

## 1.0 INTRODUCTION

### 1.1 SUMMARY OF TEST PROGRAM

The Andersons Marathon Holdings LLC contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance emissions test program on the Hammermill (FGMILL2) controlled by baghouses C-30A-1;2;3;4, and the dried distillers grain (DDGS) cooling drum (EU-COOLINGDRUM) controlled by baghouse C-70A at the Andersons Marathon Holdings LLC facility located in Albion, Michigan. The tests were conducted to satisfy the emissions testing requirements of the Title V Renewable Operating Permit No. MI-ROP-B8570-2015 issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

The specific objectives were to:

- Verify the filterable Particulate Matter (PM) emissions of the FGMILL2
- Verify the Total Particulate Matter (TPM) emissions of the EU-COOLINGDRUM
- Verify the Volatile Organic Compound (VOC) emissions of the EU-COOLINGDRUM
- 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(s)	Unit ID/ Source Name	Activity/ Parameters	Test Methods	No. of Runs	Duration (Minutes)
11/1/2022	EU-COOLING DRUM	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	60
11/1/2022	EU-COOLING DRUM	O <sub>2</sub> , CO <sub>2</sub>	EPA 3	3	60
11/1/2022	EU-COOLING DRUM	Moisture	EPA 4	3	60
11/1/2022	EU-COOLING DRUM	Total PM <sub>10</sub> /PM <sub>2.5</sub>	EPA 17/202	3	60
11/1/2022	EU-COOLING DRUM	VOC	EPA 320	3	60
11/2/2022	FGMILL2	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	60
11/2/2022	FGMILL2	O <sub>2</sub> , CO <sub>2</sub>	EPA 3	3	60
11/2/2022	FGMILL2	Moisture	EPA 4	3	60

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AIR QUALITY DIVISION



11/2/2022      FGMILL2      Filterable  
 PM<sub>10</sub>/PM<sub>2.5</sub>      EPA 17      3      60

To simplify this report, a list of Units and Abbreviations is included in Appendix D.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 testing was conducted by the Montrose personnel listed in Table 1-3. The tests were conducted according to the test plan (MW024AS-018984-PP-517) dated September 8, 2022 that was submitted to EGLE.

**TABLE 1-2  
 SUMMARY OF AVERAGE COMPLIANCE RESULTS -  
 EU-COOLING DRUM  
 November 1, 2022**

Parameter/Units	Average Results	Emission Limits
<b>Total PM<sub>10</sub>/PM<sub>2.5</sub></b> lb/hr*	0.81	2.14
<b>Total VOCs</b> Lb/hr**	< 11.8	13.6

\* Total Particulate Matter was determined by the summation of all filterable and condensable particulate matter captured by the USEPA Method 17/202 Train.

\*\* Total VOC by FTIR includes acetaldehyde, acetic acid, acrolein, ethanol, ethyl acetate, formaldehyde, formic acid, 2-furaldehyde, methanol.

**TABLE 1-2  
 SUMMARY OF AVERAGE COMPLIANCE RESULTS -  
 FGMILL2  
 November 2, 2022**

Parameter/Units	Average Results	Emission Limits
<b>Filterable Particulate Matter</b> lb/hr	0.17	0.64

## 1.2 KEY PERSONNEL

A list of project participants is included below:

### Facility Information

Source Location: The Andersons Marathon Holdings LLC  
26250 B Drive North  
Albion, MI 49224

Contact: Evan Dankert  
Role: EHS Senior Specialist  
Company: The Andersons Marathon Holdings  
Email: Evan\_Dankert@andersonsinc.com

### Agency Information

Regulatory Agency: EGLE

### Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC

Contact: John Nestor  
Title: District Manager  
Telephone: 248-765-5032  
Email: jonestor@montrose-env.com

### Laboratory Information

Laboratory: Montrose Detroit  
City, State: Royal Oak, Michigan  
Method: EPA Method 17

Laboratory: Montrose Elk Grove  
City, State: Elk Grove, Illinois  
Method: EPA Method 202

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

**TABLE 1-3  
TEST PERSONNEL AND OBSERVERS**

<b>Name</b>	<b>Affiliation</b>	<b>Role/Responsibility</b>
John Nestor	Montrose	Field Project Manager, QI
Roy Zimmer	Montrose	Field Technician
Clayton Deronne	Montrose	Field Technician
Tony Sloma	The Andersons, Inc.	Observer/Client Liaison/Test Coordinator
Evan Dankert	The Andersons, Inc.	Observer/Client Liaison/Test Coordinator

**2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS**

**2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT**

The Andersons Marathon Holdings LLC operates an ethanol process that produces ethanol from grain product. This facility utilizes multiple hammermill baghouses to control the emissions from grinding of corn. Emissions from the FGMILL2 were monitored with the hammermills and baghouses in operation. Emissions from the EU-COOLINGDRUM were conducted at normal operation while the baghouse C-70A was in use.

**2.2 FLUE GAS SAMPLING LOCATION**

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

**TABLE 2-1  
 SAMPLING LOCATION**

Sampling Location	Stack Inside Dimensions (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
FGMILL2 Exhaust Stack	31"	1368 / 26	63.6 / 2	Isokinetic: 12 (6/port)
EU-COOLINGDRUM Exhaust Stack	49"	224.6/4.6	780/15.9	Isokinetic: 24 (12/port)

Sample location(s) were verified in the field to conform to EPA Method 1. Acceptable cyclonic flow conditions were confirmed prior to testing using EPA Method 1, Section 11.4. See Appendices A.1 and A.2 for more information.

**2.3 OPERATING CONDITIONS AND PROCESS DATA**

Emission tests were performed while the source/units and air pollution control devices were operating at the conditions required by the permit. The unit were tested while operating at normal conditions.

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 were presented previously 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.

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.

##### **3.1.3 EPA Method 3, Gas Analysis for the Determination of Dry Molecular Weight**

EPA Method 3 is used to calculate the dry molecular weight of the stack gas using one of three methods. The first choice is to measure the percent O<sub>2</sub> and CO<sub>2</sub> in the gas stream. A gas sample is extracted from a stack by one of the following methods: (1) single-point, grab sampling; (2) single-point, integrated sampling; or (3) multi-point, integrated sampling. The gas sample is analyzed for percent CO<sub>2</sub> and percent O<sub>2</sub> using either an Orsat or a Fyrite analyzer.

##### **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.

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

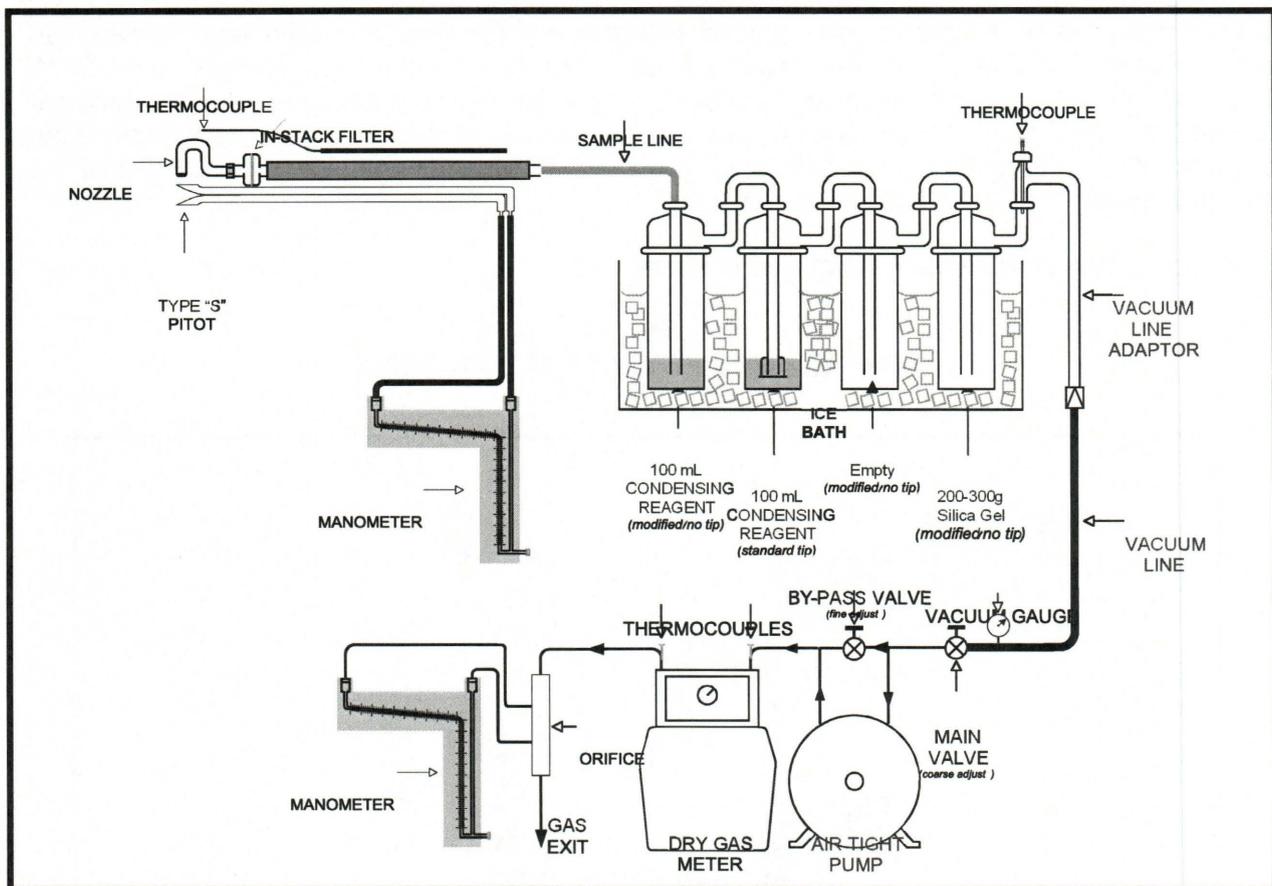
##### **3.1.6 EPA Method 17, Determination of Particulate Matter Emissions from Stationary Sources**

EPA Method 17 is a manual, isokinetic test method used to measure emissions of FPM. Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter

maintained at stack temperature. The PM mass is determined gravimetrically after the removal of uncombined water.

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

**FIGURE 3-1  
 US EPA METHOD 17 SAMPLING TRAIN**



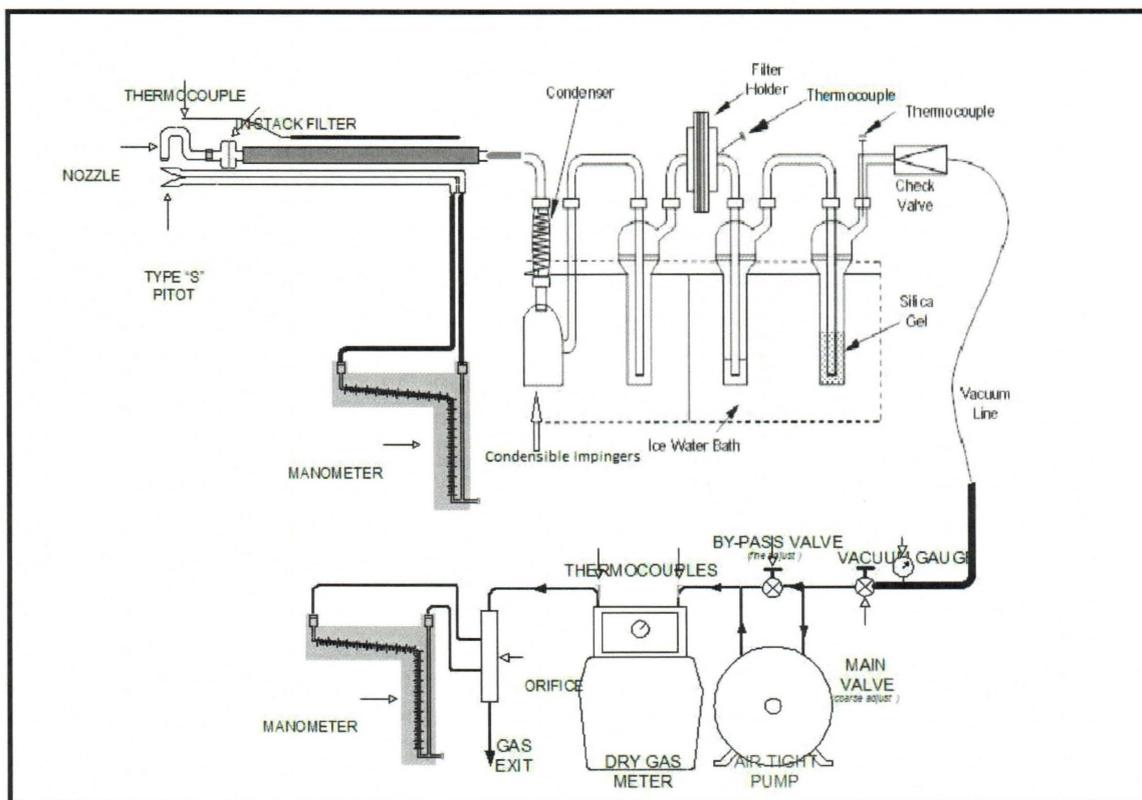
### 3.1.6 EPA Method 17/202, Determination of Total Particulate Matter Emissions from Stationary Sources

EPA Method 17/202 is a manual, isokinetic test method used to measure emissions of FPM and Condensable particulate matter (CPM). CPM and FPM are then summed together to determine a total PM emission rate less than 10 microns and 2.5 microns. Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at stack temperature. The CPM is collected in dry impingers after filterable PM has been collected on a filter maintained as specified in either Method 5 of Appendix A-3 to 40 CFR 60, Method 17 of Appendix A-6 to 40 CFR 60, or Method 201A of Appendix M to 40 CFR 51. The organic and aqueous fractions of the impingers and an out-of-stack CPM filter are then taken to dryness and weighed. The total of the impinger fractions and the CPM filter represents the CPM. Compared to the version of Method 202 that was promulgated on December 17, 1991, this

method eliminates the use of water as the collection media in impingers and includes the addition of a condenser followed by a water dropout impinger immediately after the final in-stack or heated filter. This method also includes the addition of one modified Greenburg Smith impinger (backup impinger) and a CPM filter following the water dropout impinger. CPM is collected in the water dropout impinger, the modified Greenburg Smith impinger, and the CPM filter of the sampling train as described in this method. The impinger contents are purged with nitrogen immediately after sample collection to remove dissolved SO<sub>2</sub> gases from the impinger. The CPM filter is extracted with water and hexane. The impinger solution is then extracted with hexane. The organic and aqueous fractions are dried and the residues are weighed. The total of the aqueous and organic fractions represents the CPM. The potential artifacts from SO<sub>2</sub> are reduced using a condenser and water dropout impinger to separate CPM from reactive gases. No water is added to the impingers prior to the start of sampling. To improve the collection efficiency of CPM, an additional filter (the "CPM filter") is placed between the second and third impingers.

The Typical Sampling System is detailed in Figure 3-2.

**FIGURE 3-2  
US EPA METHOD 17/202 SAMPLING TRAIN**



### 3.1.7 EPA Method 320, VOC and HAP Determination using FTIR Spectroscopy

Speciated VOC and HAP sampling was conducted using FTIR instrumentation following the principles of USEPA Method 320 and ASTM Method D6348-12.

An MKS Model MultiGas 2030 FTIR analyzer was used to measure the specific VOC and HAP compounds. The analyzer is composed of a mks 2030 FTIR spectrometer, a high optical throughput sampling cell, analysis software, and a quantitative spectral library. The analyzer collects high resolution spectra in the mid infrared spectral region (400 to 4,000  $\text{cm}^{-1}$ ), which are analyzed using the quantitative spectral library. This provides an accurate, highly sensitive measurement of gases and vapors.

As shown in Figure 3-3, the sample delivery system consisted of a stainless steel sampling probe, calibration tee assembly, Teflon sampling line, fast loop bypass pump, and sample manifold. The gas sample was continuously extracted from each source at approximately 6 liters per minute.

Independent calculations of optical path length were not performed because the instrument has a fixed path of 5.11 meters. A signal to noise ratio test (S/N) was performed using MKS software to verify instrument performance.

Performance parameters measured included signal to noise tests, noise equivalent absorbance (NEA), detector linearity, background spectra, potential interferences, and cell and system leakage.

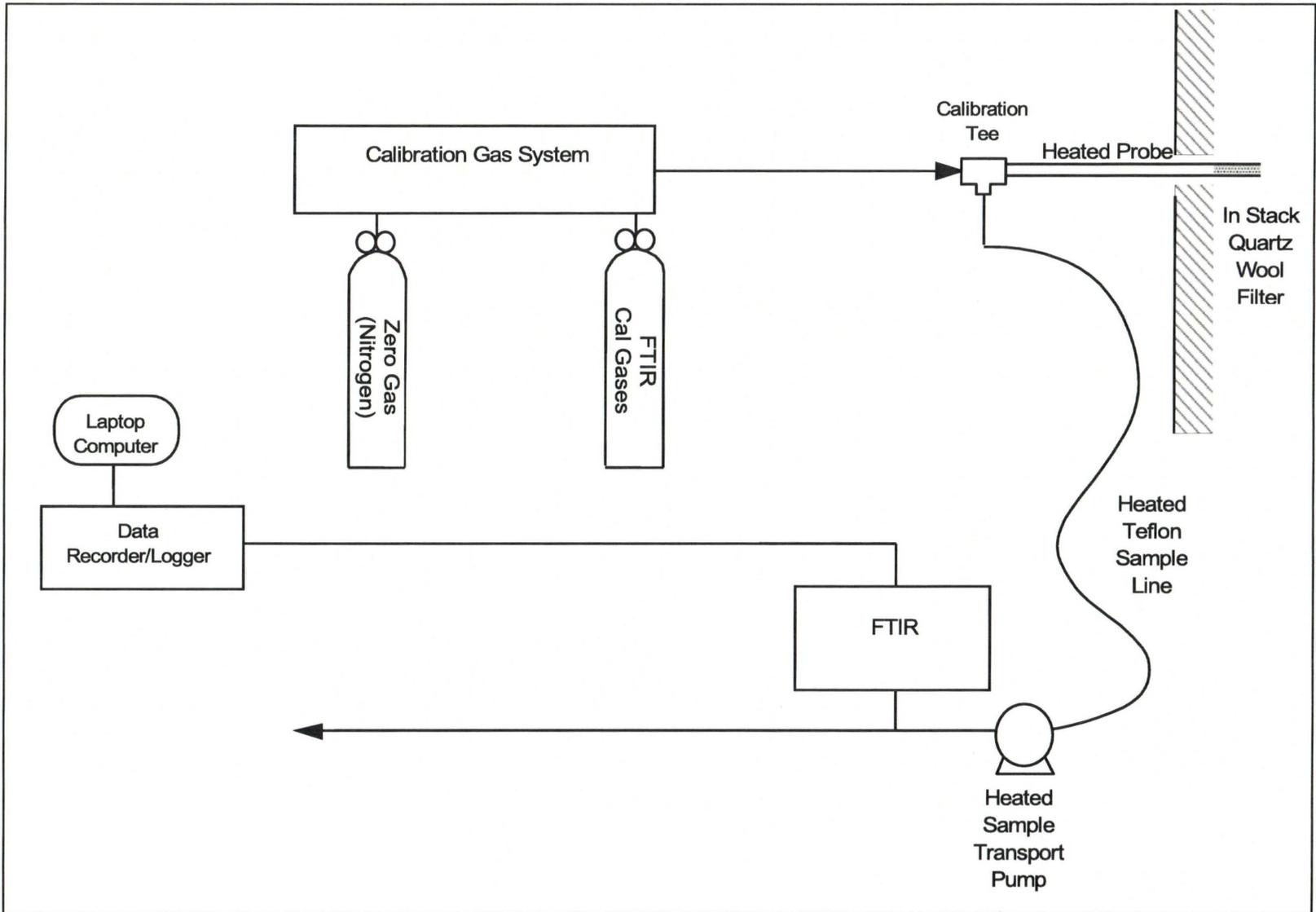
Quality assurance procedures included baseline measurement with ultra high purity nitrogen, measurement of a calibration transfer standard (~ 100 ppm methane), direct analyte calibration measurements, and measurements to determine baseline shift.  $\text{SF}_6$  was used as a tracer gas in the calibration gases to verify the sample delivery system integrity.

The general FTIR field sampling procedure was as follows:

#### PRE-TEST

- 1) Background spectrum
  - Evaluate diagnostics of the instrumentation
- 2) Baseline (cylinder UHP- $\text{N}_2$  for zero check)
  - Determine the level of background noise
  - Observe spectrum for baseline tilt, i.e., indicates vibrations/perturbations affecting instrument
- 3) Calibration transfer standard (cylinder 100 ppm methane)
  - Determine level of response to evaluate the spectral response and stability of the instrument
  - Create a field reference spectrum

3-3  
US EPA Method 320 Sampling System



The Andersons Albion Ethanol, LLC  
2022 Compliance Source Test Report

- 4) Baseline evaluation
  - Note baseline flush/clean out FTIR sample cell
  - Observe spectrum for baseline tilt
- 5) Collection of spectra stack gas
  - Determine stack gas analyte concentrations
- 6) Measurement of analyte calibration gas
- 7) Perform dynamic spiking recovery study (recovery must be  $0.7 \leq R \leq 1.3$ )

**TEST (REPEAT EACH RUN)**

- 1) Baseline Determination
- 2) Measurement of dynamic spike
- 3) Collect sequential spectra of stack gas
- 4) Baseline Determination
- 5) Measurement of Calibration Transfer Standard

**POST-TEST**

- 1) Baseline Determination
- 2) Measurement of Calibration Transfer Standard (i.e. span check)
- 3) Measurement of analyte calibration gas (optional)

**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

No 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 Tables 4-1 through 4-3. 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.

Concentration values in Table 4-1 denoted with a '<' were measured to be below the minimum detection limit (MDL) of the applicable analytical method. Emissions denoted with a '<' in Table 4-1 were calculated utilizing the applicable MDL concentration value instead of the "as measured" concentration value.

**TABLE 4-1  
 FILTERABLE PM EMISSIONS RESULTS -  
 EU-COOLINGDRUM EXHAUST**

Run Number	1	2	3	Average
Date	11/1/2022	11/1/2022	11/1/2022	--
Time	16:05-17:08	17:27-18:35	19:05-20:10	--
<b>Flue Gas Parameters</b>				
O <sub>2</sub> , % volume dry	20.9	20.9	20.9	20.9
CO <sub>2</sub> , % volume dry	0.0	0.0	0.0	0.0
flue gas temperature, °F	97.1	95.7	94.4	95.7
moisture content, % volume*	4.47	3.89	4.77	4.38
volumetric flow rate, dscfm	55,211	54,745	55,576	55,178
<b>Filterable PM</b>				
lb/hr**	1.04	0.63	0.75	0.81

**TABLE 4-2  
 VOC EMISSIONS RESULTS -  
 EU-COOLINGDRUM EXHAUST**

Client: The Anderson's Marathon Holdings, LLC  
 Facility: Albion, MI  
 Test Location: EU-COOLING DRUM  
 Test Method: Method 320

Source Condition	11/1/2022		11/1/2022		11/1/2022	
Date	11/1/2022	11/1/2022	11/1/2022	11/1/2022	11/1/2022	11/1/2022
Start Time	16:15	17:40	17:40	19:08	19:08	
End Time	17:14	18:39	18:39	20:07	20:07	
	Run 1	Run 2	Run 3	Run 3	Run 3	Run 3
<b>Stack Conditions</b>						
Average Gas Temperature °F	97.1	95.7	94.4			
Effluent Moisture, percent by volume	2.4	3.0	2.9			
Average Effluent Pressure in. hg	-0.3	-0.3	-0.3			
Effluent Volumetric Flow Rate, acfm	60,582	59,555	60,874			
Effluent Volumetric Flow Rate, dscfm	57,797	56,962	58,360			
Effluent Volumetric Flow Rate, scfm	55,211	54,745	55,576			
<b>Acetaldehyde</b>						
ppmv wet	3.3	2.9	2.8	3.0		
ppmv dry	3.4	3.0	2.8	3.1		
lb/hr	1.2	1.1	1.1	1.1		
<b>Acetic Acid</b>						
ppmv wet	5.0	11.4	10.7	9.1		
ppmv dry	5.2	11.8	11.1	9.3		
lb/hr	2.6	5.9	5.6	4.7		
<b>Acrolein</b>						
ppmv wet <	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
ppmv dry <	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
lb/hr <	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
<b>Ethanol</b>						
ppmv wet	9.1	9.2	7.8	8.7		
ppmv dry	9.3	9.5	8.0	8.9		
lb/hr	3.6	3.6	3.1	3.4		
<b>Ethyl Acetate</b>						
ppmv wet	2.0	2.1	2.1	2.0		
ppmv dry	2.1	2.1	2.1	2.1		
lb/hr	1.5	1.6	1.6	1.6		
<b>Formaldehyde</b>						
ppmv wet <	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
ppmv dry <	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
lb/hr <	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
<b>Formic Acid</b>						
ppmv wet <	0.2	0.4	0.3	0.3		
ppmv dry <	0.2	0.4	0.3	0.3		
lb/hr <	0.1	0.1	0.1	0.1		
<b>2-Furaldehyde</b>						
ppmv wet <	0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
ppmv dry <	0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
lb/hr <	0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
<b>Methanol</b>						
ppmv wet <	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
ppmv dry <	0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2
lb/hr <	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
<b>Total VOCs</b>						
lb/hr <	9.9	< 13.1	< 12.3	< 11.8		

**TABLE 4-3  
 FILTERABLE PM EMISSIONS RESULTS -  
 FGMILL2 BAGHOUSESTACK**

Run Number	1	2	3	Average
<b>Date</b>	11/2/2022	11/2/2022	11/2/2022	--
<b>Time</b>	8:40-9:45	9:58-11:01	11:20-12:23	--
<b>Flue Gas Parameters</b>				
O <sub>2</sub> , % volume dry	20.9	20.9	20.9	20.9
CO <sub>2</sub> , % volume dry	0.0	0.0	0.0	0.0
flue gas temperature, °F	78.5	81.6	82.2	80.8
moisture content, % volume*	1.19	1.59	1.41	1.39
volumetric flow rate, dscfm	19,590	19,755	19,138	19,494
<b>Filterable PM</b>				
lb/hr**	0.144	0.180	0.191	0.171

## 5.0 INTERNAL QA/QC ACTIVITIES

### 5.1 QA/QC AUDITS

The meter box and sampling train(s) used during sampling performed within the requirements of their respective methods. All post-test leak checks, minimum metered volumes, minimum sample durations, and percent isokinetics met the applicable QA/QC criteria.

### 5.2 QA/QC DISCUSSION

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

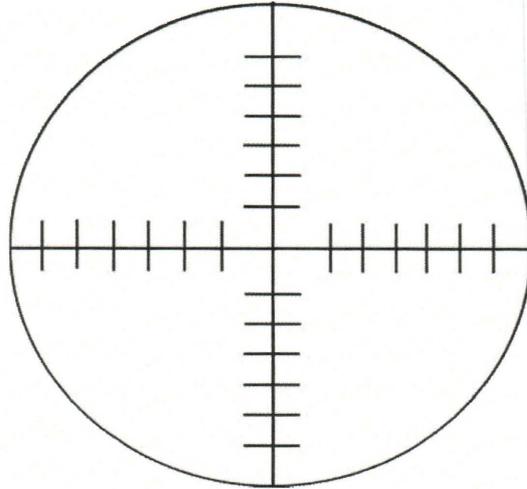
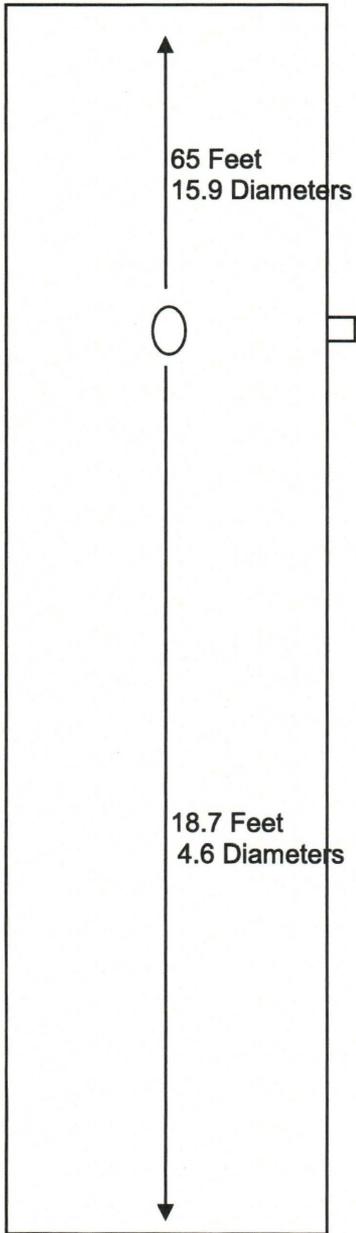
### 5.3 QUALITY STATEMENT

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 Qualified Individual (QI) as defined in D7036-04 Section 8.3.2. Data quality objectives for estimating measurement uncertainty within the documented limits in the test methods are met by using approved test protocols for each project as defined in D7036-04 Sections 7.2.1 and 12.10. Additional quality assurance information is 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

diameter = 49 "



Not to Scale

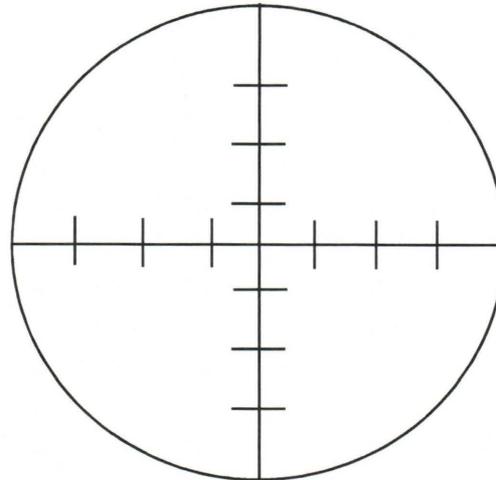
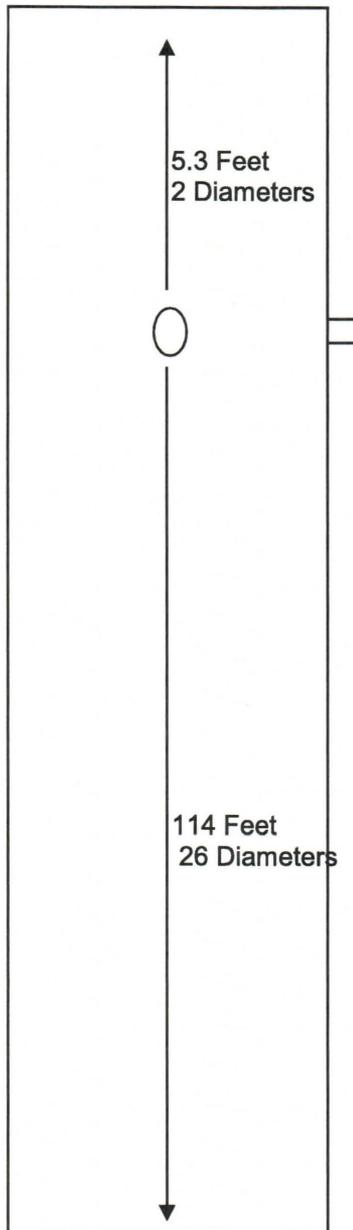
Points	Distance "
1	1.0
2	3.3
3	5.8
4	8.7
5	12.3
6	17.4
7	31.6
8	36.8
9	40.3
10	43.2
11	45.7
12	48.0

**Site:**  
The Andersons Ethanaol  
Albion, Michigan  
EU COOLING DRUM

**Sampling Dates:**  
11/1/2022

**Montrose Air Quality Services,  
LLC**  
4949 Fernlee  
Royal Oak, Michigan

diameter = 31 "



Not to Scale

Points	Distance "
1	1.4
2	4.5
3	9.2
4	21.8
5	26.5
6	29.6

**Site:**  
The Andersons Ethanaol  
Albion, Michigan  
FGMILL2

**Sampling Dates:**  
11/2/2022

**Montrose Air Quality Services,  
LLC**  
4949 Fernlee  
Royal Oak, Michigan