

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: John Nestor **Date:** 03 / 31 / 2023

Name: John Nestor **Title:** District Manager

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: robert j lisy jr **Date:** 03 / 31 / 2023

Name: Robert J. Lisy, Jr. **Title:** Reporting Hub Manager

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1.0 Introduction

1.1 Summary of Test Program

Marysville Ethanol, LLC contracted Montrose Air Quality Services, LLC (Montrose) to perform the Annual Quality Assurance (QA) Relative Accuracy Test Audit (RATA) for the Predictive Emission Monitoring Systems (PEMS) associated with the EU-RTO&HSRG at the Marysville Ethanol, LLC facility (SRN: N7493) located in Marysville, Michigan. Testing was performed on February 7, 2023, for the purpose of satisfying the emission testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Permit-to-Install No. 175-05D by evaluating the quality of the emissions data produced by Marysville Ethanol, LLC's PEMS in accordance with 40 CFR Part 60, Appendices B and F.

The specific objectives were to:

- Verify the relative accuracy (RA) of the EU-RTO&HSRG PEMS for nitrogen oxides (NO_x) (as NO₂) lb/MMBtu emissions in accordance with Performance Specification 16 (PS-16)
- 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)
2/7/2023	EU-RTO&HSRG	O ₂	EPA 3A	10	21
2/7/2023	EU-RTO&HSRG	NO _x	EPA 7E	10	21

For the Part 60 RATA, of the ten RATA runs performed, nine were used to determine the RA of the EU-RTO&HSRG PEMS.

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 RA test results are summarized and compared to their respective regulatory requirements 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 (protocol) dated December 30, 2022 that was submitted to and approved by EGLE.

Table 1-2
Summary of Part 60 PEMS RATA Results – EU-RTO&HSRG
February 7, 2023

Parameter/Units	Regulatory Reference	RA	Allowable
Part 60			
Nitrogen Oxides (NO_x)			
lb/MMBtu (as NO ₂)	PS-16	1.42	≤ 20% of RM

1.2 Key Personnel

A list of project participants is included below:

Facility Information

Source Location: Marysville Ethanol, LLC
 2512 Busha Highway
 Marysville, MI 48040

Project Contact: Susan Jack
 Role: Production Manager
 Company: Marysville Ethanol, LLC
 Telephone: 810-479-8266
 Email: sjack@marysvilleethanol.com

Agency Information

Regulatory Agency: EGLE
 Agency Contact: Jeremiah Brown
 Telephone: 517-599-7825
 Email: brownj9@michigan.gov

Testing Company Information

Testing Firm: Montrose Air Quality Services, LLC

Contact: Robert J. Lisy, Jr.	John Nestor
Title: Reporting Hub Manager	District Manager
Telephone: 440-262-3760	248-548-8070
Email: rlisy@montrose-env.com	jonestor@montrose-env.com

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

Table 1-3
Test Personnel and Observers

Name	Affiliation	Role/Responsibility
John Nestor	Montrose	District Manager
Shane Rabideau	Montrose	Field Technician

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Name	Affiliation	Role/Responsibility
Susan Jack	Marysville Ethanol, LLC	Test Coordinator
Andrew Riley	EGLE	Observer

2.0 Plant and Sampling Location Descriptions

2.1 Process Description, Operation, and Control Equipment

The Marysville Ethanol facility operates two natural gas-fired 45 MMBtu/hr dryers and a 125 MMBtu/hr natural gas-fired regenerative thermal oxidizer (RTO) with a heat recovery steam generator (HRSG). The RTO controls emissions from several emission units. Low-NOx combustors minimize the emissions of nitrogen oxides from the process. The EU-RTO&HRSG was in operation during this test event.

2.2 Facility PEMS and Reference Method (RM) CEMS Descriptions

The Facility PEMS information is presented in Table 2-1, and the RM CEMS analyzer information is presented in Table 2-2.

**Table 2-1
Facility PEMS Information**

Measurement Type	Manufacturer	Model No.	Serial No.
EU-RTO&HRSG PEMS	CMC Solutions	SmartCEMSTM-60	S10.65175

**Table 2-2
RM CEMS Information**

Analyzer Type	Manufacturer	Model No.	Serial No.	Range
O ₂	Teledyne	T802	197	0-19.91%
NO _x	Teledyne	T200H	727	0-91.39 ppm

2.3 Flue Gas Sampling Location

Information regarding the sampling location is presented in Table 2-3.

**Table 2-3
Sampling Location**

Sampling Location	Stack Inside Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
EU-RTO&HRSG Exhaust Stack	83.0	360 / 4.3	780 / 9.4	Gaseous: 3

See Appendix A.1 for more information.

2.4 Operating Conditions and Process Data

The PEMS RATA was performed while the EU-RTO&HRSG was operating at greater than 50% of normal operating load.

Plant personnel were responsible for establishing the test conditions and collecting all applicable unit-operating data. The Facility PEMS and process data that was provided is presented in Appendix B. Data collected includes the following parameters:

- Facility PEMS data for each 21-minute RATA run
- Steam Flow, lb/hr
- Natural Gas Usage, MMBtu/hr

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 3A, Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

EPA Method 3A is an instrumental test method used to measure the concentration of O₂ and CO₂ in stack gas. The effluent gas is continuously or intermittently sampled and conveyed to analyzers that measure the concentration of O₂ and CO₂. The performance requirements of the method must be met to validate data.

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

3.1.2 EPA Method 7E, Determination of Nitrogen Oxides Emissions from Stationary Source (Instrumental Analyzer Procedure)

EPA Method 7E is an instrumental test method used to continuously measure emissions of NO_x as NO₂. Conditioned gas is sent to an analyzer to measure the concentration of NO_x. NO and NO₂ can be measured separately or simultaneously together but, for the purposes of this method, NO_x is the sum of NO and NO₂. The performance requirements of the method must be met to validate the data.

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

3.1.3 EPA Method 19, Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide, and Nitrogen Oxide Emission Rates

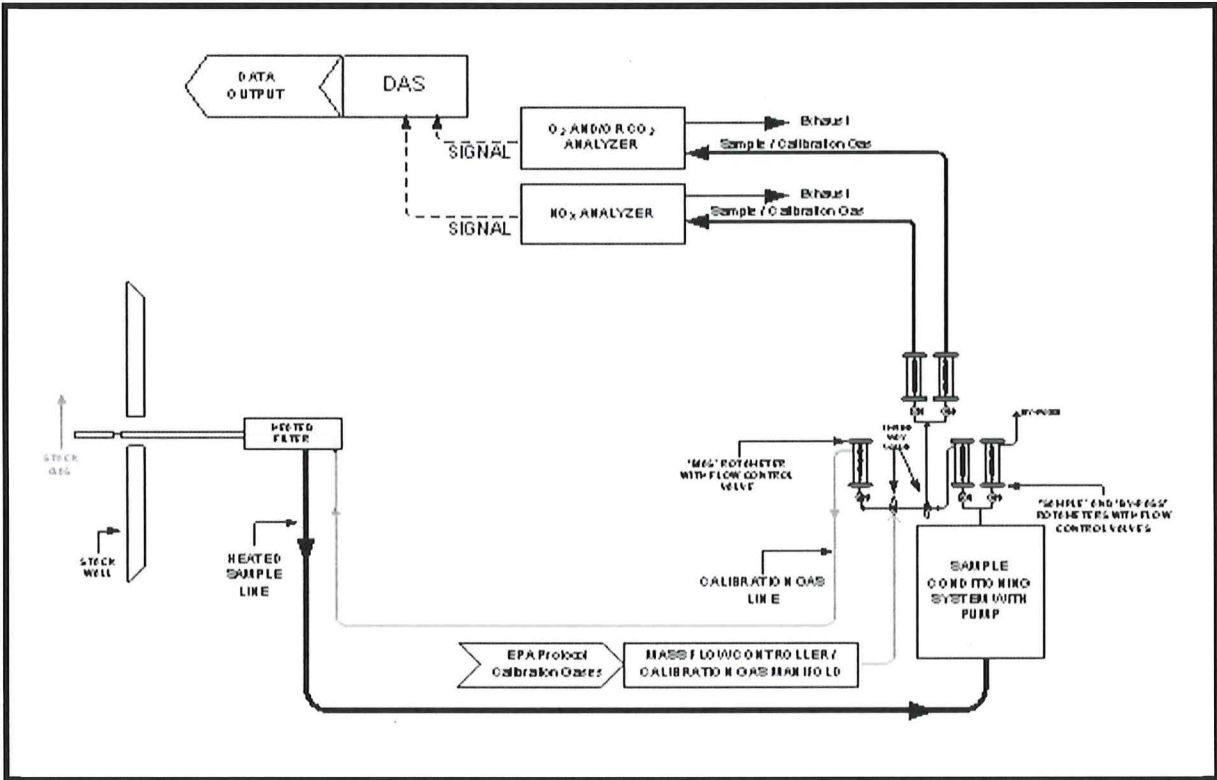
EPA Method 19 is used to calculate mass emission rates in units of lb/MMBtu. EPA Method 19, Table 19-2 contains a list of assigned fuel factors for different types of fuels, which can be used for these calculations.

3.1.4 EPA Performance Specification 16, Specifications and Test Procedures for Predictive Emission Monitoring Systems in Stationary Sources

EPA Performance Specification 16 is a specification used to evaluate the acceptability of Predictive Emission Monitoring Systems (PEMS) to show compliance with an emission limitation under 40 CFR 60, 61, or 63. These procedures are used to certify a PEMS after initial installation and periodically thereafter to ensure the system is operating properly and

meets the requirements of all applicable regulations. Ongoing QA/QC tests include sensor evaluation, bias correction, quarterly Relative Accuracy Audits (RAA), and annual Relative Accuracy Test Audits (RATA).

**Figure 3-1
EPA Method 3A and 7E 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 RA results are compared to the regulatory requirements in Table 1-2. The results of individual 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
NO_x (lb/MMBtu) RATA Results –
EU-RTO&HRSG**

Run No.	Date	Time	RM	PEMS	Difference	Run used (Y/N)	Steam Flow (lb/hr)
1	2/7/2023	6:38-6:59	0.068	0.070	-0.0022	N	97,095
2	2/7/2023	7:09-7:30	0.070	0.070	0.0003	Y	97,095
3	2/7/2023	9:28-9:49	0.070	0.070	0.0002	Y	96,158
4	2/7/2023	10:10-10:31	0.069	0.070	-0.0008	Y	96,127
5	2/7/2023	10:43-11:04	0.070	0.070	-0.0003	Y	98,149
6	2/7/2023	11:13-11:34	0.069	0.070	-0.0011	Y	98,280
7	2/7/2023	11:43-12:04	0.070	0.070	-0.0003	Y	98,105
8	2/7/2023	12:15-12:36	0.068	0.070	-0.0018	Y	96,373
9	2/7/2023	12:49-13:10	0.070	0.070	0.0004	Y	96,158
10	2/7/2023	13:19-13:40	0.070	0.070	-0.0004	Y	96,188
Averages			0.070	0.070	-0.0004		96,959
Standard Deviation			0.00073				
Confidence Coefficient (CC)			0.00056				
RA based on mean RM value			1.42	%			

5.0 Internal QA/QC Activities

5.1 QA/QC Audits

Table 5-1 presents a summary of the gas cylinder information.

Table 5-1
Part 60 Gas Cylinder Information

Gas Type	Gas Concentrations	Cylinder ID	Expiration Date
O ₂ , Balance N ₂	10.08%	ALM-041308	11/10/2030
O ₂ , Balance N ₂	19.91%	SG9162511BAL	9/2/2030
NO _x , Balance N ₂	51.62 ppmv	CC27069	5/9/2030
NO _x , Balance N ₂	91.39 ppmv	AAL069508	11/30/2029
NO ₂ , Balance Air	50.32 ppmv	EB0147946	9/14/2025

EPA Method 3A and 7E calibration audits were all within the measurement system performance specifications for the calibration drift checks, system calibration bias checks, and calibration error checks.

The NO₂ to NO converter efficiency check of the analyzer was conducted per the procedures in EPA Method 7E, Section 8.2.4. The conversion efficiency met the criteria.

5.2 QA/QC Discussion

Montrose did not have a Qualified Individual (QI) for EPA Methods 3A and 7E onsite during the test event as per ASTM D7036-04 requirements. However, upon data review, all EPA Method 3A and 7E data quality objectives were met.

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

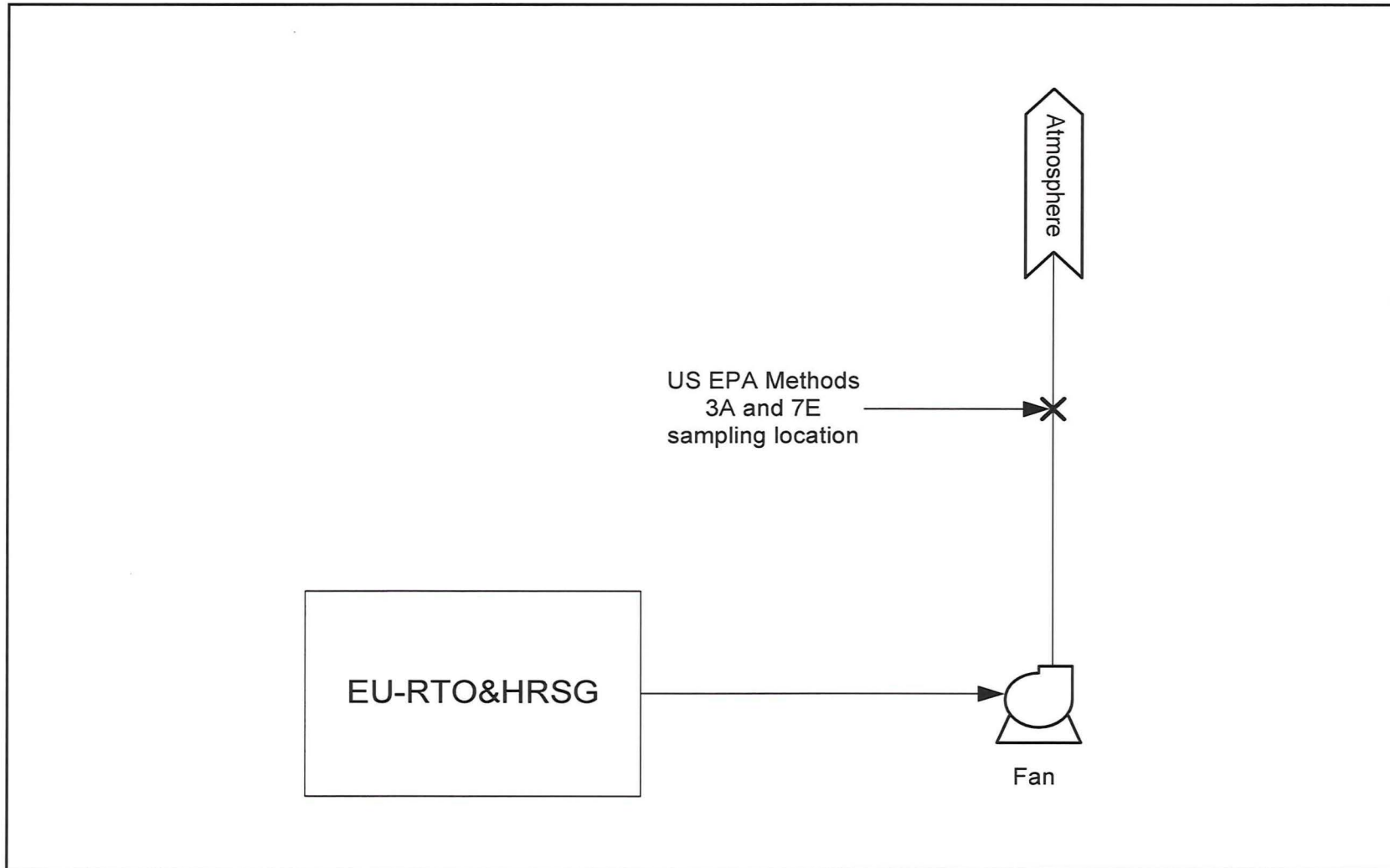
Field Data and Calculations

Appendix A.1

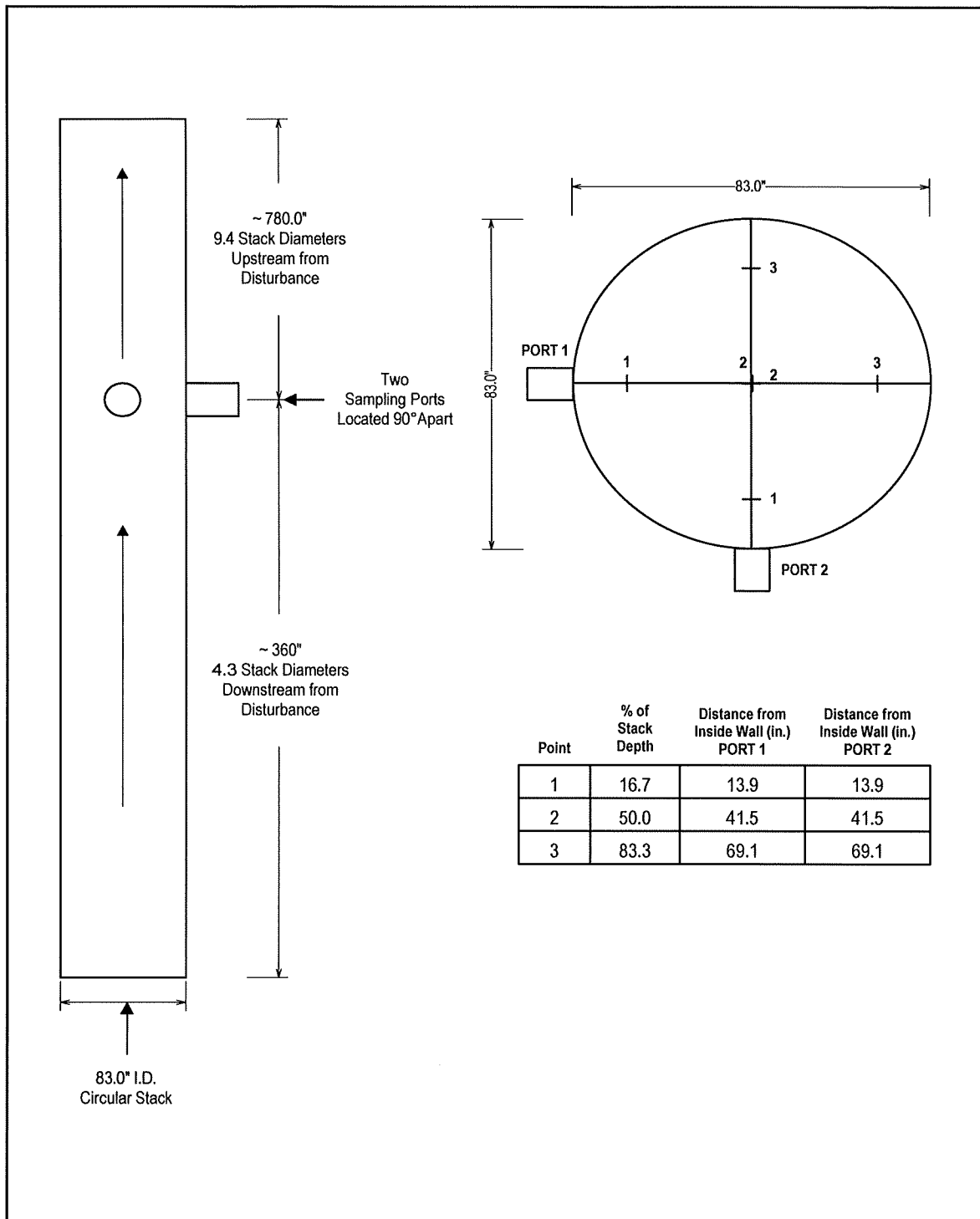
Sampling Locations

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EU-RTO&HRSG PROCESS AND SAMPLING LOCATION SCHEMATIC



EU-RTO&HRSG EXHAUST TRAVERSE POINT LOCATION DRAWING



Appendix A.2

EU-RTO&HSRG Data Sheets