Source Test Report for 2022 Compliance Testing
RTO
Atlas Molded Products
Byron Center, Michigan

Prepared For:

Atlas Molded Products
8240 Byron Center Ave SW
Byron Center, MI 49315

Prepared By:

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For Submission To:

Michigan Department of Environment, Great Lakes and Energy
525 West Allegan Street
Lansing, MI 48933

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TO ASTM D7036 ONLY
CERT #1925.01

Review and Certification

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

Signature:	Kurt Wepprecht	**Date:**	04 / 18 / 2022
Name:	Kurt Wepprecht, QI	**Title:**	Vice President, Technical

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

Signature:	Henry M. Taylor	**Date:**	04 / 18 / 2022
Name:	Henry M. Taylor, QSTO	**Title:**	Senior Reporting Sepcialist

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1.0 Introduction

1.1 Summary of Test Program

Atlas Molded Products (Atlas) contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance emissions test program on the RTO at their facility located in Byron Center, Michigan.

The tests were conducted to determine compliance with the conditions set forth in the Atlas permit issued by the Michigan Department of Environmental, Great Lakes and Energy (EGLE).

The specific objectives were to:

- Determine the THC concentration, emission rate, and DE of the RTO
- Conduct the test program with a focus on safety

Montrose performed the tests to measure the emission parameters listed in Table 1-1.

Table 1-1
Summary of Test Program

Test Date	Unit ID/ Source Name	Activity/Parameters	Test Methods	No. of Runs	Duration (Minutes)
3/22/22	RTO Inlet &	Velocity/Volumetric Flow	EPA 1 & 2	3	60
	Outlet	O_2, CO_2	EPA 3A	3	60
		Moisture	EPA 4	3	60
		THC	EPA 25A	3	60

To simplify this report, a list of Units and Abbreviations is included in Appendix C.1. Throughout this report, chemical nomenclature, acronyms, and reporting units are not defined. Please refer to the list for specific details.

This report presents the test results and supporting data, descriptions of the testing procedures, descriptions of the facility and sampling locations, and a summary of the quality assurance procedures used by Montrose. The average emission test results are summarized and compared to their respective permit limits in Table 1-2. Detailed results for individual test runs can be found in Section 4.0. All supporting data can be found in the appendices.

The tests were conducted according to the test plan (protocol) dated February 21, 2022 that was submitted to and approved by the EGLE.

Table 1-2
Summary of Average Compliance Results – RTO Outlet

March 22, 2022

Parameter/Units	Average Results	Emission Limits
Total Hydrocarbons (THC), as Propane		
ppmvw	10.80	--
lb/hr	0.240	--
DE, %	99.6	> 98%
Total Hydrocarbons (THC), as Pentane		
ppmvw	6.82	--
lb/hr	0.248	--
DE, %	99.6	> 98%

1.2 Key Personnel

A list of project participants is included below:

Facility Information

Source Location:	Atlas Molded Products 8240 Byron Center Ave SW Byron Center, MI 49315
Project Contact:	Tim Van Hoeven
Telephone:	616-644-2454
Email:	tvanhoeven@atlasroofing.com

Agency Information

Regulatory Agency:	Michigan Department of Environment, Great Lakes and Energy
Agency Contact:	Karen Kajiya-Mills
Telephone:	517-256-0880
Email:	kajiya-millsk@michigan.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC
Contact:	Kurt Wepprecht
Title:	Vice President, Technical
Telephone:	630-860-4740
Email:	kwepprecht@montrose-env.com

Test personnel and observers are summarized in Table 1-3.

Table 1-3
Test Personnel and Observers

Name	Affiliation	Role/Responsibility
Kurt Wepprecht	Montrose	Vice President, Technical/QI/Field Team Leader/Trailer Operator
Michael Hess	Montrose	Client Project Manager/QI/Sample Recovery/Sample Train Operator
Paul Repuyan	Montrose	Field Technician/Sample train operator
Jacob Cartee	Montrose	Report preparation
Tim Van Hoeven	Atlas	Client Liaison/Test Coordinator

2.0 Plant and Sampling Location Descriptions

2.1 Process Description, Operation, and Control Equipment

Atlas Molded Products manufactures expanded polystyrene (EPS) foam and foam products. The facility receives as its primary raw material EPS beads. EPS beads are made using a polymerization process which produces translucent spherical beads of polystyrene, about the size of sugar granules. During this process, pentane gas is added to the material to assist expansion during subsequent processing.

EPS foam is produced in a three-stage process:

Pre-expansion - Upon contact with steam the pentane contained in the beads starts to boil and the beads are expanded to between 40 to 50 times their original volume.

Conditioning – After Expansion, the beads undergo a maturing period in order to reach an equilibrium temperature and pressure.

Molding - The beads are placed within a mold and again reheated with steam. The pre-foamed beads expand further, completely fill the mold cavity, and fuse together. The beads are molded to form blocks or customized shape products.

There are two molding processes for EPS. Block molding produces large blocks of EPS which can then be cut into shapes or sheets for use in both packaging and building/construction applications. Shape molding produces parts which have custom designed specifications such as electronic product packaging.

2.2 Flue Gas Sampling Locations

Information regarding the sampling locations is presented in Table 2-1.

Table 2-1
Sampling Locations

Sampling Location	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
RTO Inlet	15	70/4.7	45/3.0	Flow: 16 (8/port) Gaseous: 1
RTO Outlet	22	88/4.0	160/7.3	Flow: 16 (8/port) Gaseous: 1

The sample locations were verified in the field to conform to EPA Method 1. Absence of cyclonic flow conditions was confirmed following EPA Method 1, Section 11.4. See Appendix A.1 for more information.

2.3 Operating Conditions and Process Data

Emission tests were performed while the source and air pollution control devices were operating at the conditions required by the permit.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The process data that was provided is presented in Appendix B.

3.0 Sampling and Analytical Procedures

3.1 Test Methods

The test methods for this test program have been presented in Table 1-1. Additional information regarding specific applications or modifications to standard procedures is presented below.

3.1.1 EPA Method 1, Sample and Velocity Traverses for Stationary Sources

EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or duct equivalent diameters downstream from a flow disturbance and one-half equivalent diameter upstream from a flow disturbance.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - None
- Method Exceptions:
  - None

The sample port and traverse point locations are detailed in Appendix A.

3.1.2 EPA Method 2, Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 2 is used to measure the gas velocity using an S-type pitot tube connected to a pressure measurement device, and to measure the gas temperature using a calibrated thermocouple connected to a thermocouple indicator. Typically, Type S (Stausscheibe) pitot tubes conforming to the geometric specifications in the test method are used, along with an inclined manometer. The measurements are made at traverse points specified by EPA Method 1. The molecular weight of the gas stream is determined from independent measurements of O_2, CO_2, and moisture. The stack gas volumetric flow rate is calculated using the measured average velocity head, the area of the duct at the measurement plane, the measured average temperature, the measured duct static pressure, the molecular weight of the gas stream, and the measured moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - S-type pitot tube coefficient is 0.84
- Method Exceptions:
  - None

The typical sampling system is detailed in Figure 3-2.

3.1.3 EPA Method 3A, Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedures)

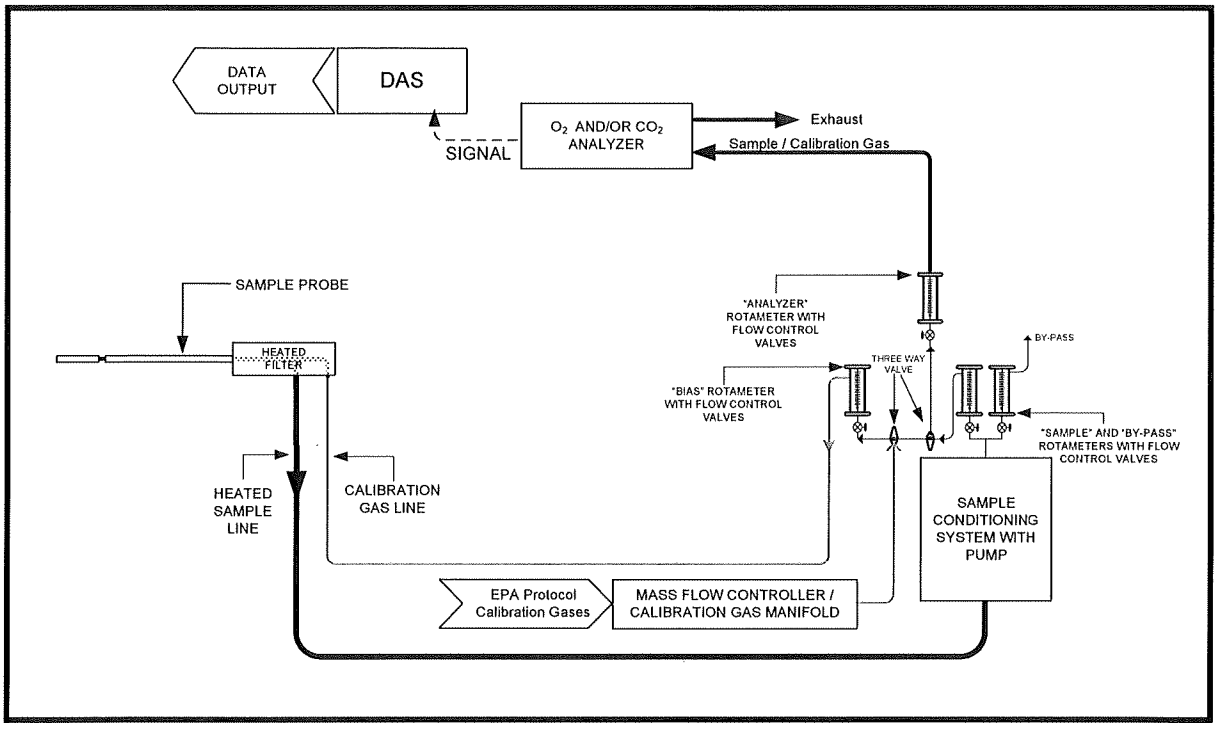
Concentrations of O_2 and CO_2 are measured simultaneously using EPA Method 3A which is an instrumental test method. Conditioned gas is sent to a series of analyzers to measure the gaseous emission concentrations. The performance requirements of the method must be met to validate the data.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - A dry extractive sampling system is used to report emissions on a dry basis
  - A paramagnetic analyzer is used to measure O_2
  - A nondispersive infrared analyzer is used to measure CO_2
  - An integrated bag sample was collected during each sampling run and analyzed for CO_2 and O_2 using the calibrated reference Method 3A analyzers
- Method Exceptions:
  - None
- Target and/or Minimum Required Sample Duration: 60 minutes

The typical sampling system is detailed in Figure 3-1.

FIGURE 3-1
EPA METHOD 3A SAMPLING TRAIN



3.1.4 EPA Method 4, Determination of Moisture Content in Stack Gas

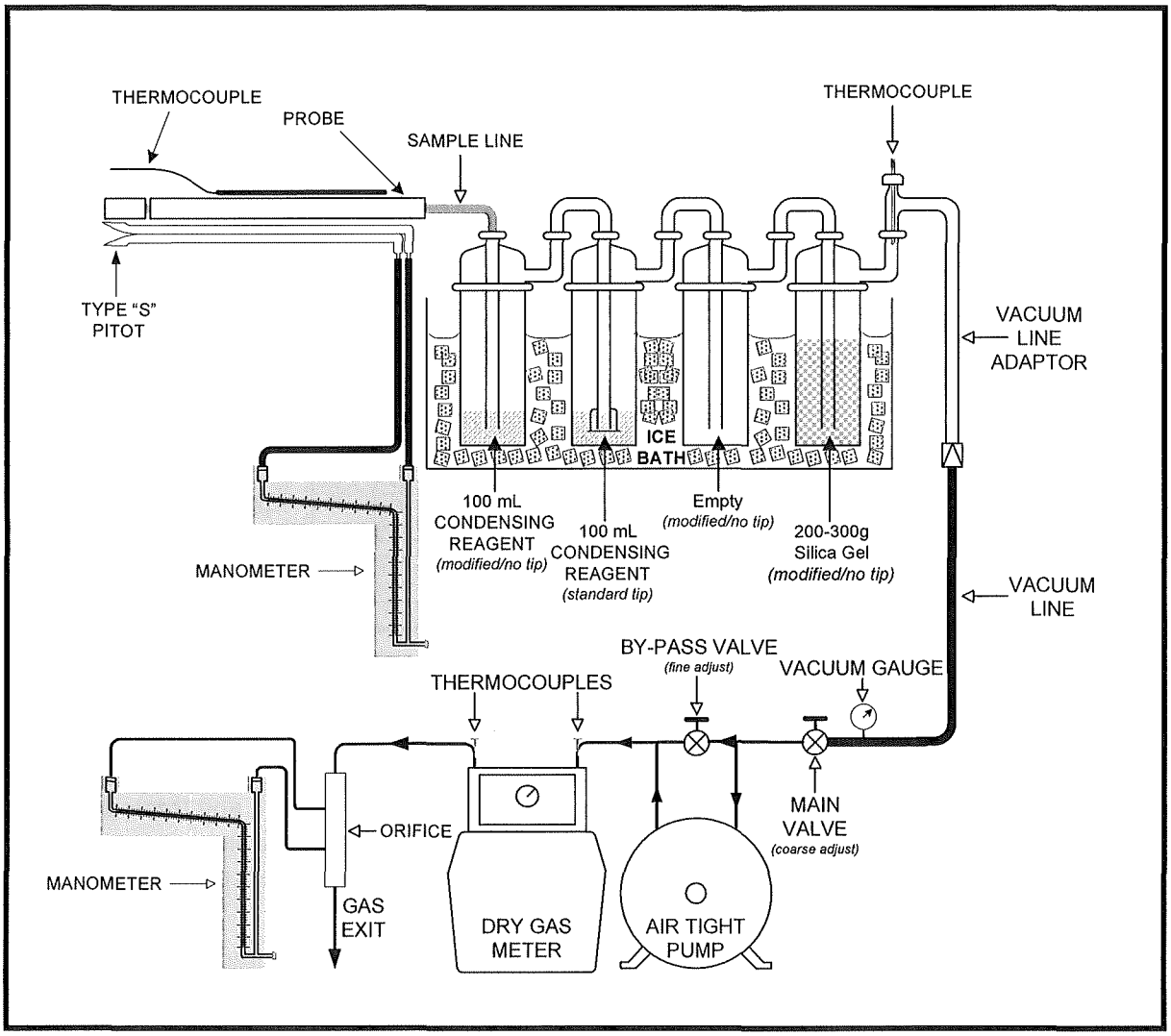
EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed in an ice water bath. The impingers are weighed after each run to determine the percent moisture.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Moisture sampling is performed as part of the pollutant sample trains
  - Since it is theoretically impossible for measured moisture to be higher than psychrometric moisture, the psychrometric moisture is also calculated, and the lower moisture value is used in the calculations
- Method Exceptions:
  - Moisture sampling is performed as a stand-alone method at a single point in the centroid of the stack
- Target and/or Minimum Required Sample Duration: 60 minutes

The typical sampling system is detailed in Figure 3-2.

FIGURE 3-2
EPA METHOD 4 DETACHED WITH PITOTS SAMPLING TRAIN



3.1.5 EPA Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

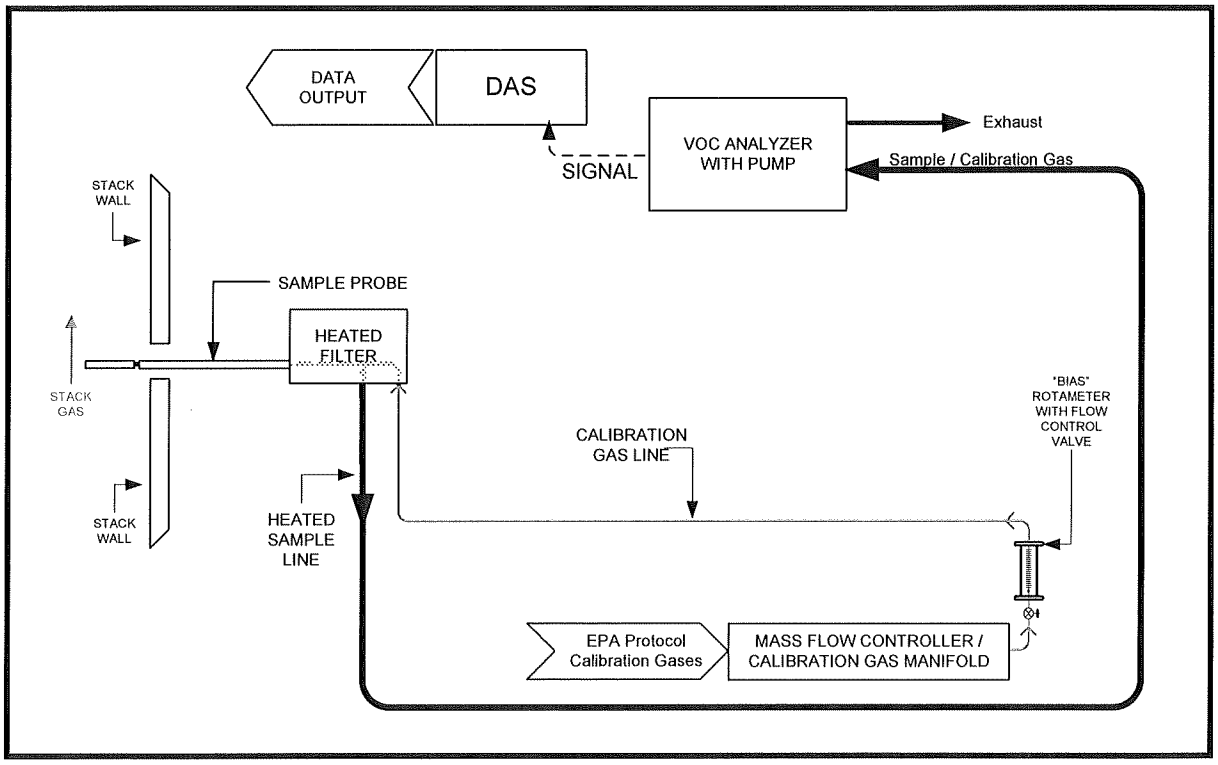
EPA Method 25A is an instrumental test method used to measure the concentration of THC in stack gas. A gas sample is extracted from the source through a heated sample line and glass fiber filter to a FIA. Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

Pertinent information regarding the performance of the method is presented below:

- Method Options:
  - Results are reported in terms of propane
- Method Exceptions:
  - None
- Target and/or Minimum Required Sample Duration: 60 minutes

The typical sampling system is detailed in Figure 3-3.

FIGURE 3-3
EPA METHOD M25A SAMPLING TRAIN



3.2 Process Test Methods

The test plan did not require that process samples be collected during this test program; therefore, no process sample data are presented in this test report.

4.0 Test Discussion and Results

4.1 Field Test Deviations and Exceptions

It should be noted that one of the calibration gas cylinder standards used to calibrate the Method 25A THC analyzer (Cylinder #CC89362 – 3002 ppmv propane) exceeded its expiration date by 5 days. The cylinder will be recertified to ensure the accuracy of its content and to support the accuracy and acceptability of the test results.

No other field deviations or exceptions from the test plan or test methods occurred during this test program.

4.2 Presentation of Results

The average results are compared to the permit limits in Table 1-2. The results of individual compliance test runs performed are presented in Table 4-1. Emissions are reported in units consistent with those in the applicable regulations or requirements. Additional information is included in the appendices as presented in the Table of Contents.

Table 4-1
THC Emissions and DE Results -
RTO

Parameter/Units	Run 1	Run 2	Run 3	Average
Date	3/22/2022	3/22/2022	3/22/2022	--
Time	09:32-10:32	11:38-12:38	13:30-14:30	--
Inlet Flue Gas Parameters				
flue gas temperature, °F	135.1	145.1	147.8	142.6
volumetric flow rate, acfm	1,841	1,892	1,623	1,785
volumetric flow rate, scfm	1,600	1,617	1,381	1,533
volumetric flow rate, dscfm	1,318	1,249	1,052	1,206
CO_2, % volume dry	0.3	0.3	0.2	0.3
O_2, % volume dry	21.4	21.4	21.4	21.4
moisture content, % volume	17.65	22.83	23.85	21.44
Inlet Total Hydrocarbons (THC), as propane				
ppmvw	5,445	5,199	5,177	5,274
lb/hr	59.8	57.7	49.1	55.6
Inlet Total Hydrocarbons (THC), as pentane				
ppmvw	3,724	3,555	3,541	3,607
lb/hr	66.9	64.6	55.0	62.2
Outlet Flue Gas Parameters				
flue gas temperature, °F	249	266	260	258
volumetric flow rate, acfm	4,516	4,293	4,603	4,471
volumetric flow rate, scfm	3,313	3,077	3,324	3,238
volumetric flow rate, dscfm	2,932	2,730	2,894	2,852
CO_2, % volume dry	1.0	1.0	0.9	1.0
O_2, % volume dry	19.4	19.6	19.5	19.5
moisture content, % volume	11.54	11.30	12.92	11.92
Outlet Total Hydrocarbons (THC), as propane				
ppmvw	10.00	10.52	11.87	10.80
lb/hr	0.227	0.222	0.271	0.240
DE, %	99.6	99.6	99.4	99.6
Outlet Total Hydrocarbons (THC), as pentane				
ppmvw	6.32	6.65	7.50	6.82
lb/hr	0.235	0.230	0.280	0.248
DE, %	99.6	99.6	99.5	99.6

5.0 Internal QA/QC Activities

5.1 QA/QC Audits

The meter boxes and sampling trains used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes, and minimum sample durations met the applicable QA/QC criteria.

EPA Method 3A calibration audits were all within the measurement system performance specifications for the calibration drift checks, system calibration bias checks, and calibration error checks.

EPA Method 25A FIA calibration audits were within the measurement system performance specifications for the calibration drift checks and calibration error checks.

5.2 QA/QC Discussion

All QA/QC criteria were met during this test program.

5.3 Quality Statement

Montrose is qualified to conduct this test program and has established a quality management system that led to accreditation with ASTM Standard D7036-04 (Standard Practice for Competence of Air Emission Testing Bodies). Montrose participates in annual functional assessments for conformance with D7036-04 which are conducted by the American Association for Laboratory Accreditation (A2LA). All testing performed by Montrose is supervised on site by at least one QI as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is included in the report appendices. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).

Appendix A
Field Data and Calculations

Appendix A.1
Sampling Locations