1.0 Introduction

Ervin Industries – Amasteel Division (Ervin Amasteel) retained Impact Compliance & Testing, Inc. (ICT) to perform emissions testing on the gases exhausted from the positive pressure fabric filter baghouse used to control emissions from the electric arc furnace (EAF) processes operated at the Adrian, Michigan facility.

The facility is regulated by Michigan Department of Environmental, Great Lakes, and Energy – Air Quality Division (EGLE-AQD) Renewable Operating Permit (ROP) MI-ROP-B1754-2018 and National Emission Standards for Hazardous Air Pollutants (NESHAP) for Area Sources: Electric Arc Furnaces (40 CFR Part 63 Subpart YYYYY). Scrap metal refining processes are collectively referred to as FG-0009 and the baghouse is referred to as Baghouse-0009 in MI-ROP-B1754-2018.

Testing included the determination of particulate matter (PM), particulate matter less than 10 microns in aerodynamic diameter (PM10), carbon monoxide (CO) concentrations and emission rates, and opacity determinations from the positive pressure fabric filter baghouse exhaust.

Testing was conducted August 2-4, 2021 by ICT personnel Blake Beddow, Clay Gaffey, Andrew Eisenberg, and Max Fierro. Assistance and process coordination was provided by Richard Payne, Plant Engineer, Ervin Amasteel.

The exhaust gas sampling and analysis was performed using procedures specified in the approved Test Protocol prepared by ICT dated June 3, 2021. Mr. Mark Dziadosz of EGLE-AQD was on site to observe portions of the test program.

2.0 Summary of Test Results and Operating Conditions

2.1 Purpose and Objective of the Tests

Conditions of the NESHAP for Area Sources: Electric Arc Furnaces (40 CFR Part 63 Subpart YYYYY) require Ervin Amasteel to test initial compliance after any modifications. Subpart YYYYY also states that previous emissions tests may be used to demonstrate compliance provided that the test was conducted within 5 years of the compliance date. MI-ROP-B1754-2018 require PM10 testing upon request by the AQD District Supervisor and also annual CO monitoring in lieu of operating a continuous emissions monitoring system (CEMS).

2.2 Operating Conditions During the Compliance Tests

The process operated normally during the triplicate 240-minute PM test periods and triplicate heat-length (80 to 90 minute) CO test periods. The facility processed between 17.5 and 19.4 tons of scrap steel per hour (ton/hr) during the CO test periods. CO test runs were ended once the facility process performed a tap out where steel production was paused and the melt cycle (heat) was completed. The PM test sampling was paused after tap outs and resumed once steel production resumed.

Process data and production rates are provided in Appendix 1.

2.3 Summary of Air Pollutant Sampling Results

The exhaust gas from Baghouse-0009 was sampled for three (3) four-hour test periods using United States Environmental Protection Agency (USEPA) Reference Test Methods to determine particulate matter emission rates. The inlet duct to Baghouse-0009 was sampled for three heat lengths (batch cycles) for determination of carbon monoxide (CO) emission rates and factors. Opacity observations were conducted during daylight hours.

Table 2.1 presents a summary of the measured exhaust gas flowrate, CO and PM emission rates, and exhaust plume opacity compared to the emission limits in the ROP and NESHAP.

The data presented in Table 2.1 is the average of the three test periods. Data for individual test periods is presented at the end of this report in Table 6.1.

Table 2.1 Summary of measured exhaust gas flowrate, CO and PM emission rates, and exhaust plume opacity

Parameter	Baghouse-0009 Three-Test Average Result	Permitted Limit
Exhaust Flowrate (dscfm)	225,012	-
PM Emission Rate (lb/hr)	0.05	5.9
PM Conc. (gr/dscf)	2.68E-05	5.2E-03
$PM_{10/2.5}$ Emission Rate (lb/hr)	0.59	5.9
CO Emission Factor (lb/ton)	0.6	3.0
CO Emission Rate (lb/hr)	12	90
CO Emission Rate (TpY)	52.4	322.5
Opacity (%)	0	6

3.0 Source and Sampling Location Description

3.1 General Process Description

Ervin Amasteel manufactures cast steel abrasives using a 30-megawatt (MW) electric arc furnace and heat-treating furnaces. Steel scrap is charged into the furnace and the furnace roof is then closed. Large electrodes are arced within the scrap bringing it to a molten state, which meets quality standards of the facility. When in a molten state, approximately 1% by weight of carbon, manganese, and silicon and a fraction of a percent of aluminum are added as alloys. The molten metal is then poured into a ladle and the melt process is repeated. The facility performs the melt cycles, called "heats", during the evening (off peak) hours.

3.2 Rated Capacities and Air Emission Controls

The facility processes and melts a little under 30 tons of scrap steel per hour, or approximately 40 tons per melt cycle (heat). The scrap steel is melted to approximately 3,100 degrees Fahrenheit (°F) prior to being poured into the ladle.

Emissions from melting the scrap metal are directed, prior to discharge to the atmosphere, to a positive-pressure fabric filter baghouse. The emissions are directed to the baghouse via an inline dirty air fan to a water-cooled duct system that terminates into dry ducting. Dry ducting tempers the furnace fume with fugitive emissions captured from furnace charging, tapping, and casting operations.

The emission control system has a maximum rated capacity of 293,000 actual cubic feet per minute (acfm) at 275 degrees Fahrenheit (°F). The rated particulate removal efficiency of the fabric filter baghouse is 99.83%.

Appendix B presents sampling locations and baghouse layout.

3.3 Sampling Locations

Inlet gas velocity was measured at the baghouse inlet duct which has an inner diameter of 113.5 inches.

Exhaust gas CO concentration and CO2/O2 content was measured inside the inlet duct downstream of where stack velocity is measured, which is at ground level. Due to the variable nature of the EAF exhaust CO concentration and the ground level sampling location not meeting USEPA Method 1 criteria the exhaust gas cannot be classified as not stratified using the guidelines (i.e., the results indicate stratification pursuant to the Method 7E guidelines due the time-dependent variability of the CO concentration). Therefore, the maximum number of sampling points, determined in accordance with USEPA Method 1, were sampled throughout each test period (i.e., twelve points were sampled).

Particulate sampling was performed using a matrix of sampling points immediately downstream (above) the filter bags inside the baghouse cells. There are 8 separate cells within the baghouse. Six (6) equally-spaced sampling points were designated within each cell for a total of 72 sampling locations. One test period consisted of sampling the six locations within four cells (24 sampling points per test period). Each point was sampled for ten minutes that resulted in a sampling period of 240 minutes. The sampling pump was turned off and nozzle opening was capped while the sampling train was moved between cells. After the completion of two test runs, the four (4) middle cells were sampled (i.e., cells 3 through 6 were sampled for the final 240-minute test).

Sampling location diagrams are provided in Appendix 2.

4.0 Sampling and Analytical Procedures

A test protocol for the air emission testing was reviewed and approved by the EGLE-AQD. This section provides a summary of the sampling and analytical procedures that were used during the testing periods.

4.1 Summary of Sampling Methods

USEPA Method 1	Velocity and sampling locations were selected based on physical stack measurements in accordance with USEPA Method 1.
USEPA Method 2	Exhaust gas velocity pressure and temperature using a Type-S Pitot tube connected to a red oil incline manometer; temperature was measured using a K-type thermocouple connected to the pitot tube.
USEPA Method 3A	Exhaust gas O_2 and CO_2 content determined using paramagnetic and infrared instrumental analyzers, respectively.
USEPA Method 4	Exhaust gas moisture determined using the chilled impinger method (as part of the particulate sampling train) and wet bulb/dry bulb technique.
USEPA Method 5D	Procedure for determining particulate matter sampling locations and average exit velocity for positive pressure baghouse exhausts.
USEPA Method 9	Exhaust gas opacity during each sampling period was determined by a certified observer of visible emissions.
USEPA Method 10	Exhaust gas CO concentration measured using an infrared instrumental analyzer.
USEPA Method 17	Filterable PM determined using isokinetic sampling procedures and analysis of the front half of the particulate matter sampling train
USEPA Method 202	Condensable PM determined using a dry impinger sampling train.

Appendix 3 provides sample train drawings and detailed sampling procedures

4.2 Sampling Location and Exhaust Gas Velocity Determination (USEPA Methods 1 and 2)

4.2.1 Baghouse Inlet

A single inlet duct contributes to the total air volume introduced into the baghouse. The gas velocity and volumetric flowrate for the inlet duct were measured using USEPA Methods 1 and 2.

Velocity measurement points were determined in accordance with the procedures specified in USEPA Method 1. The Pitot tube was positioned at each of the velocity traverse points with the planes of the face openings of the Pitot tube perpendicular to the stack cross-sectional plane. The Pitot tube was then rotated to determine the null angle (rotational angle as measured from the perpendicular, or reference, position at which the differential pressure is equal to zero). Velocity pressure measurements were performed at each traverse point using an S-type Pitot tube and red-oil manometer. Temperature measurements at each traverse point were conducted using a K-type thermocouple and a calibrated digital thermometer.

Volumetric flowrate measurements were performed before each each heat-length CO test run. Flowrate measurements were also performed before each 240-minute PM test run, with the initial flowrate measurement used to calculate mass emissions for the first CO and PM test periods.

4.2.2 Baghouse Exhaust

The velocity at the baghouse exhaust sampling location was too low to accurately measure. Therefore, the measured inlet volumetric flowrate was used to calculate the average baghouse exhaust exit velocity based on the total area of the baghouse exhaust measurement site in accordance with USEPA Method 5D. A matrix was developed to determine the locations of the isokinetic sampling points within each baghouse cell. Each cell was sampled for six 10-minute sampling points, with four cells consisting of a full 240 minute test.

Appendix 2 provides drawings for the inlet duct and exhaust cell sampling locations. Flowrate calculations and field data sheets are presented in Appendix 4.

4.3 Exhaust Gas Molecular Weight Determination (USEPA Method 3A)

Carbon dioxide (CO_2) and oxygen (O_2) concentrations were measured concurrently with the CO test runs and the PM test runs using an instrumental analyzer in accordance with Method 3A. A Servomex 1440D single beam single wavelength infrared (SBSW) Gas Analyzer was used to measure the CO_2 content in the exhaust gas. A Servomex 1440D Gas Analyzer equipped with a paramagnetic sensor was used to measure the O_2 content in the exhaust gas.

The flue gas was withdrawn continuously from the inlet duct of the baghouse using a heated Teflon sample line and sample pump. Moisture was removed from the sampled gas stream using a condenser and the conditioned (dried) gas samples were delivered to the instrumental analyzers.

Appendix 4 provides O_2 and CO_2 calculation sheets. Raw instrument data are provided in Appendix 8.

4.4 Moisture Content (USEPA Method 4)

The exhaust gas moisture content for the PM test runs was determined by the condensate gain in chilled impingers in accordance with USEPA Method 4. Moisture content was determined as a component of the sampling train for PM (i.e., not as a separate measurement train).

Exhaust gas moisture content for the CO test runs was determined by using the wet bulb/dry bulb technique. The moisture content determination worksheet uses two equations to provide the percentage of moisture in an exhaust gas stream.

The following Equation was used to determine moisture content based on the wet bulb temperature and the dry bulb temperature.

$$\%H_2O = \frac{e'' - \dfrac{(P_a - e'') * (t_d - t_w)}{2{,}800 - 1.3 * t_w}}{P_a} * 100$$

e"	vapor pressure of water at the wet bulb temperature (in. Hg)
P_a	absolute barometric pressure (in. Hg)
t_d	dry bulb temperature (°F)
t_w	wet bulb temperature (°F)

The vapor pressure (e") of water is required in the equation above, and can be determined using the following equation:

$$e'' = (6.07864 * 10^{-6}) * (t_w)^3 - (1.00431 * 10^{-3})(t_w)^2 + (0.075602) * t_w - 1.69343$$

These equations are limited to stack temperatures between 50°F and 200°F. The stack temperatures during each flowrate were within this range.

Appendix 4 provides moisture catch recovery field data sheets.

4.5 CO Concentration Measurements (USEPA Method 10)

Exhaust gas CO concentrations were determined during each sample period using a Thermo Environmental Inc. Model 48i Non-Dispersive Infrared (NDIR) Gas Analyzer in accordance with USEPA Method 10.

Exhaust gas was withdrawn continuously from the inlet duct of the baghouse using a heated Teflon sample line, conditioned, and delivered to the CO instrumental analyzer. Sampling was conducted at twelve points within the stack cross-section for a minimum of 5 minutes per point to satisfy stratification requirements.

Appendix 4 provides CO calculation sheets. Raw instrument response data are provided in Appendix 8.

4.6 Particulate Matter Emissions (USEPA Methods 5D, 17, and 202)

USEPA Method 202 specifies that if the gas filtration temperature exceeds 30°C (85°F) then the filterable and condensable portions of particulate matter must be combined to determine total primary (direct) PM emissions. A combined USEPA Method 17/202 sample train was used to measure total particulate matter, which is reported as PM_{10}. The front half of the sample train (from the sampling nozzle to the filter) captured filterable PM; the back half of the sampling train (from the exit of the filter, through the dry impingers, to the condensable PM filter) captured condensable PM. PM sampling was conducted during periods of time where the facility processed scrap steel, i.e. during each heat. Testing was paused between each heat and is notated on the left side of the isokinetic field data sheets.

Based on the procedures in USEPA Method 5D for sampling particulate matter in positive pressure baghouse exhausts, particulate sampling was performed using a matrix of sampling points immediately downstream (above) the filter bags. There are 8 separate cells within the baghouse at Ervin Amasteel. Six (6) equally-spaced sampling points were designated within each cell for a total of 72 sampling locations. One test period consisted of sampling the six locations within four cells (24 sampling points per test period). Each point was measured for ten minutes resulting in a sampling period of 240 minutes. The sampling pump was turned off and all openings were covered while the sampling train moved between cells. The velocity at the sampling location was to be too low to accurately measure. Therefore, the measured inlet volumetric flowrate was used to calculate the average exit velocity based on the total area of the measurement site. The calculated average exit velocity was used in the isokinetic calculation required for Method 17 for determination of the orifice meter delta H.

Appendix 4 presents flowrate calculations and field data sheets. Appendix 5 presents the Enthalpy Analytical laboratory report.

4.6.1 Filterable PM Emissions

Exhaust gas was withdrawn from each sample location using an appropriately sized sample nozzle. The collected exhaust gas was passed through an in-stack filter placed just after the "goose-neck" nozzle. PM in the sampled gas stream was collected onto a pre-tared glass fiber filter. The stainless steel in-stack filter holder was connected to a sample probe and the sample probe was connected to an impinger train (described in the following section).

At the end of each 240-minute test period, the filter was recovered and the nozzle and front half of the filter holder was brushed and rinsed with acetone. Gravimetric analysis for recovered filterable PM samples was performed by Enthalpy Analytical, Durham, North Carolina.

4.6.2 Condensable PM Emissions

Following the Method 17 sampling filter and probe, the sample gas traveled through a condensable particulate matter (CPM) sampling train that consisted of an inline condenser, a dry knock-out impinger, a dry Greenberg-Smith impinger, and a non-heated PTFE CPM filter (with exhaust thermocouple). The dry impingers were immersed in tempered water, which is also circulated in the condenser to maintain the temperature of the sample gas between 65 and 85°F.

Chilled impingers were connected to the outlet of the CPM train to catch any remaining moisture in the sampled gas stream.

At the conclusion of each test period, the impingers were transported to the recovery area where they were weighed. A nitrogen purge was not conducted on the sample train as 0.1 milliliters (mL) of liquid was the greatest amount of moisture condensed in the first two impingers during the three test periods. Upon completion of the test periods, the samples were recovered and the first two impingers, in-line condenser, back half of the method 17 filter holder, front half of the method 202 filter holder, connecting Teflon line, connecting glassware, and sample probe were rinsed with DI water, acetone and hexane in accordance with the Method 202 sample recovery procedures. The samples and recovered rinses were clearly and uniquely labeled and transferred to Enthalpy Analytical, Durham, North Carolina for analysis.

Appendix 4 presents PM emission calculations and field data sheets. Appendix 5 presents the Enthalpy Analytical laboratory report.

4.7 Opacity (USEPA Method 9)

USEPA Method 9 procedures were used to evaluate the opacity of the baghouse exhaust gas. Opacity readings were conducted during daylight hours for an 18 minute period near the start of the first heat.

In accordance with USEPA Method 9, the qualified observer stood at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back.

Opacity observations were made at the point of greatest opacity in the portion of the plume where condensed water vapor was not present. Observations were made and recorded at 15-second intervals for the duration of each observation period and reduced to six-minute averages.

All visual opacity determinations were be performed by a qualified observer in accordance with USEPA Method 9, Section 3.

Opacity test data and the observer certificate are presented in Appendix 6.

4.8 Number and Length of Sampling Runs

The PM emission verification tests consisted of three (3), 240 minute sampling periods. Four baghouse cells were tested during each test period, and four cells were tested twice.

Visible emission observations were performed by Ervin Amasteel personnel and consisted of one 18 minute period at the start of the first heat on August 2, 2021.

5.0 Quality Assurance/Quality Control Activities

Appendix 7 provides sampling equipment quality assurance and calibration data. A summary of these procedures is provided in this section.

5.1 Sampling Location and Flow Measurement Equipment

The representative flowrate locations were determined in accordance with USEPA Method 1 based on the measured distance to upstream and downstream disturbances. The flowrate location was determined to be acceptable based on the absence of significant cyclonic flow, which was measured and recorded on field data sheets. The inlet duct diagram is provided in Appendix 2.

Prior to performing the initial velocity traverse each day, the S-type Pitot tube and manometer lines were leak-checked. These checks were made by blowing into the impact opening of the Pitot tube until 3 or more inches of water were recorded on the manometer, then capping the impact opening and holding it closed for 15 seconds to ensure that it was leak free. The static pressure side of the Pitot tube was leak-checked using the same procedure.

5.2 Dry Gas Meter Calibration

The isokinetic sampling console was calibrated prior to and after the test event using the critical orifice calibration technique presented in USEPA Method 5. The metering console calibration exhibited no data outside the acceptable ranges presented in USEPA Method 5. The digital pyrometer in the gas metering console was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

Appendix 7 presents the dry gas meter calibration sheets.

5.3 Particulate Matter Recovery and Analysis

All recovered particulate matter samples were stored and shipped in certified trace clean amber glass sample bottles with Teflon® lined caps. The liquid level on each bottle was marked with a permanent marker prior to shipment and the caps were secured closed with tape. Samples of the reagents used in the test event (200 milliliters each of deionized high-purity water, acetone and hexane) were sent to the laboratory for analysis to verify that the reagents used to recover the samples have low particulate matter residues.

The glassware used in the condensable PM impinger trains was washed and rinsed prior to use in accordance with the procedures of USEPA Method 202. The glassware was not baked prior to use; therefore, a field train proof blank was recovered according to the option provided in USEPA Method 202. Analysis of the collected field train proof blank rinses (sample train rinse performed prior to use) indicated a total of 2.1 milligrams (mg) of recovered PM from the sample train. In addition, a field train recovery proof blank was performed following the first sampling period. Analysis of the field train recovery proof blank resulted in 3.4 mg of recovered PM from the sample train. The reported condensable PM test results were blank-corrected for 2 mg of condensable PM in the organic catch as per USEPA Method 202.

The laboratory report is presented in Appendix 5.

5.4 Laboratory Quality Assurance/Quality Control Procedures

The laboratory particulate matter analyses were conducted by a qualified third-party laboratory according to the appropriate Quality Assurance/Quality Control (QA/QC) procedures specified in the associated USEPA test methods and included in the final reports provided by Enthalpy Analytical (Durham, North Carolina).

The laboratory report is presented in Appendix 5.

5.5 Instrumental Analyzer Interference Check

The instrumental analyzers used to measure CO, O_2 and CO_2 have had an interference response test preformed prior to their use in the field, pursuant to the interference response test procedures specified in USEPA Method 7E. The appropriate interference test gases (i.e., gases that would be encountered in the exhaust gas stream) were introduced into each analyzer, separately and as a mixture with the analyte that each analyzer is designed to measure. All of analyzers exhibited a composite deviation of less than 2.5% of the span for all

5.6 Instrument Calibration and System Bias Checks

At the beginning of each day of the testing program, initial three-point instrument calibrations were performed for the CO, CO_2 and O_2 analyzers by injecting calibration gas directly into the inlet sample port for each instrument. System bias checks were performed prior to and at the conclusion of each sampling period by introducing the upscale calibration gas and zero gas into the sampling system (at the base of the stainless steel sampling probe prior to the particulate filter and Teflon® heated sample line) and determining the instrument response against the initial instrument calibration readings.

The instruments were calibrated with USEPA Protocol 1 certified concentrations of CO_2, O_2, and CO in nitrogen and zeroed using nitrogen. A STEC Model SGD-710C ten-step gas divider was used to obtain intermediate calibration gas concentrations as needed.

5.7 Gas Divider Certification

A STEC Model SGD-710C 10-step gas divider was used to obtain appropriate calibration span gases. The ten-step STEC gas divider was NIST certified (within the last 12 months) with a primary flow standard in accordance with Method 205. When cut with an appropriate zero gas, the ten-step STEC gas divider delivered calibration gas values ranging from 0% to 100% (in 10% step increments) of the USEPA Protocol 1 calibration gas that was introduced into the system. The field evaluation procedures presented in Section 3.2 of Method 205 were followed prior to use of gas divider. The field evaluation yielded no errors greater than

2% of the triplicate measured average and no errors greater than 2% from the expected values.

6.0 Results

6.1 Test Results and Allowable Emission Limits

6.1.1 Particulate Matter Emissions and Opacity

The filterable particulate matter emission rate (lb/hr PM) for the baghouse exhaust was calculated based on the amount of dry stack gas metered through the sampling system, the laboratory results for PM recovered from the front half of the sampling train (filter and nozzle/ filter housing rinses) and the adjusted exhaust gas volumetric flowrate.

The total particulate matter emission rate (PM_{10} lb/hr) in the baghouse exhaust was calculated based on the amount of dry stack gas metered through the sampling system, the laboratory results for filterable and condensable particulate matter recovered from the sampling train, and the adjusted exhaust gas volumetric flowrate.

The testing did not include particle size analysis. Therefore, the test results represent a worst-case scenario for PM_{10} mass emissions (all recovered PM was considered to be PM_{10}).

The baghouse exhaust gases exhibited no observable opacity (0%) during the observation period.

Test results in Table 7.1 indicate that Ervin Amasteel is operating within the following PM emission limits in MI-ROP-B1754-2018, and 40 CFR Part 63 Subpart YYYYY:

- 0.0052 grains PM per dry standard cubic foot (gr/dscf),
- 5.9 lb PM/hr, and
- 5.9 lb PM10/hr.

6.1.2 Carbon Monoxide Emissions

The CO mass emission rate was calculated based on the measured CO concentration in the baghouse inlet duct and the inlet duct volumetric flowrate. The CO emission rate per ton of steel tapped (lb/ton) was calculated based on the weight of scrap that was tapped during a period of time and the elapsed time for each included heat.

The average CO concentration for each test period was between 7.4 and 18.3 ppmvd, with concentration spikes up to around 70 ppm.

Test results in Table 7.1 indicate that Ervin Amasteel is operating within the following CO emission limits in MI-ROP-B1754-2018:

- 90 lb CO/hr on a three hour average,
- 3.0 lb CO/ton of melted steel, and
- 322.5 tons CO/year.

6.2 Variations from Normal Sampling Procedures or Operating Conditions

The testing was performed as described in the approved test protocol and specified USEPA test methods. During the test event the processes were operated normally, at or near normal maximum achievable capacity.

Table 6.1 Measured particulate matter emissions and opacity from Baghouse-0009 exhaust

Test No.	EAF-17/202-1	EAF-17/202-2	EAF-17/202-3	Three Test Average
Test Date:	8/2-8/3/2021	8/3-8/4/2021	8/4/2021	
Test Period:	19:45-01:33	19:18-00:28	01:26-06:41	
Exhaust Gas Properties				
Exhaust gas flow (dscfm)	222,718	223,411	228,906	225,012
Moisture (% H2O)	1.9	1.9	2.1	2.0
CO2 (%)	0.29	0.27	0.27	0.28
O2 (%)	21.2	21.2	21.2	21.2
Opacity				
Highest 6-minute average (%)	0.0	-	-	0.0
Opacity Limit (%)	-	-	-	*6*
Filterable Emissions				
Sample volume (dscf)	204.1	198.5	213.4	205.3
PM catch primary filter (mg)	0.00	0.00	0.00	0.00
PM Catch acetone rinse (mg)	0.47	0.30	0.30	0.36
Total filterable catch (mg)	0.47	0.30	0.30	0.36
Emission factor (gr/dscf)	3.55E-05	2.33E-05	2.17E-05	2.68E-05
PM Permit Limit (gr/dscf)	-	-	-	*0.0052*
Emission Rate (lb/hr)	0.07	0.04	0.04	0.05
PM Permit Limit (lb/hr)	-	-	-	*5.9*
Condensable Emissions				
Sample volume (dscf)	204.1	198.5	213.4	205.3
CPM catch inorganic (mg)	3.0	3.1	2.2	2.8
CPM catch organic (mg)	0.1	2.3	0.3	0.9
Total CPM catch (mg)	3.1	5.4	2.5	3.7
CPM emission rate (lb/hr)	0.5	0.8	0.4	0.6
Total PM Emissions (as PM10)				
Total Emission Rate (lb/hr)	0.52	0.86	0.40	0.59
Total PM Permit Limit (lb/hr)	-	-	-	*5.9*
Total Emission Rate (gr/dscf)	2.7E-04	4.5E-04	2.0E-04	3.1E-04
Total PM Permit Limit (gr/dscf)	-	-	-	*0.0052*

Table 6.2 Measured CO emissions from Baghouse-0009 exhaust

Test No. Test Date: Test Period:	CO-1 8/2/2021 19:45-21:10	CO-2 8/2/2021 21:50-23:10	CO-3 8/2-8/3/2021 23:38-00:57	Three Test Average
Exhaust Gas Properties				
Exhaust gas flow (dscfm)	222,621	229,254	228,362	226,746
Moisture (% H2O)	1.6	1.4	1.5	1.5
CO2 (%)	0.30	0.27	0.30	0.29
O2 (%)	21.2	21.2	21.1	21.2
Tons scrap tapped per hour (TpH)	19.4	17.5	19.1	18.7
Carbon Monoxide Emissions				
Concentration (ppmvd)	7.4	10.4	18.3	12.0
Emission Rate (lb/hr)	7.2	10.5	18.3	12.0
CO Permit Limit (lb/hr)	-	-	-	*90.0*
Emission Rate (ton/yr)	31.4	45.8	79.9	52.4
CO Permit Limit (ton/yr)	-	-	-	*322.5*
Emission Factor (lb CO/ton steel)	0.37	0.60	0.96	0.64
Emission Factor Limit	-	-	-	*3.0*