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EMISSIONS COMPLIANCE TEST PROGRAM

Performed At
Barber Steel Foundry Corporation
Rothbury Foundry
EUINDCFURNEIF6 and Building Vents
Rothbury, Michigan

Test Date
September 26, 2014

Report No.
TRC Environmental Corporation Report 218515B

Report Submittal Date
November 17, 2014

TRC Environmental Corporation
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Report Certification

I certify that to the best of my knowledge:

- Testing data and all corresponding information have been checked for accuracy and completeness.
- Sampling and analysis have been conducted in accordance with the approved protocol and applicable reference methods (as applicable).
- All deviations, method modifications, or sampling and analytical anomalies are summarized in the appropriate report narrative(s).

Anthony Sakellariou
Project Manager

November 17, 2014
Date

TRC was operating in conformance with the requirements of ASTM D7036-04 during this test program.

Jeffrey W. Burdette
TRC Air Measurements Technical Director

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) performed an emission compliance test program to determine total metal hazardous air pollutants (HAPs) from the EUINDCFURNEIF6 and to determine fugitive emissions from building vents subject to an opacity limit at the Rothbury Foundry of Barber Steel Foundry Corporation in Rothbury, Michigan on September 26, 2014. The tests were authorized by and performed for Barber Steel Foundry Corporation.

The purpose of this test program was to comply with the testing requirements of the Permit to Install (PTI) 174-11 and the United States Environmental Protection Agency (USEPA), Title 40 Code of Federal Regulations Part 63 (40CFR63), Subpart ZZZZZ—National Emission Standards for Hazardous Air Pollutants (NESHAP) for Iron and Steel Foundries Area Sources.

1.1 Project Contact Information

Participants		
Test Facility	Barber Steel Foundry Corporation Rothbury Foundry 2625 West Winston Road Rothbury, Michigan 49452 State Registration No. B1961	Mr. Bruce Milligan Plant Manager (231) 981-3933 (phone) bmilligan@wabtec.com
Air Emissions Testing Body (AETB)	TRC Environmental Corporation 7521 Brush Hill Road Burr Ridge, Illinois 60527	Mr. Anthony Sakellariou Project Manager (312) 533-2035 (phone) (312) 533-2070 (fax) asakellariou@trcsolutions.com

Ricardo Nunez and Anthony Sakellariou of TRC conducted the testing. Documentation of the on-site ASTM D7036-04 Qualified Individual(s) (QI) can be located in the appendix to this report.

Eric Grinstern and Jeremy Howe of the Michigan Department of Air Quality Division (MIDEQ) observed the testing.

2.0 SUMMARY OF RESULTS

The results of this test program are summarized in the table below. Detailed individual run results are presented in Section 6.0.

Unit ID	Pollutant Tested	Measured Emissions	Permitted Emission Limit
EUINDCFURNEIF6	Total Metal HAPs	0.000045 lb/ton of metal charged	0.008 lb/ton of metal charged
Melt Area	Visible Emissions	0.7 %	20% (6-minute average)
Cooling Shakeout Area		1.8 %	
Finishing Area		0.0 %	

The table below summarizes the test methods used, as well as the number and duration of each at each test location:

Unit ID/ Sample Location	Parameter Measured	Test Method	No. of Runs	Run Duration
EUINDCFURNEIF6 Stack SV-B	Metal HAPs	USEPA Methods 1, 2, 3, 29	3	72 - 120 min
Melt Area Vent	Visible Emissions	USEPA Method 9	1	60 min
Cooling Shakeout Area Vent				
Finishing Area Vent				

3.0 DISCUSSION OF RESULTS

No problems were encountered with the testing equipment during the test program. Source operation appeared normal during the entire test program. Unit operating data was recorded by plant personnel and appended to the report. After the first 120-minute metal HAPs test run on EUINDCFURNEIF6, the test time for the second and third run was reduced to 72 minutes in order to accommodate the operating schedule.

4.0 SAMPLING AND ANALYSIS PROCEDURES

All testing, sampling, analytical, and calibration procedures used for this test program were performed in accordance with the methods presented in the following sections. Where applicable, the *Quality Assurance Handbook for Air Pollution Measurement Systems*, Volume III, Stationary Source Specific Methods, USEPA 600/R-94/038c, September 1994 was used to supplement procedures.

4.1 Determination of Sample Point Locations by USEPA Method 1

This method is applicable to gas streams flowing in ducts, stacks, and flues and is designed to aid in the representative measurement of pollutant emissions and/or total volumetric flow rates from stationary sources. In order to qualify as an acceptable sample location, it must be located at a position at least two stack or duct equivalent diameters downstream and a half equivalent diameter upstream from any flow disturbance.

The cross-section of the measurement site was divided into a number of equal areas, and the traverse points were then located in the center of these areas. The minimum number of points were determined from Figure 1-1 (particulate) of USEPA Method 1.

4.2 Volumetric Flow Rate Determination by USEPA Method 2

This method is applicable for the determination of the average velocity and the volumetric flow rate of a gas stream.

The gas velocity head (ΔP) and temperature were measured at traverse points defined by USEPA Method 1. The velocity head was measured with a Type S (Stausscheibe or reverse type) pitot tube and oil-filled manometer; and the gas temperature was measured with a Type K thermocouple. The average gas velocity in the flue was calculated based on: the gas density (as determined by USEPA Methods 3 and 4); the flue gas pressure; the average of the square roots of the velocity heads at each traverse point, and the average flue gas temperature.

4.3 CO_2 and O_2 Determination by USEPA Method 3

This method is applicable for the determination of CO_2 and O_2 concentrations and dry molecular weight of a sample from an effluent gas stream of a fossil-fuel combustion process or other process.

A gas sample was 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 was analyzed for percent CO_2 and percent O_2 usinga Fyrite.

4.4 Visible Emissions Determination by USEPA Method 9

This method is applicable for the determination of the opacity of emissions from stationary sources pursuant to § 60.11(b) and for visually determining opacity of emissions.

Opacity observations were made by a qualified observer. 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 at 15-second intervals for the duration of the test period.

4.5 Trace Metals Determination by USEPA Method 29

This method is applicable for the determination of metals emissions from stationary sources. This method may be used to determine particulate emissions in addition to the metals emissions if the prescribed procedures and precautions are followed. USEPA Methods 2-4 were performed concurrently with, and as an integral part of these determinations.

Flue gas was withdrawn isokinetically from the source at traverse points determined per USEPA Method 1 through a nozzle, probe liner, glass fiber filter and a series of impingers. The probe liner and filter were 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. Particle-bound metals were collected in the nozzle, probe on the filter. Gaseous metals were collected in a solution of nitric acid and hydrogen peroxide (analyzed for all metals including Hg) and a solution of acidified potassium permanganate (analyzed only for Hg).

The recovered samples were analyzed using the techniques identified in the appended analytical report.

5.0 QUALITY ASSURANCE PROCEDURES

TRC integrates our Quality Management System (QMS) into every aspect of our testing service. We follow the procedures specified in current published versions of the test Method(s) referenced in this report. Any modifications or deviations are specifically identified in the body of the report. We routinely participate in independent, third party audits of our activities, and maintain:

- Louisiana Environmental Lab Accreditation Program (LELAP) accreditation;
- Interim accreditation from the Stack Testing Accreditation Council (STAC) that our operations conform with the requirements of ASTM D 7036-04

These accreditations demonstrate that our systems for training, equipment maintenance and calibration, document control and project management will fully ensure that project objectives are achieved in a timely and efficient manner with a strict commitment to quality.

All calibrations are performed in accordance with the test Method(s) identified in this report. If a Method allows for more than one calibration approach, or if approved alternatives are available, the calibration documentation in the appendices specifies which approach was used. All measurement devices are calibrated or verified at set intervals against standards traceable to the National Institute of Standards and Technology (NIST). NIST traceability information is available upon request.

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6.0 TEST RESULTS SUMMARY

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Method 29 Metals Test Results Summary

Company:	**Barber Steel Foundry**
Plant:	**Rothbury Foundry**
Unit:	**EUINDUCFURNEIF6**
Location:	**Stack (SV-B)**

Run No:	1	2	3	Average
Date:	9/26/14	9/26/14	9/26/14	
Start Time:	2:45	5:38	7:45	
End Time:	4:50	6:54	9:04	
Run Duration (min):	120.0	72.0	72.0	
Fixed Gas Content:				
CO2 (% vol)	0.0	0.0	0.0	0.0
O2 (% vol)	20.9	20.9	20.9	20.9
Fractional Moisture Content:	0.013	0.012	0.013	0.013
Sample Volume (V_{mStd})				
(dry std ft^3):	63	60	64	62
Measured Volumetric Flow Rate				
Q_{std} (std ft^3/min):	10,543	10,420	11,042	10,668
$Q_{std(dry)}$ (dry std ft^3/min):	10,402	10,294	10,900	10,532
Metal Charged (ton/hr)	4.401	4.616	4.358	4.458
Net Mass Collected (ug)				
Arsenic:	0.000 [2]	0.000 [2]	0.000 [2]	0.000 [BDL]
Beryllium:	0.000 [2]	0.000 [2]	0.000 [2]	0.000 [BDL]
Cadmium:	0.000 [2]	0.000 [2]	0.000 [2]	0.000 [BDL]
Chromium:	0.250	0.830	0.090	0.390 [ADL]
Cobalt:	0.027 [1]	0.000 [1]	0.000 [1]	0.009 [DLL]
Mercury:	0.040 [1]	0.017 [1]	0.022 [1]	0.026 [DLL]
Manganese:	4.130	3.770	14.100	7.333 [ADL]
Nickel:	0.130	0.060	0.080	0.090 [ADL]
Lead:	0.560	0.970	0.600	0.710 [ADL]
Antimony:	0.000 [2]	0.000 [2]	0.000 [2]	0.000 [BDL]
Selenium:	0.000 [2]	0.770 [1]	0.000 [2]	0.257 [DLL]
Total Metals (ug)	5.137	6.417	14.892	8.815

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Method 29 Metals Test Results Summary

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Location:	**Stack (SV-B)**

Run No:	1	2	3	Average
Date:	9/26/14	9/26/14	9/26/14	
Start Time:	2:45	5:38	7:45	
End Time:	4:50	6:54	9:04	
Run Duration (min):	120.0	72.0	72.0	
Metals Concentration (ug/dscm)				
Arsenic:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Beryllium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Cadmium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Chromium:	1.39E-01	4.92E-01	4.97E-02	2.27E-01 ADL
Cobalt:	1.50E-02 [1]	0.00E+00 [1]	0.00E+00 [1]	5.01E-03 DLL
Mercury:	2.23E-02 [1]	1.01E-02 [1]	1.22E-02 [1]	1.48E-02 DLL
Manganese:	2.30E+00	2.23E+00	7.79E+00	4.11E+00 ADL
Nickel:	7.23E-02	3.56E-02	4.42E-02	5.07E-02 ADL
Lead:	3.12E-01	5.75E-01	3.31E-01	4.06E-01 ADL
Antimony:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Selenium:	0.00E+00 [2]	4.56E-01 [1]	0.00E+00 [2]	1.52E-01 DLL
Total Metals (ug/dscm)	2.858	3.804	8.227	4.963
Metals Concentration (lb/dscf)				
Arsenic:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Beryllium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Cadmium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Chromium:	8.68E-12	3.07E-11	3.10E-12	1.42E-11 ADL
Cobalt:	9.38E-13 [1]	0.00E+00 [1]	0.00E+00 [1]	3.13E-13 DLL
Mercury:	1.39E-12 [1]	6.29E-13 [1]	7.59E-13 [1]	9.26E-13 DLL
Manganese:	1.43E-10	1.40E-10	4.86E-10	2.56E-10 ADL
Nickel:	4.52E-12	2.22E-12	2.76E-12	3.17E-12 ADL
Lead:	1.95E-11	3.59E-11	2.07E-11	2.53E-11 ADL
Antimony:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 BDL
Selenium:	0.00E+00 [2]	2.85E-11 [1]	0.00E+00 [2]	9.50E-12 DLL
Total Metals (lb/dscf)	1.78E-10	2.37E-10	5.14E-10	3.10E-10

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Unit:	**EUINDUCFURNEIF6**
Location:	**Stack (SV-B)**

Run No:	1	2	3	Average	
Date:	9/26/14	9/26/14	9/26/14		
Start Time:	2:45	5:38	7:45		
End Time:	4:50	6:54	9:04		
Run Duration (min):	120.0	72.0	72.0		
Metals Emission Rate (lb/hr)					
Arsenic:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Beryllium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Cadmium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Chromium:	5.42E-06	1.90E-05	2.03E-06	8.81E-06	ADL
Cobalt:	5.85E-07 [1]	0.00E+00 [1]	0.00E+00 [1]	1.95E-07	DLL
Mercury:	8.67E-07 [1]	3.89E-07 [1]	4.96E-07 [1]	5.84E-07	DLL
Manganese:	8.95E-05	8.62E-05	3.18E-04	1.65E-04	ADL
Nickel:	2.82E-06	1.37E-06	1.80E-06	2.00E-06	ADL
Lead:	1.21E-05	2.22E-05	1.35E-05	1.59E-05	ADL
Antimony:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Selenium:	0.00E+00 [2]	1.76E-05 [1]	0.00E+00 [2]	5.87E-06	DLL
Total Metals (lb/hr)	0.00011	0.00015	0.00034	0.00020	
Metals Emission Rate (lb/ton)					
Arsenic:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Beryllium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Cadmium:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Chromium:	1.23E-06	4.11E-06	4.66E-07	1.94E-06	ADL
Cobalt:	1.33E-07 [1]	0.00E+00 [1]	0.00E+00 [1]	4.43E-08	DLL
Mercury:	1.97E-07 [1]	8.42E-08 [1]	1.14E-07 [1]	1.32E-07	DLL
Manganese:	2.03E-05	1.87E-05	7.30E-05	3.73E-05	ADL
Nickel:	6.40E-07	2.97E-07	4.14E-07	4.51E-07	ADL
Lead:	2.76E-06	4.80E-06	3.11E-06	3.56E-06	ADL
Antimony:	0.00E+00 [2]	0.00E+00 [2]	0.00E+00 [2]	0.00E+00	BDL
Selenium:	0.00E+00 [2]	3.81E-06 [1]	0.00E+00 [2]	1.27E-06	DLL
Total Metals (lb/ton)	0.000025	0.000032	0.000077	0.000045	
Isokinetic Variation (%):	100.7	94.6	95.9	97.1	

1 - The mass in one of the sample fractions was below the analytical detection limit

2 - The mass in both the sample fractions was below the analytical detection limit

ADL - all analytical values used to calculate and report an in-stack emissions value are greater than the laboratory's reported detection level(s)

DLL - at least one, but not all values used to calculate and report an in-stack emissions value are greater than the laboratory's reported detection level(s)

BDL - all analytical values used to calculate and report an in-stack emissions value are less than the laboratory's reported detection level(s)