1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

General Formulations, Inc. contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance emissions test program on the Coating Operations (FG-SolventBased (EU-MixRoom, EU-CoaterB, EU-CoaterD, EU-CoaterG, EU-CoaterH)) at the General Formulations, Inc. facility located in Sparta, Michigan. The tests were conducted to satisfy the emissions testing requirements pursuant to Michigan Department of Environment Great Lakes and Energy (EGLE) Permit No. 192-03G.

The specific objectives were to:

- Verify the total gaseous organic (TGO) destruction efficiency (DE) of the RTO serving FG-SolventBased
- 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)
08/11/2020	RTO	Velocity/Volumetric Flow Rate	EPA 1 & 2	3	10 (Inlet) 10 (Exhaust)
08/11/2020	RTO	Moisture	EPA 4	3	~1 (Inlet) 30 (Exhaust)
08/11/2020	RTO	TGO	EPA 25A	3	60 (Inlet) 60 (Exhaust)

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 testing was conducted by the Montrose personnel listed in Table 1-3 on August 11, 2020 The tests were conducted according to the test plan (protocol) dated July 7, 2020 that was submitted to and approved by EGLE.

TABLE 1-2
SUMMARY OF AVERAGE COMPLIANCE RESULTS -
RTO
AUGUST 11, 2020

Parameter/Units	Average Results	Allowable Limits
TGO Destruction Efficiency (DE)		
%	99	95

1.2 KEY PERSONNEL

A list of project participants is included below:

Facility Information

Source Location:	General Formulations, Inc. 309 S. Union Sparta, MI 49345
Project Contact:	Rob Bachholzky
Role:	Quality Control Manager
Company:	General Formulations, Inc.
Telephone:	616-887-7387
Email:	rbachholzky@generalformulationsInc.com

Agency Information

Regulatory Agency:	Michigan Department of EGLE
Contact:	Karen Kajiya-Mills
Telephone:	517-284-6780
Email:	Kajiya-millsk@michigan.gov

Testing Company Information

Testing Firm:	Montrose Air Quality Services, LLC	
Contact:	Matthew Young	Todd Wessel
Title:	District Manager	Client Project Manager
Telephone:	248-548-8070	248-548-8070
Email:	myoung@montrose-env.com	twessel@montrose-env.com

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

TABLE 1-3
TEST PERSONNEL AND OBSERVERS

Name	Affiliation	Role/Responsibility
Todd Wessel	Montrose	Client Project Manager
Ryan McWhinnie	Montrose	Field Technician
Jeffrey Peitzsch	Montrose	Field Technician
Rob Bachholzky	General Formulations, Inc.	Observer/Client Liaison/Test Coordinator

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS DESCRIPTION, OPERATION, AND CONTROL EQUIPMENT

General Formulations, Inc. offers pressure sensitive films, polyesters, vinyls, and special laminations, as well as inks for plastic films. The facility's operations include a (FG-SolventBased) mix room (EU-MixRoom), roll laminators (CoatersB. D, G, and H), and natural gas ovens). Coater B uses only solvent-based coatings and Coaters D, G, and H use water and/or solvent-based coatings. EU-MixRoom is a batch process where coatings and adhesives are produced for internal use and external sales. Each emission unit is equipped with a filtration system to control particulate matter and VOC emissions are captured by a PTE and controlled by a regenerative thermal oxidizer (RTO) (SV-NewRTO). FG-SolventBased was in operation during this test.

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 Dimensions (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
SV-NewRTO Inlet	54.0X54.0 Circular	112.0/2.1	39.0/0.7	Flow: 16 (8/port); Moisture and Gaseous: 1
SV-NewRTO Exhaust	76.0X42.0 Rectangular	290.0/5.4	56.0/1.0	Flow: 16 (4/port); Moisture and Gaseous: 1

Sample locations were verified in the field to conform to EPA Method 1, except for the downstream distance from the nearest disturbance. See Section 4-1 for details. Acceptable cyclonic flow conditions were confirmed prior to testing using EPA Method 1, Section 11.4. See Appendices A.1 through A.3 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(s) were tested when operating normally/as found/at greater than 90% capacity/at maximum load and full load/at least 50% of rated load.

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. Data collected includes the following parameters:

- Permanent Total Enclosure Station Status
- Permanent Total Enclosure Station Running
- Permanent Total Enclosure (PTE) 3-hr average, in.-H2O
- Permanent Total Enclosure (PTE) 15-min average, in.-H2O
- RTO Chamber Temperature (maximum and minimum),°F
- RTO Inlet/Outlet Temperature (maximum and minimum),°F
- Raw Material Components and Operations

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

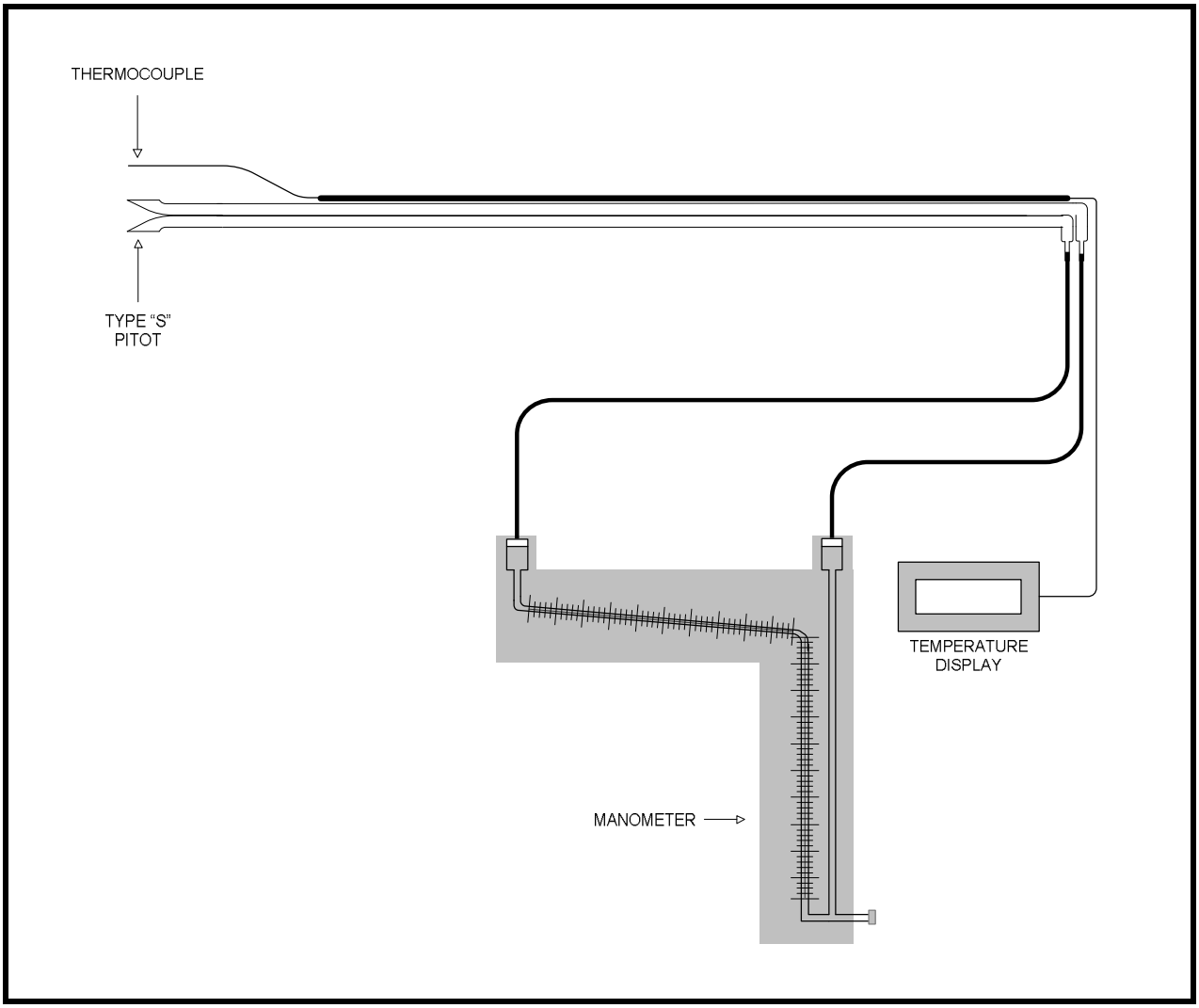
EPA Method 1 is used to assure that representative measurements of volumetric flow rate are obtained by dividing the cross-section of the stack or duct into equal areas, and then locating a traverse point within each of the equal areas. Acceptable sample locations must be located at least two stack or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

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 sampling system is detailed in Figure 3-1.

FIGURE 3-1
EPA METHOD 2 SAMPLING SYSTEM



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_2 and CO_2 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_2 and percent O_2 using either an Orsat or a Fyrite analyzer.

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

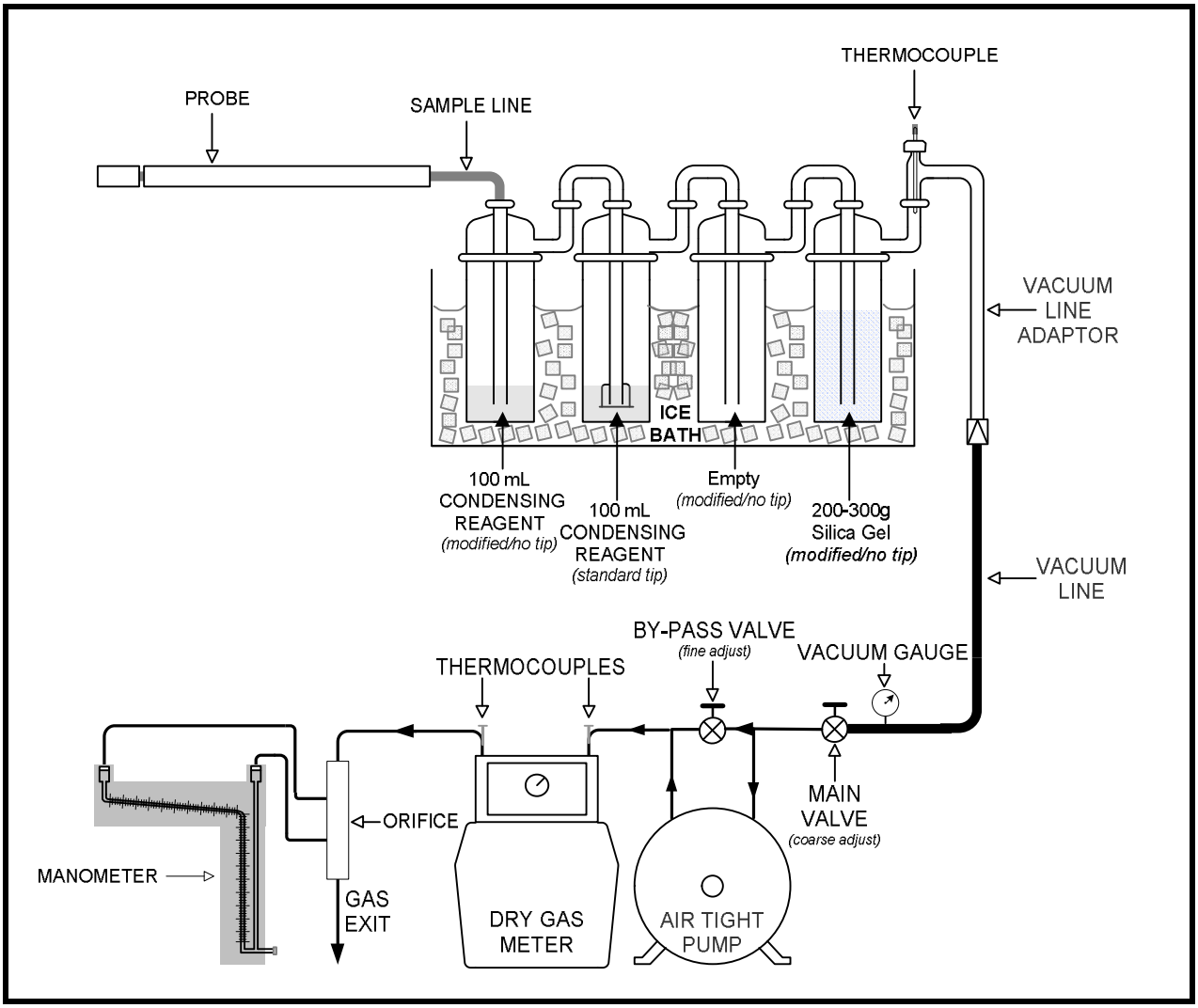
EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train.

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 wet bulb/dry bulb approximation method (EPA Method 4, Section 2.2.1) was also utilized during this test event.

The sampling system is detailed in Figure 3-2.

FIGURE 3-2
EPA METHOD 4(DETACHED) SAMPLING TRAIN



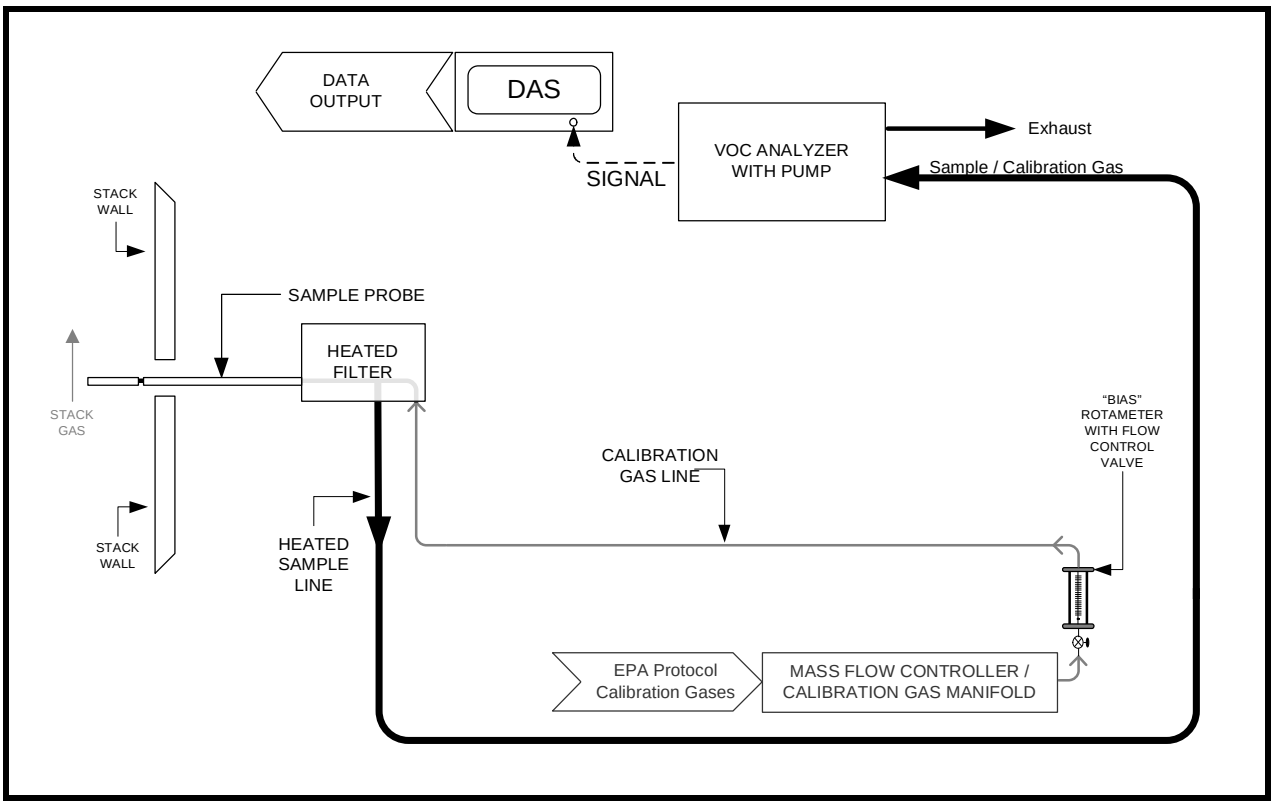
3.1.5 EPA Method 25A, Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

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 flame ionization analyzer (FIA). Results are reported as volume concentration equivalents of the calibration gas or as carbon equivalents.

The sampling system is detailed in Figure 3-3.

FIGURE 3-3
EPA METHOD 25A 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

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 displayed in Table 1-2. The results of individual test runs performed are presented in Tables 4-1 and 4-2. 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.

A dry molecular weight value of 29.0 g/g-mole was utilized at both sampling locations during this test event (EPA Method 2 Section 8.6).

Moisture during each run at the SV-NewRTO Inlet was measured using the wet-bulb/dry-bulb approximation method (EPA Method 4 Section 2.2.1).

TABLE 4-1
TGO EMISSIONS RESULTS -
SV-NEW RTO INLET

Run Number	1	2	3	Average
Date	08/11/2020	08/11/2020	08/11/2020	--
Time	08:12-09:12	09:32-10:32	10:47-12:18	--
Flue Gas Parameters				
flue gas temperature, °F	101	108	109	106
moisture content, % volume	2.23	2.31	2.67	2.40
volumetric flow rate, dscfm	28,443	38,381	36,866	34,563
TGO as Propane				
ppmvd	2,684	2,066	2,031	2,261
lb/hr	524	545	514	528

TABLE4-2
TGO EMISSIONS AND DE RESULTS -
SV-NEWRTO EXHAUST

Run Number	1	2	3	Average
Date	08/11/2020	08/11/2020	08/11/2020	--
Time	08:12-09:12	09:32-10:32	10:47-12:18	--
Process Data				
RTO temperature-max, °F	1,729	1,686	1,672	1,696
RTO temperature-min, °F	1,731	1,690	1,675	1,699
Flue Gas Parameters				
flue gas temperature, °F	336	347	304	329
moisture content, % volume	4.04	2.94	1.57	2.85
volumetric flow rate, dscfm	33,987	34,482	34,627	34,365
TGO as Propane				
ppmvd	26.0	28.4	21.9	25.4
lb/hr	6.07	6.71	5.21	6.00
TGO DE				
%	98.8	98.8	99.0	98.9

5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA/QC AUDITS

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

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

An EPA Method 205 field evaluation of the calibration gas dilution system was conducted. The dilution accuracy and precision QA specifications were met.

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).