03	TAB
BE04959	GX (7/32)	GX-13	Glass	0.206	0.206	0.208	0.207	08/09/06	AGK
BE04959	GX (7/32)	GX-14	Glass	0.207	0.206	0.207	0.207	08/09/06	AGK
BE04959	GX (7/32)	GX-15	Glass	0.207	0.207	0.208	0.207	08/09/06	AGK
BE04959	GX (7/32)	GX-16	Glass	0.208	0.209	0.209	0.208	08/09/06	AGK
BE04959	GX (7/32)	GX-17	Glass	0.208	0.207	0.208	0.208	08/09/06	AGK
BE04959	GX (7/32)	GX-18	Glass	0.208	0.208	0.209	0.208	08/09/06	AGK
BE04959 Count	7								
BE04960	GC (1/4)	GC-49	Glass	0.261	0.261	0.261	0.261	08/05/03	AGK
BE04960	GC (1/4)	GC-54	Glass	0.256	0.256	0.256	0.256	08/05/03	AGK
BE04960	GC (1/4)	GC-60	Glass	0.253	0.252	0.253	0.253	12/13/04	SZ
BE04960	GC (1/4)	GC-68	Glass	0.255	0.255	0.255	0.255	12/13/04	SZ
BE04960	GC (1/4)	GC-69	Glass	0.257	0.258	0.257	0.257	08/09/06	AGK
BE04960	GC (1/4)	GC-70	Glass	0.256	0.258	0.257	0.257	08/09/06	AGK
BE04960	GC (1/4)	GC-71	Glass	0.257	0.258	0.258	0.258	08/09/06	AGK
BE04960	GC (1/4)	GC-72	Glass	0.259	0.258	0.258	0.258	08/09/06	AGK
BE04960	GC (1/4)	GC-73	Glass	0.260	0.258	0.259	0.259	08/09/06	AGK
BE04960	GC (1/4)	GC-74	Glass	0.258	0.258	0.259	0.258	08/09/06	AGK
BE04960 Count	4								
BE04961	GW (9/32)	GW-07	Glass	0.275	0.275	0.274	0.275	12/03/01	LCE
BE04961	GW (9/32)	GW-08	Glass	0.274	0.275	0.274	0.274	12/03/01	LCE
BE04961	GW (9/32)	GW-17	Glass	0.277	0.279	0.276	0.277	02/24/03	SH

Control #	Avg Diameter	Nozzle I.D.	Type	Diameter 1	Diameter 2	Diameter 3	Average Diameter	Cal Date	Calibrator
BE04961	GW (9/32)	GW-18	Glass	0.280	0.280	0.279	0.280	02/24/03	SH
BE04961	GW (9/32)	GW-19	Glass	0.279	0.276	0.278	0.277	08/09/06	AGK
BE04961	GW (9/32)	GW-20	Glass	0.278	0.278	0.279	0.278	08/09/06	AGK
BE04961	GW (9/32)	GW-21	Glass	0.277	0.277	0.278	0.278	08/09/06	AGK
BE04961 Count	4								
BE04962	GD (5/16)	GD-33	Glass	0.297	0.298	0.297	0.297	04/12/04	JMO
BE04962	GD (5/16)	GD-35	Glass	0.300	0.301	0.299	0.300	04/12/04	JMO
BE04962	GD (5/16)	GD-42	Glass	0.309	0.308	0.307	0.308	04/29/05	SZ
BE04962	GD (5/16)	GD-43	Glass	0.312	0.312	0.311	0.312	08/09/06	AGK
BE04962	GD (5/16)	GD-44	Glass	0.313	0.312	0.312	0.312	08/09/06	AGK
BE04962	GD (5/16)	GD-45	Glass	0.314	0.313	0.313	0.313	08/09/06	AGK
BE04962 Count	3								
BE04963	GE (23/64)	GE-32	Glass	0.367	0.369	0.369	0.368	04/12/04	JMO
BE04963	GE (23/64)	GE-33	Glass	0.376	0.375	0.376	0.376	04/12/04	JMO
BE04963	GE (23/64)	GE-35	Glass	0.378	0.377	0.377	0.377	04/12/04	JMO
BE04963	GE (23/64)	GE-36	Glass	0.374	0.375	0.376	0.375	04/12/04	JMO
BE04963	GE (23/64)	GE-37	Glass	0.370	0.369	0.369	0.369	04/12/04	JMO
BE04963	GE (23/64)	GE-39	Glass	0.375	0.377	0.375	0.376	04/12/04	JMO
BE04963	GE (23/64)	GE-41	Glass	0.376	0.378	0.376	0.377	04/12/04	JMO
BE04963 Count	7								
BE04964	GZ (25/64)	GZ-04	Glass	0.391	0.391	0.391	0.391	01/03/02	KWJ
BE04964	GZ (25/64)	GZ-05	Glass	0.395	0.396	0.393	0.395	01/13/99	RCS
BE04964	GZ (25/64)	GZ-09	Glass	0.390	0.391	0.390	0.390	04/12/04	JMO
BE04964	GZ (25/64)	GZ-10	Glass	0.392	0.392	0.392	0.392	04/12/04	JMO
BE04964	GZ (25/64)	GZ-11	Glass	0.383	0.383	0.383	0.383	04/12/04	JMO
BE04964	GZ (25/64)	GZ-12	Glass	0.389	0.388	0.388	0.388	04/12/04	JMO
BE04964 Count	6								
BE04965	GF (7/16)								
BE04965 Count	1								
BE04966	GG (1/2)	GG-02	Glass	0.501	0.499	0.503	0.501	09/05/00	JJC
BE04966	GG (1/2)	GG-03	Glass	0.493	0.500	0.499	0.497	09/05/00	JJC
BE04966	GG (1/2)	GG-10	Glass	0.501	0.500	0.501	0.501	01/13/99	RCS
BE04966 Count	3								
BE04967	QA								
BE04967 Count	1								
BE04968	QB (3/16)	QB-01	Quartz	0.180	0.179	0.180	0.180	01/13/99	RCS
BE04968	QB (3/16)	QB-02	Quartz	0.182	0.181	0.181	0.181	01/13/99	RCS
BE04968	QB (3/16)	QB-03	Quartz	0.197	0.196	0.197	0.197	01/13/99	RCS
BE04968	QB (3/16)	QB-11	Quartz	0.196	0.198	0.197	0.197	01/13/99	RCS
BE04968	QB (3/16)	QB-21	Quartz	0.197	0.199	0.199	0.198	01/13/99	RCS
BE04968	QB (3/16)	QB-22	Quartz	0.194	0.195	0.195	0.195	08/09/06	AGK
BE04968	QB (3/16)	QB-23	Quartz	0.193	0.197	0.195	0.195	08/09/06	AGK
BE04968	QB (3/16)	QB-24	Quartz	0.194	0.195	0.195	0.195	08/09/06	AGK
BE04968 Count	5								
BE04969	QC (1/4)	QC-02	Quartz	0.260	0.258	0.261	0.260	01/13/99	RCS
BE04969	QC (1/4)	QC-09	Quartz	0.260	0.262	0.261	0.261	04/12/04	JMO
BE04969	QC (1/4)	QC-12	Quartz	0.226	0.227	0.227	0.227	08/09/06	AGK
BE04969	QC (1/4)	QC-13	Quartz	0.228	0.227	0.227	0.227	08/09/06	AGK
BE04969	QC (1/4)	QC-14	Quartz	0.231	0.230	0.230	0.230	08/09/06	AGK
BE04969	QC (1/4)	QC-15	Quartz	0.228	0.226	0.227	0.227	10/14/05	SZ
BE04969	QC (1/4)	QC-16	Quartz	0.229	0.230	0.230	0.230	10/14/05	SZ
BE04969 Count	7								
BE04970	QD	QD-01	Quartz	0.314	0.314	0.314	0.314	10/14/05	SZ
BE04970	QD(5/16)	QD-03	Quartz	0.315	0.315	0.315	0.315	10/14/05	SZ
BE04970	QD(5/16)	QD-05	Quartz	0.311	0.309	0.310	0.310	08/09/06	AGK
BE04970	QD(5/16)	QD-06	Quartz	0.310	0.311	0.310	0.310	08/09/06	AGK
BE04970	QD(5/16)	QD-07	Quartz	0.316	0.315	0.315	0.315	08/09/06	AGK
BE04970	QD(5/16)	QD-08	Quartz	0.319	0.320	0.319	0.319	08/09/06	AGK
BE04970 Count	2								
BE04971	QE (25/64)	QE-01	Quartz	0.391	0.389	0.391	0.390	04/16/04	JMO
BE04971	QE (25/64)	QE-02	Quartz	0.389	0.390	0.390	0.390	01/13/99	RCS

E3 Division
CONESTOGA-ROVERS & ASSOCIATES

Method 2 Calibration Report
(Thermocouples, Pitots and Pitot Assemblies)

Calibration Date: 09/12/06
Calibrator's Initials: SZ

Project Number: 045396_00
Project Name: Owens Corning

Equipment ID																							
Ass.	Pitot	Tc	a1 (°)	a2 (°)	b1 (°)	b2 (°)	Dt (in.)	PA (in.)	PB (in.)	w (in.)	Z (in.)	Field Tc Temp (F)	Cal. Tc Temp (F)	Field Tc Temp (R)	Cal. Tc Temp (R)	Pitot Pass/Fail	W (in.)	X (in.)	Y (in.)	Pitot Ass. Pass/Fail	W (in.)	Pitot Ass w/ st therm Pass/Fail
BE04182A	2P-1	2T-1	1.0	1.0	0.0	0.0	0.375	0.505	0.505	0.000	0.035	71	70	531	530	Pass	6.50	2.00	3.25	Pass		Fail
BE04182G	2P-7	2T-7	0.5	1.0	1.5	1.5	0.375	0.447	0.447	0.000	0.045	70	70	530	530	Pass	6.00	1.75	3.25	Pass		Fail
BE04183F	3P-6	3T-6	0.5	1.5	0.5	0.5	0.375	0.489	0.489	0.002	0.046	71	70	531	530	Pass	6.25	2.000	3.75	Pass		Fail
BE04183I	3P-9	3T-9	0.5	0.0	0.5	1.0	0.375	0.510	0.510	0.000	0.043	70	70	530	530	Pass	7.00	2.00	3.75	Pass		Fail
BE04186H	6P-8	6T-8	1.5	0.0	1.0	0.5	0.375	0.485	0.485	0.004	0.048	70	70	530	530	Pass	6.25	2.25	3.25	Pass		Fail
BE04186J	6P-10	6T-10	0.0	1.0	1.0	1.0	0.375	0.456	0.456	0.000	0.048	69	70	529	530	Pass	6.00	2.00	3.25	Pass		Fail
BE04185J	5P-10	5T-10	0.0	1.5	1.0	1.5	0.375	0.472	0.472	0.002	0.052	69	70	529	530	Pass	13.00	2.00	3.50	Pass		Fail
BE04185P	5P-16	5T-16	2.0	1.5	1.5	1.0	0.375	0.476	0.476	0.003	0.052	70	70	530	530	Pass	12.50	2.0	3.25	Pass		Fail

Acceptance Criteria

Pitots			Pitot Assemblies			Thermocouples
a1	< +10°	PA = PB	a1	< +10°	X	Thermocouples are calibrated at absolute stack temperature and the calibration is valid if the field thermocouple and the calibrated thermocouple read temperatures to within 1.5% of each other.
a2	< +10°	Dt: between 3/16 and 3/8 in.	a2	< +10°	Y	
b1	< +5°	P: 1.05Dt < P < 1.50Dt	b1	< +5°	Dt:	
b2	< +5°		b2	< +5°	W	
Z	< 1/8 in.		Z	< 1/8 in.		
w	< 0.03125 in		w	< 0.03125 in	P:	

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

Barometer Calibration Report

Project Number:	045396_00			
Project Name:	Owens Corning			
Test Date:	8/15-8/23/06			
Barometer ID:	BE04921			
	Pre. Cal		**Post Cal**	
Calibrator's Initials:	S.Z.		S.Z.	
Calibration Date:	08/10/06		09/05/06	
Time:	11:27		8:16	
Barometric Pressure:	29.94	**in. Hg**	30.12	**in. Hg**
NWS Station Pressure:	29.94	**in. Hg**	30.10	**in. Hg**
Pass/Fail, (within 0.1 in. Hg):	**Pass**		**Pass**	

Elevation at CRA Buffalo Office: 704' **Elevation at National Weather Service: 714'**

Barometer pressure correction due to altitude is not necessary due to the fact that the elevations are similar.

E3 Division
CONESTOGA-ROVERS
& ASSOCIATES

Barometer Calibration Report

Project Number:	045396_00			
Project Name:	Owens Corning			
Test Date:	8/15-8/23/06			
Barometer ID:	BE04923			
	Pre. Cal		**Post Cal**	
Calibrator's Initials:	S.Z.		S.Z.	
Calibration Date:	08/10/06		09/05/06	
Time:	11:27		8:16	
Barometric Pressure:	29.94	**in. Hg**	30.11	**in. Hg**
NWS Station Pressure:	29.94	**in. Hg**	30.10	**in. Hg**
Pass/Fail, (within 0.1 in. Hg):	**Pass**		**Pass**	

Elevation at CRA Buffalo Office: 704' **Elevation at National Weather Service: 714'**

Barometer pressure correction due to altitude is not necessary due to the fact that the elevations are similar.

APPENDIX D

OHIO EPA INTENT TO TEST FORMS

AGENCY USE ONLY

Date Received _____

Assigned _____

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

Proposed Test Date _____

Pre-Test Meeting Desired? Yes ☐ No ☐

Facility Premise No. _____ SCC Code _____

A. Facility Information

Name: Owens Corning Medina Roofing

Contact Person: Mr. Brian Thomas

Address: 870 West Smith Rd., Medina, OH 44256-2483

Telephone Number: 330-764-7839

B. Testing Firm Information

Name: CRA, Inc.

Contact Person: Mr. Michael Tahirak

Address: 2371 George Urban Blvd., Depew, NY 14043

Telephone Number: 716-206-0202

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

Emissions Unit #	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method(s)	Filter Box Temperature	Number of Sampling Points	Total Time for Test Run	Number of Sampling Runs
P-907	Baghouse		PM	5A/202		~~[illegible]~~ 15		3

Source is testing to comply with (check all that apply): ☐ State PTI ☐ State PTO ☐ Title V ☐ NSPS ☒ MACT ☐ BIF ☐ Title IV ☐ Other _____

D. What is the maximum rated capacity? 800 ft/min based on line speed

Will Emissions Unit be operated at the maximum capacity given in its permit-to-install or permit-to-operate? Yes ☐ No ☐ If no, attach explanation. N/A none in permit

Specify how operating rate will be demonstrated during testing (*See notes 1, 2 and 3 on page 2.): Line Speed

Are any modifications to USEPA Reference Method(s) proposed? Yes ☒ No ☐ If "no" is checked, then no modification, however minor, will be accepted.

If yes, explain proposed modification(s): 5 ports present, only 3 reasonable, other two blocked by baffles, will test 3 ports/5 points per port

Sampling Location(s): Inlet ☐ Outlet ☒ Simultaneous ☐ Will Cyclonic flow check(s) be conducted? Yes ☐ No ☒ already done

Fuel Sampling: Coal - Proximate ☐ Ultimate ☐ Other ☐ If other, specify: N/A

Emission rate to be calculated using: F-Factor ☐ Ultimate Coal Analysis ☐ Other ☒ If other, specify: Stack test data

Are concurrent Method 9 readings to be performed? Yes ☐ No ☒ Does the test method require audit samples? Yes ☐ No ☒

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes ☒ No ☐

If yes, briefly describe: 7/27/05 Check & replace pulsers 2,3,4,5 / 7/29/05 repair diaphragms, replace 1 valve / 3/20/06 Change HEPA Filt

(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.

4/6/06 Change Bags in RVI

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

AGENCY USE ONLY

Date Received _____

Assigned _____

Proposed Test Date _____

Pre-Test Meeting Desired? Yes ☐ No ☐

Facility Premise No. _____ SCC Code _____

A. Facility Information

Name: Owens Corning Medina Roofing

Address: 870 West Smith Rd., Medina, OH 44256-2483

Contact Person: Mr. Brian Thomas

Telephone Number: 330-764-7839

B. Testing Firm Information

Name: CRA, Inc.

Address: 2371 George Urban Blvd., Depew, NY 14043

Contact Person: Mr. Michael Tahirak

Telephone Number: 716-206-0202

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

Emissions Unit #	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method(s)	Filter Box Temperature	Number of Sampling Points	Total Time for Test Run	Number of Sampling Runs
P917	Baghouse		PM	5A/202	108±18	5	~~60~~ 60 mins	3

Source is testing to comply with (check all that apply): ☐ State PTI ☐ State PTO ☐ Title V ☐ NSPS ☒ MACT ☐ BIF ☐ Title IV ☐ Other _____

D. What is the maximum rated capacity? 800 ft/min based on line speed

Will Emissions Unit be operated at the maximum capacity given in its permit-to-install or permit-to-operate? Yes ☐ No ☐ If no, attach explanation. N/A None in permit

Specify how operating rate will be demonstrated during testing (*See notes 1, 2 and 3 on page 2.): Line Speed

Are any modifications to USEPA Reference Method(s) proposed? Yes ☒ No ☐ If "no" is checked, then no modification, however minor, will be accepted.

If yes, explain proposed modification(s): Only 1 test port, Spectra will be sampled, Flow traverses before & after runs

Sampling Location(s): Inlet ☐ Outlet ☒ Simultaneous ☐ Will Cyclonic flow check(s) be conducted? Yes ☐ No ☐

Fuel Sampling: Coal - Proximate ☐ Ultimate ☐ Other ☐ If other, specify: N/A

Emission rate to be calculated using: F-Factor ☐ Ultimate Coal Analysis ☐ Other ☒ If other, specify: Stack test data

Are concurrent Method 9 readings to be performed? Yes ☐ No ☒ Does the test method require audit samples? Yes ☐ No ☒

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes ☐ No ☒

If yes, briefly describe: _____

(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.

AGENCY USE ONLY

Date Received _____

Assigned _____

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

Proposed Test Date _____

Pre-Test Meeting Desired? Yes ☐ No ☐

Facility Premise No. _____

Code _____

A. Facility Information

Name Owens Corning Medina Roofing

Contact Person Mr. Brian Thomas

Address 870 West Smith Rd., Medina, OH 44256-2

Telephone Number 330-764-7839

B. Testing Firm Information

Name CRA, Inc.

Contact Person Mr. Michael Tahirak

Address 2371 George Urban Blvd., Depew, NY 14043

Telephone Number 716-206-0202

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

Emissions Unit #	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method(s)	Filter Box Temperature	Number of Sampling Points	Total Time for Test Run	Numbe Sampling
P906	Fiber Bed Filter		PM	5A/202	108±18	16	128 mins	3
			Opacity	9				3

Source is testing to comply with (check all that apply): ☐ State PTI ☐ State PTO ☐ Title V ☐ NSPS ☒ MACT ☐ BIF ☐ Title IV ☐ Other _____

D. What is the maximum rated capacity? 800 ft/min based on line speed

Will Emissions Unit be operated at the maximum capacity given in its permit-to-install or permit-to-operate? Yes ☐ No ☐ If no, attach explanation. N/A none inperm

Specify how operating rate will be demonstrated during testing (*See notes 1, 2 and 3 on page 2.): Line Speed

Are any modifications to USEPA Reference Method(s) proposed? Yes ☐ No ☒ If "no" is checked, then no modification, however minor, will be accepted.

If yes, explain proposed modification(s): _____

Sampling Location(s): Inlet ☐ Outlet ☒ Simultaneous ☐ Will Cyclonic flow check(s) be conducted? Yes ☒ No ☐

Fuel Sampling: Coal - Proximate ☐ Ultimate ☐ Other ☐ If other, specify: N/A

Emission rate to be calculated using: F-Factor ☐ Ultimate Coal Analysis ☐ Other ☒ If other, specify: Stack test data

Are concurrent Method 9 readings to be performed? Yes ☒ No ☐ Does the test method require audit samples? Yes ☐ No ☒

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes ☐ No ☒

If yes, briefly describe: _____

(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 perforr 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.

AGENCY USE ONLY

Date Received _____

Assigned _____

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

Proposed Test Date _____

Pre-Test Meeting Desired? Yes ☐ No ☐

Facility Premise No. _____ SCC Code _____

A. Facility Information

Name: Owens Corning Medina Roofing

Contact Person: Mr. Brian Thomas

Address: 870 West Smith Rd., Medina, OH 44256-2483

Telephone Number: 330-764-7839

B. Testing Firm Information

Name: CRA, Inc.

Contact Person: Mr. Michael Tahirak

Address: 2371 George Urban Blvd., Depew, NY 14043

Telephone Number: 716-206-0202

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

Emissions Unit #	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method(s)	Filter Box Temperature	Number of Sampling Points	Total Time for Test Run	Number of Sampling Runs
P-908	Fiber bed filter		PM	5A/202	108±18	12	120 min	3
			Opacity	9				3

Source is testing to comply with (check all that apply): ☐ State PTI ☐ State PTO ☐ Title V ☐ NSPS ☒ MACT ☐ BIF ☐ Title IV ☐ Other _____

D. What is the maximum rated capacity? 800 ft/min, based on line speed

Will Emissions Unit be operated at the maximum capacity given in its permit-to-install or permit-to-operate? Yes ☐ No ☐ If no, attach explanation. N/A none in permit

Specify how operating rate will be demonstrated during testing (*See notes 1, 2 and 3 on page 2.): Line speed

Are any modifications to USEPA Reference Method(s) proposed? Yes ☐ No ☒ If "no" is checked, then no modification, however minor, will be accepted.

If yes, explain proposed modification(s): _____

Sampling Location(s): Inlet ☐ Outlet ☒ Simultaneous ☐ Will Cyclonic flow check(s) be conducted? Yes ☒ No ☐

Fuel Sampling: Coal - Proximate ☐ Ultimate ☐ Other ☐ If other, specify: N/A

Emission rate to be calculated using: F-Factor ☐ Ultimate Coal Analysis ☐ Other ☒ If other, specify: Stack test Data

Are concurrent Method 9 readings to be performed? Yes ☒ No ☐ Does the test method require audit samples? Yes ☐ No ☒

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes ☒ No ☐

If yes, briefly describe: Changed 2 candle filters 3 July 06

(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.

AGENCY USE ONLY

Date Received _____

Assigned _____

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

Proposed Test Date _____

Pre-Test Meeting Desired? Yes [ ] No [ ]

Facility Premise No. _____ SCC Code _____

A. Facility Information

Name: Owens Corning Medina Roofing

Contact Person: Mr. Brian Thomas

Address: 870 West Smith Rd., Medina, OH 44256-2483

Telephone Number: 330-764-7839

B. Testing Firm Information

Name: CRA, Inc.

Contact Person: Mr. Michael Tahirak

Address: 2371 George Urban Blvd., Depew, NY 14043

Telephone Number: 716-206-0202

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

Emissions Unit #	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method(s)	Filter Box Temperature	Number of Sampling Points	Total Time for Test Run	Number of Sampling Runs
P912			PM	5A/202	108 ± 18	not yet determined	60 mins	3

Source is testing to comply with (check all that apply): [ ] State PTI [ ] State PTO [ ] Title V [ ] NSPS [X] MACT [ ] BIF [ ] Title IV [ ] Other _____

D. What is the maximum rated capacity? 800 ft/min based on line speed

Will Emissions Unit be operated at the maximum capacity given in its permit-to-install or permit-to-operate? Yes [ ] No [ ] If no, attach explanation. N/A, none in permit

Specify how operating rate will be demonstrated during testing (*See notes 1, 2 and 3 on page 2.): Line speed

Are any modifications to USEPA Reference Method(s) proposed? Yes [ ] No [ ] If "no" is checked, then no modification, however minor, will be accepted.

If yes, explain proposed modification(s): Unknown at this time.

Sampling Location(s): Inlet [ ] Outlet [X] Simultaneous [ ] Will Cyclonic flow check(s) be conducted? Yes [X] No [ ]

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

Emission rate to be calculated using: F-Factor [ ] Ultimate Coal Analysis [ ] Other [X] If other, specify: Shell test data

Are concurrent Method 9 readings to be performed? Yes [ ] No [X] Does the test method require audit samples? Yes [ ] No [X]

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes [ ] No [X]

If yes, briefly describe: _____

(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.

INTENT TO TEST NOTIFICATION (One Emissions Unit Per Sheet)

AGENCY USE ONLY

Date Received _____

Assigned _____

Proposed Test Date _____

Pre-Test Meeting Desired? Yes ☐ No ☐

Facility Premise No. _____ SCC Code _____

A. Facility Information

Name: Owens Corning Medina Roofing

Contact Person: Mr. Brian Thomas

Address: 870 West Smith Rd., Medina, OH 44256-2483

Telephone Number: 330-764-7839

B. Testing Firm Information

Name: CRA, Inc.

Contact Person: Mr. Michael Tahirak

Address: 2371 George Urban Blvd., Depew, NY 14043

Telephone Number: 716-206-0202

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

Emissions Unit #	Control Equipment	Monitoring Equipment	Pollutant(s) to be Tested	EPA Test Method(s)	Filter Box Temperature	Number of Sampling Points	Total Time for Test Run	Number of Sampling Runs
P913			PM	5A/202	108 ± 18	not yet determined	60 mins	3

Source is testing to comply with (check all that apply): ☐ State PTI ☐ State PTO ☐ Title V ☐ NSPS ☒ MACT ☐ BIF ☐ Title IV ☐ Other _____

D. What is the maximum rated capacity? 800 ft/min based on line speed

Will Emissions Unit be operated at the maximum capacity given in its permit-to-install or permit-to-operate? Yes ☐ No ☐ If no, attach explanation. N/A none in permit

Specify how operating rate will be demonstrated during testing (*See notes 1, 2 and 3 on page 2.): Linespeed

Are any modifications to USEPA Reference Method(s) proposed? Yes ☐ No ☐ If "no" is checked, then no modification, however minor, will be accepted.

If yes, explain proposed modification(s): Unknown at this time

Sampling Location(s): Inlet ☐ Outlet ☒ Simultaneous ☐ Will Cyclonic flow check(s) be conducted? Yes ☒ No ☐

Fuel Sampling: Coal - Proximate ☐ Ultimate ☐ Other ☐ If other, specify: N/A

Emission rate to be calculated using: F-Factor ☐ Ultimate Coal Analysis ☐ Other ☒ If other, specify: Stack test data

Are concurrent Method 9 readings to be performed? Yes ☐ No ☒ Does the test method require audit samples? Yes ☐ No ☒

Has any maintenance or parts replacement been performed on the emissions unit or the control equipment within the last year? Yes ☐ No ☒

If yes, briefly describe: _____

(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.

APPENDIX E

PROCESS DATA

Inlet gas temperature and Differential pressure summary

	Average Differential Pressure	Average Inlet gas Temperature
P917	4.2	163.9
P906	5.6	102.4
P913	4.9	136.3
P912	5	128.6
P907	4.2	103.4
P908	7.9	115

Average	Strip	Coater	Fiber	Fume	Bed	Temp	1 IP_TREND_TIME
---	VALUE	DATE	TIME				
	118.0	17-Aug-06	14:37				
	117.0	17-Aug-06	14:22				
	115.0	17-Aug-06	14:07				
	114.0	17-Aug-06	13:52				
	116.0	17-Aug-06	13:37				
	115.0	17-Aug-06	13:22				
	115.0	17-Aug-06	13:07				
	116.0	17-Aug-06	12:52				
	116.0	17-Aug-06	12:37				
	116.0	17-Aug-06	12:22				
	115.0	17-Aug-06	12:07				
	113.0	17-Aug-06	11:52				
	112.0	17-Aug-06	11:37				
	113.0	17-Aug-06	11:22				

Average	Strip	Coater	Fiber	Fume	Bed	Temp	1 IP_TREND_TIME
---	VALUE	DATE	TIME				
	115.0	18-Aug-06	11:07				
	116.0	18-Aug-06	10:52				
	115.0	18-Aug-06	10:37				
	115.0	18-Aug-06	10:22				
	114.0	18-Aug-06	10:07				
	114.0	18-Aug-06	9:52				
	114.0	18-Aug-06	9:37				
	114.0	18-Aug-06	9:22				
	111.0	18-Aug-06	9:07				
	112.0	18-Aug-06	8:52				
	112.0	18-Aug-06	8:37				

Average	Strip	Coater	Fiber	Fume	Bed	Temp	1 IP_TREND_TIME
---	VALUE	DATE	TIME				
	115.0	18-Aug-06	13:52				
	116.0	18-Aug-06	13:37				
	117.0	18-Aug-06	13:22				
	116.0	18-Aug-06	13:07				
	116.0	18-Aug-06	12:52				
	115.0	18-Aug-06	12:37				
	116.0	18-Aug-06	12:22				
	116.0	18-Aug-06	12:07				
	116.0	18-Aug-06	11:52				

Average	Strip	Coater	Fiber	Fume	Bed	Temp	2 IP_TREND_TIME
---	VALUE	DATE	TIME				
	118.0	17-Aug-06	14:37				
	117.0	17-Aug-06	14:22				
	115.0	17-Aug-06	14:07				
	114.0	17-Aug-06	13:52				
	116.0	17-Aug-06	13:37				
	115.0	17-Aug-06	13:22				
	115.0	17-Aug-06	13:07				
	116.0	17-Aug-06	12:52				
	116.0	17-Aug-06	12:37				
	116.0	17-Aug-06	12:22				
	115.0	17-Aug-06	12:07				
	114.0	17-Aug-06	11:52				
	112.0	17-Aug-06	11:37				
	113.0	17-Aug-06	11:22				

Average	Strip	Coater	Fiber	Fume	Bed	Temp	2 IP_TREND_TIME
---	VALUE	DATE	TIME				
	115.0	18-Aug-06	11:07				
	116.0	18-Aug-06	10:52				
	116.0	18-Aug-06	10:37				
	115.0	18-Aug-06	10:22				
	114.0	18-Aug-06	10:07				
	114.0	18-Aug-06	9:52				
	115.0	18-Aug-06	9:37				
	114.0	18-Aug-06	9:22				
	111.0	18-Aug-06	9:07				
	112.0	18-Aug-06	8:52				
	112.0	18-Aug-06	8:37				

Average	Strip	Coater	Fiber	Fume	Bed	Temp	2 IP_TREND_TIME
---	VALUE	DATE	TIME				
	116.0	18-Aug-06	13:52				
	116.0	18-Aug-06	13:37				

	117.0	18-Aug-06	13:22
	116.0	18-Aug-06	13:07
	116.0	18-Aug-06	12:52
	116.0	18-Aug-06	12:37
	116.0	18-Aug-06	12:22
	116.0	18-Aug-06	12:07
	116.0	18-Aug-06	11:52
Average	**115.0**		

Average	Strip	Coater	Fiber	Fume	Bed	DP1	IP_TREND_TIME
---	VALUE	DATE	TIME				
	8.2	17-Aug-06	14:37				
	8.2	17-Aug-06	14:22				
	8.2	17-Aug-06	14:07				
	8.3	17-Aug-06	13:52				
	8.2	17-Aug-06	13:37				
	8.2	17-Aug-06	13:22				
	8.3	17-Aug-06	13:07				
	8.3	17-Aug-06	12:52				
	8.2	17-Aug-06	12:37				
	8.2	17-Aug-06	12:22				
	8.3	17-Aug-06	12:07				
	8.3	17-Aug-06	11:52				
	8.3	17-Aug-06	11:37				
	8.3	17-Aug-06	11:22				

Average	Strip	Coater	Fiber	Fume	Bed	DP1	IP_TREND_TIME
---	VALUE	DATE	TIME				
	8.2	18-Aug-06	11:07				
	8.2	18-Aug-06	10:52				
	8.3	18-Aug-06	10:37				
	8.2	18-Aug-06	10:22				
	8.2	18-Aug-06	10:07				
	8.2	18-Aug-06	9:52				
	8.2	18-Aug-06	9:37				
	8.2	18-Aug-06	9:22				
	8.2	18-Aug-06	9:07				
	8.2	18-Aug-06	8:52				
	8.2	18-Aug-06	8:37				

Average	Strip	Coater	Fiber	Fume	Bed	DP1	IP_TREND_TIME
---	VALUE	DATE	TIME				
	8.2	18-Aug-06	13:52				
	8.2	18-Aug-06	13:37				
	8.2	18-Aug-06	13:22				
	8.3	18-Aug-06	13:07				
	8.3	18-Aug-06	12:52				
	8.2	18-Aug-06	12:37				
	8.2	18-Aug-06	12:22				
	8.2	18-Aug-06	12:07				
	8.2	18-Aug-06	11:52				

Average	Strip	Coater	Fiber	Fume	Bed	DP2	IP_TREND_TIME
---	VALUE	DATE	TIME				
	7.6	17-Aug-06	14:37				
	7.6	17-Aug-06	14:22				
	7.6	17-Aug-06	14:07				
	7.6	17-Aug-06	13:52				
	7.6	17-Aug-06	13:37				
	7.6	17-Aug-06	13:22				
	7.6	17-Aug-06	13:07				
	7.6	17-Aug-06	12:52				
	7.6	17-Aug-06	12:37				
	7.6	17-Aug-06	12:22				
	7.6	17-Aug-06	12:07				
	7.7	17-Aug-06	11:52				
	7.6	17-Aug-06	11:37				
	7.7	17-Aug-06	11:22				

Average	Strip	Coater	Fiber	Fume	Bed	DP2	IP_TREND_TIME
---	VALUE	DATE	TIME				
	7.6	18-Aug-06	11:07				
	7.6	18-Aug-06	10:52				
	7.7	18-Aug-06	10:37				
	7.6	18-Aug-06	10:22				
	7.6	18-Aug-06	10:07				
	7.6	18-Aug-06	9:52				

	7.6	18-Aug-06	9:37				
	7.6	18-Aug-06	9:22				
	7.6	18-Aug-06	9:07				
	7.6	18-Aug-06	8:52				
	7.6	18-Aug-06	8:37				
Average	Strip	Coater	Fiber	Fume	Bed	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	7.6	18-Aug-06	13:52				
	7.6	18-Aug-06	13:37				
	7.6	18-Aug-06	13:22				
	7.6	18-Aug-06	13:07				
	7.6	18-Aug-06	12:52				
	7.6	18-Aug-06	12:37				
	7.6	18-Aug-06	12:22				
	7.6	18-Aug-06	12:07				
	7.6	18-Aug-06	11:52				
Average	**7.9**						
Average	Strip	Primary	Dust	Collector	Temp		1 IP_TREND_TIME
----------	VALUE	DATE	TIME				
	104.0	18-Aug-06	10:52				
	104.0	18-Aug-06	10:37				
	104.0	18-Aug-06	10:22				
	103.0	18-Aug-06	10:07				
	103.0	18-Aug-06	9:52				
	103.0	18-Aug-06	9:37				
	101.0	18-Aug-06	9:22				
	99.0	18-Aug-06	9:07				
	99.0	18-Aug-06	8:52				
	98.0	18-Aug-06	8:37				
Average	Strip	Primary	Dust	Collector	Temp		1 IP_TREND_TIME
----------	VALUE	DATE	TIME				
	105.0	18-Aug-06	12:52				
	105.0	18-Aug-06	12:37				
	105.0	18-Aug-06	12:22				
	106.0	18-Aug-06	12:07				
	105.0	18-Aug-06	11:52				
	106.0	18-Aug-06	11:37				
Average	Strip	Primary	Dust	Collector	Temp		1 IP_TREND_TIME
----------	VALUE	DATE	TIME				
	107.0	18-Aug-06	15:37				
	106.0	18-Aug-06	15:22				
	106.0	18-Aug-06	15:07				
	106.0	18-Aug-06	14:52				
	106.0	18-Aug-06	14:37				
	105.0	18-Aug-06	14:22				
	104.0	18-Aug-06	14:07				
	102.0	18-Aug-06	13:52				
	105.0	18-Aug-06	13:37				
Average	Strip	Primary	Dust	Collector	Temp		2 IP_TREND_TIME
----------	VALUE	DATE	TIME				
	103.0	18-Aug-06	10:52				
	103.0	18-Aug-06	10:37				
	103.0	18-Aug-06	10:22				
	102.0	18-Aug-06	10:07				
	102.0	18-Aug-06	9:52				
	102.0	18-Aug-06	9:37				
	100.0	18-Aug-06	9:22				
	98.0	18-Aug-06	9:07				
	98.0	18-Aug-06	8:52				
	97.0	18-Aug-06	8:37				
Average	Strip	Primary	Dust	Collector	Temp		2 IP_TREND_TIME
----------	VALUE	DATE	TIME				
	104.0	18-Aug-06	12:52				
	104.0	18-Aug-06	12:37				
	104.0	18-Aug-06	12:22				
	105.0	18-Aug-06	12:07				
	104.0	18-Aug-06	11:52				
	104.0	18-Aug-06	11:37				
Average	Strip	Primary	Dust	Collector	Temp		2 IP_TREND_TIME
----------	VALUE	DATE	TIME				
	106.0	18-Aug-06	15:37				

	105.0	18-Aug-06	15:22
	105.0	18-Aug-06	15:07
	105.0	18-Aug-06	14:52
	105.0	18-Aug-06	14:37
	104.0	18-Aug-06	14:22
	103.0	18-Aug-06	14:07
	101.0	18-Aug-06	13:52
	104.0	18-Aug-06	13:37

Average **103.4**

Average	Strip	Primary	Dust	Collector	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME			
	4.2	18-Aug-06	10:52			
	4.2	18-Aug-06	10:37			
	4.2	18-Aug-06	10:22			
	4.1	18-Aug-06	10:07			
	4.1	18-Aug-06	9:52			
	4.1	18-Aug-06	9:37			
	4.1	18-Aug-06	9:22			
	4.1	18-Aug-06	9:07			
	4.1	18-Aug-06	8:52			
	4.1	18-Aug-06	8:37			

Average	Strip	Primary	Dust	Collector	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME			
	4.2	18-Aug-06	12:52			
	4.2	18-Aug-06	12:37			
	4.2	18-Aug-06	12:22			
	4.2	18-Aug-06	12:07			
	4.2	18-Aug-06	11:52			
	4.2	18-Aug-06	11:37			

Average	Strip	Primary	Dust	Collector	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME			
	4.3	18-Aug-06	15:37			
	4.3	18-Aug-06	15:22			
	4.3	18-Aug-06	15:07			
	4.3	18-Aug-06	14:52			
	4.3	18-Aug-06	14:37			
	4.3	18-Aug-06	14:22			
	4.3	18-Aug-06	14:07			
	4.3	18-Aug-06	13:52			
	4.3	18-Aug-06	13:37			

Average	Strip	Primary	Dust	Collector	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME			
	4.1	18-Aug-06	10:52			
	4.1	18-Aug-06	10:37			
	4.1	18-Aug-06	10:22			
	4.1	18-Aug-06	10:07			
	4.1	18-Aug-06	9:52			
	4.1	18-Aug-06	9:37			
	4.1	18-Aug-06	9:22			
	4.1	18-Aug-06	9:07			
	4.1	18-Aug-06	8:52			
	4.1	18-Aug-06	8:37			

Average	Strip	Primary	Dust	Collector	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME			
	4.2	18-Aug-06	12:52			
	4.2	18-Aug-06	12:37			
	4.2	18-Aug-06	12:22			
	4.2	18-Aug-06	12:07			
	4.2	18-Aug-06	11:52			
	4.1	18-Aug-06	11:37			

Average	Strip	Primary	Dust	Collector	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME			
	4.3	18-Aug-06	15:37			
	4.3	18-Aug-06	15:22			
	4.3	18-Aug-06	15:07			
	4.3	18-Aug-06	14:52			
	4.3	18-Aug-06	14:37			
	4.2	18-Aug-06	14:22			
	4.2	18-Aug-06	14:07			
	4.2	18-Aug-06	13:52			
	4.2	18-Aug-06	13:37			

Average 4.2

Average	Lam	Coater	Fiber	Fume	Bed	Temp1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	104.0	15-Aug-06	16:07				
	104.0	15-Aug-06	15:52				
	104.0	15-Aug-06	15:37				
	103.0	15-Aug-06	15:22				
	102.0	15-Aug-06	15:07				
	102.0	15-Aug-06	14:52				
	101.0	15-Aug-06	14:37				
	101.0	15-Aug-06	14:22				
	99.0	15-Aug-06	14:07				
	98.0	15-Aug-06	13:52				
	101.0	15-Aug-06	13:37				
	102.0	15-Aug-06	13:22				
	100.0	15-Aug-06	13:07				

Average	Lam	Coater	Fiber	Fume	Bed	Temp1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	105.0	15-Aug-06	19:37				
	105.0	15-Aug-06	19:22				
	105.0	15-Aug-06	19:07				
	106.0	15-Aug-06	18:52				
	106.0	15-Aug-06	18:37				
	105.0	15-Aug-06	18:22				
	104.0	15-Aug-06	18:07				
	103.0	15-Aug-06	17:52				
	104.0	15-Aug-06	17:37				
	105.0	15-Aug-06	17:22				
	105.0	15-Aug-06	17:07				

Average	Lam	Coater	Fiber	Fume	Bed	Temp1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	102.0	16-Aug-06	12:07				
	102.0	16-Aug-06	11:52				
	102.0	16-Aug-06	11:37				
	102.0	16-Aug-06	11:22				
	101.0	16-Aug-06	11:07				
	100.0	16-Aug-06	10:52				
	99.0	16-Aug-06	10:37				
	99.0	16-Aug-06	10:22				
	99.0	16-Aug-06	10:07				

Average	Lam	Coater	Fiber	Fume	Bed	Temp2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	104.0	15-Aug-06	16:07				
	104.0	15-Aug-06	15:52				
	104.0	15-Aug-06	15:37				
	103.0	15-Aug-06	15:22				
	102.0	15-Aug-06	15:07				
	102.0	15-Aug-06	14:52				
	101.0	15-Aug-06	14:37				
	101.0	15-Aug-06	14:22				
	99.0	15-Aug-06	14:07				
	98.0	15-Aug-06	13:52				
	101.0	15-Aug-06	13:37				
	102.0	15-Aug-06	13:22				
	100.0	15-Aug-06	13:07				

Average	Lam	Coater	Fiber	Fume	Bed	Temp2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	105.0	15-Aug-06	19:37				
	105.0	15-Aug-06	19:22				
	105.0	15-Aug-06	19:07				
	106.0	15-Aug-06	18:52				
	105.0	15-Aug-06	18:37				
	105.0	15-Aug-06	18:22				
	104.0	15-Aug-06	18:07				
	103.0	15-Aug-06	17:52				
	104.0	15-Aug-06	17:37				
	105.0	15-Aug-06	17:22				
	105.0	15-Aug-06	17:07				

Average	Lam	Coater	Fiber	Fume	Bed	Temp2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	102.0	16-Aug-06	12:07				

	102.0	16-Aug-06	11:52
	102.0	16-Aug-06	11:37
	102.0	16-Aug-06	11:22
	101.0	16-Aug-06	11:07
	100.0	16-Aug-06	10:52
	99.0	16-Aug-06	10:37
	99.0	16-Aug-06	10:22
	99.0	16-Aug-06	10:07
Average	**102.4**		

Average	Lam	Coater	Fiber	Fume	Bed	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	5.9	15-Aug-06	16:07				
	5.9	15-Aug-06	15:52				
	5.8	15-Aug-06	15:37				
	5.8	15-Aug-06	15:22				
	5.8	15-Aug-06	15:07				
	5.7	15-Aug-06	14:52				
	5.8	15-Aug-06	14:37				
	5.7	15-Aug-06	14:22				
	5.7	15-Aug-06	14:07				
	5.7	15-Aug-06	13:52				
	5.7	15-Aug-06	13:37				
	5.8	15-Aug-06	13:22				
	5.7	15-Aug-06	13:07				

Average	Lam	Coater	Fiber	Fume	Bed	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	5.9	15-Aug-06	19:37				
	5.9	15-Aug-06	19:22				
	6.0	15-Aug-06	19:07				
	5.9	15-Aug-06	18:52				
	5.9	15-Aug-06	18:37				
	5.9	15-Aug-06	18:22				
	6.0	15-Aug-06	18:07				
	6.0	15-Aug-06	17:52				
	5.9	15-Aug-06	17:37				
	5.9	15-Aug-06	17:22				
	5.9	15-Aug-06	17:07				

Average	Lam	Coater	Fiber	Fume	Bed	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	5.8	16-Aug-06	12:07				
	5.8	16-Aug-06	11:52				
	5.9	16-Aug-06	11:37				
	5.8	16-Aug-06	11:22				
	6.0	16-Aug-06	11:07				
	5.8	16-Aug-06	10:52				
	5.9	16-Aug-06	10:37				
	5.8	16-Aug-06	10:22				
	5.8	16-Aug-06	10:07				

Average	Lam	Coater	Fiber	Fume	Bed	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	5.5	15-Aug-06	16:07				
	5.4	15-Aug-06	15:52				
	5.4	15-Aug-06	15:37				
	5.4	15-Aug-06	15:22				
	5.3	15-Aug-06	15:07				
	5.3	15-Aug-06	14:52				
	5.4	15-Aug-06	14:37				
	5.3	15-Aug-06	14:22				
	5.3	15-Aug-06	14:07				
	5.2	15-Aug-06	13:52				
	5.3	15-Aug-06	13:37				
	5.3	15-Aug-06	13:22				
	5.3	15-Aug-06	13:07				

Average	Lam	Coater	Fiber	Fume	Bed	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	5.4	15-Aug-06	19:37				
	5.5	15-Aug-06	19:22				
	5.5	15-Aug-06	19:07				
	5.5	15-Aug-06	18:52				
	5.4	15-Aug-06	18:37				
	5.5	15-Aug-06	18:22				

	5.5	15-Aug-06	18:07				
	5.5	15-Aug-06	17:52				
	5.5	15-Aug-06	17:37				
	5.5	15-Aug-06	17:22				
	5.4	15-Aug-06	17:07				
Average	Lam	Coater	Fiber	Fume	Bed	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	5.4	16-Aug-06	12:07				
	5.4	16-Aug-06	11:52				
	5.4	16-Aug-06	11:37				
	5.4	16-Aug-06	11:22				
	5.5	16-Aug-06	11:07				
	5.4	16-Aug-06	10:52				
	5.4	16-Aug-06	10:37				
	5.3	16-Aug-06	10:22				
	5.4	16-Aug-06	10:07				
Average	**5.6**						

Average	Lam	Filler	Heater	Dust	Collector	Temp1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	164.0	19-Aug-06	19:52				
	165.0	19-Aug-06	19:37				
	164.0	19-Aug-06	19:22				
	164.0	19-Aug-06	19:07				
Average	Lam	Filler	Heater	Dust	Collector	Temp1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	165.0	19-Aug-06	21:22				
	164.0	19-Aug-06	21:07				
	164.0	19-Aug-06	20:52				
	164.0	19-Aug-06	20:37				
Average	Lam	Filler	Heater	Dust	Collector	Temp2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	163.0	19-Aug-06	19:52				
	164.0	19-Aug-06	19:37				
	163.0	19-Aug-06	19:22				
	164.0	19-Aug-06	19:07				
Average	Lam	Filler	Heater	Dust	Collector	Temp2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	164.0	19-Aug-06	21:22				
	163.0	19-Aug-06	21:07				
	163.0	19-Aug-06	20:52				
	164.0	19-Aug-06	20:37				
Average	**163.9**						

Average	Lam	Filler	Heater	Dust	Collector	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	4.4	19-Aug-06	19:52				
	4.5	19-Aug-06	19:37				
	4.3	19-Aug-06	19:22				
	4.6	19-Aug-06	19:07				
Average	Lam	Filler	Heater	Dust	Collector	DP1	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	4.3	19-Aug-06	21:22				
	4.0	19-Aug-06	21:07				
	4.1	19-Aug-06	20:52				
	4.4	19-Aug-06	20:37				
Average	Lam	Filler	Heater	Dust	Collector	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	4.2	19-Aug-06	19:52				
	4.3	19-Aug-06	19:37				
	4.1	19-Aug-06	19:22				
	4.4	19-Aug-06	19:07				
Average	Lam	Filler	Heater	Dust	Collector	DP2	IP_TREND_TIME
----------	VALUE	DATE	TIME				
	4.1	19-Aug-06	21:22				
	3.8	19-Aug-06	21:07				
	4.0	19-Aug-06	20:52				
	4.2	19-Aug-06	20:37				
Average	**4.2**						

Average	MLA	AIR	TEMP1	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	131.0	16-Aug-06	16:07	
	130.0	16-Aug-06	15:52	
	129.0	16-Aug-06	15:37	
	127.0	16-Aug-06	15:22	
Average	MLA	AIR	TEMP1	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	131.0	16-Aug-06	17:52	
	131.0	16-Aug-06	17:37	
	130.0	16-Aug-06	17:22	
	127.0	16-Aug-06	17:07	
	128.0	16-Aug-06	16:52	
	134.0	16-Aug-06	16:37	
	132.0	16-Aug-06	16:22	
	131.0	16-Aug-06	16:07	
	130.0	16-Aug-06	15:52	
Average	MLA	AIR	TEMP1	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	127.0	16-Aug-06	20:07	
	124.0	16-Aug-06	19:52	
	125.0	16-Aug-06	19:37	
	126.0	16-Aug-06	19:22	
	131.0	16-Aug-06	19:07	
	132.0	16-Aug-06	18:52	
Average	MLA	AIR	TEMP2	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	129.0	16-Aug-06	16:07	
	129.0	16-Aug-06	15:52	
	127.0	16-Aug-06	15:37	
	126.0	16-Aug-06	15:22	
Average	MLA	AIR	TEMP2	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	130.0	16-Aug-06	17:52	
	129.0	16-Aug-06	17:37	
	129.0	16-Aug-06	17:22	
	126.0	16-Aug-06	17:07	
	127.0	16-Aug-06	16:52	
	132.0	16-Aug-06	16:37	
	131.0	16-Aug-06	16:22	
	129.0	16-Aug-06	16:07	
	129.0	16-Aug-06	15:52	
Average	MLA	AIR	TEMP2	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	125.0	16-Aug-06	20:07	
	123.0	16-Aug-06	19:52	
	123.0	16-Aug-06	19:37	
	125.0	16-Aug-06	19:22	
	130.0	16-Aug-06	19:07	
	130.0	16-Aug-06	18:52	

Average **128.6**

Average	MLA	DP1	_TREND_TIME
----------	VALUE	DATE	TIME
	5.0	16-Aug-06	16:07
	5.0	16-Aug-06	15:52
	4.9	16-Aug-06	15:37
	4.9	16-Aug-06	15:22
Average	MLA	DP1	_TREND_TIME
----------	VALUE	DATE	TIME
	4.9	16-Aug-06	17:52
	5.0	16-Aug-06	17:37
	5.0	16-Aug-06	17:22
	4.9	16-Aug-06	17:07
	5.0	16-Aug-06	16:52
	4.9	16-Aug-06	16:37
	4.9	16-Aug-06	16:22
	5.0	16-Aug-06	16:07
	5.0	16-Aug-06	15:52
Average	MLA	DP1	_TREND_TIME
----------	VALUE	DATE	TIME
	4.9	16-Aug-06	20:07

	5.0	16-Aug-06	19:52
	4.9	16-Aug-06	19:37
	4.9	16-Aug-06	19:22
	4.9	16-Aug-06	19:07
	4.9	16-Aug-06	18:52
Average	MLA	DP2	_TREND_TIME
----------	VALUE	DATE	TIME
	5.1	16-Aug-06	16:07
	5.1	16-Aug-06	15:52
	5.1	16-Aug-06	15:37
	5.1	16-Aug-06	15:22
Average	MLA	DP2	_TREND_TIME
----------	VALUE	DATE	TIME
	5.1	16-Aug-06	17:52
	5.2	16-Aug-06	17:37
	5.2	16-Aug-06	17:22
	5.1	16-Aug-06	17:07
	5.2	16-Aug-06	16:52
	5.1	16-Aug-06	16:37
	5.1	16-Aug-06	16:22
	5.1	16-Aug-06	16:07
	5.1	16-Aug-06	15:52
Average	MLA	DP2	_TREND_TIME
----------	VALUE	DATE	TIME
	5.1	16-Aug-06	20:07
	5.1	16-Aug-06	19:52
	5.1	16-Aug-06	19:37
	5.1	16-Aug-06	19:22
	5.1	16-Aug-06	19:07
	5.1	16-Aug-06	18:52

Average **5.0**

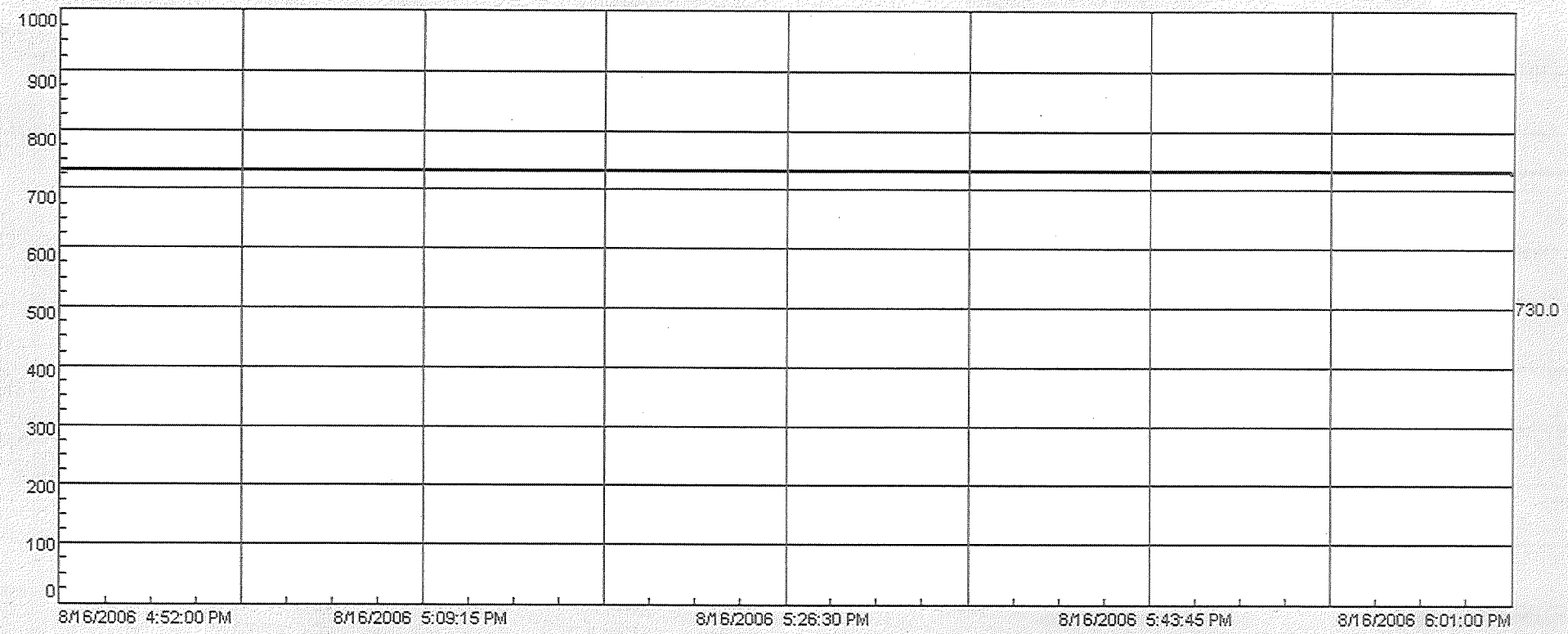
Average	MSA	AIR	TEMP1	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	134.0	16-Aug-06	16:07	
	134.0	16-Aug-06	15:52	
	137.0	16-Aug-06	15:37	
	139.0	16-Aug-06	15:22	
Average	MSA	AIR	TEMP1	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	138.0	16-Aug-06	17:52	
	137.0	16-Aug-06	17:37	
	136.0	16-Aug-06	17:22	
	136.0	16-Aug-06	17:07	
	140.0	16-Aug-06	16:52	
Average	MSA	AIR	TEMP1	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	134.0	16-Aug-06	20:07	
	133.0	16-Aug-06	19:52	
	134.0	16-Aug-06	19:37	
	140.0	16-Aug-06	19:22	
	140.0	16-Aug-06	19:07	
	140.0	16-Aug-06	18:52	
Average	MSA	AIR	TEMP2	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	133.0	16-Aug-06	16:07	
	133.0	16-Aug-06	15:52	
	137.0	16-Aug-06	15:37	
	138.0	16-Aug-06	15:22	
Average	MSA	AIR	TEMP2	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	137.0	16-Aug-06	17:52	
	136.0	16-Aug-06	17:37	
	135.0	16-Aug-06	17:22	
	135.0	16-Aug-06	17:07	
	139.0	16-Aug-06	16:52	
Average	MSA	AIR	TEMP2	IP_TREND_TIME
----------	VALUE	DATE	TIME	
	133.0	16-Aug-06	20:07	
	132.0	16-Aug-06	19:52	
	133.0	16-Aug-06	19:37	
	139.0	16-Aug-06	19:22	

	139.0	16-Aug-06	19:07
	139.0	16-Aug-06	18:52
Average	**136.3**		

Average	MSA	DP1	_TREND_TIME
----------	VALUE	DATE	TIME
	4.9	16-Aug-06	16:07
	4.9	16-Aug-06	15:52
	4.9	16-Aug-06	15:37
	4.9	16-Aug-06	15:22
Average	MSA	DP1	_TREND_TIME
----------	VALUE	DATE	TIME
	4.9	16-Aug-06	17:52
	4.9	16-Aug-06	17:37
	4.9	16-Aug-06	17:22
	4.9	16-Aug-06	17:07
	4.9	16-Aug-06	16:52
Average	MSA	DP1	_TREND_TIME
----------	VALUE	DATE	TIME
	4.9	16-Aug-06	20:07
	4.9	16-Aug-06	19:52
	4.9	16-Aug-06	19:37
	4.9	16-Aug-06	19:22
	4.9	16-Aug-06	19:07
	4.9	16-Aug-06	18:52
Average	MSA	DP2	_TREND_TIME
----------	VALUE	DATE	TIME
	4.8	16-Aug-06	16:07
	4.8	16-Aug-06	15:52
	4.9	16-Aug-06	15:37
	4.9	16-Aug-06	15:22
Average	MSA	DP2	_TREND_TIME
----------	VALUE	DATE	TIME
	4.8	16-Aug-06	17:52
	4.9	16-Aug-06	17:37
	4.8	16-Aug-06	17:22
	4.9	16-Aug-06	17:07
	4.9	16-Aug-06	16:52
Average	MSA	DP2	_TREND_TIME
----------	VALUE	DATE	TIME
	4.8	16-Aug-06	20:07
	4.8	16-Aug-06	19:52
	4.9	16-Aug-06	19:37
	4.8	16-Aug-06	19:22
	4.8	16-Aug-06	19:07
	4.9	16-Aug-06	18:52
Average	**4.9**		

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



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	MED1P148_MasterLineSpeed	MEDS6600	Master Line	730.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0 0:00:0		1 Hour		☐	☐
	MED1C148_ParkRate	MEDS6600	LAM PACK F	***		0	1000	Best Fit		IP_Analc		☐	0 0:00:0		1 Hour		☐	☐
	MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐
	MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	***		-4	4	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐

8/16/2006 4:52:00 PM | 0 1:09:00 | 8/16/2006 6:01:00 PM

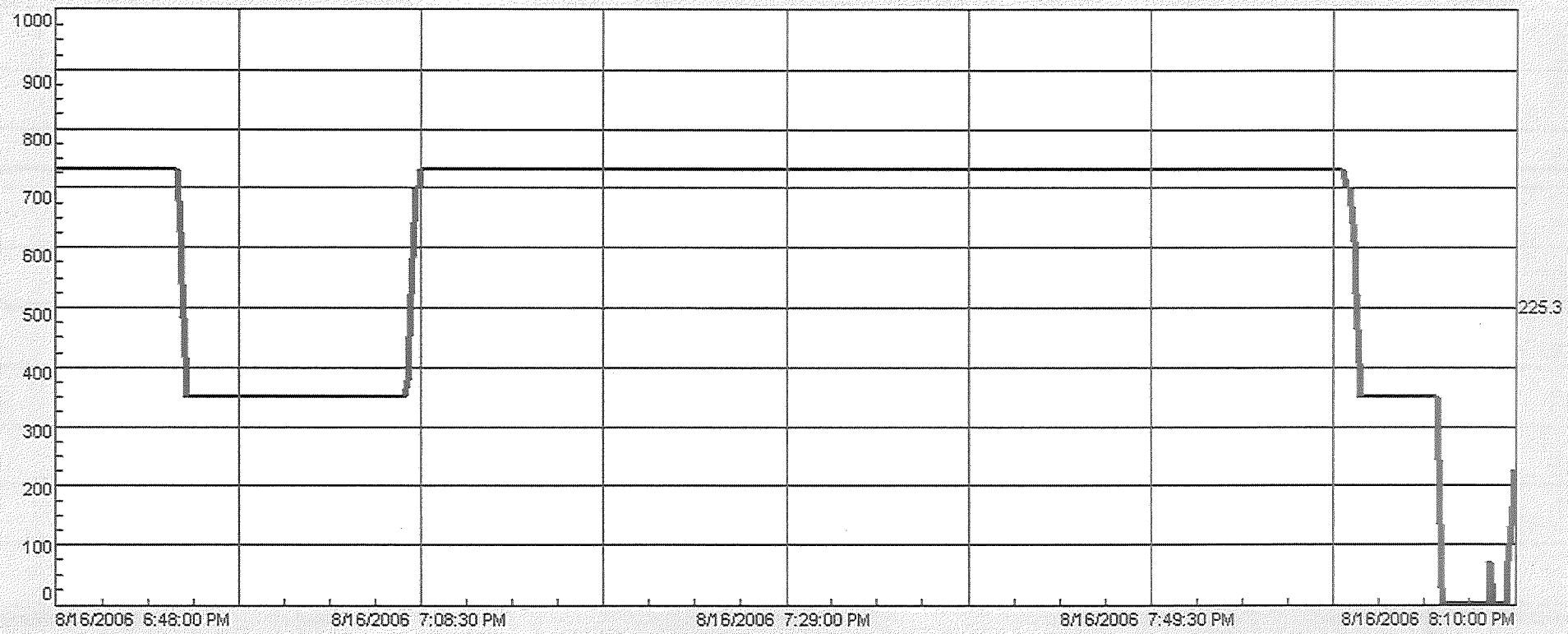
12:16 13:25 14:34 15:43 16:52 18:01

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | C:\Documents and Settin... | 12:20 PM

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



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	MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
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8/16/ 2006 6:48:00 PM | 0 1:22:00 | 8/16/ 2006 8:10:00 PM

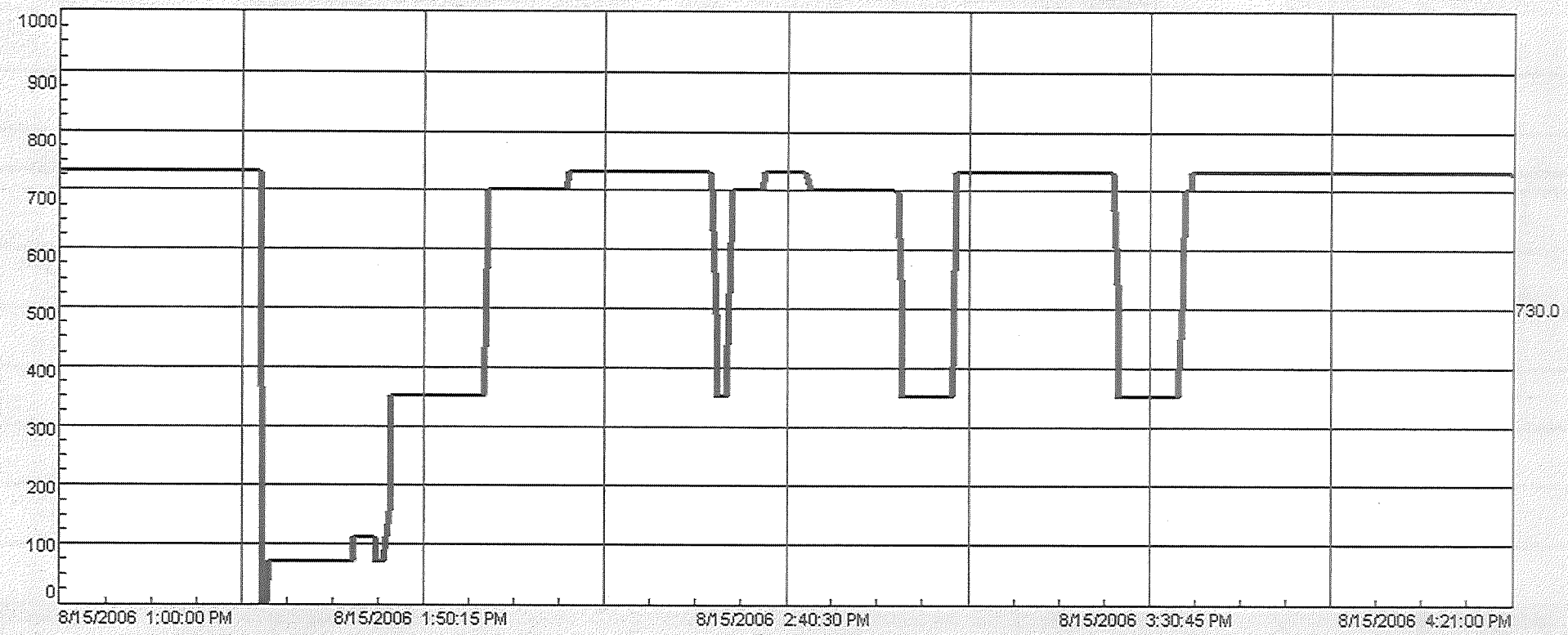
13:20 14:42 16:04 17:26 18:48 20:10

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | C:\Documents and Settin... | 12:21 PM

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



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MED1P148_MasterLineSpeed	MEDS6600	Master Line	730.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0 0:00:C		1 Hour		☐	☐
MED1C148_ParkRate	MEDS6600	LAM PACK I	***		0	1000	Best Fit		IP_Analc		☐	0 0:00:C		1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	***		-4	4	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐

8/15/2006 1:00:00 PM | 0 3:21:00 | 8/15/2006 4:21:00 PM

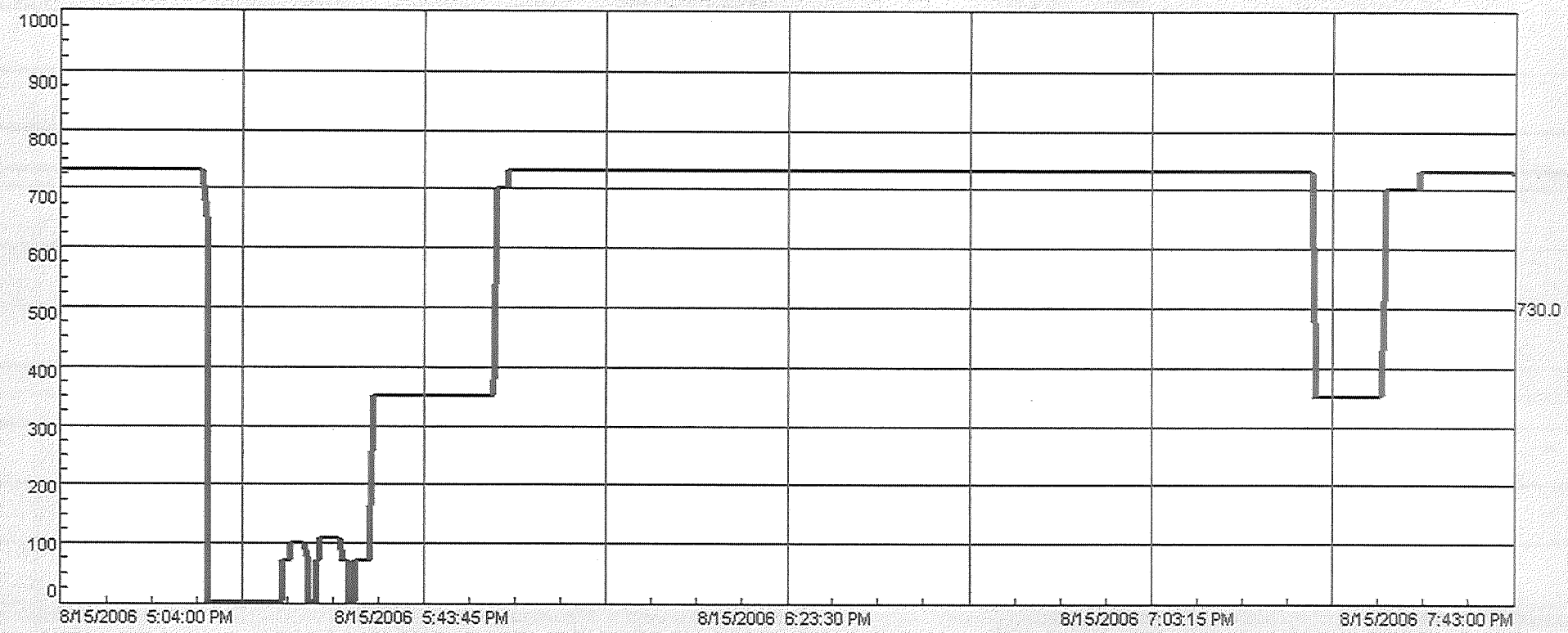
23:36 | 2:57 | 6:18 | 9:39 | 13:00 | 16:21

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explorer -... | C:\Documents and Settin... | 12:18 PM

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
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MED1P148_MasterLineSpeed	MEDS6600	Master Line	730.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0 0:00:0		1 Hour		☐	☐
MED1C148_ParkRate	MEDS6600	LAM PACK F	***		0	1000	Best Fit		IP_Analc		☐	0 0:00:0		1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐
MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	***		-4	4	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐

8/15/2006 5:04:00 PM | 0 2:39:00 | 8/15/2006 7:43:00 PM

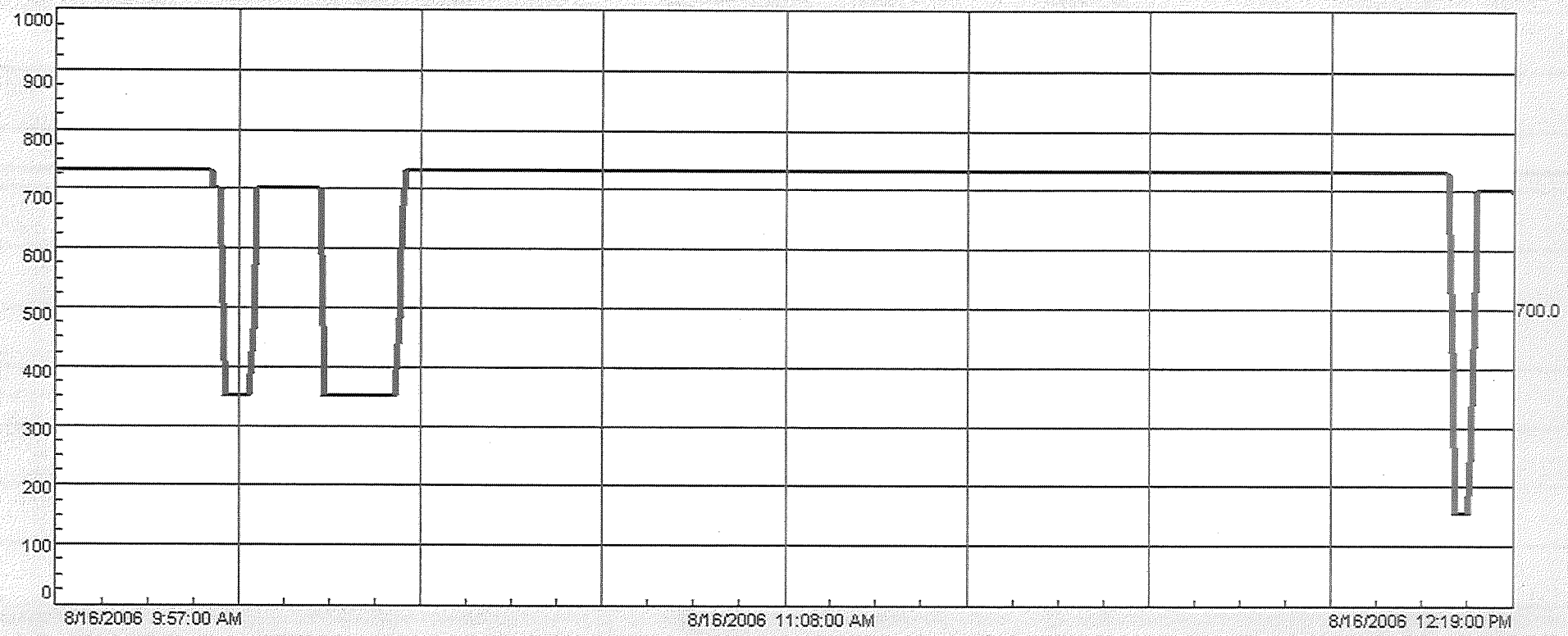
6:28 9:07 11:46 14:25 17:04 19:43

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | C:\Documents and Settin... | 12:17 PM

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



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MED1P148_MasterLineSpeed	MEDS6600	Master Line	700.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0	0:00:C	1 Hour		☐	☐
MED1C148_ParkRate	MEDS6600	LAM PACK I	***		0	1000	Best Fit		IP_Analc		☐	0	0:00:C	1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	***		-4	4	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐

8/16/2006 9:57:00 AM | 0 2:22:00 | 8/16/2006 12:19:00 PM

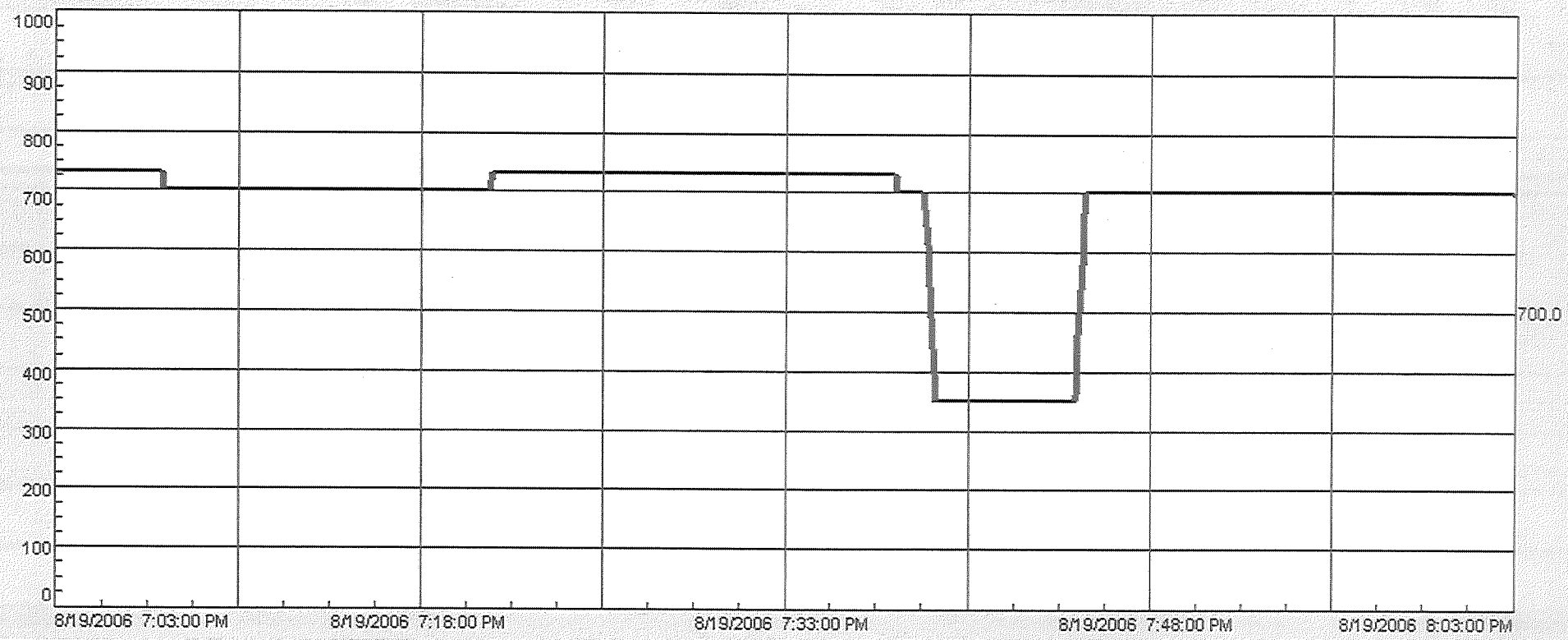
0:29 2:51 5:13 7:35 9:57 12:19

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | C:\Documents and Settin... | 12:15 PM

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



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MED1C148_ParkRate	MEDS6600	LAM PACK I	***		0	1000	Best Fit		IP_Analc		☐	0	0:00:C	1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
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8/19/2006 7:03:00 PM | 0 1:00:00 | 8/19/2006 8:03:00 PM

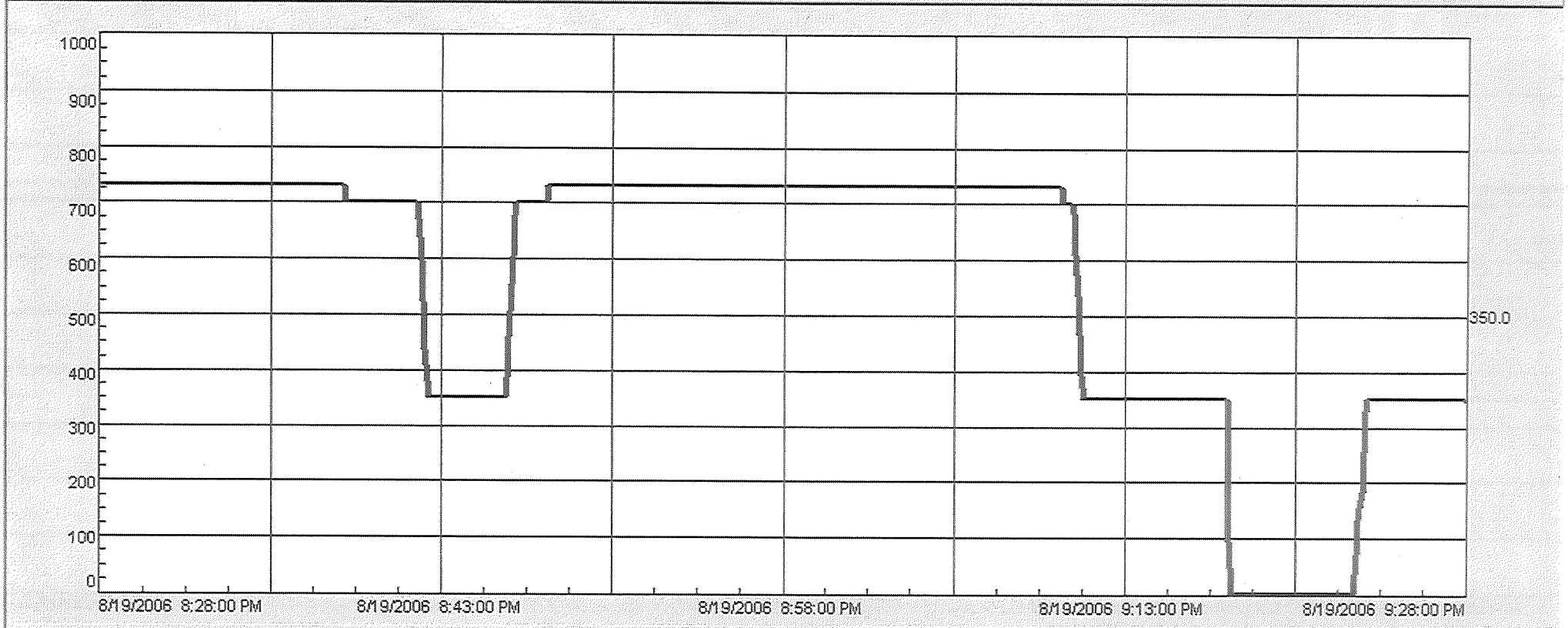
15:03 16:03 17:03 18:03 19:03 20:03

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | 12:00 PM

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
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MED1C148_ParkRate	MEDS6600	LAM PACK I	***		0	1000	Best Fit		IP_Analc		☐	0	0:00:C	1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	***		-4	4	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐

8/19/2006 8:28:00 PM | 0 1:00:00 | 8/19/2006 9:28:00 PM

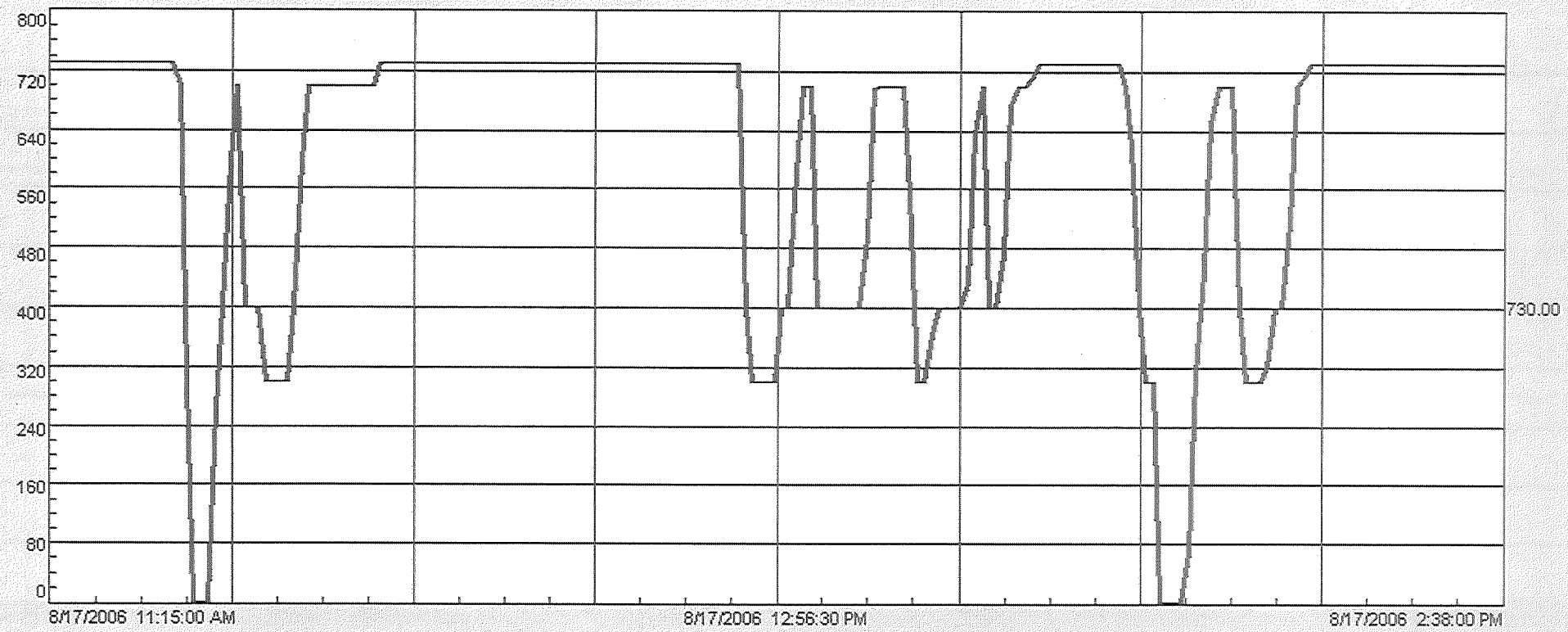
16:28 17:28 18:28 19:28 20:28 21:28

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | 11:59 AM

Aspen Process Explorer - [Line Drive Speeds Tracking.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Ext
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MED2P148_InkRollrpms	MEDS6600	Coater Inkin	***		-100	700	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
MED2P148_GrnlFluteSpd	MEDS6600	Granule Flut	***		0	800	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
MED2P148_CoolDrvSpd	MEDS6600	Cooling Sec	***		-100	700	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
MED2P148_BtmWtRollSpd	MEDS6600	Bottom Coat	***		0	800	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐

8/17/2006 11:15:00 AM | 0 3:23:00 | 8/17/2006 2:38:00 PM

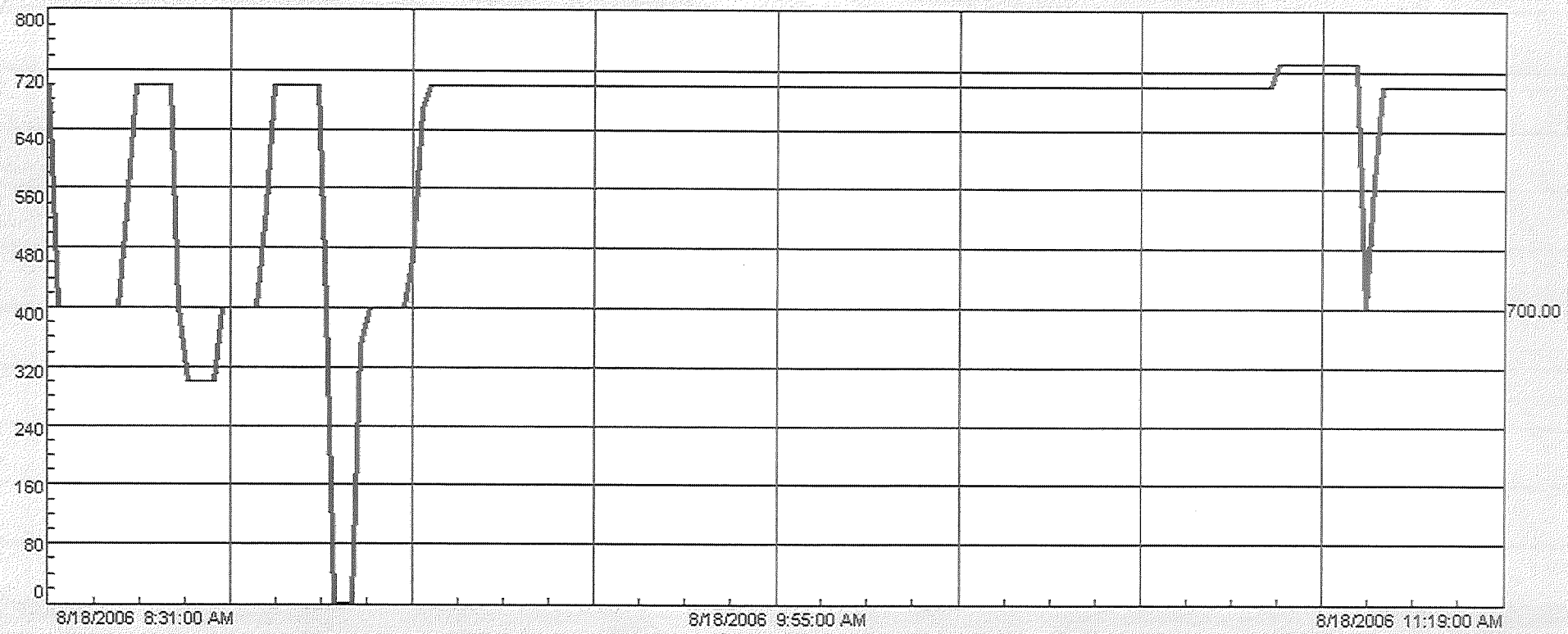
21:43 | 1:06 | 4:29 | 7:52 | 11:15 | 14:38

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explorer -... | 12:06 PM

Aspen Process Explorer - [Line Drive Speeds Tracking.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
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MED2P148_MasterLineSpeed	MEDS6600	Line Drive M	700.00	Good	0	800	Best Fit		IP_Analc	Good	☑	0	0:00:C	1 Hour		☐	☐
MED2P148_InkRollrpms	MEDS6600	Coater Inkin	***		-100	700	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED2P148_GrnlFluteSpd	MEDS6600	Granule Flut	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
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MED2P148_BtmWtRollSpd	MEDS6600	Bottom Coat	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐

8/18/2006 8:31:00 AM | 0 2:48:00 | 8/18/2006 11:19:00 AM

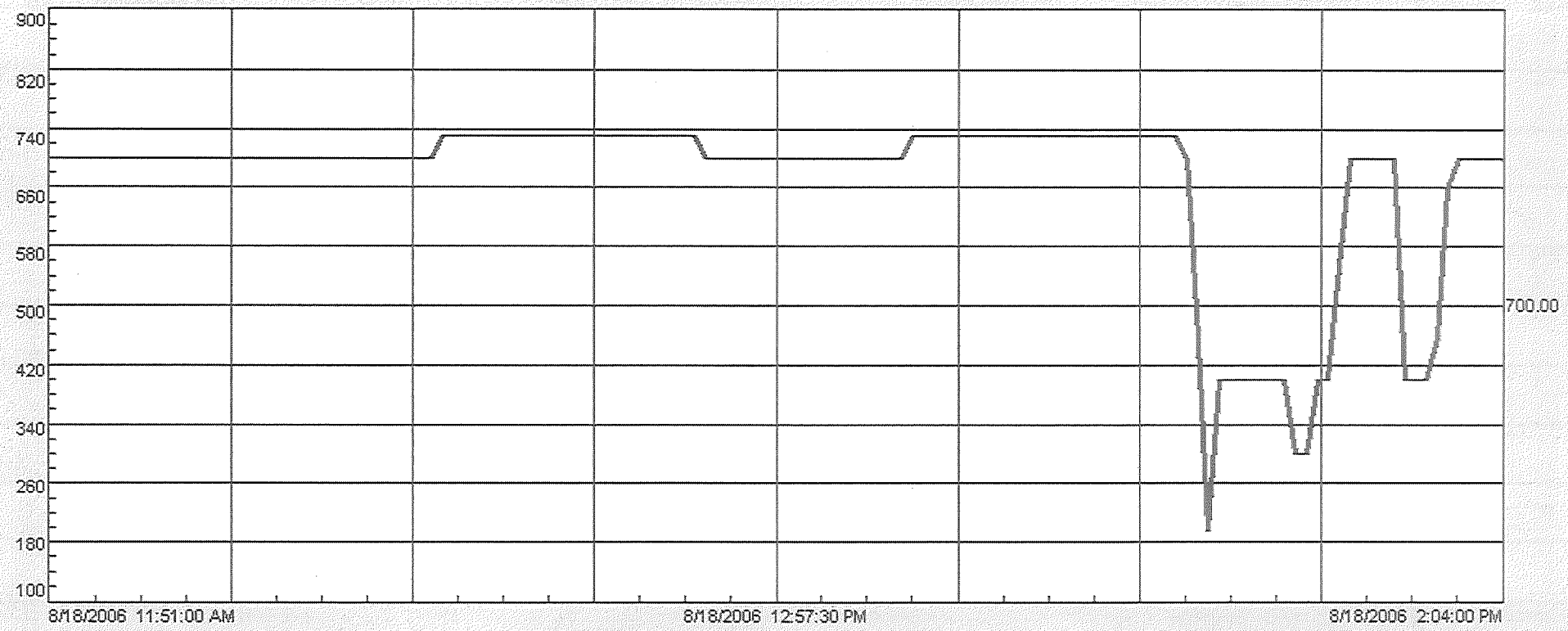
21:19 | 0:07 | 2:55 | 5:43 | 8:31 | 11:19

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | 12:08 PM

Aspen Process Explorer - [Line Drive Speeds Tracking.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Ex
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MED2P148_InkRollrpms	MEDS6600	Coater Inkin	***		-100	700	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED2P148_GrnlFluteSpd	MEDS6600	Granule Flut	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED2P148_CoolDrvSpd	MEDS6600	Cooling Secl	***		-100	700	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED2P148_BtmWtRollSpd	MEDS6600	Bottom Coat	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐

8/18/ 2006 11:51:00 AM | 0 2:13:00 | 8/18/ 2006 2:04:00 PM

2:59 5:12 7:25 9:38 11:51 14:04

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | 12:09 PM

Aspen Process Explorer - [Line Drive Speeds Tracking.apx]

File Edit View Plots Favorites Tools Window Help

Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
MED2P148_SlateDustSpd	MEDS6600	Slate/Dust D	***		-200	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED2P148_MasterLineSpeed	MEDS6600	Line Drive M	730.00	Good	0	800	Best Fit		IP_Analc	Good	☑	0	0:00:C	1 Hour		☐	☐
MED2P148_InkRollrpms	MEDS6600	Coater Inkin	***		-100	700	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED2P148_GrnlFluteSpd	MEDS6600	Granule Flut	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
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MED2P148_BtmWtRollSpd	MEDS6600	Bottom Coat	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐

8/18/2006 8:31:00 AM | 0 2:29:00 | 8/18/2006 11:00:00 AM

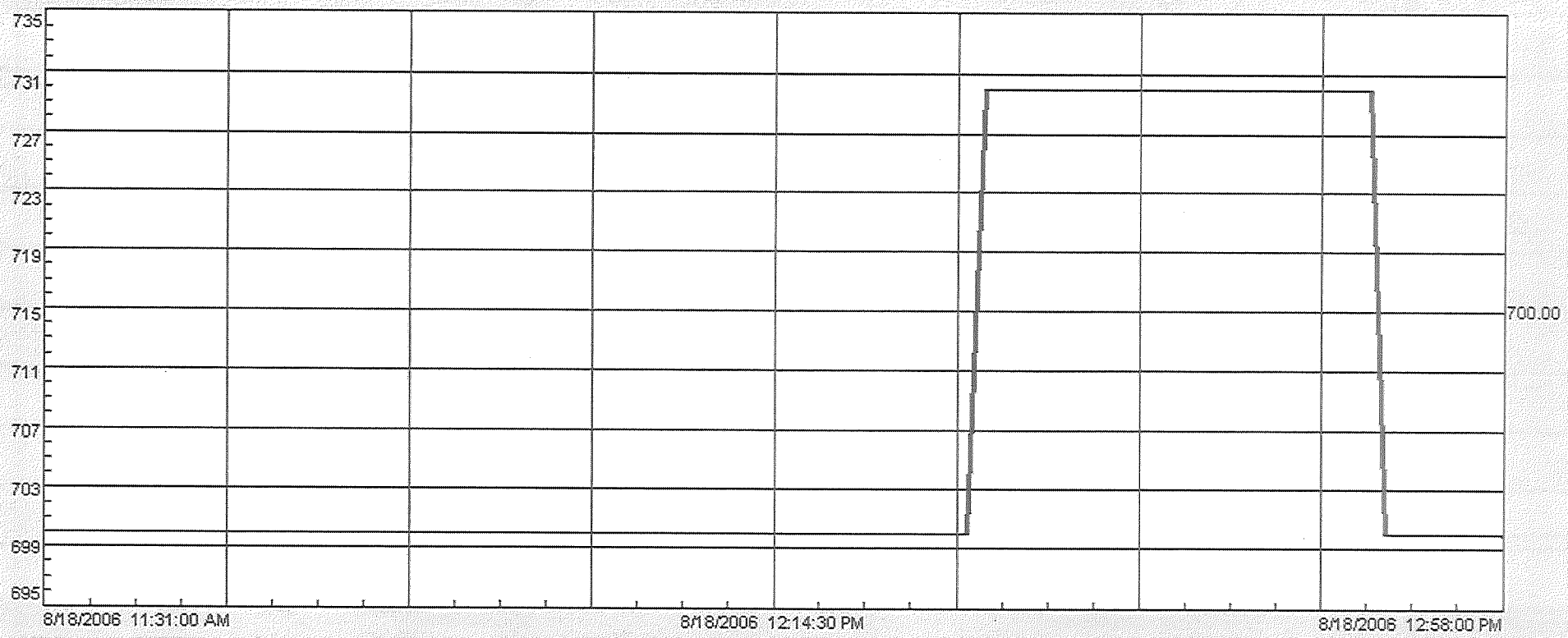
22:35 1:04 3:33 6:02 8:31 11:00

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explor... | 12:02 PM

Aspen Process Explorer - [Line Drive Speeds Tracking.apx]

File Edit View Plots Favorites Tools Window Help



	Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Ext
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	MED2P148_MasterLineSpeed	MEDS6600	Line Drive M	700.00	Good	695	735	Best Fit		IP_Analc	Good	☑	0	0:00:C	1 Hour		☐	☐
	MED2P148_InkRollrpms	MEDS6600	Coater Inkin	***		-100	700	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
	MED2P148_GrnlFluteSpd	MEDS6600	Granule Flut	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
	MED2P148_CoolDrvSpd	MEDS6600	Cooling Sect	***		-100	700	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
	MED2P148_BtmWtRollSpd	MEDS6600	Bottom Coat	***		0	800	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐

8/18/2006 11:31:00 AM | 0 1:27:00 | 8/18/2006 12:58:00 PM

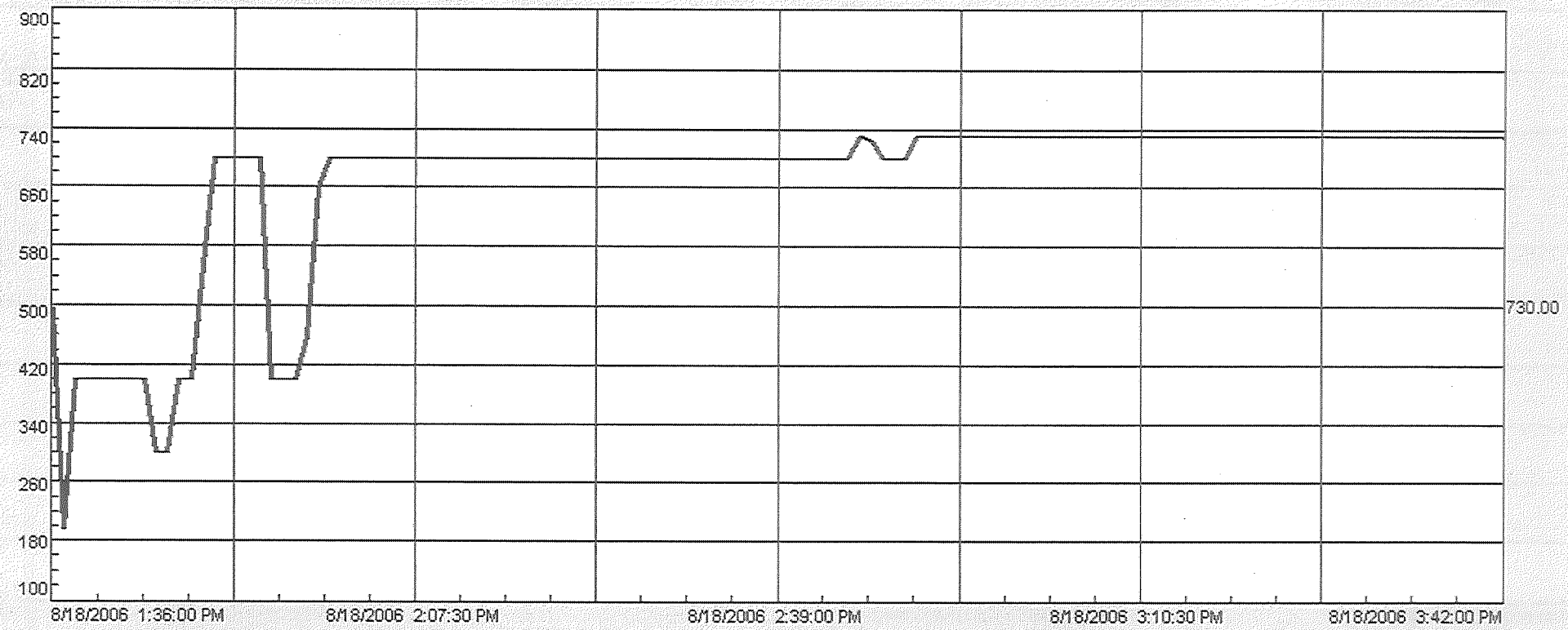
5:43 7:10 8:37 10:04 11:31 12:58

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explorer -... | 12:03 PM

Aspen Process Explorer - [Line Drive Speeds Tracking.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
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MED2P148_MasterLineSpeed	MEDS6600	Line Drive M	730.00	Good	100	900	Best Fit		IP_Analc	Good	☑	0 0:00:0		1 Hour		☐	☐
MED2P148_InkRollrpms	MEDS6600	Coater Inking	***		-100	700	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐
MED2P148_GrnlFluteSpd	MEDS6600	Granule Flut	***		0	800	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐
MED2P148_CoolDrySpd	MEDS6600	Cooling Sect	***		-100	700	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐
MED2P148_BtmWtRollSpd	MEDS6600	Bottom Coat	***		0	800	Best Fit		IP_Analc		☑	0 0:00:0		1 Hour		☐	☐

8/18/2006 1:36:00 PM | 0 2:06:00 | 8/18/2006 3:42:00 PM

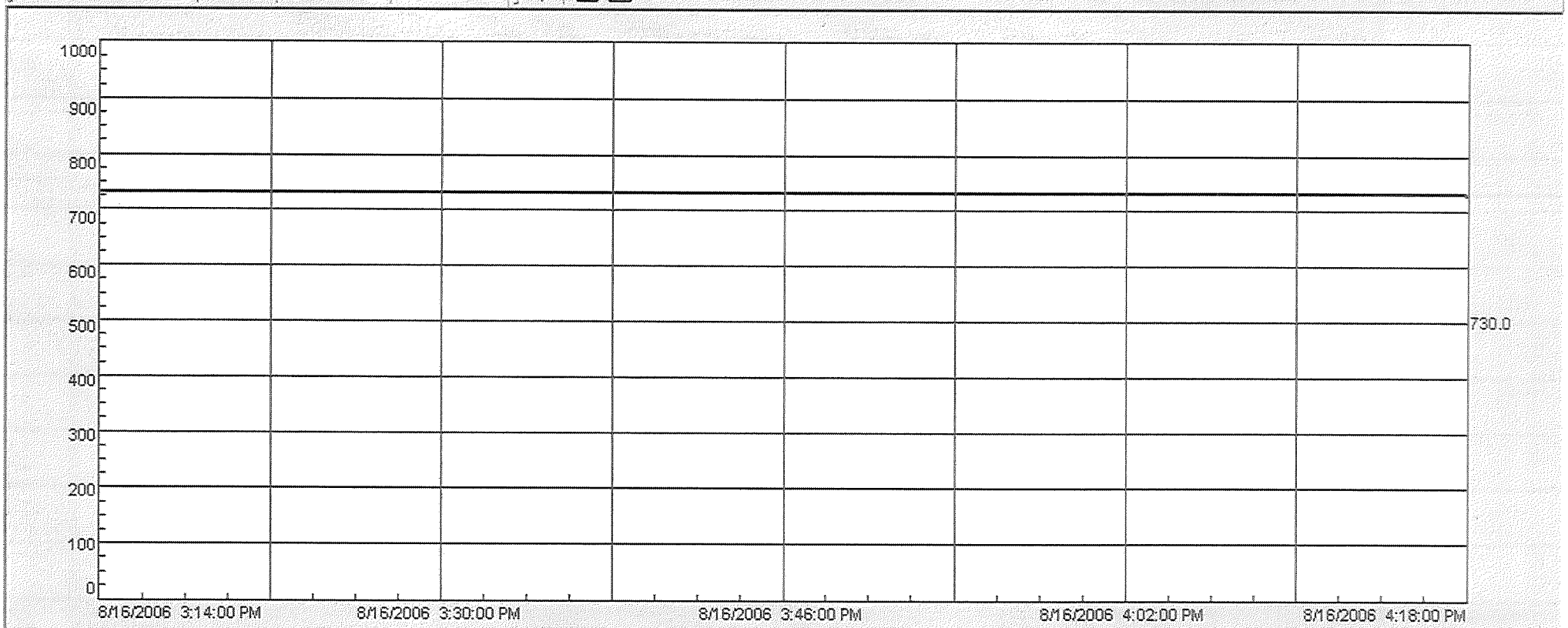
5:12 7:18 9:24 11:30 13:36 15:42

Ready

Start | Inbox - Microsoft Outlook | Aspen Process Explorer -... | 12:04 PM

Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
MED1P194_LamMasterSpdRef	MEDS6600	Laminator M	***		0	1	Best Fit		IP_Analc		☐	0	0:00:C	1 Hour		☐	☐
MED1P148_MasterLineSpeed	MEDS6600	Master Line	730.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0	0:00:C	1 Hour		☐	☐
MED1C148_ParkRate	MEDS6600	LAM PACK F	***		0	1000	Best Fit		IP_Analc		☐	0	0:00:C	1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐
MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	***		-4	4	Best Fit		IP_Analc		☑	0	0:00:C	1 Hour		☐	☐

8/16/2006 3:14:00 PM | 0 1:04:00 | 8/16/2006 4:18:00 PM

10:58 12:02 13:06 14:10 15:14 16:18

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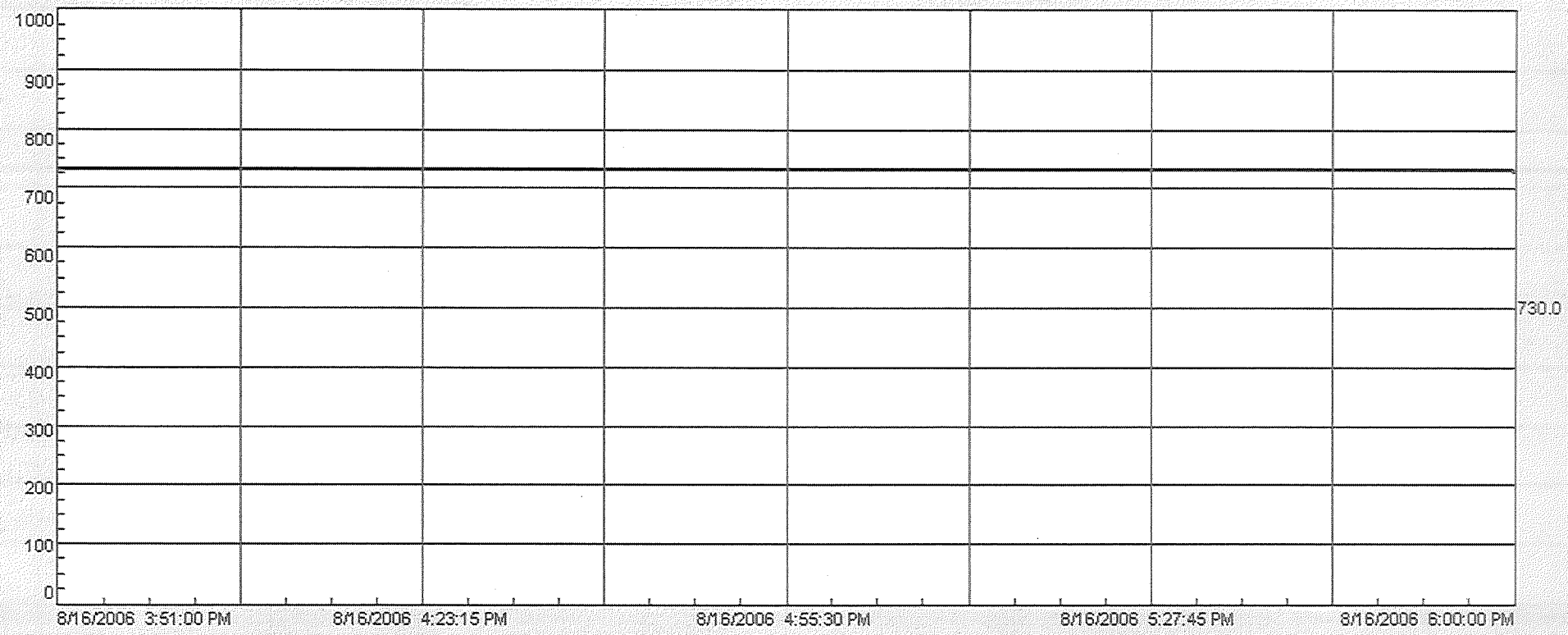
Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



	Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
	MED1P194_LamMasterSpdRef	MEDS6600	Laminator M	****		0	1	Best Fit		IP_Analc		☐	0 0:00:C		1 Hour		☐	☐
	MED1P148_MasterLineSpeed	MEDS6600	Master Line	730.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0 0:00:C		1 Hour		☐	☐
	MED1C148_ParkRate	MEDS6600	LAM PACK I	****		0	1000	Best Fit		IP_Analc		☐	0 0:00:C		1 Hour		☐	☐
	MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	****		-20	140	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
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8/16/2006 3:51:00 PM | 0 2:09:00 | 8/16/2006 6:00:00 PM

7:15 9:24 11:33 13:42 15:51 18:00

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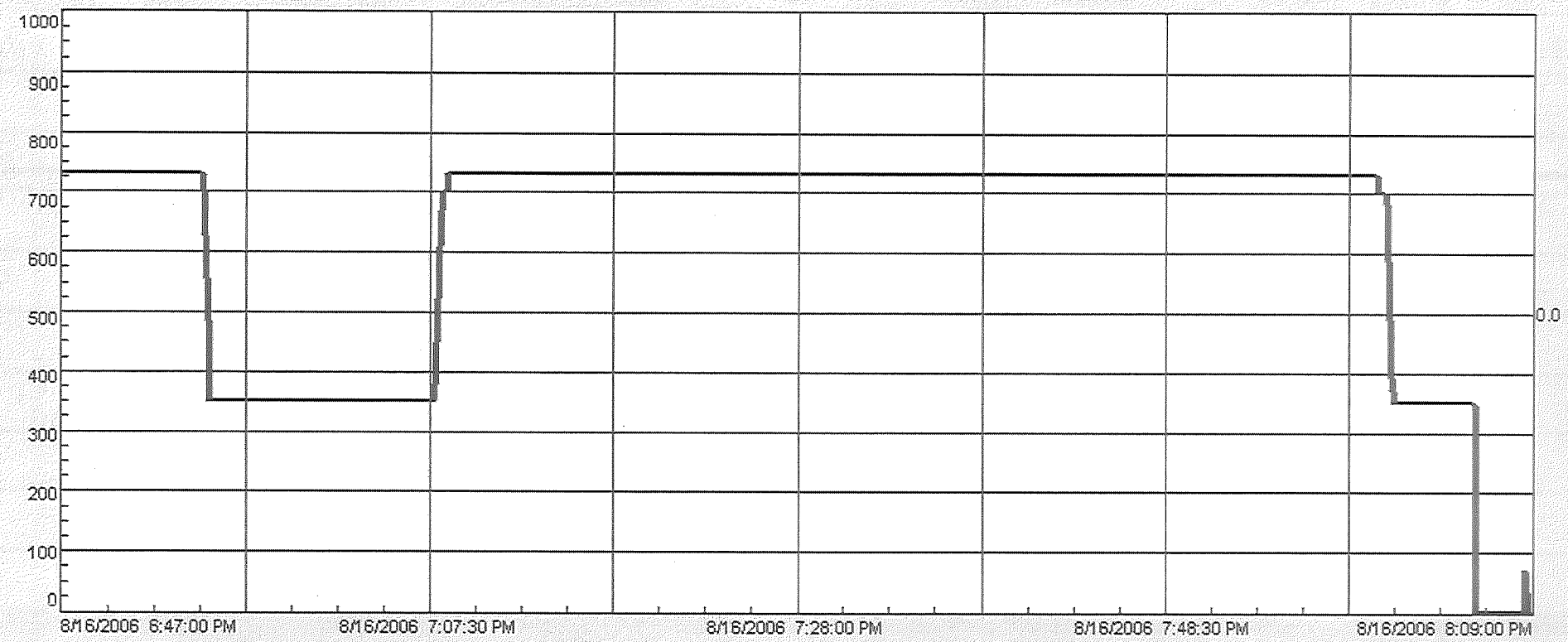
Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Exl
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MED1P148_MasterLineSpeed	MEDS6600	Master Line	0.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0 0:00:C		1 Hour		☐	☐
MED1C148_ParkRate	MEDS6600	LAM PACK F	***		0	1000	Best Fit		IP_Analc		☐	0 0:00:C		1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	***		-20	140	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	***		-4	4	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐

8/16/2006 6:47:00 PM | 0 1:22:00 | 8/16/2006 8:09:00 PM

13:19 14:41 16:03 17:25 18:47 20:09

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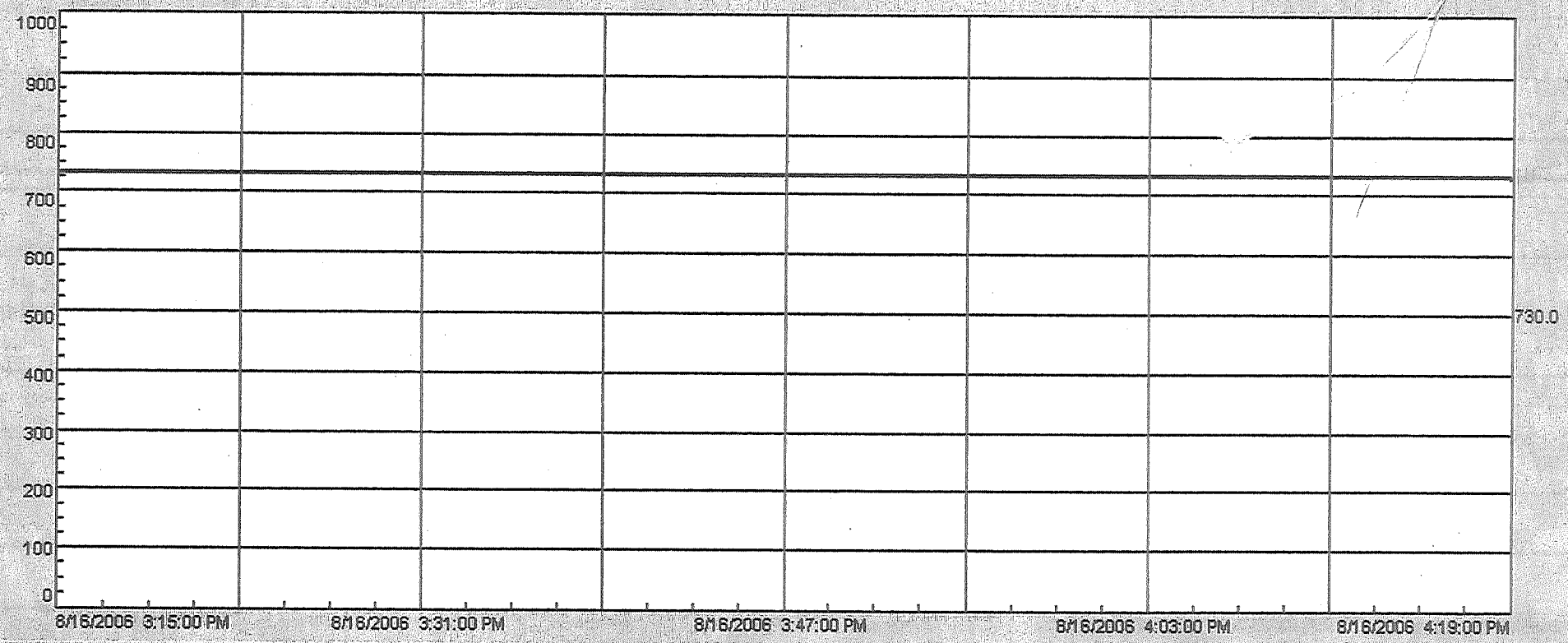
Aspen Process Explorer - [MED1 LINE SPEED TRACKING.apx]

File Edit View Plots Favorites Tools Window Help



Name	Data Source	Description	Value	Level	Plot Min	Plot Max	Type	Units	Map	Status	Au	Shift	TZ	Period	Method	Ste	Ext
MED1P194_LamMasterSpdRef	MEDS6600	Laminator M	****		0	1	Best Fit		IP_Analc		☐	0 0:00:C		1 Hour		☐	☐
MED1P148_MasterLineSpeed	MEDS6600	Master Line	730.0	Good	0	1000	Best Fit		IP_Analc	Good	☐	0 0:00:C		1 Hour		☐	☐
MED1C148_ParkRate	MEDS6600	LAM PACK I	****		0	1000	Best Fit		IP_Analc		☐	0 0:00:C		1 Hour		☐	☐
MED1C148_PercentMaxLSD	MEDS6600	% of SHIFT I	****		-20	140	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐
MED1P148_LineSpeedAvg	MEDS6600	Line Speed I	****		-4	4	Best Fit		IP_Analc		☑	0 0:00:C		1 Hour		☐	☐

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10:59 12:03 13:07 14:11 15:15 16:19

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