FINAL REPORT

GERDAU MACSTEEL, INC

MONROE, MICHIGAN

MONROE MILL:
SOURCE TESTING REPORT – CO RATA RE-TEST

RWDI #2402618

March 15, 2024

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI USA LLC (RWDI) was retained by Gerdau MacSteel, Inc (Gerdau) to complete the Relative Accuracy Testing Audit (RATA) program at the Monroe Mill located at 3000 East Front Street, Monroe, Michigan. The test program was conducted to fulfill the requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) MI-ROP-B7061-2016 and PTI 75-18 for carbon monoxide (CO) from EUEAF. The test program was completed on February 15th, 2024.

The original RATA completed on November 16th, 2023 included carbon monoxide (CO), sulfur dioxide (SO_2) and Flowrate RATA. SO_2 and flowrate were able to demonstrate compliance requirements with Performance Specifications 2 and 6. In November of 2023, CO was unable to demonstrate compliance with RATA specifications under Performance Specification 4. As such, Gerdau underwent maintenance on the Continuous Emissions Monitoring (CEM) systems and the testing completed on February 15th, 2024 was able to demonstrate that the CEM systems, for CO, were in compliance with the Performance Specification 4.

As per Performance Specification 4 the annual RATA was completed under normal operating conditions.

Executive Table i: Results - EUEAF CO RATA

Parameter	Pollutant
	CO
RATA Result (%)	4.25%
Limits	5% of Applicable Emission Standard (260 lb/hr)

Based on the results of the RATA, CO was determined to be within acceptable Relative Accuracy (RA) tolerances as per US EPA Performance Specification 4 for CO.

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1 INTRODUCTION

RWDI USA LLC (RWDI) was retained by Gerdau MacSteel, Inc (Gerdau) to complete the Relative Accuracy Testing Audit (RATA) program at the Monroe Mill located at 3000 East Front Street, Monroe, Michigan. The test program was conducted to fulfill the requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) MI-ROP-B7061-2016 and PTI 75-18 for carbon monoxide (CO) from EUEAF. The test program was completed on February 15th, 2024.

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As per Performance Specification 4 the annual RATA was completed under normal operating conditions.

1.1 Location and Dates of Testing

The test program was completed February 15th, 2024, at the Gerdau Monroe Mill.

1.2 Purpose of Testing

The testing was conducted to fulfill the requirements of Michigan Department of Environment, Great Lakes, and Energy (EGLE) MI-ROP-B7061-2016 and PTI 75-18.

1.3 Description of Source

Gerdau Monroe Mill is a producer of Special Bar Quality (SBQ) steel. The steel-melting process utilizes Electric Arc Furnace Technology (EAF). The EAF is a refractory-lined cylindrical vessel made of steel plates and having a bowl-shaped hearth and a dome-shaped roof. Water-cooled panels are used for the shell and roof to reduce refractory costs. Three electrodes, powered by a transformer, are mounted on a superstructure above the furnace and are lowered and raised through ports in the furnace roof. The electrode conveys the energy for melting the scrap steel. Supplemental energy is provided by an oxy-fuel burner and an oxygen/coke lance which swings into the slag door area and operates during the melting/refining process. The furnace is mounted on curved rockers, which allow tiling for slagging and bottom tapping. The EAF melts scrap metal in a batch operation referred to as a heat.

1.4 Personnel Involved in Testing

Table 1.4.1: Testing Personnel

Personnel (Title & Email)	Affiliation	Phone Number
Christopher Hessler Regional Environmental Manager Christopher.Hessler@gerdau.com	**Gerdau MacSteel Inc.**	(734) 384-6544
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Mason Sakshaug Supervisor, Source Mason.Sakshaug@rwdi.com		(989) 323-0355
Cade Smith Field Technician Cade.Smith@rwdi.com		(734) 552-7270

2 SUMMARY OF RESULTS

2.1 Operating Data

Gerdau personnel collected the process data and verified the unit was operating correctly and production was at acceptable capacity. The process data can be found in **Appendix A**.

2.2 Applicable Permit Number

MI-ROP-B7061-2016 and PTI 75-18

3 SOURCE DESCRIPTION

3.1 Description of Process and Emission Control Equipment

Emissions from the process within the Melt Shop are directed to two baghouses (DVBAGHOUSE-01 and DVLMFBAGHOUSE). DVBAGHOUSE-01 serves EUEAF and accepts emissions captured by the canopy hood in the Melt Shop. DVBAGHOUSE-01 is a positive pressure baghouse with reverse air cleaning. Three main exhaust fans and one direct evacuation control (DEC) fan. The baghouse is equipped with two exhaust stacks, SVBH-01-STACK1 and SVBH-01-STACK2. CO is combusted in the DEC combustion chamber. Screw conveyors transfer the collected baghouse dust to a pneumatic conveying system which transfers the dust into a silo for storage until removed from the site. The second baghouse (DVLMFBAGHOUSE) serves the LMF and VTD operations in the Melt Shop. DVLMFBAGHOUSE is a positive pressure baghouse with reverse air cleaning and is equipped with a single exhaust stack. Dust collected by DVLMFBAGHOUSE is stored in the baghouse hoppers until it is removed from the site.

3.2 Process Flow Sheet or Diagram (if applicable)

Process flow diagram is available upon request.

3.3 Type and Quantity of Raw and Finished Materials

This facility produces steel.

3.4 Normal Rated Capacity of Process

The rated capacity of each process is 900,000 liquid steel tons per year.

3.5 Process Instrumentation Monitored During the Test

Plant personnel recorded the following process data:

- Cast rate (tons/hr)
- Tap amounts (tons)
- CEMS emissions print outs for CO and flowrate

Table 3.5.1: Gerdau Analyzers

Pollutant	Specifications		
	Manufacturer	Serial Number	Range
Carbon Monoxide	Teledyne API T300M	779	0-10 ppb 0-3,000 ppm
Flowrate	Rosemount 3051CD	802633	0-3"

4 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Description of Sampling Train and Field Procedures

4.1.1 Moisture Determination

Gerdau confirmed compliance with Performance Specification 6 for the flowrate RATA in November 2023. Per the approved test plan for this program, RWDI used Gerdau's flowrate data from the CEM system to calculate the lb/hr emissions rate from each of SVBH-01-STACK1 and SVBH-01-STACK2 sources. Gerdau's flowrate is based on a wet flow and the CEMs data for CO is based on ppm (wet). RWDI measured CO concentration as ppm (dry). Therefore, in order to convert RWDI (or RM) to CO ppm (wet) from ppm (dry), RWDI measured the moisture content of the stack gas and converted the in-stack concentrations based on the measured moisture. The CO in ppm (wet) was used in conjunction with the flow rate (scfm) to determine the CO lb/hr from each of the sources and combined for the system.

Stack moisture content was determined through direct condensation and according to USEPA Method 4, "Determination of Moisture Content of Stack Gases". A schematic of the Method 4 sampling train is provided in **Figures Section**. A single (1) 30-minute moisture test was conducted for every third (3rd) RATA test.

4.1.2 Sampling for Carbon Monoxide (CO)

Eleven (11) 21-minute tests were performed on EAF1 and EAF2. CO concentrations were determined utilizing RWDI's continuous emissions monitoring (CEM) system following US EPA Method 10. Prior to testing, a 3-point analyzer calibration error check was conducted using USEPA protocol gases. The calibration error check was performed by introducing zero, mid, and high-level calibration gases directly into the analyzer. The calibration error check was performed to confirm that the analyzer response was within ±2% of the certified calibration gas introduced. Prior to each test run, a system-bias test was performed where known concentrations of calibration gases were introduced at the probe tip to confirm that the analyzers response was within ±5% of the introduced calibration gas concentrations. At the conclusion of each test run a system-bias check was performed to evaluate the percent drift from pre and post-test system bias checks. The system bias checks were used to confirm that the analyzer did not drift greater than ±3% throughout a test run.

Zero and upscale calibration checks were conducted both before and after each test run in order to quantify measurement system calibration drift and sampling system bias. Upscale is either the mid- or high-range gas, whichever most closely approximates the flue gas level. During these checks, the calibration gases were introduced into the sampling system at the probe outlet so that the calibration gases would be analyzed in the same manner as the flue gas samples.

A gas sample was continuously extracted from the stack and delivered to each gas analyzer, which measure the pollutant or diluent concentrations in the gas. The analyzers were calibrated on-site using EPA Protocol No. 1 certified calibration mixtures. The end of the probe was connected to a heated Teflon sample line, which delivered the sample gases from the stack to the CEM system. The heated sample line was set to maintain the gas temperature above 250°F to prevent condensation of stack gas moisture within the line.

Before entering the analyzer, the gas sample passed directly into a refrigerated condenser, which cooled the gas to approximately 35°F to remove the stack gas moisture. After passing through the condenser, the dry gas entered a Teflon-head diaphragm pump and a flow control panel, which will deliver the gas to the CO analyzer. The analyzer will measure the respective gas concentration on a dry volumetric basis.

RWDI used three (3) points for each RATA test per USEPA Method 7E. **Figure section** illustrates USEPA Method 10 sampling train.

4.1.3 Gas Dilution System

Calibration gas was mixed using an Environics 4040 Gas Dilution System. The mass flow controllers are factory calibrated using a primary flow standard traceable to the United States National Institute of Standards and Technology (NIST). Each flow controller utilizes an 11-point calibration table with linear interpolation, to increase accuracy and reduce flow controller nonlinearity. The calibration is done yearly, and the records are included in the Source Testing Report. A multi-point EPA Method 205 check was executed in the field prior to testing to ensure accurate gas-mixtures. The gas dilution system consisting of calibrated orifices or mass flow controllers and dilutes a high-level calibration gas to within ±2% of predicted values. The gas divider is capable of diluting gases at set increments and was evaluated for accuracy in the field in accordance with US EPA Method 205 "*Verification of Gas Dilution Systems for Field Instrument Calibrations*". The gas divider dilutions were measured to evaluate that the responses are within ±2% of predicted values. In addition, a certified mid-level calibration gas within ±10% of one of the tested dilution gases was introduced into an analyzer to ensure the response of the gas calibration was within ±2% of gas divider dilution concentration.

4.2 Description of Recovery and Analytical Procedures

There were no samples to recover during this test program. All testing used real time data from the analyzers.

4.3 Sampling Port Description

Stack figures can be found in the **Figures Section**. The EUEAF stacks met USEPA Method 1 requirements.

5 TEST RESULTS AND DISCUSSION

5.1 Detailed Results

Table 5.1.1: Results - EUEAF CO RATA

Parameter	Pollutant
	CO
RATA Result (%)	4.25%
Limits	5% of Applicable Emission Standard (260 lb/hr)

5.2 Discussion of Results

Based on the results of the RATA, CO was determined to be within acceptable Relative Accuracy (RA) tolerances as per US EPA Performance Specification 4.

Detailed CEMs data can be found in **Appendix B** and the moisture data can be found in **Appendix C**.

5.3 Variations in Testing Procedures

No variations.

5.4 Process Upset Conditions During Testing

There were normal process breaks during production.

5.5 Maintenance Performed in Last Three Months

Only routine maintenance has been performed on the process. The CEM systems underwent a major maintenance to identify the inconsistent results from the November 2023 testing event.

5.6 Re-Test

This was a retest.

5.7 Audit Samples

This test did not require any audit samples.

5.8 Field Data Sheets

Field data sheets can be found in **Appendix D**.

5.9 Calibration Records

Calibration records can be found in **Appendix E**.

5.10 Sample Calculations

Sample calculations can be found in **Appendix F**.

5.11 Laboratory Data

There was no laboratory data from this testing program.

5.12 Source Testing Plan

Source testing plan and EGLE correspondence can be found in **Appendix G**.

Table 1: EAF - RATA 2024 Results

Date: Thursday, February 15, 2024

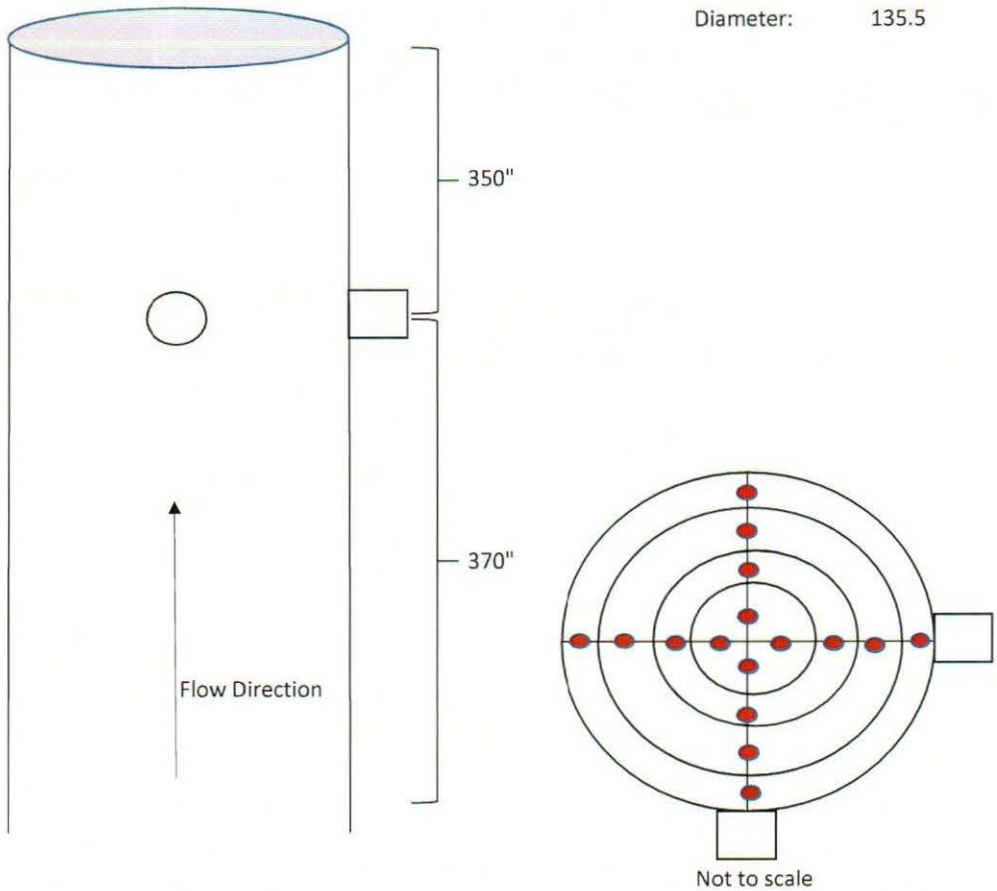
Test	RWDI Time		CO		
	Start Time	End Time	RM (lb/hr)	CEM (lb/hr)	di (lb/hr)
1	8:54	9:14	171.5	164.40	7.10
2	9:24	9:44	23.3	15.5	7.81
3	9:56	10:16	109.4	98.6	10.82
4	10:25	10:45	83.5	69.3	14.20
5	10:55	11:15	153.9	146.9	6.97
6	11:50	12:10	76.1	79.9	-3.81
7	***12:22***	***12:42***	***174.8***	***144.2***	***30.65***
8	12:58	13:18	46.6	36.8	9.81
9	***13:28***	***13:48***	***163.2***	***137.5***	***25.73***
10	13:59	14:19	89.4	81.0	8.38
11	14:52	15:12	57.92	57.30	0.62
		AVERAGE	90.18	83.30	6.88
		STDS	48.34	48.09	5.41

n	9
Full Scale	500
$t_{0.975}$	2.306
I d I	6.88
I cc I	4.16
Limit (Applicable Standard)	5% RA
Limit (RM)	10% RA
Applicable Standard (lb/hr)	260
Relative Accuracy (Applicable Standard)	**4.25% = Pass**

Notes:

RM = Reference Method (RWDI measurements)
CEM = Continuous Emission Monitors (Gerdau data)
di = Difference between CEMS and RM for each point
n = number of tests
I d I = Absolute mean difference between the CEM and RM results

Figure No. #1: East Stack

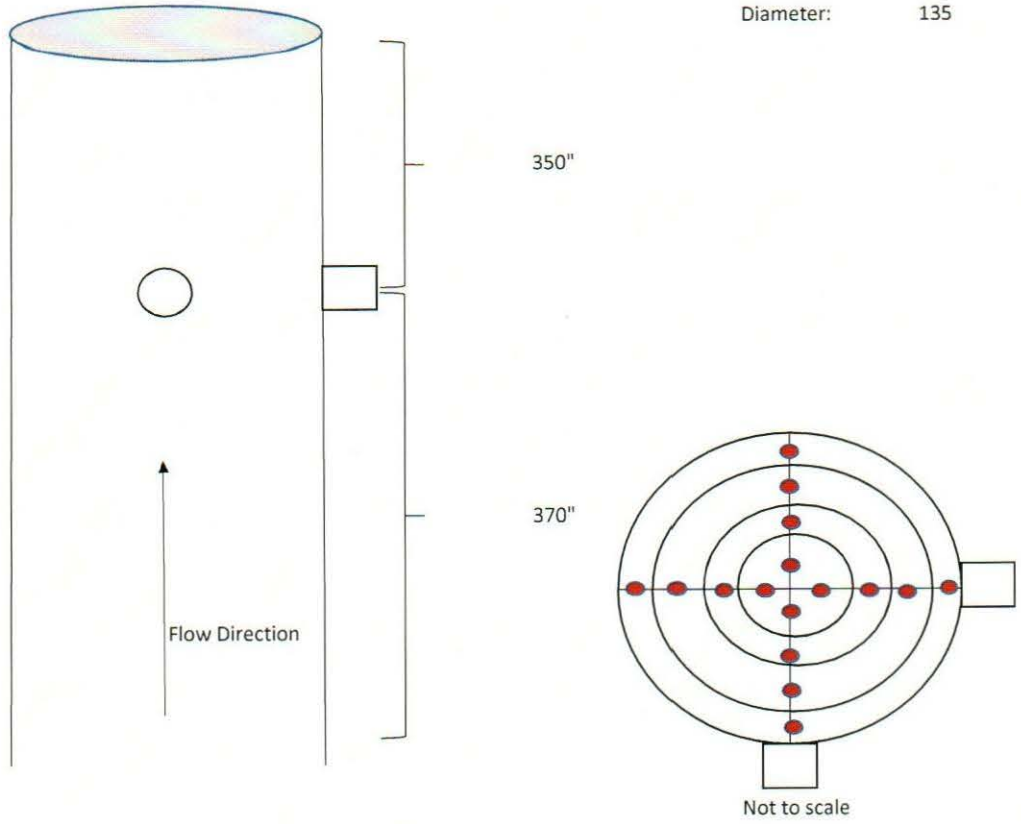


EUEAF East
Gerdau
Monroe Mill
Monroe, Michigan

Date:
February 15, 2024

RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure No. #2: West Stack

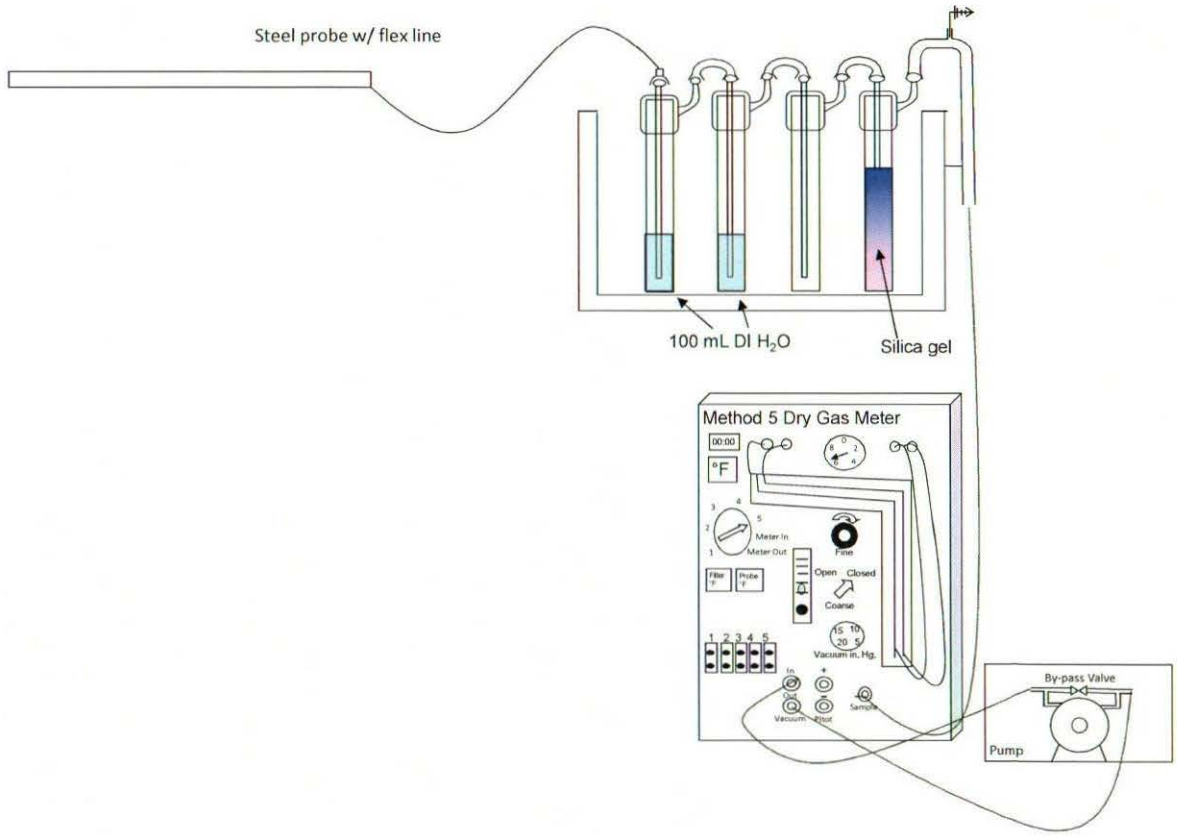


EUEAF West
Gerdau
Monroe Mill
Monroe, Michigan

Date:
February 15, 2024

RWDI USA LLC
2239 Star Court
Rochester Hills, MI 48309

Figure No. 3: Schematic of US EPA Method 4

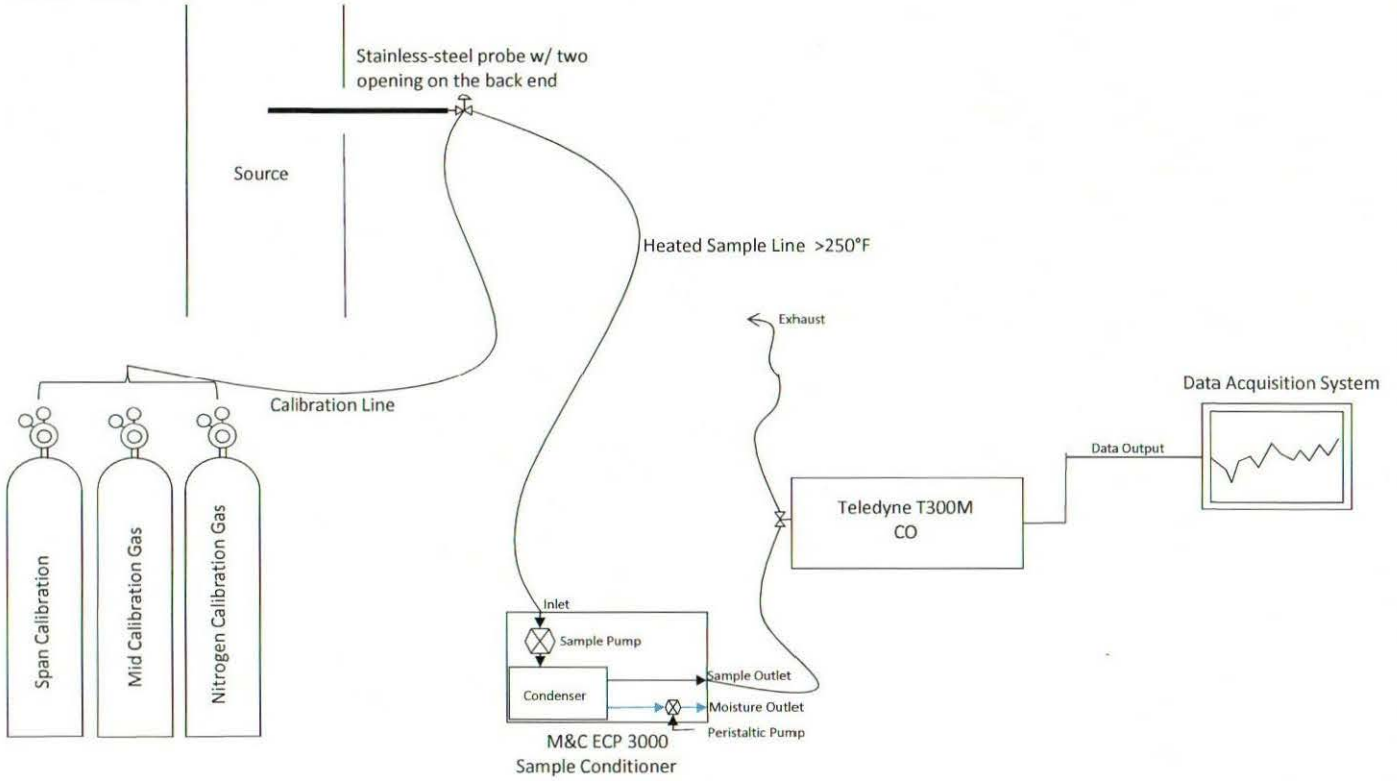


USEPA Method 4

Gerdau
Monroe Mill
EUEAF
Monroe, MI

Date: February 15, 2024

Figure No.4: Schematic of US EPA Method 10



USEPA Method 10

Gerdau

Monroe Mill

EUEAF

Monroe, Michigan

15-Feb-24