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Source Test Report for 2022 Compliance Emissions Testing

Reverberatory Furnace (EUALUMINUM)

Fritz Products, Inc.
River Rouge, Michigan

Prepared For:

EDJ Consulting LLC
5 South Fork Drive
Pittsburgh, PA 15229

Prepared By:

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For Submission To:

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

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Test Dates: August 23-24, 2022
Submittal Date: October 20, 2022

m4547_test_20220823

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STAC ACCREDITED TO ASTM D7036 ONLY

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:** 10-8-2022

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.

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1.0 Introduction

1.1 Summary of Test Program

Fritz Products, Inc. (State Registration No.: M4547) contracted Montrose Air Quality Services, LLC (Montrose) to perform a compliance test program on the Reverberatory Furnace (EUALUMINUM) at the Fritz Products facility located in River Rouge, Michigan. Testing was performed on August 23-24, 2022, for the purpose of satisfying the emission testing requirements pursuant to Michigan Department of Environment, Great Lakes, and Energy (EGLE) Permit-to-Install (PTI) No. 15-01B and 40 CFR Part 63, Subpart RRR.

The specific objectives were to:

- Verify the emissions of filterable particulate matter (FPM), particulate matter <2.5 µm ($PM_{2.5}$), hydrogen chloride (HCl), and polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF) from the baghouse serving EUALUMINUM
- 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)
August 23-24, 2022	EUALUMINUM	Velocity/Volumetric Flow Rate	EPA 1 & 2	4	180
August 23-24, 2022	EUALUMINUM	O_2, CO_2	EPA 3	4	180
August 23-24, 2022	EUALUMINUM	Moisture	EPA 4	4	180
August 23-24, 2022	EUALUMINUM	TPM	EPA 5/202	4	180
August 23-24, 2022	EUALUMINUM	HCl	EPA 320	4	180
August 23-24, 2022	EUALUMINUM	Velocity/Volumetric Flow Rate	EPA 1 & 2	4	180
August 23-24, 2022	EUALUMINUM	O_2, CO_2	EPA 3	4	180
August 23-24, 2022	EUALUMINUM	Moisture	EPA 4	4	180
August 23-24, 2022	EUALUMINUM	PCDD & PCDF	EPA 23	4	180

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.

All Total PM emissions are to be considered as $PM_{2.5}$ for compliance determination. 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 June 16, 2022, that was submitted to EGLE.

Table 1-2
Summary of Average Compliance Results - EUALUMINUM

August 23-24, 2022

Parameter/Units	Average Results	Emission Limits
Filterable Particulate Matter (FPM)		
lb/1000 lb of exhaust gas	0.0018	0.0095
Total Particulate Matter (TPM)*		
lb/hr	0.65	3.2
lb/per ton of charge	0.14	0.40
Hydrogen Chloride (HCl)		
lb/hr	1.73	2.03
lb/per ton of charge	0.34	0.40
Total Dioxins/Furans (PCDD/PCDF)		
gr D/F TEQ per Ton	3.12E-06	2.10E-04

* Total PM emissions are to be considered as $PM_{2.5}$ for compliance determination.

1.2 Key Personnel

A list of project participants is included below:

Facility Information

Source Location:	Fritz Products, Inc 255 Marion Ave River Rouge, MI 48218
Project Contact:	David Splan
Company:	Fritz Products, Inc
Telephone:	734-362-5240
Email:	dsplan@fritzinc.com

Agency Information

Regulatory Agency:	Regina Angellotti
Agency Contact:	EGLE
Telephone:	313-418-0895
Email:	angellottiR1@michgan.gov

Testing Company Information

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

Laboratory Information

Laboratory:	Montrose Royal Oak
City, State:	Royal Oak, MI
Method:	EPA Method 5
Laboratory:	Montrose Wauconda
City, State:	Wauconda, IL
Method:	EPA Method 202
Laboratory:	Enthalpy Analytical, LLC - Ultratrace
City, State:	Wilmington, NC
Method:	EPA Method 23

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Consultant Information

Company: EDJ Consulting LLC
Contact: Joe Duckett
Role: Senior Environmental Engineer
Email: joeduckett27@gmail.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
Roy Zimmer	Montrose	Field Technician
Carlos Sandoval	Montrose	Shop Manager
David Splan	Fritz Products, Inc	Test Coordinator
Joe Duckett	EDJ Consulting LLC	Consultant/ Test Coordinator
Regina Angellotti	EGLE	Observer

2.0 Plant and Sampling Location Descriptions

2.1 Process Description, Operation, and Control Equipment

The facility operates a Rotary Drum Cylinder Preheater and a Reverberatory Furnace with 2 burners each rated for 5 MMBtu/hr with an aluminum production rate of 7 ton/hr. The emissions are controlled with a baghouse dust collector with lime and activated carbon injection.

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 Diameter (in.)	Distance from Nearest Disturbance		Number of Traverse Points
		Downstream EPA "B" (in./dia.)	Upstream EPA "A" (in./dia.)	
EUALUMINUM Baghouse Exhaust Stack	60	72.0 / 1.2	70.5 / 1.2	Isokinetic: 24 (12/port) Gaseous: 1

The sampling location did not meet EPA Method 1, Section 11.1.1 criteria which requires that the sample ports be located at a position at least two stack diameters downstream and a half-diameter upstream from any flow disturbance. The sampling location was located 1.2 stack diameters downstream from the nearest flow disturbance. Acceptable two-dimensional cyclonic flow conditions were confirmed prior to testing using 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 EUALUMINUM and air pollution control devices were operating at the conditions required by the permit. EUALUMINUM was tested when operating normally.

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:

- Differential Pressure, in H_2O
- Lime Injection/Carbon Injection, lbs
- Chlorine Usage, lbs
- Inlet Temperature, °F
- Scrap Charge Rate, tons/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 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 (Stauβcheibe) 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 1.3

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. The second choice is to use stoichiometric calculations to calculate dry molecular weight. The third choice is to use an assigned value of 30.0, in lieu of actual measurements, for processes burning natural gas, coal, or oil.

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

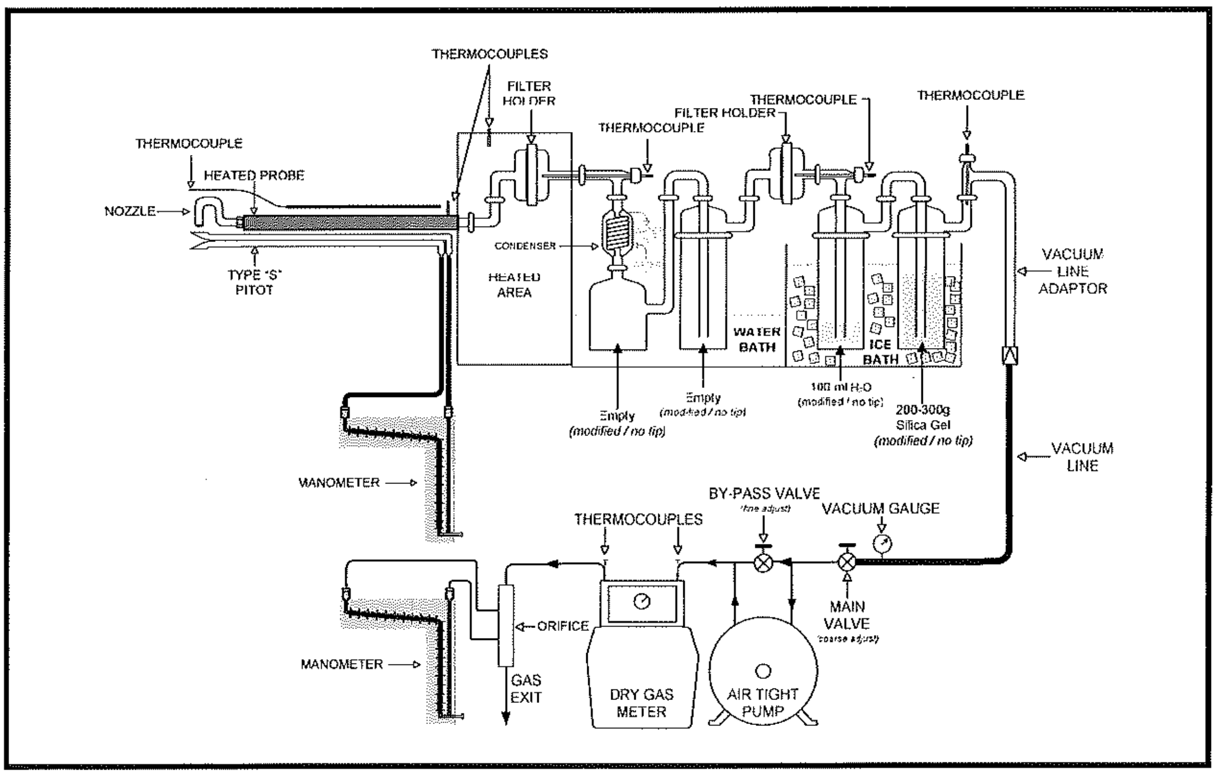
EPA Method 4 is a manual, non-isokinetic method used to measure the moisture content of gas streams. Gas is sampled at a constant sampling rate through a probe and impinger train. Moisture is removed using a series of pre-weighed impingers containing methodology-specific liquids and silica gel immersed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

3.1.5 EPA Method 5, Determination of Particulate Matter from Stationary Sources

EPA Method 5 is a manual, isokinetic method used to measure FPM emissions. The samples are analyzed gravimetrically. This method is performed in conjunction with EPA Methods 1 through 4. The stack gas is sampled through a nozzle, probe, filter, and impinge train. FPM results are reported in emission concentration and emission rate units.

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

Figure 3-1
EPA Method 5 and 202 Sampling Train

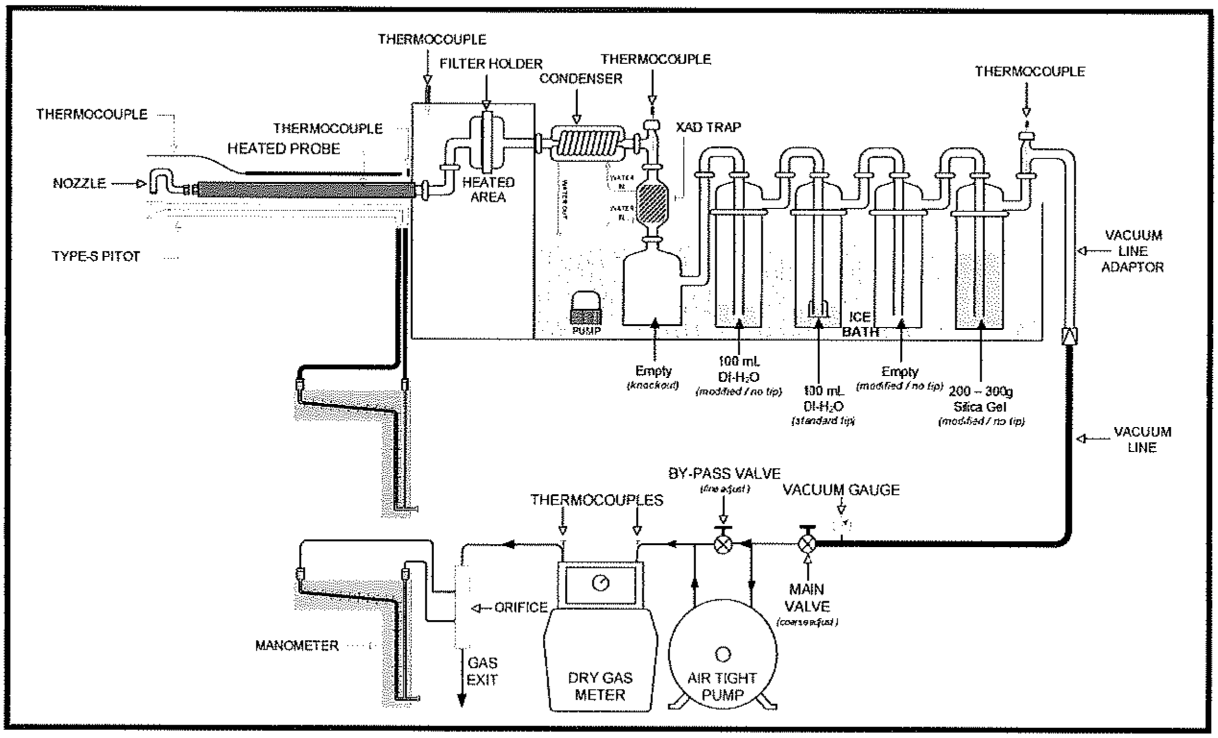


3.1.6 EPA Method 23, Determination of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans from Stationary Sources

EPA Method 23 is a manual, isokinetic method to measure polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) emissions using high resolution gas chromatography with high resolution mass spectroscopy (HRGC/HRMS). The stack gas is sampled through a nozzle, probe, filter, sorbent trap module encased in a water-cooled condenser, and impinger train. Dioxin/furan emissions are reported in emission concentration and emission rate units.

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

Figure 3-2
EPA Method 23 Sampling Train



3.1.7 EPA Method 202, Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources

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_2 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_2 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

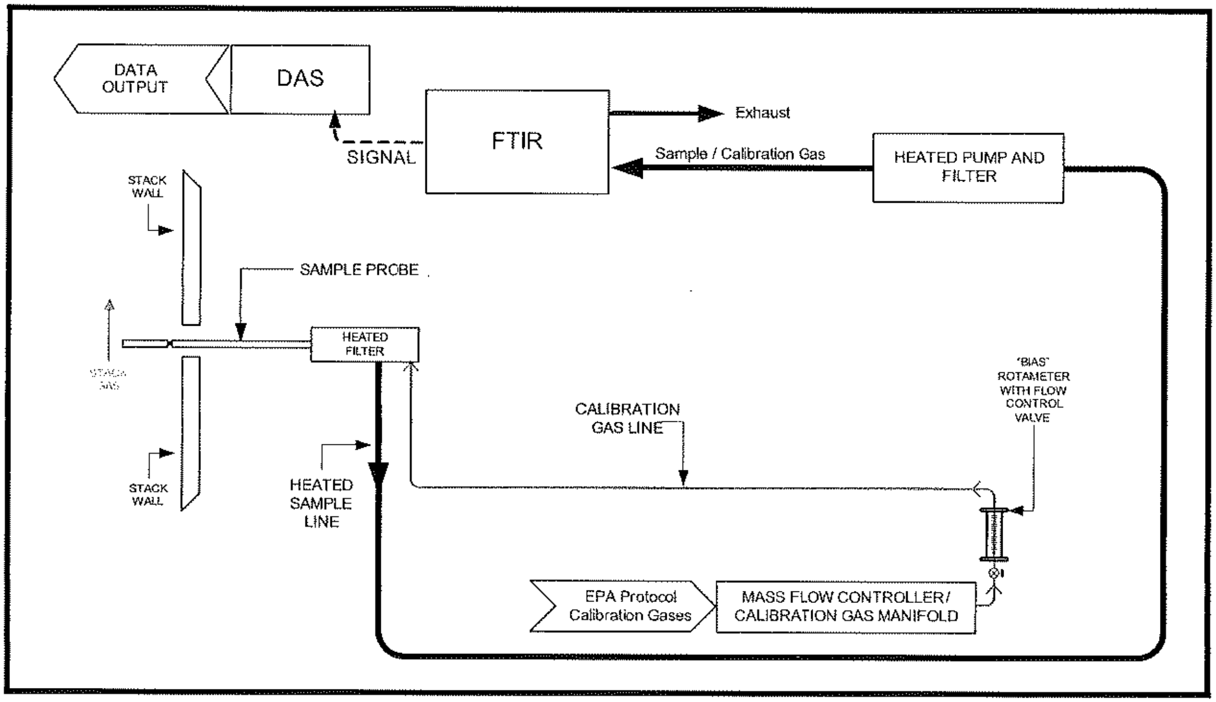
The typical sampling system is detailed in Figure 3-1.

3.1.8 EPA Method 320, Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive FTIR Spectroscopy

EPA Method 320 is an instrumental test method used to measure specific analyte concentrations for which EPA reference spectra have been developed or prepared. Extractive emission measurements are performed using FTIR spectroscopy. The FTIR analyzer is composed of a spectrometer and detector, 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 cm-1), which are analyzed using the quantitative spectral library. This provides an accurate, highly sensitive measurement of gases and vapors.

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

Figure 3-3
EPA Method 320 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

During Run 2, the chlorine injection rate was found to be too high for the corresponding lime injection rate. Run 2 of all test methods was voided and an additional run (Run 4) was performed. The results for Run 2 are included in the test report, but are not included in the overall average.

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 4-2. 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.

The Total Dioxins/Furans (PCDD/PCDF) emissions shown in Tables 1-2 and 4-2 use the ITEQ (ND=EDL EMPC=EDL) results from the EPA Method 23 Laboratory Report in Appendix Section C.3. An explanation of the additional run is presented in section 4.2.1

Table 4-1
TPM and HCl Emissions Results - EUALUMINUM

Parameter/Units	Run 1	Run 2*	Run 3	Run 4	Average
Date	8/23/2022	8/23/2022	8/23/2022	8/24/2022	--
Time	7:37-10:47	12:56-16:11	17:29-20:40	8:42-11:48	--
Process Data†					
Scrap charge rate, ton/hr	6.06	5.34	4.46	5.65	5.39
Sampling & Flue Gas Parameters					
O_2, % volume dry	20.60	20.60	20.60	20.60	20.60
CO_2, % volume dry	0.20	0.20	0.20	0.20	0.20
flue gas temperature, °F	115.9	127.9	127.0	117.5	120.1
moisture content, % volume	2.62	2.37	2.63	2.42	2.56
volumetric flow rate, dscfm	25,308	26,589	26,837	25,948	26,031
Filterable Particulate Matter (FPM)					
gr/dscf	0.00129	0.00068	0.00108	0.00054	0.00073
lb/hr	0.28	0.16	0.25	0.12	0.22
lb/1,000 lb exhaust gas	0.0025	0.0013	0.0021	0.0010	0.0018
Condensable Particulate Matter (CPM)					
gr/dscf	0.00056	0.00360	0.00472	0.00050	0.00192
lb/hr	0.12	0.82	1.08	0.11	0.44
Total Particulate Matter (TPM)‡					
lb/hr	0.40	0.97	1.33	0.23	0.65
lb/per ton of charge	0.066	0.183	0.299	0.041	0.135
Hydrogen Chloride (HCl)					
ppmvd	8.3	35.6	16.3	10.4	12.3
lb/hr	1.19	5.37	2.48	1.53	1.73
lb/per ton of charge	0.20	1.01	0.56	0.27	0.34

* Run 2 is not included in the Average Results.
† Process Data was provided by Fritz Products, Inc. personnel.
‡ Total PM emissions are to be considered as $PM_{2.5}$ for compliance determination.

Table 4-2
PCDD/PCDF Emissions Results - EUALUMINUM

Parameter/Units	Run 1	Run 2*	Run 3	Run 4	Average
Date	8/23/2022	8/23/2022	8/23/2022	8/24/2022	--
Time	7:37-10:47	12:56-16:11	17:29-20:39	8:42-11:48	--
Process Data†					
Scrap charge rate, ton/hr	6.06	5.34	4.46	5.65	5.39
Sampling & Flue Gas Parameters					
O_2, % volume dry	20.60	20.60	20.60	20.60	20.60
CO_2, % volume dry	0.20	0.20	0.20	0.20	0.20
flue gas temperature, °F	117.0	125.9	127.0	116.3	120.1
moisture content, % volume	2.27	1.19	1.81	1.59	1.89
volumetric flow rate, dscfm	26,450	25,584	26,911	23,418	25,593
Total Dioxins/Furans (PCDD/PCDF)					
gr/dscf	5.50E-12	1.22E-11	1.29E-11	1.31E-11	1.05E-11
gr/hr	8.73E-06	1.87E-05	2.08E-05	1.83E-05	1.59E-05
gr D/F TEQ per Ton	1.44E-06	3.50E-06	4.67E-06	3.25E-06	3.12E-06

* Run 2 is not included in the Average Results.
† Process Data was provided by Fritz Products, Inc. personnel.

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Section 4.2.1

August 24, 2022Fritz Products, Inc.

River Rouge Aluminum Plant

Air Compliance Testing – August, 2022

Statement on Re-running Test Run No. 2 from 8-23-22

The original plan for air emission compliance testing at our River Rouge Facility was to run three successive tests, each for 3 hours, and each using a different pair of baghouses. There are three baghouses at the plant, and we typically operate only two at a time. They are all breeched to the main ductwork from the plant.

During Test No 1, using baghouses Nos 1 and 2, we noticed that the measured HCl emission rates were well below (approximately half of) our allowable 2.03 pounds per hour (PPH) permit limit. We realize that our allowable liquid chlorine injection rate will be capped by whatever rate is established during the tests.

Our aluminum scrap operating process employs liquid chlorine injection into the furnace bath for removal of unwanted magnesium in the final aluminum product. We are required by our customers to tightly control the final magnesium content of our metal.

As an effort to increase the liquid chlorine injection cap under our permit, we are interested in establishing an upper liquid chlorine injection limit that gives us some operating margin if, for reasons of scrap quality, we must remove more than normal concentrations of magnesium.

During Test No.2 (baghouses 1 and 3), we increased the chlorine feed rate from 200 PPH to approximately 230 PPH during the test run. As noted, our objective was simply to provide an increased operating margin. In normal operation, there is no reason for us to add any more chlorine than is needed to control the magnesium content.

The results of Test No. 2 demonstrated that we weren't controlling HCl emissions adequately. We completed the three hours of this test run, but the HCl emission readings were clearly higher than the permit allowed limit. Consequently, we concluded that we could not feed 230 PPH of chlorine. We can, however, control HCl emissions up to a liquid chlorine feed rate of around 200 PPH. Therefore, we've adopted this as our cap – essentially the same as our current permit limit.

Given the above background, we are re-ran test run No 2 (baghouses 1 and 3) and accepted whatever liquid chlorine feed cap would be established based on the said re-run.

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.

Fyrite analyzer audits were performed during this test in accordance with EPA Method 3, Section 10.1 requirements. The results were within ± 0.5% of the respective audit gas concentrations.

EPA Method 5 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met, except if noted in Section 5.2. An EPA Method 5 reagent blank was analyzed. The maximum allowable amount that can be subtracted is 0.001% of the weight of the acetone used. The blank did not exceed the maximum residue allowed.

EPA Method 202 analytical QA/QC results are included in the laboratory report. The method QA/QC criteria were met. An EPA Method 202 Field Train Recovery Blank (FTRB) was performed for each source category. The maximum allowable amount that can be subtracted is 0.002 g (2.0 mg). For this project, the FTRB had a mass of 1.7 mg, and 1.7 mg was subtracted.

The EPA Method 320 performance parameters measured included signal to noise tests, noise equivalent absorbance (NEA), detector linearity, background spectra, potential interferents, and cell and system leakage. Quality assurance procedures included baseline measurement with ultra-high purity nitrogen, measurement of a calibration transfer standard, direct analyte calibration measurements, and measurements to determine baseline shift. SF_6 was also used as a tracer gas in the calibration gases to evaluate dilution ratios and verify the sample delivery system integrity. A dynamic matrix spike was performed using SF_6 as a tracer gas. The method QA/QC criteria were met.

5.2 QA/QC Discussion

During Run 1, the condensable PM filter exit temperature readings of the EPA Method 5/202 sampling train were observed to be outside of the 65-85°F range as required by Method 202, Section 8.5.1.3. Montrose personnel notified the on-site EGLE representative, Regina Angellotti, and Fritz Products, Inc. personnel of the situation, and it was agreed that the runs would be accepted as valid by all parties.

Montrose did not have a Qualified Individual (QI) for EPA Method 5, 23, 202, or 320 onsite during the test event as per ASTM D7036-04 requirements. Upon data review, all EPA Method 5, 23, 202, and 320 data quality objectives were met.

The Run 4 EPA Method 23 sampling train collected 103.215 dscf of dry gas, below the recommended sample volume of 108.0 dscf. Recommended samples volumes are typically set to ensure that adequate quantities of the targeted pollutants are collected. All target pollutants however were collected in quantities above the minimum detection limit (MDL) of their respective EPA Test Methods. Therefore, the less than recommend sample volumes most likely had little to no effect on the results of this test event.

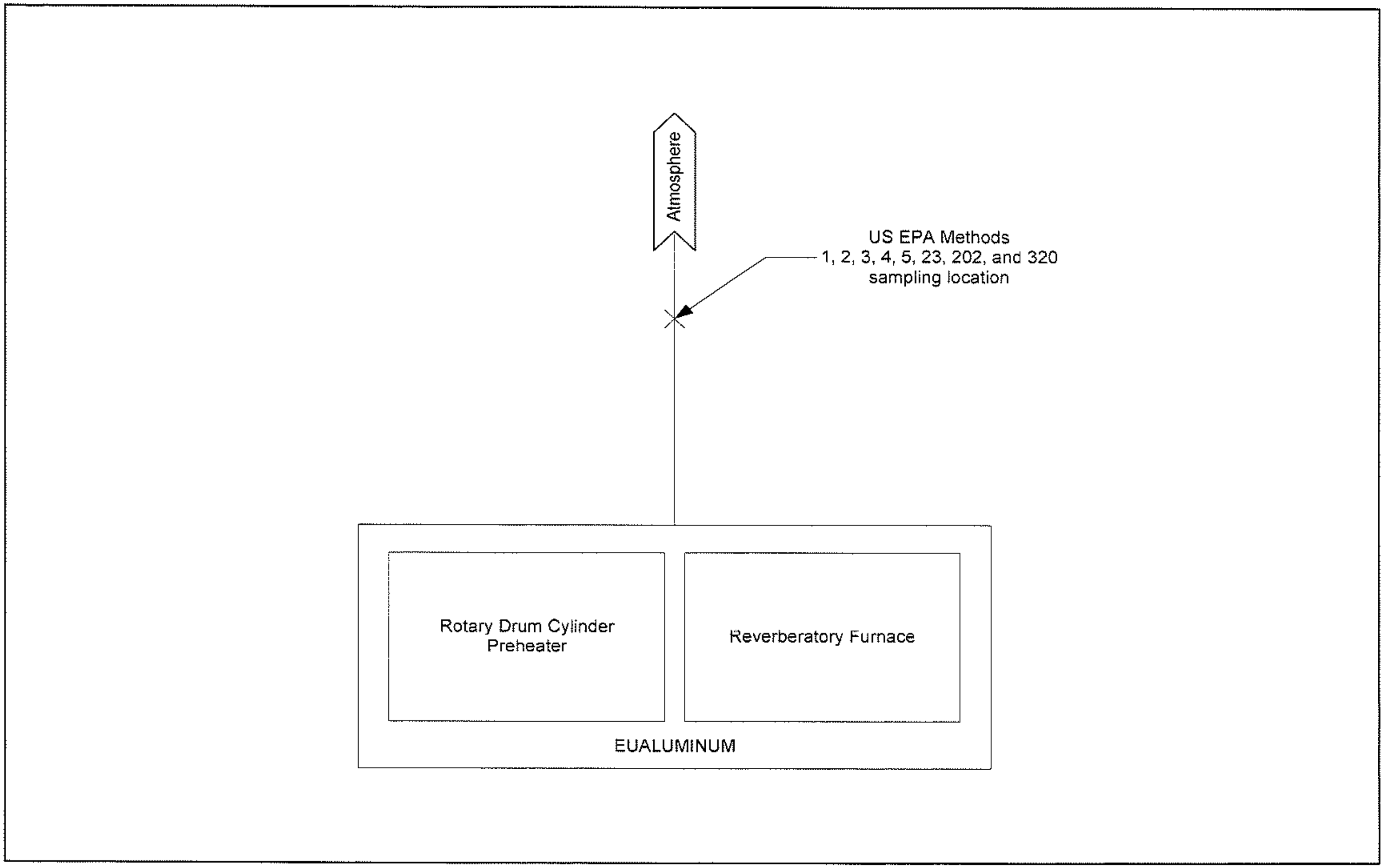
5.3 Quality Statement

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 included in the report appendices. The content of this report is modeled after the EPA Emission Measurement Center Guideline Document (GD-043).

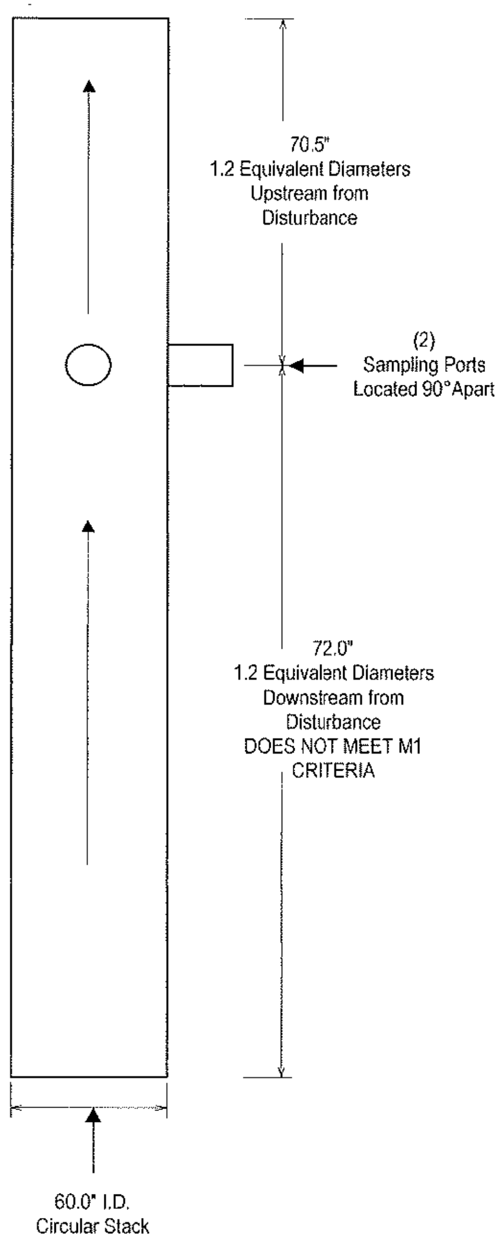
Appendix A
Field Data and Calculations

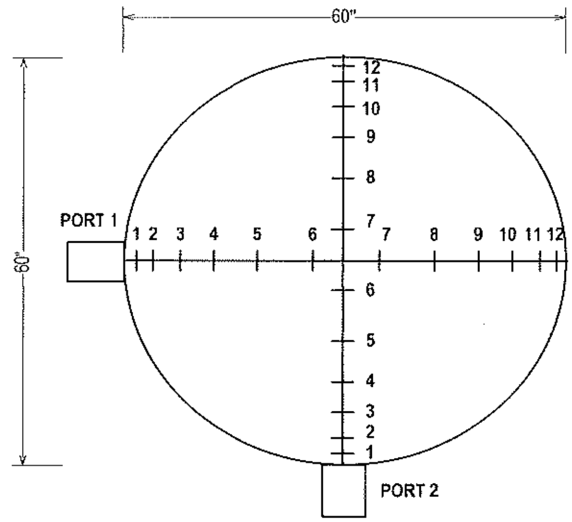
Appendix A.1
Sampling Locations

EUALUMINUM PROCESS AND SAMPLING LOCATION SCHEMATIC



EUALUMINUM EXHAUST TRAVERSE POINT LOCATION DRAWING





Point	% of Stack Depth	Distance from Inside Wall (in.) PORT 1	Distance from Inside Wall (in.) PORT 2
1	2.1	1.3	1.3
2	6.7	4.0	4.0
3	11.8	7.1	7.1
4	17.7	10.6	10.6
5	25.0	15.0	15.0
6	35.6	21.4	21.4
7	64.4	38.6	38.6
8	75.0	45.0	45.0
9	82.3	49.4	49.4
10	88.2	53.9	53.9
11	93.3	56.0	56.0
12	97.9	58.7	58.7