COMPLIANCE STACK EMISSION TEST REPORT

WEST BRASS CHIP DRYER (EUWCHIPDRYER)

Determination of Filterable Particulate Matter, Hydrogen Chloride, Lead, and Sulfuric Acid Emissions

Utilizing US EPA Method 1, 2, 3, 4, 5, 8, 12, and 26A

Test Date(s): September 4-5, 2019
State Registration Number: B1650
Source Location: Belding, Michigan
Permit: EGLE Permit-to-Install No. 16-11

Prepared For:

Mueller Brass Company
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ACCREDITED
TO ASTM D7036 ONLY
CERT #3725.01

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TEST RESULTS SUMMARY - US EPA METHODS 5 AND 26A

Source Name:	**West Brass Chip Dryer**
Source ID Number:	**EUWCHIPDRYER**
Control Device(s):	**Cyclone, T-OX, Wet Scrubber, and Demister**
Test Date:	**September 4-5, 2019**
Sampling Location:	**Exhaust Stack**
Stack/Vent ID:	**SVWCHIPDRYER**
Filterable PM Mass Emission Rate (lb/1,000 lb-exhaust gas (dry basis))	**0.065**
Permit Limit - Filterable PM Mass Emission Rate (lb/1,000 lb-dry exhaust gas)	*0.10*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Filterable PM Mass Emission Rate (lb/hr)	**0.70**
Permit Limit - Filterable PM Mass Emission Rate (lb/hr)	*1.6*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Hydrogen Chloride Mass Emission Rate (lb/hr)	**0.029**
Permit Limit - Hydrogen Chloride Mass Emission Rate (lb/hr)	*0.06*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Hydrogen Chloride Concentration (mg/dscm)	**2.2**
Permit Limit - Hydrogen Chloride Concentration (mg/dscm)	*8*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Permit No.	**EGLE Permit-to-Install No. 16-11**

TEST RESULTS SUMMARY - US EPA METHODS 8 AND 12

Source Name:	**West Brass Chip Dryer**
Source ID Number:	**EUWCHIPDRYER**
Control Device(s):	**Cyclone, T-OX, Wet Scrubber, and Demister**
Test Date:	**September 4-5, 2019**
Sampling Location:	**Exhaust Stack**
Stack/Vent ID:	**SVWCHIPDRYER**
Lead Mass Emission Rate (lb/hr)	**0.19**
Permit Limit - Lead Mass Emission Rate (lb/hr)	*0.3*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Lead Concentration (mg/dscm)	**22.4**
Permit Limit - Lead Concentration (mg/dscm)	*23*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Sulfuric Acid Mass Emission Rate (lb/hr)	**0.03**
Permit Limit - Sulfuric Acid Mass Emission Rate (lb/hr)	*0.2*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Sulfuric Acid Concentration (mg/dscm)	**3.7**
Permit Limit - Sulfuric Acid Concentration (mg/dscm)	*25*
Compliance Acceptability Criteria Met (YES/NO)	*YES*
Permit No.	**EGLE Permit-to-Install No. 16-11**

REVIEW AND CERTIFICATION

The results of the Compliance Test conducted on September 4-5, 2019 are a product of the application of the United States Environmental Protection Agency (US EPA) Stationary Source Sampling Methods listed in 40 CFR Part 60, Appendix A, that were in effect at the time of this test.

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: _____ Date: 11-7-19

Name: Matthew Young Title: Client Project 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: _____ Date: 11-7-19

Name: Randal Tysar Title: District Manager

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

The Mueller Brass Company (State Registration Number: B1650), located in Belding, Michigan, contracted Montrose Air Quality Services, LLC (Montrose) of Detroit, Michigan, to conduct compliance stack emission testing for their West Brass Chip Dryer (EUWCHIPDRYER). Testing was performed to satisfy the emissions testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Permit-to-Install (PTI) No. 16-11. The testing was performed on September 4-5, 2019.

Sampling was performed at the EUWCHIPDRYER Scrubber Exhaust Stack (SVWCHIPDRYER) to determine the emissions of filterable particulate matter (PM), hydrogen chloride (HCl), lead (Pb), and sulfuric acid (H_2SO_4). Testing was conducted during normal operations. During this test, emissions from the EUWCHIPDRYER were controlled by a cyclone, thermal oxidizer (T-OX), wet scrubber, and demister in series.

The test methods that were conducted during this test were US EPA Method 1, 2, 3, 4, 5, 8, 12, and 26A.

1.2 KEY PERSONNEL

The key personnel who coordinated this test program (and their phone numbers) were:

- Tim McFarlane, Facilities Manager, Mueller Brass Company, 810-987-7770
- Karen Kajiya-Mills, Environmental Manager, Michigan Department of Environment, Great Lakes and Energy, 517-284-6780
- Jeremy Howe, Environmental Quality Analyst, Michigan Department of Environment, Great Lakes and Energy, 231-878-6687
- Eric Grinstern, Environmental Quality Specialist, Michigan Department of Environment, Great Lakes and Energy, 616-356-0266
- Matthew Young QSTI, Client Project Manager, Montrose, 248-548-7980

2.0 SUMMARY AND DISCUSSION OF TEST RESULTS

2.1 OBJECTIVES AND TEST MATRIX

The purpose of this test was to determine the emissions of filterable PM, HCl, Pb, and H_2SO_4 at the EUWCHIPDRYER Scrubber Exhaust Stack during normal operations. Testing was performed to satisfy the emissions testing requirements pursuant to EGLE PTI No. 16-11.

The specific test objectives for this test are as follows:

- Measure the concentrations of filterable PM, HCl, Pb, and H_2SO_4 at the EUWCHIPDRYER Scrubber Exhaust Stack.
- Measure the actual and dry standard volumetric flowrate of the stack gas at the EUWCHIPDRYER Scrubber Exhaust Stack.
- Utilize the above variables to determine the emissions of filterable PM, HCl, Pb, and H_2SO_4 at the EUWCHIPDRYER Scrubber Exhaust Stack during normal operations.

Table 2.1 presents the sampling matrix log for this test.

2.2 FIELD TEST CHANGES AND PROBLEMS

No field test changes or problems occurred during the performance of this test that would bias the accuracy of the results of this test.

2.3 PRESENTATION OF RESULTS

Three sampling trains were utilized at the EUWCHIPDRYER Scrubber Exhaust Stack to determine the emissions of filterable PM, HCl, Pb, and H_2SO_4. One sampling train measured stack gas volumetric flowrate, dry molecular weight, moisture content, and the concentrations of filterable PM and HCl. The second sampling train measured stack gas volumetric flow rate, dry molecular weight, moisture content, and the concentration of H_2SO_4. The third sampling train measured stack gas volumetric flowrate, dry molecular weight, moisture content, and the concentration of Pb.

Table 2.2 displays the emissions of filterable PM and HCl measured at the EUWCHIPDRYER Scrubber Exhaust Stack during normal operations.

Table 2.3 displays the emissions of H_2SO_4 measured at the EUWCHIPDRYER Scrubber Exhaust Stack during normal operations.

Table 2.4 displays the emissions of Pb measured at the EUWCHIPDRYER Scrubber Exhaust Stack during normal operations.

The US EPA Methods 5 and 26A Run 1 emissions displayed in Table 2.2 utilizes the saturated moisture content value determined for the given stack gas temperature and pressure as per Section 4.0 of US EPA Method 4. The measured flue gas percent by volume moisture content was higher than the calculated saturated value.

TABLE 2.1
SAMPLING MATRIX OF TEST METHODS UTILIZED

Date	Run No.	Sampling Location	US EPA METHODS 1/2 (Flow) Sampling Time / Duration (min)	US EPA METHOD 3 (Dry Molecular Wt.) Sampling Time / Duration (min)	US EPA METHOD 4 (%H2O) Sampling Time / Duration (min)	US EPA METHOD 5 (Filterable PM) Sampling Time / Duration (min)	US EPA 26A (HCl) Sampling Time / Duration (min)
9/4/2019	1	EUWCHIPDRYER Scrubber Exhaust Stack	7:46 - 8:49 / 60	7:46 - 8:49 / 60	7:46 - 8:49 / 60	7:46 - 8:49 / 60	7:46 - 8:49 / 60
9/4/2019	2	EUWCHIPDRYER Scrubber Exhaust Stack	11:44 - 12:52 / 60	11:44 - 12:52 / 60	11:44 - 12:52 / 60	11:44 - 12:52 / 60	11:44 - 12:52 / 60
9/4/2019	3	EUWCHIPDRYER Scrubber Exhaust Stack	13:46 - 15:00 / 60	13:46 - 15:00 / 60	13:46 - 15:00 / 60	13:46 - 15:00 / 60	13:46 - 15:00 / 60

Date	Run No.	Sampling Location	US EPA METHODS 1/2 (Flow) Sampling Time / Duration (min)	US EPA METHOD 3 (Dry Molecular Wt.) Sampling Time / Duration (min)	US EPA METHOD 4 (%H2O) Sampling Time / Duration (min)	US EPA METHOD 12 (Pb) Sampling Time / Duration (min)
9/4/2019	1	EUWCHIPDRYER Scrubber Exhaust Stack	15:39 - 16:43 / 60	15:39 - 16:43 / 60	15:39 - 16:43 / 60	15:39 - 16:43 / 60
9/4/2019	2	EUWCHIPDRYER Scrubber Exhaust Stack	17:11 - 18:16 / 60	17:11 - 18:16 / 60	17:11 - 18:16 / 60	17:11 - 18:16 / 60
9/5/2019	3	EUWCHIPDRYER Scrubber Exhaust Stack	7:42 - 8:46 / 60	7:42 - 8:46 / 60	7:42 - 8:46 / 60	7:42 - 8:46 / 60

Date	Run No.	Sampling Location	US EPA METHODS 1/2 (Flow) Sampling Time / Duration (min)	US EPA METHOD 3 (Dry Molecular Wt.) Sampling Time / Duration (min)	US EPA METHOD 4 (%H2O) Sampling Time / Duration (min)	US EPA METHOD 8 (H_2SO_4) Sampling Time / Duration (min)
9/5/2019	1	EUWCHIPDRYER Scrubber Exhaust Stack	9:19 - 10:24 / 60	9:19 - 10:24 / 60	9:19 - 10:24 / 60	9:19 - 10:24 / 60
9/5/2019	2	EUWCHIPDRYER Scrubber Exhaust Stack	11:02 - 12:06 / 60	11:02 - 12:06 / 60	11:02 - 12:06 / 60	11:02 - 12:06 / 60
9/5/2019	3	EUWCHIPDRYER Scrubber Exhaust Stack	12:35 - 13:38 / 60	12:35 - 13:38 / 60	12:35 - 13:38 / 60	12:35 - 13:38 / 60

All times are Eastern Daylight Time.

TABLE 2.2
US EPA METHOD 5/26A EMISSION RESULTS

Parameter	EUWCHIPDRYER Scrubber Exhaust Stack			
	Run 1	Run 2	Run 3	Average
Filterable Particulate Matter Emissions (lb/1,000 lb-dry exhaust gas)	0.079	0.056	0.059	0.065
Filterable Particulate Matter Emissions (lb/hr)	0.85	0.61	0.64	0.70
Filterable Particulate Matter Concentration (grains/dscf)	0.043	0.030	0.031	0.035
Hydrogen Chloride Emissions (lb/hr)	0.033	0.014	0.041	0.029
Hydrogen Chloride Concentratin (mg/dscm)	2.4	1.0	3.0	2.2
Stack Gas Average Flow Rate (acfm)	4,980	4,936	5,006	4,974
Stack Gas Average Flow Rate (scfm)	4,054	4,027	4,088	4,056
Stack Gas Average Flow Rate (dscfm)	2,344	2,345	2,362	2,350
Stack Gas Average Velocity (fpm)	1,377	1,365	1,384	1,375
Stack Gas Average Static Pressure (in-H_2O)	-0.12	-0.12	-0.12	-0.12
Stack Gas Average Temperature (°F)	170	171	171	171
Stack Gas Percent by Volume Moisture (%H_2O)*	42.19	41.77	42.21	42.06
Measured Stack Inner Diameter (in)		25.8		
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	7.00	7.00	7.00	7.00
Percent by Volume Oxygen in Stack Gas (%-dry)	10.00	10.00	10.00	10.00
Percent by Volume Nitrogen in Stack Gas (%-dry)	83.00	83.00	83.00	83.00

* Displayed Run 1 moisture content values are saturated for their respective stack gas temperature and pressure. See Section 2.3 for details.

TABLE 2.3
US EPA METHOD 8 EMISSION RESULTS

Parameter	EUWCHIPDRYER Scrubber Exhaust Stack			
	Run 1	Run 2	Run 3	Average
Sulfuric Acid Emissions (lb/hr)	0.030	0.030	0.034	0.031
Sulfuric Acid Concentration (mg/dscm)	3.4	3.6	4.0	3.7
Stack Gas Average Flow Rate (acfm)	4,805	4,739	4,718	4,754
Stack Gas Average Flow Rate (scfm)	3,937	3,884	3,861	3,894
Stack Gas Average Flow Rate (dscfm)	2,303	2,260	2,252	2,272
Stack Gas Average Velocity (fpm)	1,329	1,310	1,305	1,314
Stack Gas Average Static Pressure (in-H_2O)	-0.12	-0.12	-0.12	-0.12
Stack Gas Average Temperature (°F)	171	171	171	171
Stack Gas Percent by Volume Moisture (%H_2O)	41.51	41.81	41.68	41.67
Measured Stack Inner Diameter (in)			25.8	
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	7.00	7.00	7.00	7.00
Percent by Volume Oxygen in Stack Gas (%-dry)	10.00	10.00	10.00	10.00
Percent by Volume Nitrogen in Stack Gas (%-dry)	83.00	83.00	83.00	83.00

TABLE 2.4
US EPA METHOD 12 EMISSION RESULTS

Parameter	EUWCHIPDRYER Scrubber Exhaust Stack			
	Run 1	Run 2	Run 3	Average
Lead Emissions (lb/hr)	0.23	0.16	0.18	0.19
Lead Concentration (mg/dscm)	27.3	19.1	20.7	22.4
Stack Gas Average Flow Rate (acfm)	4,807	4,874	4,911	4,864
Stack Gas Average Flow Rate (scfm)	3,924	3,968	4,027	3,973
Stack Gas Average Flow Rate (dscfm)	2,284	2,240	2,360	2,295
Stack Gas Average Velocity (fpm)	1,329	1,348	1,358	1,345
Stack Gas Average Static Pressure (in-H_2O)	-0.12	-0.12	-0.12	-0.12
Stack Gas Average Temperature (°F)	171	173	171	172
Stack Gas Percent by Volume Moisture (%H_2O)	41.80	43.55	41.38	42.25
Measured Stack Inner Diameter (in)		25.8		
Percent by Volume Carbon Dioxide in Stack Gas (%-dry)	7.00	7.00	7.00	7.00
Percent by Volume Oxygen in Stack Gas (%-dry)	10.00	10.00	10.00	10.00
Percent by Volume Nitrogen in Stack Gas (%-dry)	83.00	83.00	83.00	83.00

3.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

3.1 PROCESS DESCRIPTION AND OPERATION

Mueller Brass Company is a manufacturer of standard and Pb-free brass alloys for various industrial uses. The West Brass Chip Dryer (EUWCHIPDRYER) was in operation for this test event.

Figure 3.1 depicts the sampling location schematic.

3.2 CONTROL EQUIPMENT DESCRIPTION

During this test, emissions from the EUWCHIPDRYER were controlled by a cyclone, T-OX, wet scrubber, and demister.

3.3 SAMPLING LOCATION(S)

The EUWCHIPDRYER Scrubber Exhaust Stack had a measured inner diameter of 25.8-inches, was oriented in the vertical plane, and was accessed from a permanent platform. Two sampling ports were located 90° apart from one another at a location that met US EPA Method 1, Section 11.1.1 criteria. Prior to emissions sampling, the stack was traversed to verify the absence of cyclonic flow. An average yaw angle of 2.5° was measured. Therefore, the sampling location also met US EPA Method 1, Section 11.4.2 criteria. During emissions sampling, the stack was traversed for stack gas volumetric flowrate, dry molecular weight, moisture content, and filterable PM, HCl, Pb, and H_2SO_4 concentration determinations.

Figure 3.2 schematically illustrates the traverse point and sample port locations utilized.

3.4 PROCESS SAMPLING LOCATION(S)

The US EPA Reference Test Methods performed did not specifically require that process samples were to be taken during the performance of this testing event. It is in the best knowledge of Montrose that no process samples were obtained and therefore no process sampling location was identified in this report.

FIGURE 3.1
EUWCHIPDRYER SAMPLING LOCATION SCHEMATIC

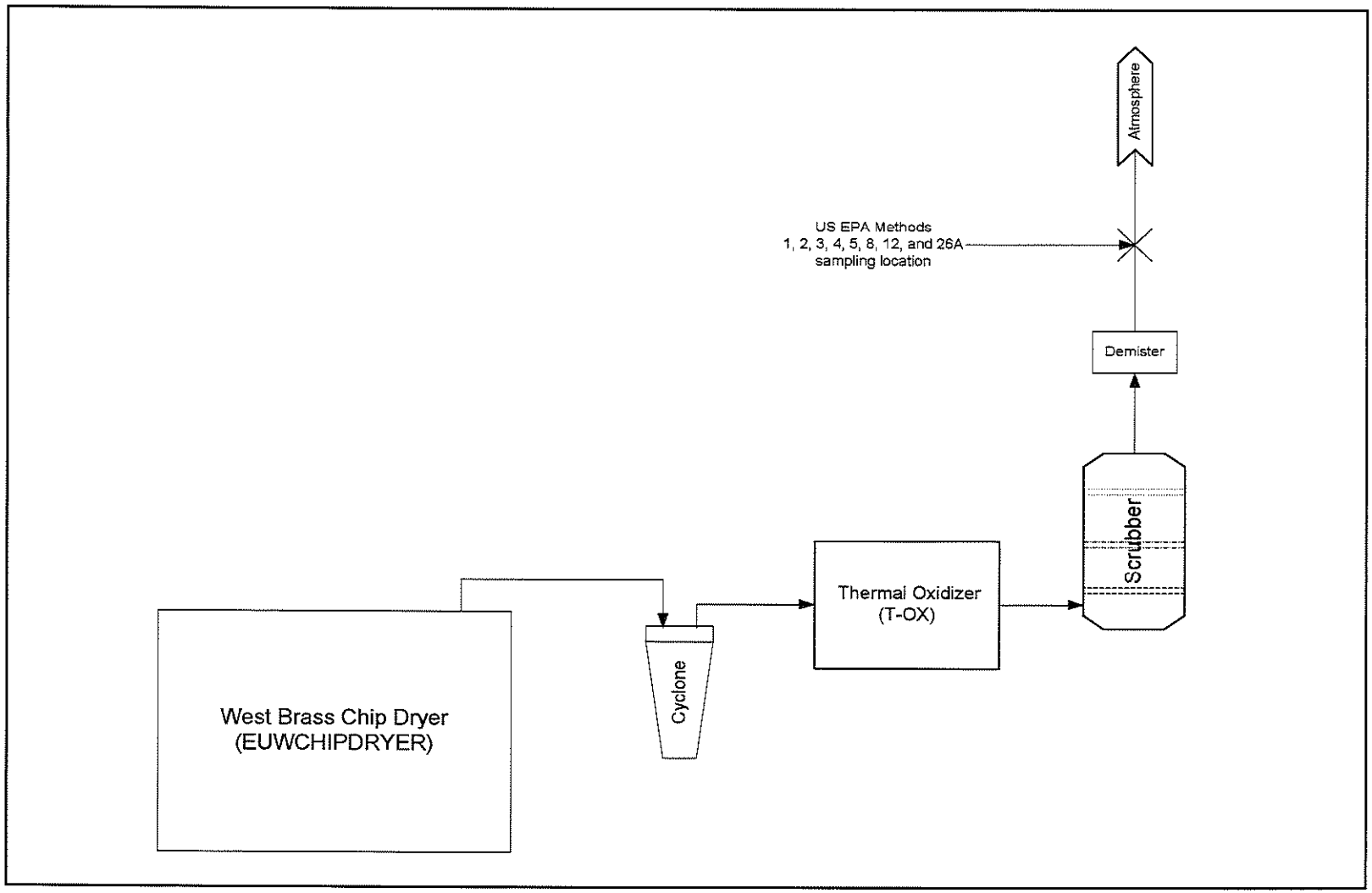
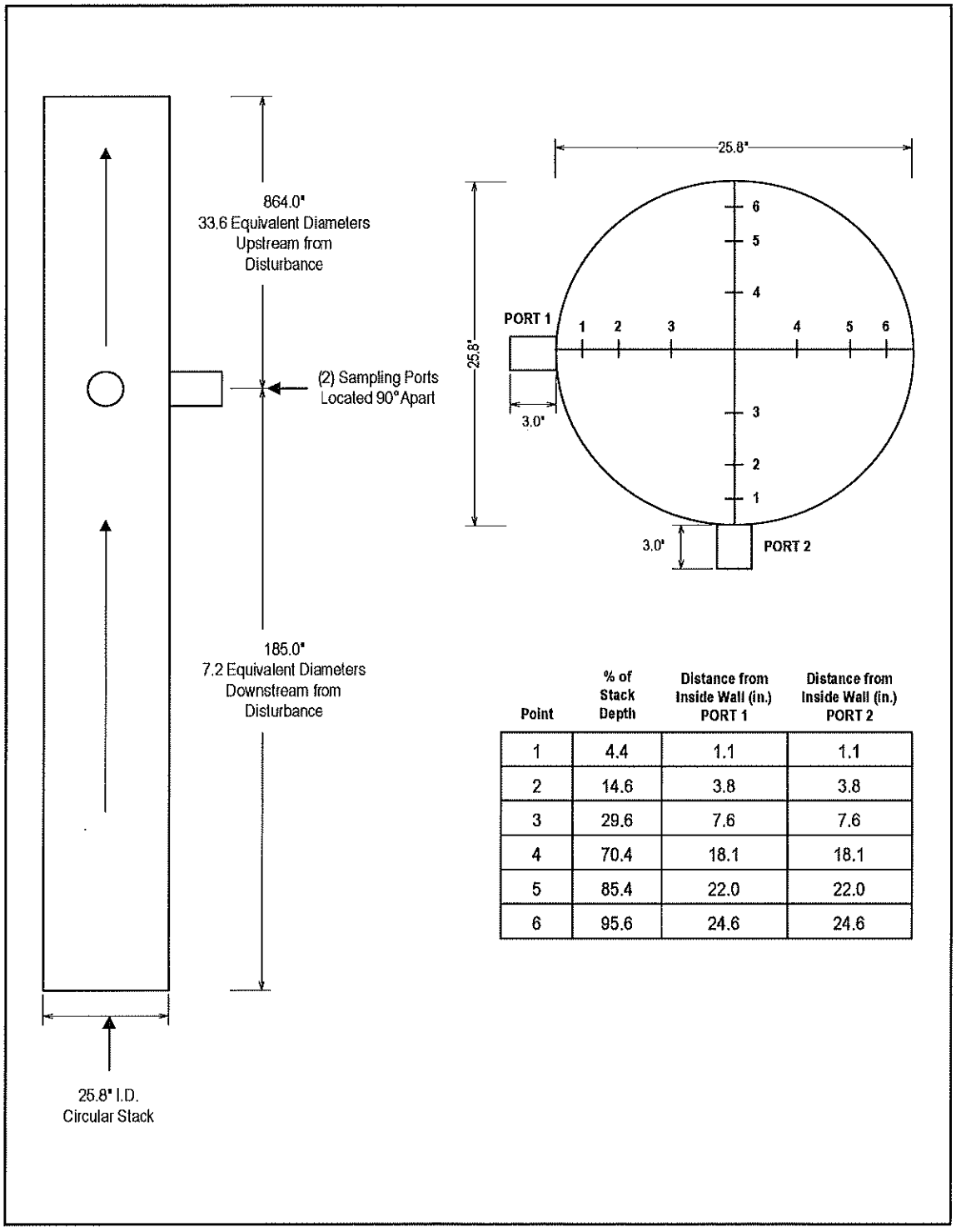


FIGURE 3.2
EUWCHIPDRYER SCRUBBER EXHAUST TRAVERSE POINT LOCATION DRAWING



Point	% of Stack Depth	Distance from Inside Wall (in.) PORT 1	Distance from Inside Wall (in.) PORT 2
1	4.4	1.1	1.1
2	14.6	3.8	3.8
3	29.6	7.6	7.6
4	70.4	18.1	18.1
5	85.4	22.0	22.0
6	95.6	24.6	24.6

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

4.1.1 US EPA Method 1: "Sample and Velocity Traverses for Stationary Sources"

Principle: To aid in the representative measurement of pollutant emissions and/or total volumetric flow rate from a stationary source, a measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. A traverse point is then located within each of these equal areas. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.2 US EPA Method 2: "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)"

Principle: The average gas velocity in a stack is determined from the gas density and from measurement of the average velocity head with a Type S (Stausscheibe or reverse type) pitot tube. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.3 US EPA Method 3: "Gas Analysis for the Determination of Dry Molecular Weight"

Principle: 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, percent O_2, and if necessary, for percent CO. For dry molecular weight determination, either an Orsat or a Fyrite analyzer may be used for the analysis. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.4 US EPA Method 4: "Determination of Moisture Content in Stack Gases"

Principle: A gas sample is extracted at a constant rate from the source; moisture is removed from the sample stream and determined either volumetrically or gravimetrically. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.5 US EPA Method 5: "Determination of Particulate Emissions from Stationary Sources (Filterable PM Only)"

Principle: Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 120 ± 14°C (248 ± 25°F) or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. The PM mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after the removal of uncombined water. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.6 US EPA Method 8: "Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources"

Principle: A gas sample is extracted isokinetically from the stack. The sulfuric acid mist (including sulfur trioxide) and the sulfur dioxide are separated, and both fractions are measured separately by the barium-thorin titration method. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.7 US EPA Method 12: "Determination of Inorganic Lead Emissions from Stationary Sources"

Principle: Particulate and gaseous Pb emissions are withdrawn isokinetically from the source and collected on a filter and in dilute nitric acid. The collected samples are digested in acid solution and analyzed by atomic absorption spectrometry using an air acetylene flame. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

4.1.8 US EPA Method 26A: "Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources-Isokinetic Method"

Principle: This method is applicable for determining emissions of hydrogen halides (HX) [hydrogen chloride (HCl), hydrogen bromide (HBr), and hydrogen fluoride (HF)] and halogens (X_2) [chlorine (Cl_2) and bromine (Br_2)] from stationary sources. This method collects the emission sample isokinetically and is therefore particularly suited for sampling at sources, such as those controlled by wet scrubbers, emitting acid particulate matter (e.g., hydrogen halides dissolved in water droplets). Only HCl was sampled during this test event. This method was utilized in its entirety as per the procedures outlined in 40 CFR Part 60, Appendix A.

The sampling trains utilized during this testing project are depicted in Figures 4.1 to 4.3.

4.2 PROCEDURES FOR OBTAINING PROCESS DATA

Process data was recorded by Mueller Brass Company personnel utilizing their typical record keeping procedures. Recorded process data was provided to Montrose personnel at the conclusion of this test event. The process data is located in the Appendix.

FIGURE 4.1
US EPA METHODS 5 AND 26A SAMPLING TRAIN SCHEMATIC

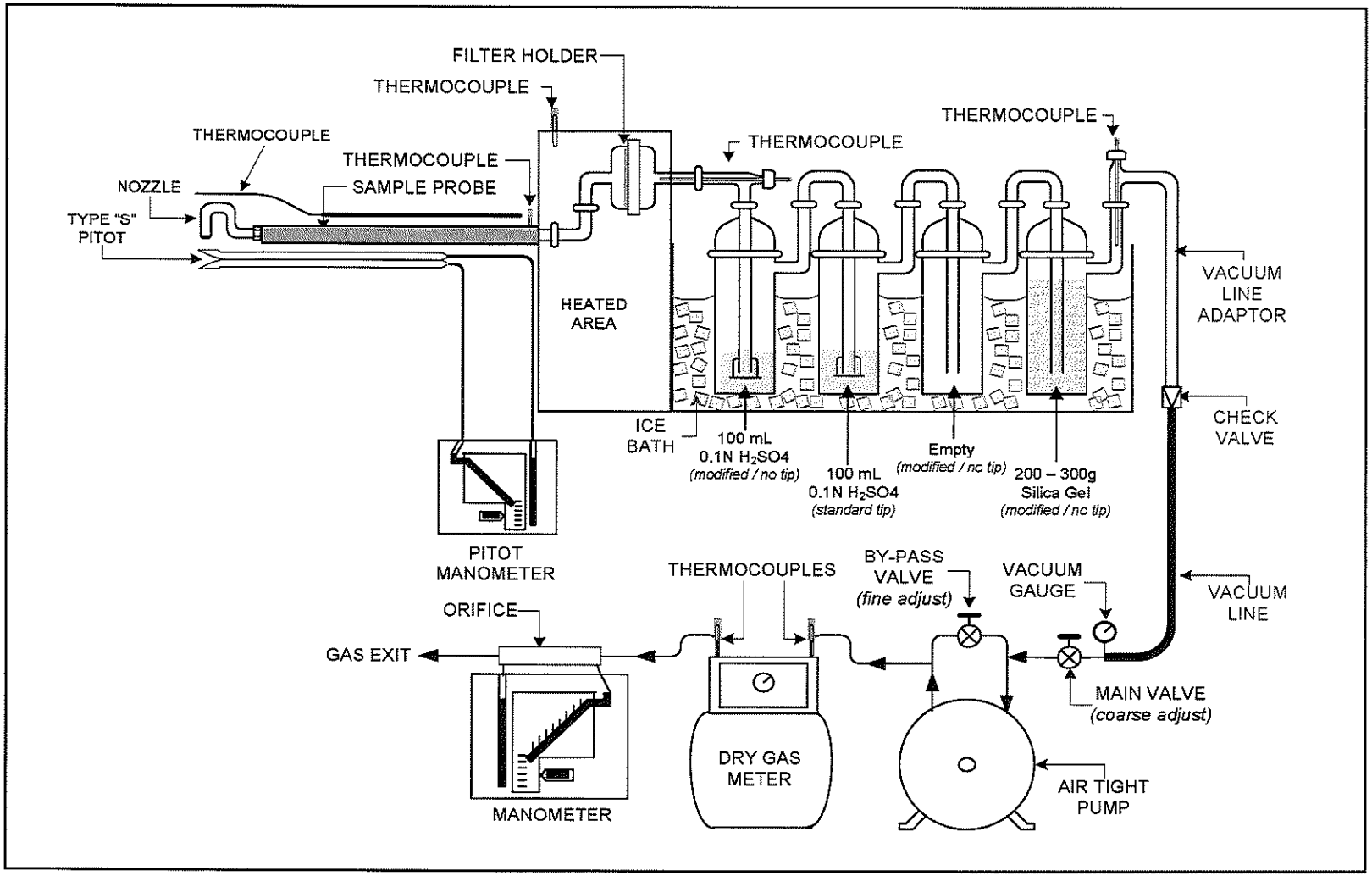


FIGURE 4.2
US EPA METHOD 8 SAMPLING TRAIN SCHEMATIC

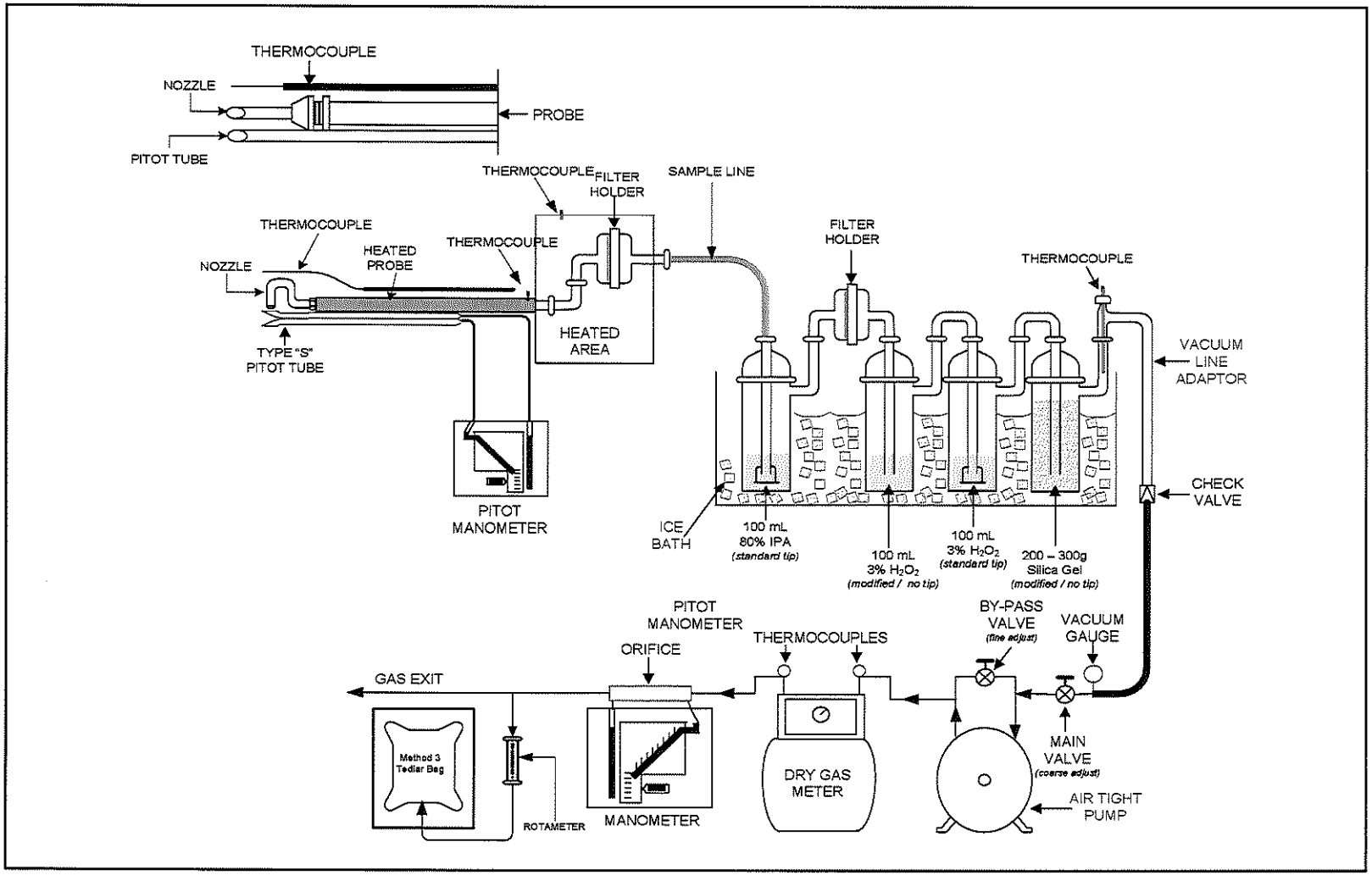
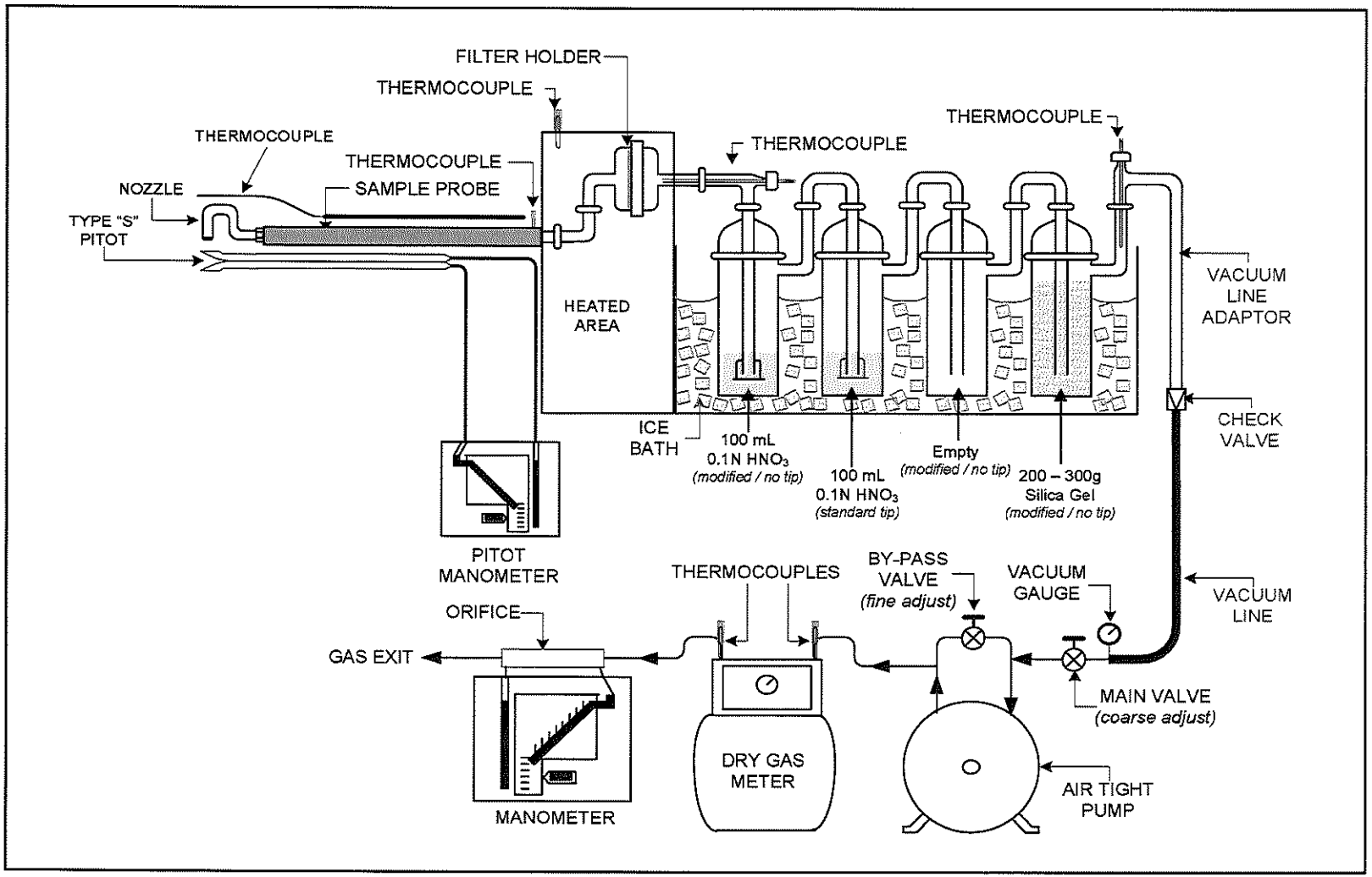


FIGURE 4.3
US EPA METHOD 12 SAMPLING TRAIN SCHEMATIC



5.0 INTERNAL QA/QC ACTIVITIES

5.1 QA AUDITS

Tables 5.1.1 to 5.5 illustrate the QA audits that were performed during this test.

All meter boxes and sampling trains used during sampling performed within the requirements of their respective methods as is shown in Tables 5.1.1 to 5.1.3 and Tables 5.2.1 to 5.2.3. All post-test leak checks were well below the applicable limit. Minimum metered volumes and percent isokinetics were also met where applicable.

Table 5.3 displays the US EPA Method 3 Fyrite Audits which were performed during this test in accordance with US EPA Method 3, Section 10.1 requirements. As shown, all Fyrite analyzer results were within ±0.5% of the respective Audit Gas concentrations.

Table 5.4 displays the laboratory QA results for US EPA Method 8 and the results of the US EPA Method 8 Audit Sample analysis. The H_2SO_4 spike recovery was within the normal range of 80% to 120%.

Table 5.5 displays the laboratory QA results for US EPA Method 26A and the results of the US EPA Method 26A Audit Sample analysis. The HCl spike recovery was within the normal range of 80% to 120%.

5.2 QA/QC PROBLEMS

No QA/QC problems occurred during this test event.

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 presented in the report appendices.

TABLE 5.1.1
US EPA METHOD 5/26A SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3
Sampling Location	**EUWCHIPDRYER Scrubber Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.000	0.005	0.000
Applicable Method Allowable Leak Rate (cfm)	0.019	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	28.606	29.847	30.730
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	93.4	97.9	100.1
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes

TABLE 5.1.2
US EPA METHOD 8 SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3
Sampling Location	**EUWCHIPDRYER Scrubber Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.005	0.000	0.005
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.019
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	29.901	29.460	29.226
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	99.9	100.3	99.9
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes

TABLE 5.1.3
US EPA METHOD 12 SAMPLING TRAIN AUDIT RESULTS

Parameter	Run 1	Run 2	Run 3
Sampling Location	**EUWCHIPDRYER Scrubber Exhaust Stack**		
Post-Test Leak Rate Observed (cfm)	0.000	0.005	0.005
Applicable Method Allowable Leak Rate (cfm)	0.020	0.020	0.020
Acceptable	Yes	Yes	Yes
Volume of Dry Gas Collected (dscf)	37.610	37.766	38.005
Recommended Volume of Dry Gas Collected (dscf)	21.000	21.000	21.000
Acceptable	Yes	Yes	Yes
Percent of Isokinetic Sampling Rate (%)	100.3	102.7	98.0
Applicable Method Allowable Isokinetic Sampling Rate (%)	100 ± 10	100 ± 10	100 ± 10
Acceptable	Yes	Yes	Yes

TABLE 5.2.1
US EPA METHODS 5 AND 26A DRY GAS METER AUDIT RESULTS

Sampling Location	Pre-Test Dry Gas Meter Calibration Factor (Y)	Average Post-Test Dry Gas Meter Calibration Check Value (Yqa)	Post Test Dry Gas Meter Calibration Check Value Difference From Pre-Test Calibration Factor (%)	Applicable Method Allowable Difference (%)	Acceptable
EUWCHIPDRYER Scrubber Exhaust	1.0170	1.0010	1.57%	5.00%	Yes

TABLE 5.2.2
US EPA METHOD 8 DRY GAS METER AUDIT RESULTS

Sampling Location	Pre-Test Dry Gas Meter Calibration Factor (Y)	Average Post-Test Dry Gas Meter Calibration Check Value (Yqa)	Post Test Dry Gas Meter Calibration Check Value Difference From Pre-Test Calibration Factor (%)	Applicable Method Allowable Difference (%)	Acceptable
EUWCHIPDRYER Scrubber Exhaust	1.0170	1.0010	1.57%	5.00%	Yes

TABLE 5.2.3
US EPA METHOD 12 DRY GAS METER AUDIT RESULTS

Sampling Location	Pre-Test Dry Gas Meter Calibration Factor (Y)	Average Post-Test Dry Gas Meter Calibration Check Value (Yqa)	Post Test Dry Gas Meter Calibration Check Value Difference From Pre-Test Calibration Factor (%)	Applicable Method Allowable Difference (%)	Acceptable
EUWCHIPDRYER Scrubber Exhaust	1.0170	1.0042	1.25%	5.00%	Yes

TABLE 5.3
US EPA METHOD 3 FYRITE AUDIT

Audit Date	**August 19, 2019**	
Audit Gas	**%CO_2**	**%O_2**
Audit Gas Concentration (%)	**10.1**	**10.1**
Fyrite Response 1 (%)	10.0	10.0
Fyrite Response 2 (%)	10.0	10.0
Fyrite Response 3 (%)	10.0	10.0
Average (%)	10.0	10.0
Average Within ±0.5%	Yes	Yes

Audit Gas Cylinder Number: CC469695

TABLE 5.4
US EPA METHOD 8 LABORATORY QA

H_2SO_4 Spike Recovery (%)	94.0
Acceptable per US EPA Method 8 *(Expected Range 70%-130%)*	YES

TABLE 5.5
US EPA METHOD 26A LABORATORY QA

HCl Spike Recovery (%)	92.0
Acceptable per US EPA Method 26A *(Expected Range 80%-120%)*	YES