

**Results of the June 23-25, 2015 Mercury Emissions
Tests Performed at the ArcelorMittal Minorca Mine
Inc. Located in Virginia, Minnesota**

Indurating Furnace Stack A	SV014
Indurating Furnace Stack B	SV015
Indurating Furnace Stack C	SV016
Indurating Furnace Stack D	SV017

MPCA AQD File No. 257

Air Emissions Permit No. 13700062-003

Barr Project No. 23691638.00

Prepared for
ArcelorMittal Minorca Mine Inc.
Virginia, Minnesota

August 2015



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Report Certification

Certification of Sampling Procedures:

I certify under penalty of law that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.



Ben Wiltse

Air Quality Technician/Project Manager
Barr Engineering Company

8/7/15
Date

Certification of Analytical Procedures:

I certify under penalty of law that the analytical procedures were performed in accordance with the requirements of the test methods and that the data presented for use in the test report were, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.

1. Element One, Inc. analyzed metals samples. A signed laboratory report is provided in this report.



Ben Wiltse

Air Quality Technician/Project Manager
Barr Engineering Company

8/7/15
Date

Certification of Test Report by Testing Company:

I certify under penalty of law that this test report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.



Tom Kuchinski

Supervisor/Senior Air Quality Technician
Barr Engineering Company

8/7/15
Date

Certification of Test Report by Owner or Operator of Emission Facility:

I certify under penalty of law that the information submitted in this test report accurately reflects the operating conditions at the emission facility during this performance test and describes the date and nature of all operational and maintenance activities that were performed on the process and control equipment during the month prior to the performance test. Based on my inquiry of the person or persons who performed the operational and maintenance activities, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.



Jaime Johnson
Process Manager - Environmental
ArcelorMittal Minorca Mine Inc.

11 AUGUST 2015

Date

Executive Summary

Barr Engineering Company performed mercury emissions testing June 23-25, 2015 at the ArcelorMittal Minnoria Mine Inc. located in Virginia, Minnesota. The testing was performed at the taconite Indurating Furnace Stacks A-D (SV014-SV017) to satisfy the Minnesota Rule 7019.3050 mercury emission inventory testing requirement. Test results are provided in the Executive Summary Table (Table ES-1).

Table ES-1 Executive Summary Table

Mercury Test Parameter EPA Methods 1,2,3,4 and 29	Average Test Results				Total
	Indurating Furnace Stack A	Indurating Furnace Stack B	Indurating Furnace Stack C	Indurating Furnace Stack D	Indurating Furnace (EU026)
Stack Vent Number	SV014	SV015	SV016	SV017	-
Test Date	June 23-24, 2015	June 25, 2015	June 23-24, 2015	June 25, 2015	-
Total Mercury Emission Rate, lb/hr					
Mercury (Hg)	0.0014	0.0017	0.0025	0.0030	0.0087

1.0 Introduction

Barr Engineering Company (Barr) performed mercury emissions testing on June 23-25, 2015 at the ArcelorMittal Minorca Mine Inc. (ArcelorMittal) located in Virginia, Minnesota. The testing was performed at the taconite Indurating Furnace Stacks A-D (SV014-SV017) to satisfy the Minnesota Rule 7019.3050 mercury emission inventory testing requirement.

A test plan was submitted April 17, 2015 to the Minnesota Pollution Control Agency (MPCA). The pretest meeting requirement was fulfilled May 28, 2015 as indicated in the Test Plan Approval. The test plan, test plan approval letter, and relevant correspondence are provided in Appendix H. The test plan includes testing for particulate matter and oxides of nitrogen which is reported separately.

Due to process operations, the testing schedule was adjusted from the schedule outlined in the test plan. The mercury tests at Indurating Furnace Stacks A (SV014) and C (SV016) were completed over a two day period. Changes to the testing schedule were communicated to Lad Strzok of the MPCA via email. The documentation of these emails is located in Appendix H.

Ben Wiltse led the Barr test teams. Jaime Johnson of ArcelorMittal provided coordination of the test team with facility operations. The performance tests were not witnessed by a representative of the MPCA. A list of project participants is provided in Appendix I.

Each test consisted of three independent 2-hour test runs at each of the four stacks using EPA Method 29 to determine mercury emissions. Indurating Furnace Stack A (SV014) and Indurating Furnace Stack C (SV016) were tested simultaneously on June 23-24, 2015. Indurating Furnace Stack B (SV015) and Indurating Furnace Stack D (SV017) tested simultaneously on June 25. Filterable particulate matter was determined in conjunction with EPA Method 29 to determine 40 CRR Pat 63 subpart RRRRR (Taconite MACT) continued compliance. Results of the filterable particulate matter tests are located in a separate report.

A list of the emissions units tested with target process operating rate ranges and applicable rules are presented in Table 1 below. Production rates during the testing were at or above 340 long tons per hour (LTPH) as required in the permit for emissions testing.

Table 1 Emission Source Information

Source	Emission Unit	Control Equipment	Plant ID	Stack Vent	Fired Pellet Rate (LTPH)	Applicable Rule
Indurating Furnace	EU26	CE014 CE015 CE016 CE017	Stack A 108DC01 Stack B 108DC02 Stack C 108DC03 Stack D 108DC04	SV014 SV015 SV016 SV017	>340	Minn. R. 7019.3050

2.0 Results

2.1 Indurating Furnace Stack A (SV014)

Results of the Indurating Furnace Stack A (SV014) June 23-24, 2015 mercury test are provided in Table 1. The average emission rate of total mercury is 0.0014 pounds per hour (lb/hr). Test run one and two were completed on June 23. Due to production scale problems after run two, run three was completed on June 24. The testing was completed within a 24 hour period.

2.2 Indurating Furnace Stack B (SV015)

Results of the Indurating Furnace Stack B (SV015) June 25, 2015 mercury test are provided in Table 2. The average emission rate of total mercury is 0.0017 pounds per hour (lb/hr).

2.3 Indurating Furnace Stack C (SV016)

Results of the Indurating Furnace Stack C (SV016) June 23-24, 2015 mercury test are provided in Table 3. The average emission rate of total mercury is 0.0025 pounds per hour (lb/hr). Indurating Furnace Stack C was tested simultaneously with Indurating Furnace Stack A. The testing was completed within a 24 hour period.

2.4 Indurating Furnace Stack D (SV017)

Results of the Indurating Furnace Stack D (SV017) June 25, 2015 mercury test are provided in Table 4. The average emission rate of total mercury is 0.0030 pounds per hour (lb/hr). Indurating Furnace Stack D (SV017) was tested simultaneously with Indurating Furnace Stack B (SV015).

2.5 Indurating Furnace (EU026)

Table 5 provides a summary of the mercury emission testing of the four Indurating Furnace stacks A-D (SV014-SV017). The combined emission rate of total mercury for the indurating furnace (EU026) average is 0.0087 pounds per hour (lb/hr).

All sources were tested during periods of normal operating conditions. Process data collected during the testing are provided in Appendix F.

3.0 Process Description

ArcelorMittal mines taconite ore (magnetite) and produces iron pellets that are shipped to the company's blast furnace in Indiana.

Concentrate slurry flows to a storage tank where limestone is added to make flux pellets. The concentrate is dewatered by vacuum disk filters, mixed with bentonite and conveyed to balling disks. Green balls produced on the balling disks are transferred to a roll conveyor for additional removal of over and undersize material.

The green balls are distributed evenly across pallet cars, prior to entry into the pellet furnace. The pallet cars have a layer of fired pellets, called the hearth layer, on the bottom and sides of the car. The hearth layer acts as a buffer between the pallet car and the heat generated through the exothermic conversion of magnetite to hematite.

There is one natural gas fired furnace at ArcelorMittal's taconite plant. The straight grate furnace has several distinct zones. The first two stages are updraft and downdraft drying zones. The next zones are the preheat zone and firing zone. The temperature increases as the pellets pass through each zone reaching a peak in the firing zone. The pellets enter the after-firing zone, where the conversion of magnetite to hematite is completed. The last two zones are cooling zones that allow the pellets to be discharged at a temperature of around 120 degrees Fahrenheit.

Heated air discharged from the two cooling zones is recirculated to the drying, preheat and firing zones. Off-gases from the furnaces are vented primarily through two ducts, the hood exhaust that handles the drying and recirculated cooling gases, and the windbox exhaust, which handles the preheat, firing, and after-firing gases. The windbox exhaust flows through a multiclone, which protects the downstream fan, and then enters a common header shared with the hood exhaust stream. The exhaust gases are subsequently divided into four streams which lead to four venturi rod scrubbers and exhaust from individual stacks.

Process throughput and control device operating data averaged by test run is summarized in the MPCA process operating forms located in Appendix F.

4.0 Stack Testing Procedures and Methods

Testing was performed at test port locations meeting EPA method 1 criteria. Method criteria are listed below in Table 2. Sample port locations and traverse points are provided in Figures 1-6.

Table 2 **EPA Method 1 Criteria**

Stack Vent Number	Distance to Upstream Disturbances (Diameters)	Distance to Downstream Disturbances (Diameters)	Number of Ports	Number of Points
SV014	8.3	3.5	4	12
SV015	8.2	3.5	4	12
SV016	8.1	3.5	4	12
SV017	8.0	3.4	4	12

Volumetric airflow determinations were performed in accordance with EPA Method 2 using an S-type pitot tube. Airflows were determined in conjunction with the EPA Method 29 tests.

Oxygen and carbon dioxide concentrations were determined using EPA Method 3A. Collection of EPA Method 3A data did not coincide with all EPA Method 29 test runs. Data were collected for approximately one and a half test runs at each stack. The concentrations observed were consistent; therefore, the average concentrations obtained were applied to periods without corresponding data. EPA method 3A data are provided in Appendix D.

Stack gas moistures were determined by performing EPA Method 4 in conjunction with the EPA Method 29 tests.

Mercury emissions were determined following EPA Method 29. All glassware used for the testing was prepared as directed by the method. All reagents were prepared at Barr's laboratory except for the acidified potassium permanganate solution which was prepared on-site daily prior to sampling. Sample recovery was performed in Barr's recovery trailer to minimize potential for sample contamination. Samples were analyzed by Element One, Inc. of Wilmington, North Carolina. A complete laboratory report along with chain of custody is located in Appendix C.

Mercury levels in all reagent blanks were below analytical detection limits. No blank corrections were performed. Sample fractions reported at the analytical detection limit are included in the total mass of the sample.

The test methods referenced above are found in 40 CFR Part 60, Appendix A.

Tables

TABLE 1

EPA METHOD 29 TEST RESULTS

Indurating Furnace Stack A (SV014)
Test 1 - Mercury

Parameter	Run 1	Run 2	Run 3	Average
Test Date	6/23/2015	6/23/2015	6/24/2015	---
Test Period	1511 - 1720	1810 - 2020	803 - 1013	---
Test Duration, min.	120	120	120	120
Air Flow Rate				
acfm	212,700	211,300	207,400	210,467
scfm	179,600	178,200	175,100	177,633
dscfm	161,900	160,500	156,800	159,733
Mercury Concentration, µg/dscf				
Front Half (Filterable) Mercury	0.015	0.012	0.012	0.013
Back Half Mercury	0.052	0.047	0.060	0.053
Total Mercury	0.068	0.059	0.073	0.066
Mercury Emission Rate, lb/hr				
Front Half (Filterable) Mercury	0.00033	0.00026	0.00026	0.00028
Back Half Mercury	0.0011	0.0010	0.0013	0.0011
Total Mercury	0.0014	0.0013	0.0015	0.0014
Process Data				
Fired Pellet Production Rate, LTPH	367	360	357	361
Emission Factor				
Total Mercury lb/LT Fired Pellet	3.9E-06	3.5E-06	4.2E-06	3.9E-06

TABLE 2

EPA METHOD 29 TEST RESULTS

Indurating Furnace Stack B (SV015)
Test 2 - Mercury

Parameter	Run 1	Run 2	Run 3	Average
Test Date	6/25/2015	6/25/2015	6/25/2015	---
Test Period	756 - 1013	1105 - 1320	1433 - 1646	---
Test Duration, min.	120	120	120	120
Air Flow Rate				
acfm	220,100	221,200	224,700	222,000
scfm	184,800	185,700	188,600	186,367
dscfm	164,400	165,700	168,400	166,167
Mercury Concentration, µg/dscf				
Front Half (Filterable) Mercury	0.013	0.013	0.0091	0.012
Back Half Mercury	0.073	0.069	0.060	0.067
Total Mercury	0.086	0.082	0.069	0.079
Mercury Emission Rate, lb/hr				
Front Half (Filterable) Mercury	0.00028	0.00029	0.00020	0.00026
Back Half Mercury	0.0016	0.0015	0.0013	0.0015
Total Mercury	0.0019	0.0018	0.0015	0.0017
Process Data				
Fired Pellet Production Rate, LTPH	361	350	345	352
Emission Factor				
Total Mercury lb/LT Fired Pellet	5.2E-06	5.1E-06	4.5E-06	4.9E-06

TABLE 3

EPA METHOD 29 TEST RESULTS

Indurating Furnace Stack C (SV016)
Test 3 - Mercury

Parameter	Run 1	Run 2	Run 3	Average
Test Date	6/23/2015	6/23/2015	6/24/2015	---
Test Period	1511 - 1720	1810 - 2020	803 - 1013	---
Test Duration, min.	120	120	120	120
Air Flow Rate				
acfm	218,900	208,100	206,500	211,167
scfm	181,700	172,200	171,200	175,033
dscfm	158,700	150,500	148,700	152,633
Mercury Concentration, µg/dscf				
Front Half (Filterable) Mercury	0.016	0.013	0.005	0.011
Back Half Mercury	0.11	0.11	0.12	0.11
Total Mercury	0.12	0.13	0.13	0.13
Mercury Emission Rate, lb/hr				
Front Half (Filterable) Mercury	0.00034	0.00025	0.00011	0.00023
Back Half Mercury	0.0022	0.0023	0.0024	0.0023
Total Mercury	0.0026	0.0025	0.0025	0.0025
Process Data				
Fired Pellet Production Rate, LTPH	367	360	357	361
Emission Factor				
Total Mercury lb/LT Fired Pellet	7.1E-06	7.0E-06	6.9E-06	7.0E-06

TABLE 4

EPA METHOD 29 TEST RESULTS

Indurating Furnace Stack D (SV017)
Test 4 - Mercury

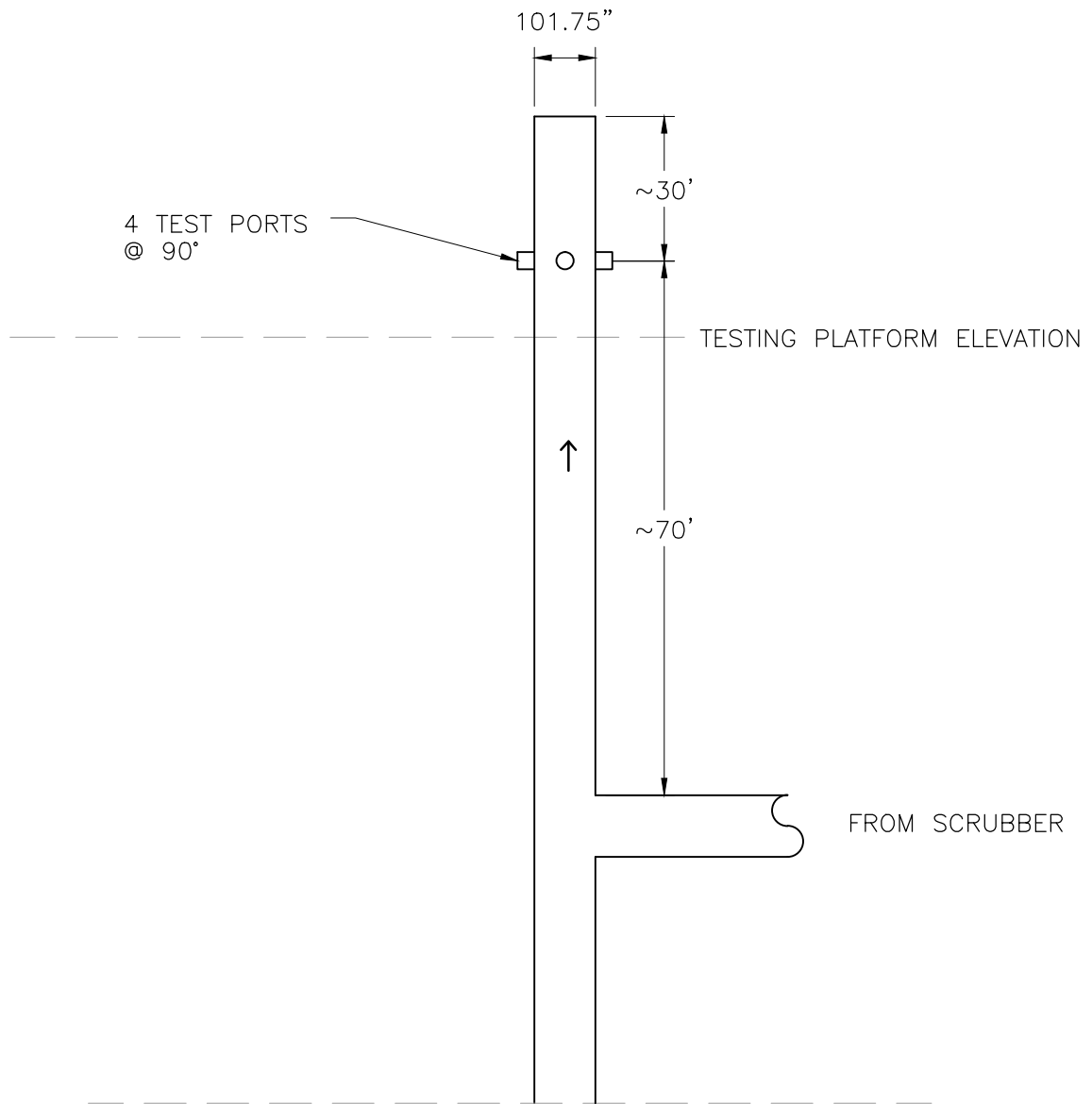
Parameter	Run 1	Run 2	Run 3	Average
Test Date	6/25/2015	6/25/2015	6/25/2015	---
Test Period	756 - 1013	1105 - 1320	1433 - 1646	---
Test Duration, min.	120	120	120	120
Air Flow Rate				
acfm	219,600	220,100	212,800	217,500
scfm	180,200	180,500	174,000	178,233
dscfm	153,700	154,800	149,300	152,600
Mercury Concentration, µg/dscf				
Front Half (Filterable) Mercury	< 0.0013	< 0.0013	< 0.0014	< 0.0013
Back Half Mercury	0.16	0.15	0.14	0.15
Total Mercury	0.16	0.15	0.14	0.15
Mercury Emission Rate, lb/hr				
Front Half (Filterable) Mercury	< 0.000027	< 0.000027	< 0.000027	< 0.000027
Back Half Mercury	0.0032	0.0030	0.0028	0.0030
Total Mercury	0.0032	0.0031	0.0028	0.0030
Process Data				
Fired Pellet Production Rate, LTPH	361	350	345	352
Emission Factor				
Total Mercury lb/LT Fired Pellet	8.9E-06	8.7E-06	8.2E-06	8.6E-06

Note: The "<" sign indicates the mass is below method detection limits. All calculations use the detection limit for concentration and emission determinations.

TABLE 5
EPA METHOD 29 TEST RESULTS SUMMARY
Indurating Furnace Stacks A-D (SV014-017), (EU026)

Parameter	Stack A SV014	Stack B SV015	Stack C SV016	Stack D SV017	EU026
Test Date	6/23/2015- 6/24/2015	6/25/2015	6/23/2015- 6/24/2015	6/25/2015	Total dscfm 631,100
Air Flow Rate					
acfm	210,500	222,000	211,200	217,500	
scfm	177,600	186,400	175,000	178,200	
dscfm	159,700	166,200	152,600	152,600	
Mercury Concentration, µg/dscf					Flow Weighted Average 0.10
Front Half (Filterable) Mercury	0.013	0.012	0.011	< 0.0013	
Back Half Mercury	0.053	0.067	0.114	0.148	
Total Mercury	0.066	0.079	0.126	0.150	
Total Mercury Concentration, µg/dscm	2.3	2.8	4.4	5.3	3.7
Mercury Emission Rate, lb/hr					Total lb/hr 0.0087
Front Half (Filterable) Mercury	0.0003	0.0003	0.0002	< 0.000027	
Back Half Mercury	0.0011	0.0015	0.0023	0.0030	
Total Mercury	0.0014	0.0017	0.0025	0.0030	
Process Rate					
Fired Pellet Production Rate, LTPH	361	352	361	352	357
Emission Factor					
Total Mercury lb/LT Fired Pellet	4.0E-06	4.9E-06	7.0E-06	8.6E-06	2.5E-05

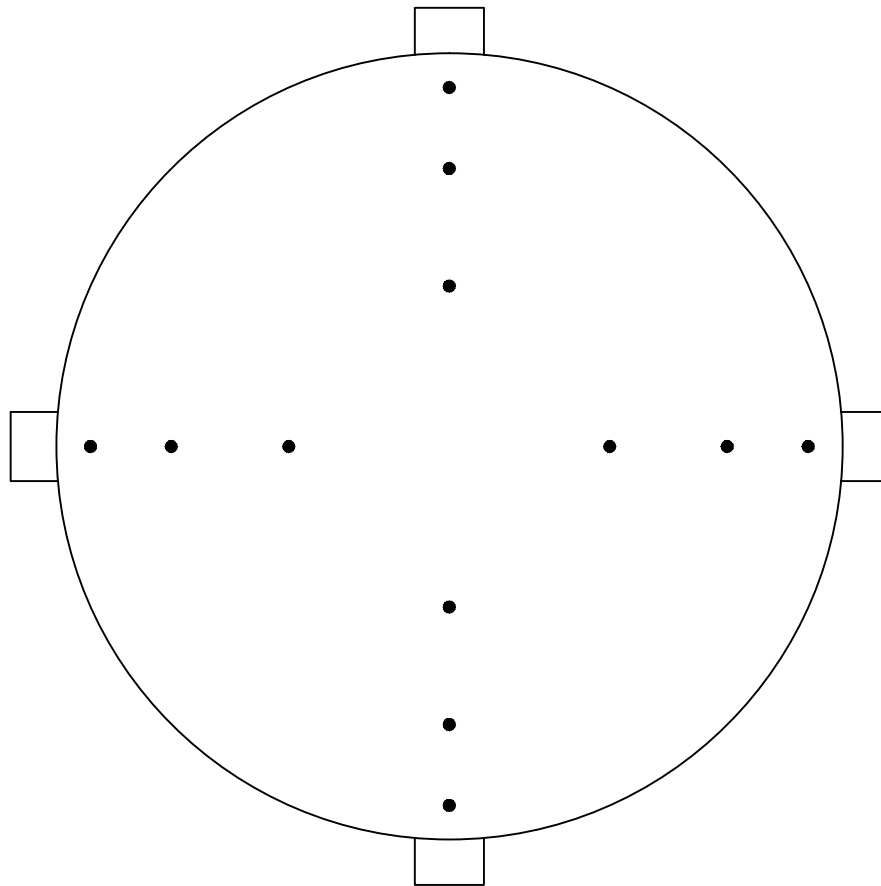
Figures



TEST PORT LOCATIONS
ARCELORMITTAL MINORCA MINE INC.
VIRGINIA, MINNESOTA
A & B INDURATING FURNACE STACKS (SV014) & (SV015)

NOT TO SCALE

FIGURE 1



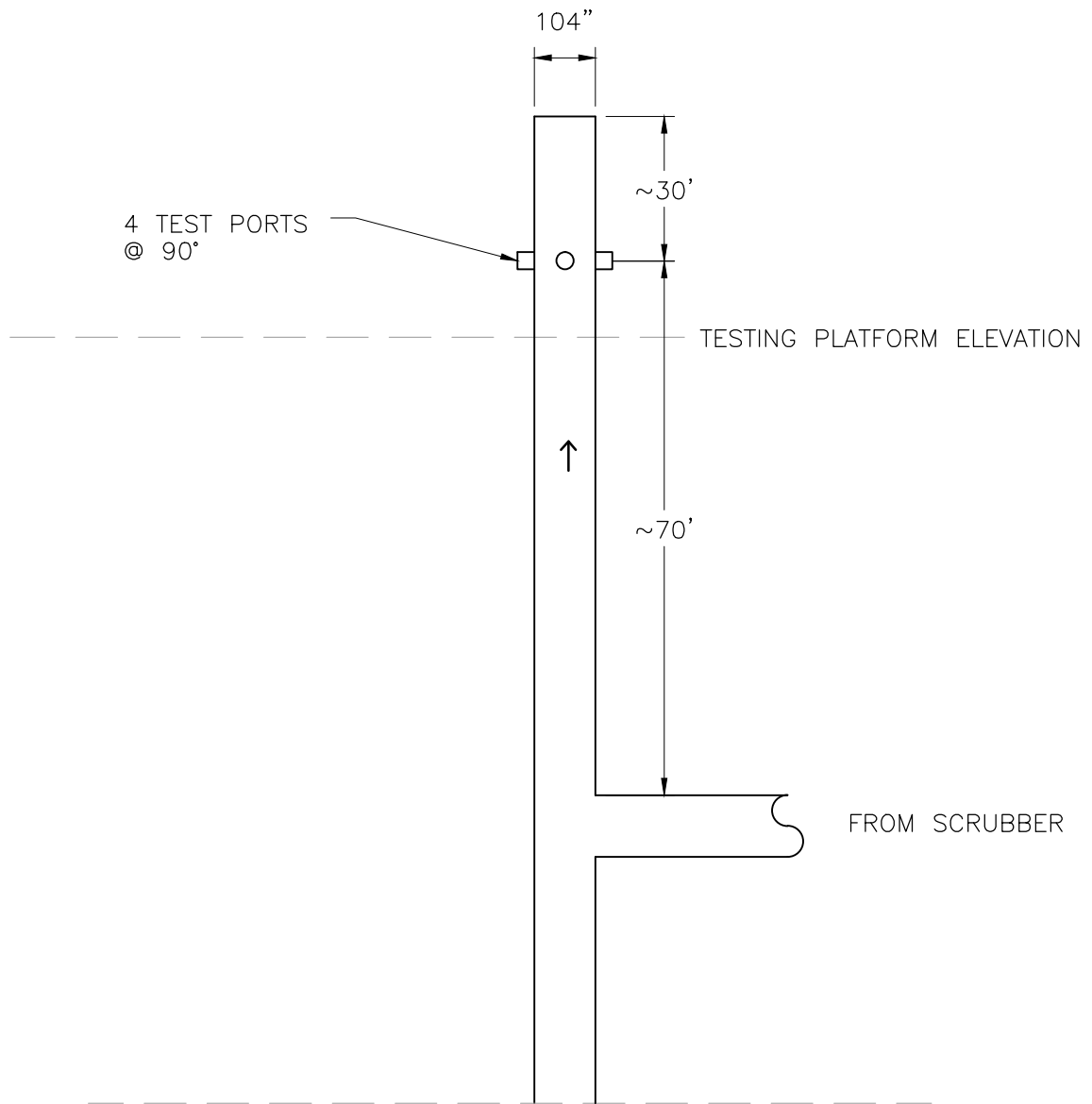
NO. OF TEST PORTS	4
PORT LENGTH	4.5"
PORT DIAMETER	4.0"
NO. OF TRAVERSE POINTS	12
DUCT DIAMETER	101.75"

POINT	INSERTION DEPTH IN "
1	4.43
2	14.90
3	30.11

TRAVERSE POINT LOCATIONS
ARCELORMITTAL MINORCA MINE INC.
VIRGINIA, MINNESOTA
A & B INDURATING FURNACE STACKS (SV014) & (SV015)

NOT TO SCALE

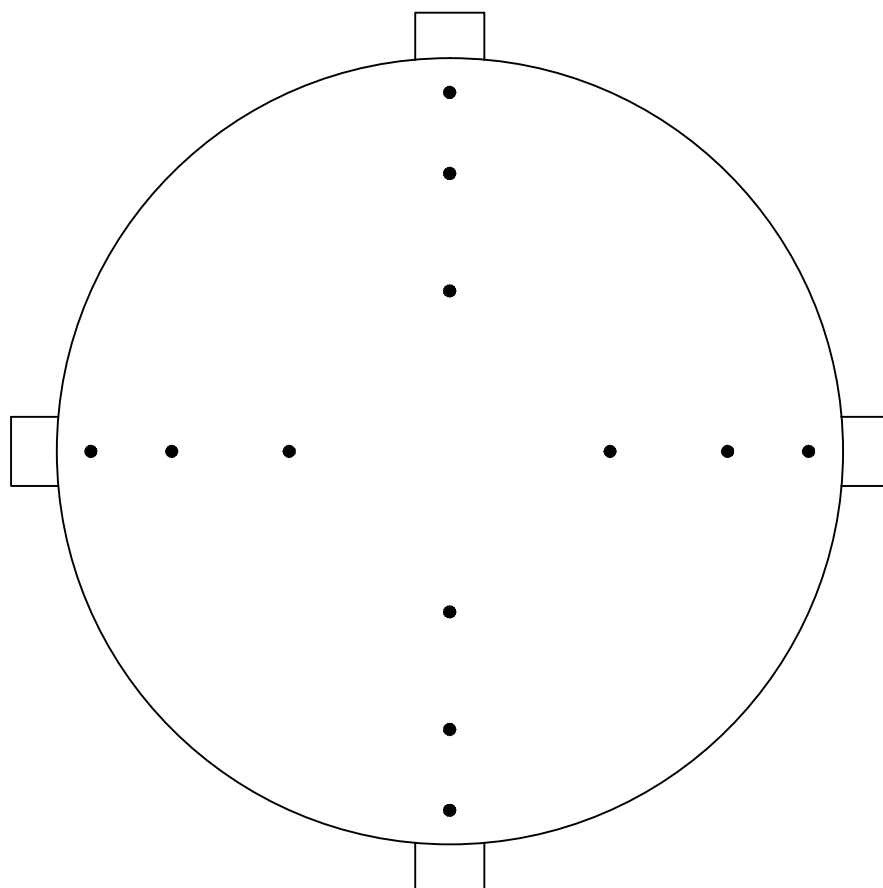
FIGURE 2



TEST PORT LOCATIONS
ARCELORMITTAL MINORCA MINE INC.
VIRGINIA, MINNESOTA
C INDURATING FURNACE STACK (SV016)

NOT TO SCALE

FIGURE 3



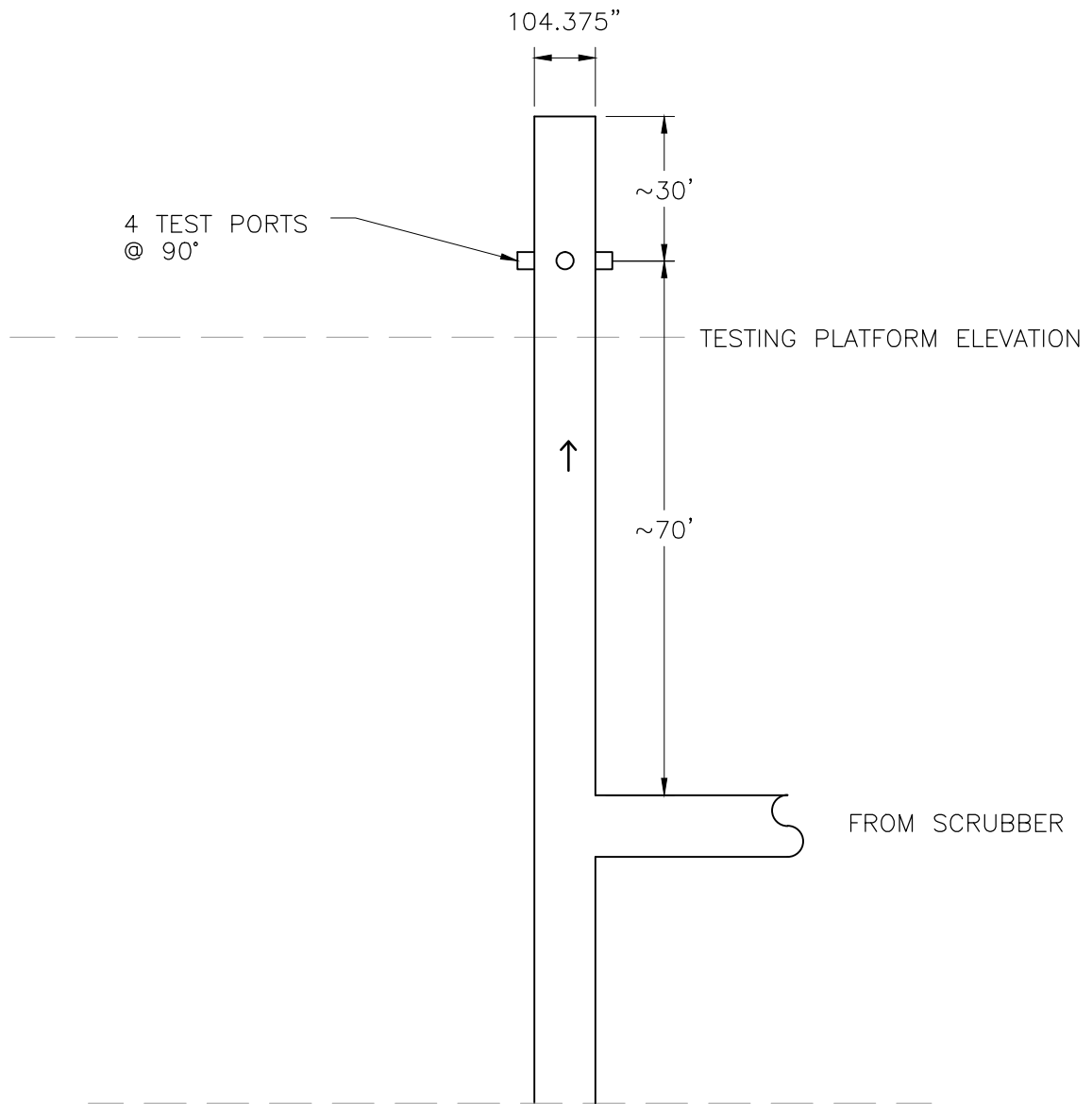
NO. OF TEST PORTS	4
PORT LENGTH	4.50"
PORT DIAMETER	6.0"
NO. OF TRAVERSE POINTS	12
DUCT DIAMETER	104.00"

POINT	INSERTION DEPTH IN "
1	4.53
2	15.23
3	30.77

TRAVERSE POINT LOCATIONS
ARCELORMITTAL MINORCA MINE INC.
VIRGINIA, MINNESOTA
C INDURATING FURNACE STACK (SV016)

NOT TO SCALE

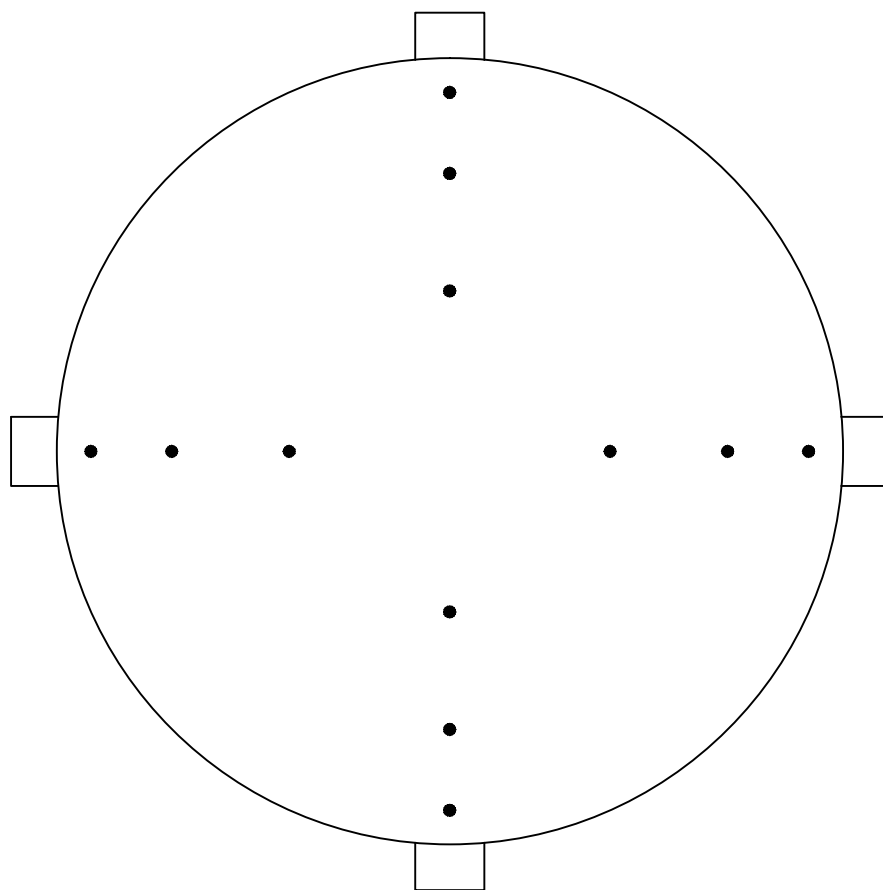
FIGURE 4



TEST PORT LOCATIONS
ARCELORMITTAL MINORCA MINE INC.
VIRGINIA, MINNESOTA
D INDURATING FURNACE STACK (SV017)

NOT TO SCALE

FIGURE 5



NO. OF TEST PORTS	4
PORT LENGTH	4.50"
PORT DIAMETER	6.0"
NO. OF TRAVERSE POINTS	12
DUCT DIAMETER	104.38"

POINT	INSERTION DEPTH IN "
1	4.55
2	15.29
3	30.88

TRAVERSE POINT LOCATIONS
ARCELORMITTAL MINORCA MINE INC.
VIRGINIA, MINNESOTA
D INDURATING FURNACE STACK (SV017)

NOT TO SCALE

FIGURE 6

Appendices

Appendix A

Report Calculations and Nomenclature

Determination of Volumetric Air Flow Rate, Gas Composition, Moisture Content, and Particulate Emissions
EPA Methods 2, 3, 4, 5, and 29
Indurating Furnace Stack A (SV014)
Test 1

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	6/23/2015	6/23/2015	6/24/2015
Test Period	-	-	1511 - 1720	1810 - 2020	803 - 1013
Number of Sample Ports	-	-	4	4	4
Number of Traverse Points	-	-	12	12	12
Duct Dimensions (diameter or Length x Width)	D, L X W	inches	101.75	101.75	101.75
Barometric Pressure	Pbar	in. Hg	28.35	28.35	28.37
Stack Static Pressure	Pg	in. H ₂ O	-0.90	-0.90	-0.90
Average Stack Temperature	Tsf	degrees F	131	132	132
Actual Dry Gas Meter Volume	Vm	cubic feet	88.99	87.72	85.88
Dry Gas Meter Calibration Factor	Y	-	1.0066	1.0066	1.0066
Average Orifice Meter Pressure Drop	DH	in H ₂ O	1.73	1.70	1.63
Average Meter Temperature	Tmf	degrees F	76	76	72
Pitot Tube Coefficient	Cp	-	0.84	0.84	0.84
Average Square Root of Velocity Head	(DP) ^{0.5}	-	1.010	1.002	0.983
Volume of Water Vapor Condensed in Impingers	Vwc	ml	180	181	183
Mass of Water Vapor Collected in Desiccant	Vwsg	g	15	13	19
Orsat Results, Dry Basis					
Oxygen	%O ₂	%v/v	19.7	19.7	19.7
Carbon Dioxide	%CO ₂	%v/v	1.10	1.10	1.10
Nitrogen + Carbon Monoxide	%N ₂ + %CO	%v/v	79.2	79.2	79.2
Nozzle Diameter	Dn	inches	0.210	0.210	0.210
Run Time	ø	minutes	120	120	120
Calculated Data	Symbol	Units	Run 1	Run 2	Run 3
Average Absolute Stack Temperature Tsr = Tsf + 460	Tsr	degrees R	591	592	592
Stack Pressure Ps = Pbar + Pg / 13.6	Ps	in. Hg	28.28	28.28	28.30
Duct Area A = 3.14 x D ² / (4 x 144) or A = L x W / 144	A	Sq. ft	56.467	56.467	56.467
Meter Volume at Standard Conditions Vmstd = 17.64 x Vm x Y x ((Pbar + (DH / 13.6)) / (Tmf + 460))	Vmstd	cubic feet	83.93	82.75	81.67
Average Moisture Content of Stack Gas MC = ((0.04707 x Vwc + 0.04715 x Vwsg) / ((0.04707 x Vwc + 0.04715 x Vwsg) + (Vmstd)) x 100	MC	% Vol	9.86	9.94	10.43
Molecular Weight of Stack Gas, dry Md = (0.44 x %CO ₂) + (0.32 x %O ₂) + (0.28 x (%N ₂ + %CO))	Md	lb/lbmol	28.96	28.96	28.96
Molecular Weight of Stack Gas, wet Ms = Md x (1-(MC/100))+18 x (MC/100)	Ms	lb/lbmol	27.88	27.87	27.82
Average Stack Gas Velocity Vs = 85.49 x Cp x (dP) ^{0.5} x ((Tsr/(Ps x Ms)) ^{0.5})	Vs	ft/sec	62.78	62.37	61.22
Actual Volumetric Air Flow Rate Qa = 60 x Vs x A	Qa	acfm	212,697	211,318	207,427
Volumetric Air Flow Rate at Standard Conditions Qs = Qa x (528 / (Ts + 460)) x (Ps / 29.92)	Qs	scfm	179,582	178,166	175,083
Dry Volumetric Air Flow Rate at Standard Conditions Qd = Qa x (1 - (MC / 100)) x (528 / Tsr) x (Ps / 29.92)	Qd	dscfm	161,877	160,457	156,823
Nozzle Cross-Sectional Area An = (3.14 x Dn ²) / (4 x 144)	An	sq. ft	0.000240	0.000240	0.000240
Isokinetic Variation I = (0.0945 x Tsr x Vmstd) / (Ps x Vs x An x theta x (1 - (MC / 100)))	I	%	101.5	101.0	102.0

ArcelorMittal Minorca Mine Inc.
Virginia, Minnesota

Barr Engineering Co.
August 7, 2015

EPA Reference Method Data
Indurating Furnace Stack A (SV014)

Test Date		06/23/15	06/24/15	06/24/15	---
Run Time		1923-2023	0803-0902	0922-1021	---
Bias Adjusted Run Average Concentrations	Symbol	Run 1	Run 2	Run 3	Average
O ₂ , % - dry Bias Corrected	O ₂ % dry-Corr	19.7	19.6	19.7	19.7
CO ₂ , % - dry Bias Corrected	CO ₂ % dry-Corr	1.1	1.2	1.1	1.1

Determination of Mercury Emissions
EPA Method 29

Indurating Furnace Stack A (SV014)
Test 1 - Mercury

Input Data	Symbol	Units	Run 1		Run 2		Run 3	
Test Date	-	-	6/23/2015		6/23/2015		6/24/2015	
Test Period	-	-	1511 - 1720		1810 - 2020		803 - 1013	
Run Time	Θ	min	120		120		120	
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	161,877		160,457		156,823	
Meter Volume at Standard Conditions	Vmstd	cubic feet	83.93		82.75		81.67	
Sample Loadings (From Lab Results)								
Mercury (Front Half Back Half)	MHg _{fh} MHg _{bh}	µg	1.290	4.390	1.025	3.857	1.015	4.928
Total Mercury ⁽¹⁾	MHg _t	µg	5.68		4.88		5.94	
Calculated Data								
	Symbol	Units	Run 1		Run 2		Run 3	
Mercury Concentration: $C = \text{MHg} / (\text{Vmstd})$								
Front Half (Filterable) Mercury	C _(HgFH)	µg/dscf	0.015		0.012		0.012	
Back Half Mercury	C _(HgBH)	µg/dscf	0.052		0.047		0.060	
Total Mercury Concentration	C _(Hg)	µg/dscf	0.068		0.059		0.073	
Mercury Emission Rates: $E = \text{MHg} \times 2.2046 \times 10^{-9} \text{ lb/} \mu\text{g} / \text{Vmstd-ft}^3 \times \text{Qd} \times 60$								
Front Half (Filterable) Mercury	E _(HgFH)	lb/hr	0.00033		0.00026		0.00026	
Back Half Mercury	E _(HgBH)	lb/hr	0.0011		0.0010		0.0013	
Total Mercury	E _(Hg)	lb/hr	0.0014		0.0013		0.0015	

(1) Calculated per EPA Method 29

Determination of Volumetric Air Flow Rate, Gas Composition, Moisture Content, and Particulate Emissions
EPA Methods 2, 3, 4, 5 and 29
Indurating Furnace Stack B (SV015)
Test 2

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	6/25/2015	6/25/2015	6/25/2015
Test Period	-	-	756 - 1013	1105 - 1320	1433 - 1646
Number of Sample Ports	-	-	4	4	4
Number of Traverse Points	-	-	12	12	12
Duct Dimensions (diameter or Length x Width)	D, L X W	inches	101.75	101.75	101.75
Barometric Pressure	Pbar	in. Hg	28.40	28.40	28.40
Stack Static Pressure	Pg	in. H ₂ O	-0.90	-0.90	-0.90
Average Stack Temperature	Tsf	degrees F	135	136	136
Actual Dry Gas Meter Volume	Vm	cubic feet	88.44	91.15	92.62
Dry Gas Meter Calibration Factor	Y	-	1.0066	1.0066	1.0066
Average Orifice Meter Pressure Drop	DH	in H ₂ O	1.74	1.80	1.87
Average Meter Temperature	Tmf	degrees F	70	76	76
Pitot Tube Coefficient	Cp	-	0.84	0.84	0.84
Average Square Root of Velocity Head	(DP) ^{0.5}	-	1.040	1.046	1.062
Volume of Water Vapor Condensed in Impingers	Vwc	ml	199	206	209
Mass of Water Vapor Collected in Desiccant	Vwsg	g	24	15	14
Orsat Results, Dry Basis					
Oxygen	%O ₂	%v/v	19.4	19.4	19.4
Carbon Dioxide	%CO ₂	%v/v	1.40	1.40	1.40
Nitrogen + Carbon Monoxide	%N ₂ + %CO	%v/v	79.2	79.2	79.2
Nozzle Diameter	Dn	inches	0.210	0.210	0.210
Run Time	ø	minutes	120	120	120
Calculated Data	Symbol	Units	Run 1	Run 2	Run 3
Average Absolute Stack Temperature Tsr = Tsf + 460	Tsr	degrees R	595	596	596
Stack Pressure Ps = Pbar + Pg / 13.6	Ps	in. Hg	28.33	28.33	28.33
Duct Area A = 3.14 x D ² / (4 x 144) or A = L x W / 144	A	Sq. ft	56.467	56.467	56.467
Meter Volume at Standard Conditions Vmstd = 17.64 x Vm x Y x ((Pbar + (DH / 13.6)) / (Tmf + 460))	Vmstd	cubic feet	84.56	86.11	87.53
Average Moisture Content of Stack Gas MC = ((0.04707 x Vwc + 0.04715 x Vwsg) / ((0.04707 x Vwc + 0.04715 x Vwsg) + (Vmstd)) x 100	MC	% Vol	11.04	10.78	10.71
Molecular Weight of Stack Gas, dry Md = (0.44 x %CO ₂) + (0.32 x %O ₂) + (0.28 x (%N ₂ + %CO))	Md	lb/lbmol	29.00	29.00	29.00
Molecular Weight of Stack Gas, wet Ms = Md x (1-(MC/100))+18 x (MC/100)	Ms	lb/lbmol	27.79	27.81	27.82
Average Stack Gas Velocity Vs = 85.49 x Cp x (dP) ^{0.5} x ((Tsr/(Ps x Ms)) ^{0.5})	Vs	ft/sec	64.95	65.28	66.33
Actual Volumetric Air Flow Rate Qa = 60 x Vs x A	Qa	acfm	220,064	221,181	224,713
Volumetric Air Flow Rate at Standard Conditions Qs = Qa x (528 / (Ts + 460)) x (Ps / 29.92)	Qs	scfm	184,815	185,688	188,613
Dry Volumetric Air Flow Rate at Standard Conditions Qd = Qa x (1 - (MC / 100)) x (528 / Tsr) x (Ps / 29.92)	Qd	dscfm	164,402	165,672	168,416
Nozzle Cross-Sectional Area An = (3.14 x Dn ²) / (4 x 144)	An	sq. ft	0.000240	0.000240	0.000240
Isokinetic Variation I = (0.0945 x Tsr x Vmstd) / (Ps x Vs x An x theta x (1 - (MC / 100)))	I	%	100.7	101.8	101.8

ArcelorMittal Minorca Mine Inc.
Virginia, Minnesota

Barr Engineering Co.
August 7, 2015

EPA Reference Method Data
Indurating Furnace Stack B (SV015)

Test Date		06/25/15	06/25/15	06/25/15	---
Run Time		0755-0855	0914-1014	1104-1204	---
Bias Adjusted Run Average Concentrations	Symbol	Run 1	Run 2	Run 3	Average
O ₂ , % - dry Bias Corrected	O ₂ % dry-Corr	19.3	19.4	19.4	19.4
CO ₂ , % - dry Bias Corrected	CO ₂ % dry-Corr	1.5	1.4	1.4	1.4

Determination of Mercury Emissions
EPA Method 29

Indurating Furnace Stack B (SV015)
Test 2 - Mercury

Input Data	Symbol	Units	Run 1		Run 2		Run 3	
Test Date	-	-	6/25/2015		6/25/2015		6/25/2015	
Test Period	-	-	756 - 1013		1105 - 1320		1433 - 1646	
Run Time	Θ	min	120		120		120	
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	164,402		165,672		168,416	
Meter Volume at Standard Conditions	Vmstd	cubic feet	84.56		86.11		87.53	
Sample Loadings (From Lab Results)								
Mercury (Front Half Back Half)	MHg _{fh} MHg _{bh}	µg	1.10	6.14	1.14	5.92	0.79	5.29
Total Mercury ⁽¹⁾	MHg _t	µg	7.24		7.05		6.08	
Calculated Data								
	Symbol	Units	Run 1		Run 2		Run 3	
Mercury Concentration: $C = \text{MHg} / (\text{Vmstd})$								
Front Half (Filterable) Mercury	C _(HgFH)	µg/dscf	0.013		0.013		0.0091	
Back Half Mercury	C _(HgBH)	µg/dscf	0.073		0.069		0.060	
Total Mercury Concentration	C _(Hg)	µg/dscf	0.086		0.082		0.069	
Mercury Emission Rates: $E = \text{MHg} \times 2.2046 \times 10^{-9} \text{ lb/} \mu\text{g} / \text{Vmstd-ft}^3 \times \text{Qd} \times 60$								
Front Half (Filterable) Mercury	E _(HgFH)	lb/hr	0.00028		0.00029		0.00020	
Back Half Mercury	E _(HgBH)	lb/hr	0.0016		0.0015		0.0013	
Total Mercury	E _(Hg)	lb/hr	0.0019		0.0018		0.0015	

(1) Calculated per EPA Method 29

Determination of Volumetric Air Flow Rate, Gas Composition, Moisture Content, and Particulate Emissions
EPA Methods 2, 3, 4, 5 and 29
Indurating Furnace Stack C (SV016)
Test 3

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	6/23/2015	6/23/2015	6/24/2015
Test Period	-	-	1511 - 1720	1810 - 2020	803 - 1013
Number of Sample Ports	-	-	4	4	4
Number of Traverse Points	-	-	12	12	12
Duct Dimensions (diameter or Length x Width)	D, L X W	inches	104.00	104.00	104.00
Barometric Pressure	Pbar	in. Hg	28.35	28.35	28.37
Stack Static Pressure	Pg	in. H ₂ O	-0.90	-0.90	-0.90
Average Stack Temperature	Tsf	degrees F	142	143	142
Actual Dry Gas Meter Volume	Vm	cubic feet	84.09	79.45	78.46
Dry Gas Meter Calibration Factor	Y	-	1.0091	1.0091	1.0091
Average Orifice Meter Pressure Drop	DH	in H ₂ O	1.45	1.30	1.27
Average Meter Temperature	Tmf	degrees F	75	76	72
Pitot Tube Coefficient	Cp	-	0.84	0.84	0.84
Average Square Root of Velocity Head	(DP) ^{0.5}	-	0.983	0.933	0.926
Volume of Water Vapor Condensed in Impingers	Vwc	ml	229	218	221
Mass of Water Vapor Collected in Desiccant	Vwsg	g	16	12	19
Orsat Results, Dry Basis					
Oxygen	%O ₂	%v/v	18.7	18.7	18.7
Carbon Dioxide	%CO ₂	%v/v	2.10	2.10	2.10
Nitrogen + Carbon Monoxide	%N ₂ + %CO	%v/v	79.2	79.2	79.2
Nozzle Diameter	Dn	inches	0.210	0.210	0.210
Run Time	ø	minutes	120	120	120
Calculated Data	Symbol	Units	Run 1	Run 2	Run 3
Average Absolute Stack Temperature Tsr = Tsf + 460	Tsr	degrees R	602	603	602
Stack Pressure Ps = Pbar + Pg / 13.6	Ps	in. Hg	28.28	28.28	28.30
Duct Area A = 3.14 x D ² / (4 x 144) or A = L x W / 144	A	Sq. ft	58.992	58.992	58.992
Meter Volume at Standard Conditions Vmstd = 17.64 x Vm x Y x ((Pbar + (DH / 13.6)) / (Tmf + 460))	Vmstd	cubic feet	79.63	75.12	74.75
Average Moisture Content of Stack Gas MC = ((0.04707 x Vwc + 0.04715 x Vwsg) / ((0.04707 x Vwc + 0.04715 x Vwsg) + (Vmstd)) x 100	MC	% Vol	12.65	12.60	13.13
Molecular Weight of Stack Gas, dry Md = (0.44 x %CO ₂) + (0.32 x %O ₂) + (0.28 x (%N ₂ + %CO))	Md	lb/lbmol	29.08	29.08	29.08
Molecular Weight of Stack Gas, wet Ms = Md x (1-(MC/100))+18 x (MC/100)	Ms	lb/lbmol	27.68	27.69	27.63
Average Stack Gas Velocity Vs = 85.49 x Cp x (dP) ^{0.5} x ((Tsr/(Ps x Ms)) ^{0.5})	Vs	ft/sec	61.86	58.81	58.34
Actual Volumetric Air Flow Rate Qa = 60 x Vs x A	Qa	acfm	218,942	208,144	206,480
Volumetric Air Flow Rate at Standard Conditions Qs = Qa x (528 / (Ts + 460)) x (Ps / 29.92)	Qs	scfm	181,666	172,181	171,221
Dry Volumetric Air Flow Rate at Standard Conditions Qd = Qa x (1 - (MC / 100)) x (528 / Tsr) x (Ps / 29.92)	Qd	dscfm	158,683	150,491	148,739
Nozzle Cross-Sectional Area An = (3.14 x Dn ²) / (4 x 144)	An	sq. ft	0.000240	0.000240	0.000240
Isokinetic Variation I = (0.0945 x Tsr x Vmstd) / (Ps x Vs x An x theta x (1 - (MC / 100)))	I	%	102.6	102.1	102.8

ArcelorMittal Minorca Mine Inc.
Virginia, Minnesota

Barr Engineering Co.
August 7, 2015

EPA Reference Method Data
Indurating Furnace Stack C (SV016)

Test Date		06/23/15	06/23/15	06/23/15	---
Run Time		1510-1610	1629-1729	1809-1909	---
Bias Adjusted Run Average Concentrations	Symbol	Run 1	Run 2	Run 3	Average
O ₂ , % - dry Bias Corrected	O ₂ % dry-Corr	18.7	18.8	18.8	18.8
CO ₂ , % - dry Bias Corrected	CO ₂ % dry-Corr	2.1	2.1	2.1	2.1

Determination of Mercury Emissions
EPA Method 29

Indurating Furnace Stack C (SV016)
Test 3 - Mercury

Input Data	Symbol	Units	Run 1		Run 2		Run 3	
Test Date	-	-	6/23/2015		6/23/2015		6/24/2015	
Test Period	-	-	1511 - 1720		1810 - 2020		803 - 1013	
Run Time	Θ	min	120		120		120	
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	158,683		150,491		148,739	
Meter Volume at Standard Conditions	Vmstd	cubic feet	79.63		75.12		74.75	
Sample Loadings (From Lab Results)								
Mercury (Front Half Back Half)	MHg _{fh} MHg _{bh}	µg	1.30	8.54	0.95	8.61	0.40	9.01
Total Mercury ⁽¹⁾	MHg _t	µg	9.84		9.56		9.41	
Calculated Data								
	Symbol	Units	Run 1		Run 2		Run 3	
Mercury Concentration: $C = MHg / (Vmstd)$								
Front Half (Filterable) Mercury	C _(HgFH)	µg/dscf	0.016		0.013		0.0054	
Back Half Mercury	C _(HgBH)	µg/dscf	0.11		0.11		0.12	
Total Mercury Concentration	C _(Hg)	µg/dscf	0.12		0.13		0.13	
Mercury Emission Rates: $E = MHg \times 2.2046 \times 10^{-9} \text{ lb/} \mu\text{g} / Vmstd\text{-ft}^3 \times Qd \times 60$								
Front Half (Filterable) Mercury	E _(HgFH)	lb/hr	0.00034		0.00025		0.00011	
Back Half Mercury	E _(HgBH)	lb/hr	0.0022		0.0023		0.0024	
Total Mercury	E _(Hg)	lb/hr	0.0026		0.0025		0.0025	

(1) Calculated per EPA Method 29

Determination of Volumetric Air Flow Rate, Gas Composition, Moisture Content, and Particulate Emissions
EPA Methods 2, 3, 4, 5, and 29
Indurating Furnace Stack D (SV017)
Test 4

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test Date	-	-	6/25/2015	6/25/2015	6/25/2015
Test Period	-	-	756 - 1013	1105 - 1320	1433 - 1646
Number of Sample Ports	-	-	4	4	4
Number of Traverse Points	-	-	12	12	12
Duct Dimensions (diameter or Length x Width)	D, L X W	inches	104.38	104.38	104.38
Barometric Pressure	Pbar	in. Hg	28.40	28.40	28.37
Stack Static Pressure	Pg	in. H ₂ O	-0.95	-0.95	-0.95
Average Stack Temperature	Tsf	degrees F	149	150	151
Actual Dry Gas Meter Volume	Vm	cubic feet	79.16	80.50	78.03
Dry Gas Meter Calibration Factor	Y	-	1.0091	1.0091	1.0091
Average Orifice Meter Pressure Drop	DH	in H ₂ O	1.31	1.35	1.27
Average Meter Temperature	Tmf	degrees F	70	76	75
Pitot Tube Coefficient	Cp	-	0.84	0.84	0.84
Average Square Root of Velocity Head	(DP) ^{0.5}	-	0.970	0.973	0.939
Volume of Water Vapor Condensed in Impingers	Vwc	ml	256	255	248
Mass of Water Vapor Collected in Desiccant	Vwsg	g	21	14	12
Orsat Results, Dry Basis					
Oxygen	%O ₂	%v/v	18.2	18.2	18.2
Carbon Dioxide	%CO ₂	%v/v	2.50	2.50	2.50
Nitrogen + Carbon Monoxide	%N ₂ + %CO	%v/v	79.3	79.3	79.3
Nozzle Diameter	Dn	inches	0.210	0.210	0.210
Run Time	ø	minutes	120	120	120
Calculated Data	Symbol	Units	Run 1	Run 2	Run 3
Average Absolute Stack Temperature Tsr = Tsf + 460	Tsr	degrees R	609	610	611
Stack Pressure Ps = Pbar + Pg / 13.6	Ps	in. Hg	28.33	28.33	28.30
Duct Area A = 3.14 x D ² / (4 x 144) or A = L x W / 144	A	Sq. ft	59.418	59.418	59.418
Meter Volume at Standard Conditions Vmstd = 17.64 x Vm x Y x ((Pbar + (DH / 13.6)) / (Tmf + 460))	Vmstd	cubic feet	75.76	76.24	73.94
Average Moisture Content of Stack Gas MC = ((0.04707 x Vwc + 0.04715 x Vwsg) / ((0.04707 x Vwc + 0.04715 x Vwsg) + (Vmstd)) x 100	MC	% Vol	14.69	14.24	14.20
Molecular Weight of Stack Gas, dry Md = (0.44 x %CO ₂) + (0.32 x %O ₂) + (0.28 x (%N ₂ + %CO))	Md	lb/lbmol	29.13	29.13	29.13
Molecular Weight of Stack Gas, wet Ms = Md x (1-(MC/100))+18 x (MC/100)	Ms	lb/lbmol	27.49	27.54	27.55
Average Stack Gas Velocity Vs = 85.49 x Cp x (dP) ^{0.5} x ((Tsr/(Ps x Ms)) ^{0.5})	Vs	ft/sec	61.61	61.75	59.69
Actual Volumetric Air Flow Rate Qa = 60 x Vs x A	Qa	acfm	219,634	220,136	212,813
Volumetric Air Flow Rate at Standard Conditions Qs = Qa x (528 / (Ts + 460)) x (Ps / 29.92)	Qs	scfm	180,180	180,530	174,042
Dry Volumetric Air Flow Rate at Standard Conditions Qd = Qa x (1 - (MC / 100)) x (528 / Tsr) x (Ps / 29.92)	Qd	dscfm	153,720	154,815	149,324
Nozzle Cross-Sectional Area An = (3.14 x Dn ²) / (4 x 144)	An	sq. ft	0.000240	0.000240	0.000240
Isokinetic Variation I = (0.0945 x Tsr x Vmstd) / (Ps x Vs x An x theta x (1 - (MC / 100)))	I	%	101.5	101.5	102.0

ArcelorMittal Minorca Mine Inc.
Virginia, Minnesota

Barr Engineering Co.
August 7, 2015

EPA Reference Method Data
Indurating Furnace Stack D (SV017)

Test Date		06/25/15	06/25/15	06/25/15	---
Run Time		1229-1329	1432-1532	1553-1653	---
Bias Adjusted Run Average Concentrations	Symbol	Run 1	Run 2	Run 3	Average
O ₂ , % - dry Bias Corrected	O ₂ % dry-Corr	18.2	18.2	18.3	18.2
CO ₂ , % - dry Bias Corrected	CO ₂ % dry-Corr	2.6	2.5	2.5	2.5

Determination of Mercury Emissions
EPA Method 29

Indurating Furnace Stack D (SV017)
Test 4 - Mercury

Input Data	Symbol	Units	Run 1		Run 2		Run 3	
Test Date	-	-	6/25/2015		6/25/2015		6/25/2015	
Test Period	-	-	756 - 1013		1105 - 1320		1433 - 1646	
Run Time	Θ	min	120		120		120	
Dry Volumetric Flowrate at Standard Conditions	Qd	dscfm	153,720		154,815		149,324	
Meter Volume at Standard Conditions	Vmstd	cubic feet	75.76		76.24		73.94	
Sample Loadings (From Lab Results)								
Mercury (Front Half Back Half)	MHg _{fh} MHg _{bh}	µg	< 0.10	11.82	< 0.10	11.28	< 0.10	10.44
Total Mercury ⁽¹⁾	MHg _t	µg	11.92		11.38		10.54	
Mercury Concentration: $C = MHg / (Vmstd)$								
Front Half (Filterable) Mercury	C _(HgFH)	µg/dscf	< 0.0013		< 0.0013		< 0.0014	
Back Half Mercury	C _(HgBH)	µg/dscf	0.16		0.15		0.14	
Total Mercury Concentration	C _(Hg)	µg/dscf	0.16		0.15		0.14	
Mercury Emission Rates: $E = MHg \times 2.2046 \times 10^{-9} \text{ lb/}\mu\text{g} / Vmstd\text{-ft}^3 \times Qd \times 60$								
Front Half (Filterable) Mercury	E _(HgFH)	lb/hr	< 0.000027		< 0.000027		< 0.000027	
Back Half Mercury	E _(HgBH)	lb/hr	0.0032		0.0030		0.0028	
Total Mercury	E _(Hg)	lb/hr	0.0032		0.0031		0.0028	

Note: The "<" sign indicates the mass is below method detection limits. All calculations use the detection limit for concentration and emission determinations.

(1) Calculated per EPA Method 29

Appendix B

Field Data Sheets

EPA METHOD 29

FIELD DATA SHEET

BARR

Project: Arcelor Mittal Minorca Mine
 Meter ID: C-12
 Meter Y: 10066
 Office H@: 15074
 Run: 1
 Operators: Rmp/als
 Date: 6-23-15
 Sample Train Leak Rate (cfm): Pretest 0.0 at 10 in Hg, Posttest 0.0 at 6 in Hg
 Pitot (3 in.) Pos. ☒ Neg. ☐
 Bar. Pres: 29.35 in Hg, Stat. Pres: -0.90 in H₂O, Probe Lght: 5 ft, Imp TC: 170-1
 Probe ID: S-3, Pitot No.: S-3, Pitot Cp: 0.84, Other: ☐ S.S. ☐ Class ☐

Sample Point	Sample Time Δt	Meter Volume v _m , ft ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T _s , °F	Probe	Filter	Impinger Outlet	Meter Inlet	Meter Outlet	Oxygen Content, %
1-1	5	431.04	1.10	1.61	4.0	131	247	250	65	72	72	
1-1	10	438.56	1.10	1.61	4.0	132	247	247	65	72	72	
1-2	15	442.35	1.10	1.61	4.0	132	249	247	64	73	72	
1-2	20	446.13	1.05	1.76	4.0	131	240	247	63	74	73	
1-3	25	449.96	1.10	1.65	4.0	130	246	246	61	75	73	
1-3	30	453.73	1.05	1.72	4.0	129	249	250	60	76	73	
2-1	35	457.63	1.30	2.04	4.5	124	247	249	66	77	74	
2-1	40	461.55	1.15	1.94	4.0	132	245	250	64	77	74	
2-2	45	465.43	1.10	1.85	4.5	133	250	250	62	78	74	
2-2	50	469.30	1.10	1.85	4.5	133	246	247	62	78	74	
2-3	55	473.03	0.99	1.67	4.0	131	246	250	62	79	74	
2-3	60	476.72	0.90	1.66	4.0	131	249	246	61	79	75	
3-1	65	480.51	1.10	1.86	4.0	131	246	246	65	78	75	
3-1	70	484.36	1.05	1.77	4.0	131	244	247	61	79	75	
3-2	75	488.22	1.00	1.69	4.0	132	246	245	61	80	76	
3-2	80	491.61	1.10	1.67	4.0	130	246	242	61	80	76	
3-3	85	495.34	0.80	1.49	4.0	130	246	250	60	80	76	
3-3	90	499.24	0.83	1.41	3.5	130	249	245	61	80	76	
4-1	95	503.49	1.00	1.70	4.0	130	245	252	65	78	76	
4-1	100	506.31	1.05	1.72	4.5	132	249	246	60	79	76	
4-2	105	509.90	0.97	1.64	4.0	132	249	246	59	80	76	
4-2	110	513.52	0.96	1.62	4.0	132	249	246	60	80	76	
4-3	115	516.81	0.90	1.35	3.5	132	247	254	61	80	76	
4-3	120	520.03	0.70	1.32	3.5	132	247	250	62	80	76	
Ø=		V _m =	1.02	ΔH=1.73		T _s =131.17					T _m =76.13	

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration	
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time	Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dn	Filler No.	Nozzle No.	Nozzle Dn		Tech: 33ALW	Date: 6/23/15
Run 1	72	18.5	10.0	15.11	17.40	NA			440415	T-1	0.210					1	0.210
Run 2																2	0.210
																3	0.210
																Avg. in.	0.210

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	793	805	785	637	764	756	1052	
Initial wt., g	666	761	776	637	765	757	1037	
Difference	127	44	9	2	-1	-1	15	195

Air Flows	
ACFM	212.149
DSCFM	161.460

EPA METHOD 29

FIELD DATA SHEET

Project Arcelor Mittal Minorca Mine Meter ID C-12 Probe ID S-3 Bar. Pres 28.35 in Hg
 Smpl Loc Furnace Stack A Meter Y 10064 Pitot No. S-3 Stat. Pres -0.40 in H₂O
 Test No. 1 Run 2 Office H@ 1.9074 Pitot Cp 0.84 Probe Lgth 5 ft
 Date 6-23-2015 Operators RMP/BBS Liner Type: ☒ Glass ☐ S.S. ☐ Other Imp TC 10.

Sample Train Leak Rate (cfm)
 Pretest 0.0 at 15 in Hg
 Posttest 0.0 at 5 in Hg
 Pitot (3 in.) Pos. ☒ Neg. ☐

Sample Point	Sample Time Δt	Meter Volume v_m , π^3	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Probe	Filter	Impinger Outlet	Meter Inlet	Meter Outlet	Oxygen Content, %
1-1	5	524.47	1.05	1.76	2.5	134	248	246	66	72	73	
1-1	10	528.25	1.05	1.76	2.5	133	248	246	62	72	73	
1-2	15	531.94	1.0	1.60	2.5	132	249	251	61	74	73	
1-2	20	535.53	0.98	1.65	2.5	132	249	250	60	75	73	
1-3	25	538.90	0.87	1.30	2.5	132	248	252	60	76	73	
1-3	30	542.20	0.750	1.31	2.5	132	246	255	59	77	74	
2-1	35	545.99	1.05	1.77	3.0	132	247	250	63	77	74	
2-1	40	549.77	1.05	1.77	2.0	133	247	250	63	78	74	
2-2	45	553.47	0.96	1.65	2.5	133	249	249	63	78	74	
2-2	50	556.98	0.96	1.66	2.5	132	249	246	62	78	75	
2-3	55	560.22	0.75	1.27	2.5	132	248	247	61	78	75	
2-3	60	563.41	0.76	1.29	2.5	132	248	248	60	78	75	
3-1	65	566.72	1.10	1.86	3.0	132	245	246	65	78	75	
3-1	70	570.03	1.10	1.86	2.5	132	246	248	64	77	75	
3-2	75	573.45	1.15	1.94	2.5	132	246	246	63	78	75	
3-2	80	577.21	1.15	1.95	2.5	132	245	249	63	78	75	
3-3	85	580.93	0.97	1.64	2.5	132	249	246	62	78	75	
3-3	90	584.65	0.99	1.60	2.5	131	247	248	61	79	75	
4-1	95	588.01	1.15	1.95	2.5	131	250	248	64	79	75	
4-1	100	593.05	1.15	1.95	2.5	132	247	246	59	79	75	
4-2	105	597.07	1.10	1.80	2.5	133	248	246	58	80	76	
4-2	110	601.06	1.20	2.04	4.0	132	246	246	56	80	76	
4-3	115	605.65	0.90	1.67	4.0	131	246	246	56	80	76	
4-3	120	609.45	0.92	1.57	3.5	130	246	246	57	80	76	
0=		596.72	1.01	$\Delta H=1.70$		$T_s=32.00$					$T_m=75.18$	

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration			
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time	Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dia	Filter No.	Nozzle No.	Nozzle Dia		Tech.	Nozzle No.		Date
73	18.5	9.9		1910	2010	NA			420490	T-1	0.310						1	See	
																	2	See	
																	3	#1	
Run 1																	Avg. in.		
Run 2																			

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	823	642	783	701	799	760	1633	
Initial wt., g	695	622	776	698	798	760	1020	
Difference	128	42	7	3	1	0	13	194

Air Flows	
ACFM	210.774
DSCFM	160.044



EPA METHOD 29
FIELD DATA SHEET

Project Arcelor Mittal Minorca Mine Meter ID C-12 Probe ID S-3 Bar. Pres 78.37 in Hg
Smpl Loc Furnace Stack A Meter Y 10066 Pitot No. S-3 Stat. Pres -0.90 in H₂O
Test No. 1 Run 3 Office H@ 19074 Pitot Cp 0.81 Probe Lgth 5 ft
Date 6-24-2015 Operators RMR/RLS Liner Type: ☒ Glass ☐ S. ☐ Other Imp TC 110-1

Sample Train Leak Rate (cfm)
Pretest 0.0 at 15 in Hg
Posttest 0.0 at 5 in Hg
Pitot (3 in.) Pos. ☐ Neg. ☒

Sample Point	Sample Time Δt	Meter Volume V_m , ft ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Sample Train Temperatures, °F				Oxygen Content, %	
							Probe	Filter	Impinger Outlet	Meter Inlet		Meter Outlet
		608.76										
1-1	5	612.54	1.10	1.42	2.5	133	244	246	59	65	65	
1-1	10	616.40	1.15	1.90	3.0	132	240	247	56	67	65	
1-2	15	620.72	1.10	1.52	3.0	132	247	249	56	69	66	
1-2	20	624.01	1.10	1.43	3.0	132	246	240	55	71	66	
1-3	25	627.51	0.92	1.53	2.5	132	240	246	57	72	67	
1-3	30	630.99	0.91	1.52	2.5	131	240	248	57	73	68	
2-1	35	634.80	1.10	1.44	2.5	130	246	244	57	73	69	
2-1	40	638.63	1.15	1.92	3.0	132	240	252	55	74	69	
2-2	45	642.46	1.10	1.44	2.0	132	246	243	55	74	70	
2-2	50	646.25	1.10	1.44	2.5	131	248	249	55	75	70	
2-3	55	649.85	0.94	1.64	2.5	131	240	244	56	75	70	
2-3	60	653.38	0.95	1.60	2.5	130	240	246	57	75	71	
3-1	65	656.95	0.97	1.63	2.5	131	246	250	61	73	71	
3-1	70	660.51	0.97	1.62	2.5	133	247	248	57	75	71	
3-2	75	664.00	0.94	1.58	2.5	132	246	249	59	76	72	
3-2	80	667.46	0.94	1.56	2.5	132	246	246	52	76	72	
3-3	85	670.60	0.81	1.36	2.5	132	247	240	53	76	72	
3-3	90	674.05	0.77	1.74	2.0	132	249	249	52	76	72	
4-1	95	677.62	0.96	1.61	3.0	132	250	247	54	77	73	
4-1	100	681.16	0.96	1.61	3.0	132	246	246	51	76	73	
4-2	105	684.76	0.94	1.58	3.0	132	249	246	51	77	73	
4-2	110	688.28	0.94	1.58	3.0	132	249	249	51	77	73	
4-3	115	691.44	0.74	1.25	2.5	132	240	247	52	77	73	
4-3	120	694.04	0.71	1.20	2.5	132	247	240	53	77	73	
\bar{Q}		$V_m=580$	0.97	$\Delta H=1.63$		$T_s=131.43$					$T_m=71.96$	

Initialization Values				Test Run Times			ORSAT System			Sample Train Components			Nozzle Calibration	
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time		Bag No.	Bag Vol	cc/min *	Filter No.	Nozzle No.	Nozzle Dn	Tech.	Date
65	10.5	9.9		0803	1013		NA			480491	1-1	0.214	Sec	
Run 1														
Run 2														

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	797	803	780	640	765	755	933	
Initial wt., g	667	761	777	639	764	755	914	
Difference	130	42	9	1	1	0	19	202

Air Flows	
ACFM	206.995
DSCFM	156.920



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 1

Project	ArcelorMittal Minorca Mine Inc.									
Sample Location	Indurating Furnace Stack A SV014									
Date	06/23/15	Meter ID	C-12	Probe ID	5-3	Bar Press.	28.35	in. Hg	Sample Train Leak Rate, cfm:	
Test	1	Meter Y	1.0066	Pilot Tube No.	5-3	Stat Press.	-0.90	in. H ₂ O	Pretest	0.000 at 10 in. Hg
Operators	1	Orifice dH@	1.9074	Pilot Cp	0.84				Posttest	0.000 at 6 in. Hg
	RMP/RBS	Liner Type:	Glass						Pretest Pilot leak Check Pos	Pass @ >3" w.c
									Posttest Pilot leak Check Neg	Pass @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F				Moisture Content, %	
									Filter	Probe	Impinger Outlet	Meter Inlet		Meter Outlet
Start Time	1511	431.04												
1	5.0	434.76	1.100	1.84	3.82	434.86	*	131	*	*	*	72	72	10.0
2	10.0	438.56	1.100	1.84	3.82	438.68	*	132	*	*	*	72	72	10.0
3	15.0	442.35	1.100	1.84	3.82	442.51	*	132	*	*	*	73	72	10.0
4	20.0	446.13	1.050	1.76	3.74	446.24	*	131	*	*	*	74	73	10.0
5	25.0	449.96	1.100	1.85	3.84	450.08	*	130	*	*	*	75	73	10.0
6	30.0	453.73	1.050	1.77	3.76	453.84	*	129	*	*	*	76	73	10.0
7	35.0	457.63	1.200	2.03	4.02	457.86	*	129	*	*	*	77	74	10.0
8	40.0	461.55	1.150	1.94	3.93	461.79	*	132	*	*	*	77	74	10.0
9	45.0	465.43	1.100	1.85	3.84	465.63	*	133	*	*	*	78	74	10.0
10	50.0	469.30	1.100	1.85	3.85	469.48	*	133	*	*	*	78	74	10.0
11	55.0	473.03	0.990	1.67	3.65	473.13	*	131	*	*	*	79	74	10.0
12	60.0	476.72	0.980	1.66	3.64	476.77	*	131	*	*	*	79	75	10.0
13	65.0	480.51	1.100	1.86	3.86	480.63	*	131	*	*	*	78	75	10.0
14	70.0	484.26	1.050	1.77	3.77	484.40	*	131	*	*	*	79	75	10.0
15	75.0	488.02	1.000	1.69	3.68	488.08	*	132	*	*	*	80	76	10.0
16	80.0	491.84	1.100	1.87	3.87	491.95	*	130	*	*	*	80	76	10.0
17	85.0	495.34	0.880	1.49	3.46	495.41	*	130	*	*	*	80	76	10.0
18	90.0	498.74	0.830	1.41	3.36	498.77	*	130	*	*	*	80	76	10.0
19	95.0	502.49	1.000	1.70	3.69	502.46	*	130	*	*	*	78	76	10.0
20	100.0	506.31	1.050	1.77	3.77	506.23	*	132	*	*	*	79	76	10.0
21	105.0	509.98	0.970	1.64	3.62	509.86	*	132	*	*	*	80	76	10.0
22	110.0	513.52	0.960	1.62	3.61	513.46	*	132	*	*	*	80	76	10.0
23	115.0	516.81	0.800	1.35	3.30	516.76	*	132	*	*	*	80	76	10.0
24	120.0	520.03	0.780	1.32	3.25	520.01	*	132	*	*	*	80	76	10.0
End Time	1720													
Run Time	120		Avg DH=	1.73			Avg Ts=	131.17				Avg Tm=	76.13	

Integrated Gas Sampling Data :									
Bag No.	NA	Filter No.	4Q0515	MOISTURE RECOVERY DATA :					
Bag Vol.	---	Nozzle No.	T-1	1	2	3	4	5	6
Leak Rate	NA	Nozzle Dn.	0.210	793	805	785	639	764	756
				666	761	776	637	765	1037
				127	44	9	2	-1	15
									Total
									195

* Data Recorded on Field Data Sheet



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 2

Project	AcelorMittal Minoroa Mine Inc.				Meter ID	C-12	Probe ID	5-3	Bar Press.	28.35	in. Hg	Sample Train Leak Rate, cfm:
Sample Location	Indurating Furnace Stack A SV014				Meter Y	1.0066	Pilot Tube No.	5-3	Stat Press.	-0.90	in. H ₂ O	0.000 at 15 in. Hg
Date	06/23/15				Orifice dh@	1.9074	Pilot Cp	0.84	Pretest	0.000	at 5 in. Hg	Posttest
Test	1				Run # 2				Liner Type: Glass			
Operators	RMP/RBS								Pretest Pilot leak Check Neg			
								Posttest Pilot leak Check Neg				Pass @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft ³	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft ³	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	Moisture Content, %
Start Time	1810	520.73												
1	5.0	524.47	1.050	1.76	3.74	524.47	*	134	*	*	*	72	73	9.9
2	10.0	528.25	1.050	1.76	3.74	528.21	*	133	*	*	*	72	73	9.9
3	15.0	531.94	1.000	1.68	3.65	531.86	*	132	*	132	*	74	73	9.9
4	20.0	535.53	0.980	1.65	3.62	535.48	*	132	*	*	*	75	73	9.9
5	25.0	538.90	0.820	1.38	3.32	538.79	*	132	*	*	*	76	73	9.9
6	30.0	542.20	0.780	1.31	3.24	542.03	*	132	*	132	*	77	74	9.9
7	35.0	545.99	1.050	1.77	3.76	545.79	*	133	*	*	*	77	74	9.9
8	40.0	549.77	1.050	1.77	3.76	549.55	*	133	*	*	*	78	74	9.9
9	45.0	553.42	0.980	1.65	3.63	553.19	*	133	*	*	*	78	74	9.9
10	50.0	556.98	0.980	1.66	3.64	556.82	*	132	*	132	*	78	75	9.9
11	55.0	560.22	0.750	1.27	3.19	560.01	*	132	*	*	*	78	75	9.9
12	60.0	563.41	0.760	1.29	3.21	563.22	*	132	*	*	*	78	75	9.9
13	65.0	566.72	1.100	1.86	3.86	567.07	*	132	*	*	*	76	75	9.9
14	70.0	570.03	1.100	1.86	3.85	570.93	*	132	*	*	*	77	75	9.9
15	75.0	573.45	1.150	1.94	3.94	574.87	*	132	*	*	*	78	75	9.9
16	80.0	577.21	1.150	1.95	3.94	578.81	*	132	*	*	*	78	75	9.9
17	85.0	580.93	0.970	1.64	3.63	582.44	*	131	*	*	*	79	75	9.9
18	90.0	584.85	0.990	1.68	3.67	586.10	*	131	*	*	*	79	75	9.9
19	95.0	589.01	1.150	1.95	3.95	590.05	*	131	*	*	*	78	75	9.9
20	100.0	593.05	1.150	1.95	3.94	594.00	*	132	*	*	*	79	75	9.9
21	105.0	597.07	1.100	1.86	3.86	597.86	*	133	*	*	*	80	76	9.9
22	110.0	601.08	1.200	2.04	4.04	601.90	*	132	*	*	*	80	76	9.9
23	115.0	604.85	0.980	1.67	3.65	605.55	*	131	*	*	*	80	76	9.9
24	120.0	608.45	0.920	1.57	3.54	609.10	*	130	*	*	*	80	76	9.9
End Time	2020													
Run Time	120		Avg DH=	1.70			Avg Ts=	132.00				Avg Tm=	75.98	

Integrated Gas Sampling Data :

Bag No.	NA	Filter No.	4Q0490	Impinger	1	2	3	4	5	6	Desiccant	Total
Bag Vol.	---	Nozzle No.	T-1	Final wt., g	823	842	783	701	799	760	1033	
Leak Rate	NA	Nozzle Dn.	0.210	Initial wt., g	695	800	776	698	798	760	1020	
				Difference	128	42	7	3	1	0	13	194

* Data Recorded on Field Data Sheet



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 3

Project	Areslor/Mital Minorca Mine Inc.			Meter ID	C-12	Probe ID	5-3	Bar.Press.	28.37	in. Hg	Sample Train Leak Rate, cfm:		
Sample Location	Indurating Furnace Stack A SV014			Meter Y	1.0066	Pilot Tube No.	5-3	Stat Press.	-0.90	in. H2O	Pretest		
Date	06/24/15			Orifice dH@	1.9074	Pilot Cp	0.84	Posttest	0.000	at 15	in. Hg		
Test	1	Run #	3	Liner Type:		Glass		Pretest Pilot leak Check Pos	PASS	@ >3" w.c			
Operators	RMP/RBS			Posttest Pilot leak Check Neg								PASS	@ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F				Moisture Content, %	
									Filter	Probe	Impinger Outlet	Meter Inlet		Meter Outlet
Start Time	0803	608.76												
1	5.0	612.54	1.100	1.82	3.77	612.53	*	133	*	*	*	65	65	9.9
2	10.0	616.40	1.150	1.90	3.86	616.38	*	132	*	*	*	67	65	9.9
3	15.0	620.22	1.100	1.82	3.78	620.16	*	132	*	*	*	69	66	9.9
4	20.0	624.01	1.100	1.83	3.79	623.95	*	132	*	*	*	71	66	9.9
5	25.0	627.51	0.920	1.53	3.47	627.42	*	132	*	*	*	72	67	9.9
6	30.0	630.99	0.910	1.52	3.46	630.89	*	131	*	*	*	73	68	9.9
7	35.0	634.80	1.100	1.84	3.82	634.70	*	130	*	*	*	73	69	9.9
8	40.0	638.63	1.150	1.92	3.90	638.60	*	132	*	*	*	73	69	9.9
9	45.0	642.46	1.100	1.84	3.81	642.42	*	132	*	*	*	74	69	9.9
10	50.0	646.25	1.100	1.84	3.82	646.24	*	131	*	*	*	74	70	9.9
11	55.0	649.85	0.980	1.64	3.61	649.85	*	131	*	*	*	75	70	9.9
12	60.0	653.38	0.950	1.60	3.56	653.41	*	130	*	*	*	75	71	9.9
13	65.0	656.95	0.970	1.63	3.60	657.01	*	131	*	*	*	73	71	9.9
14	70.0	660.51	0.970	1.62	3.59	660.59	*	133	*	*	*	75	71	9.9
15	75.0	664.00	0.940	1.58	3.54	664.13	*	132	*	*	*	76	72	9.9
16	80.0	667.48	0.940	1.58	3.55	667.68	*	132	*	*	*	76	72	9.9
17	85.0	670.80	0.810	1.36	3.29	670.97	*	132	*	*	*	76	72	9.9
18	90.0	674.05	0.770	1.29	3.21	674.18	*	132	*	*	*	76	72	9.9
19	95.0	677.62	0.960	1.61	3.58	677.76	*	132	*	*	*	74	73	9.9
20	100.0	681.18	0.960	1.61	3.58	681.34	*	132	*	*	*	76	73	9.9
21	105.0	684.76	0.940	1.58	3.55	684.89	*	132	*	*	*	77	73	9.9
22	110.0	688.28	0.940	1.58	3.55	688.44	*	132	*	*	*	77	73	9.9
23	115.0	691.49	0.740	1.25	3.15	691.60	*	132	*	*	*	77	73	9.9
24	120.0	694.64	0.710	1.20	3.09	694.68	*	132	*	*	*	77	73	9.9
End Time	1013													
Run Time	120		Avg DH=	1.63			Avg Ts=	131.75				Avg Trm=	71.96	

Integrated Gas Sampling Data :

Bag No.	NA	Filter No.	4C0491
Bag Vol.	---	Nozzle No.	T-1
Leak Rate	NA	Nozzle Dn.	0.210
		cc/min	

MOISTURE RECOVERY DATA :

Impinger	1
Final wt., g	797
Initial wt., g	667
Difference	130

	1	2	3	4	5	6	Desiccant	Total
	797	803	786	640	765	755	933	
	667	761	777	639	764	755	914	
	130	42	9	1	1	0	19	202

* Data Recorded on Field Data Sheet

EPA METHOD 29

FIELD DATA SHEET

BARR

Project Arcelor Mittal Minorca Mine Meter ID C-12 Probe ID S-3 Bar. Pres 28.40 in Hg
 Smp. Loc Furnace Stack B Meter Y 10066 Pitot No. S-3 Stat. Pres -0.90 in H₂O
 Test No. 2 Run 1 Office H@ 1.9074 Pitot Cp 0.84 Probe Lgth 5 ft
 Date 6-28-2015 Operators RMP/1203 Liner Type: ☒ Glass ☐ S.S. ☐ Other Imp TC 10-1

Sample Train Leak Rate (cfm)
 Pretest 0.0 at 15 in Hg
 Posttest 0.0 at 15 in Hg
 Pitot (3 in.) Pos. ☐ Neg. ☒

Sample Point	Sample Time Δt	Meter Volume V_m , ft ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Probe	Filter	Impinger Outlet	Meter Inlet	Meter Outlet	Oxygen Content, %
1-1	S	695.98	1.15	1.82	3.0	136	246	246	60	64	64	
1-1	10	695.63	1.10	1.74	3.0	132	246	249	57	64	64	
1-2	15	707.26	1.10	1.74	3.0	137	249	248	55	65	64	
1-2	20	710.03	1.15	1.82	3.0	137	247	240	55	66	64	
1-3	25	714.62	0.99	1.57	3.0	136	249	249	56	68	65	
1-3	30	718.13	1.00	1.59	3.0	137	246	249	58	69	65	
2-1	35	721.75	1.10	1.75	3.0	137	246	247	64	69	66	
2-1	40	725.27	1.20	1.59	3.0	136	249	246	58	70	64	
2-2	45	728.62	0.93	1.46	2.5	136	250	242	57	71	67	
2-2	50	731.92	0.90	1.44	2.5	135	249	246	56	72	67	
2-3	55	735.00	0.77	1.23	2.5	135	246	240	55	72	67	
2-3	60	738.04	0.77	1.23	2.5	135	247	246	56	73	68	
3-1	65	741.04	1.30	1.89	3.5	134	249	247	64	70	68	
3-1	70	746.10	1.25	1.94	3.5	136	250	246	52	73	69	
3-2	75	750.13	1.30	2.09	3.5	135	244	246	57	74	69	
3-2	80	754.12	1.30	2.09	3.5	134	245	246	58	75	70	
3-3	85	757.90	1.10	1.72	3.5	135	249	248	57	75	70	
3-3	90	761.68	1.00	1.72	3.5	134	246	242	60	76	70	
4-1	95	765.59	1.20	1.93	3.5	135	246	249	61	72	71	
4-1	100	769.49	1.20	1.93	3.5	135	249	246	60	75	71	
4-2	105	773.36	1.20	1.93	3.5	135	247	246	61	76	71	
4-2	110	777.21	1.20	1.94	3.5	134	246	248	62	77	71	
4-3	115	780.66	1.00	1.62	3.5	134	246	246	63	77	72	
4-3	120	784.35	0.90	1.59	3.5	134	246	249	63	77	72	
\bar{Q}		$V_m = 69.44$	1.09	$\Delta H = 1.74$		$T_s = 135.380$					$T_m = 69.61$	

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration			
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time	Bag No.	Bag Vol	cc/min *	Filter No.	Nozzle No.	Nozzle Dn	Filter No.	Nozzle No.	Nozzle Dn		Tech.	Date		
64	19.5	11.9		0756	1013	NA			460444	7-1	0.210	460444	7-1	0.210		DAW	6/23/15		
Run 1																			
Run 2																			

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	630	456	780	700	400	765	469	
Initial wt., g	696	403	771	699	401	764	465	
Difference	134	53	9	1	1	1	24	223

Air Flows	
ACFM	219.629
DSCFM	164.072



EPA METHOD 29
FIELD DATA SHEET

Project: Arcelor Mittal Minors Mine
Smp/ Loc: Furnace Stack B
Test No.: 2
Date: 6/25/2015
Operator: DMJ/DBS
Meter ID: C-17
Meter Y: 100600
Office H@: 19074
Liner Type: ☒ Glass ☐ S.S. ☐ Other
Probe ID: S-3
Pitot No.: S-3
Pitot Cp: 0.64
Bar. Pres: 28.40 in Hg
Stat. Pres: -0.90 in H₂O
Probe Lgth: 5 ft
Imp TC: 710-1
Sample Train Leak Rate (cfm):
Pretest: 0.0 at 15 in Hg
Posttest: 2.0 at 10 in Hg
Pitot (3 in.): Pos. ☐ Neg. ☒

Sample Point	Sample Time Δt	Meter Volume V_m , ft ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Sample Train Temperatures, °F				Oxygen Content, %
							Probe	Filter	Impinger Outlet	Meter Inlet	
1-1	5	784.65	1.20	1.96	8.5	136	242	240	72	71	
1-1	10	788.52	1.20	1.96	8.5	135	253	250	72	71	
1-2	15	796.42	1.15	1.88	8.5	135	247	246	72	72	
1-2	20	800.37	1.20	1.96	8.5	136	249	253	72	72	
1-3	25	804.25	1.15	1.88	8.5	136	247	246	72	73	
1-3	30	808.06	1.10	1.81	8.0	136	249	247	72	73	
2-1	35	811.89	1.20	1.92	8.5	136	247	240	72	74	
2-1	40	815.84	1.20	1.92	8.5	136	250	248	72	74	
2-2	45	819.66	1.15	1.89	8.5	136	247	248	72	74	
2-2	50	823.74	1.20	1.92	8.0	136	252	248	72	74	
2-3	55	827.60	1.10	1.81	8.5	135	247	248	80	75	
2-3	60	831.31	1.05	1.73	8.0	135	249	247	80	75	
3-1	65	835.21	1.15	1.90	8.0	135	249	247	77	75	
3-1	70	839.80	1.15	1.89	8.5	135	249	251	79	75	
3-2	75	843.75	1.00	1.81	8.0	135	249	250	80	75	
3-2	80	847.65	1.10	1.82	8.0	135	248	247	80	75	
3-3	85	851.6	0.93	1.53	7.5	135	248	248	80	76	
3-3	90	855.67	0.93	1.53	7.5	136	249	247	80	76	
4-1	95	859.46	1.10	1.81	8.0	136	249	247	72	76	
4-1	100	863.36	1.10	1.81	8.5	136	249	248	79	76	
4-2	105	867.00	1.00	1.65	8.0	136	249	248	79	76	
4-2	110	870.73	1.05	1.73	8.0	135	249	248	79	76	
4-3	115	874.31	0.89	1.47	7.5	136	247	248	79	76	
4-3	120	878.80	0.90	1.48	7.5	136	247	248	79	76	
Ø=		$V_m=115$	1.10	$\Delta H=1.80$		$T_s=355.50$				$T_m=62.9$	

Initialization Values				Test Run Times		ORSAT System		Sample Train Components		Nozzle Calibration	
Meter Temp	Oxygen Content	Moisture Content	Start Time	End Time	Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle No.	Date
72	18.5	11.0	1105	1320	NA			400538	T-1	0.210	Sec
Run 2										2	Sec
										3	Sec
										Avg. in.	#1

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	613	791	767	641	764	754	969	
Initial wt., g	607	743	756	639	764	755	954	
Difference	146	46	11	2	0	1	15	221

Air Flows	
ACFM	220.743
DSCFM	165.343



EPA METHOD 29

FIELD DATA SHEET

Project	Aracelor Mittal Minorca Mine	Meter ID	C-12	Probe ID	S-3	Bar. Pres	28.40	in Hg
Smpl Loc	Feiniger Stock P	Meter Y	1.0065	Pitot No.	S-3	Stat. Pres	-0.40	in H ₂ O
Test No.	2	Run	3	Pitot Cp	0.84	Probe Lgth	5	ft
Date	07-15-15	Operators	RMO/RBS	Liner Type:	<input checked="" type="checkbox"/> Glass <input type="checkbox"/> S.S. <input type="checkbox"/> Other	Imp TC	710.1	

Sample Train Leak Rate (cfm)	
Pretest	6.0 at 15 in Hg
Posttest	8.0 at 11 in Hg
Pitot (3 in.)	Pos. <input checked="" type="checkbox"/> Neg. <input type="checkbox"/>

Sample Point	Sample Time Δt	Meter Volume V_m , l ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Sample Train Temperatures, °F			Oxygen Content, %
							Probe	Filter	Impinger Outlet	
1-1	5	879.92	1.10	1.81	9.0	136	247	240	607	74
1-1	10	883.79	1.10	1.81	9.5	136	240	240	66	74
1-2	15	887.62	1.05	1.73	9.0	136	249	240	64	74
1-2	20	891.41	1.05	1.73	9.0	137	249	249	63	74
1-3	25	894.42	0.91	1.50	8.5	135	248	248	62	74
1-3	30	898.31	0.89	1.42	7.5	135	248	247	60	74
2-1	35	902.11	1.15	1.90	9.0	135	245	245	65	74
2-1	40	905.96	1.15	1.89	9.0	136	249	247	59	74
2-2	45	909.75	1.10	1.81	9.0	136	250	249	55	74
2-2	50	913.63	1.15	1.90	9.5	135	250	249	55	74
2-3	55	917.46	1.10	1.82	9.5	135	245	248	54	75
2-3	60	921.25	1.15	1.90	9.5	135	249	248	54	75
3-1	65	925.03	1.30	2.15	10.0	136	247	250	66	75
3-1	70	928.82	1.30	2.14	10.0	136	248	246	55	75
3-2	75	932.61	1.25	2.07	10.0	136	249	249	55	75
3-2	80	936.40	1.25	2.07	10.0	136	248	248	55	75
3-3	85	940.19	1.10	1.82	9.5	135	247	248	52	75
3-3	90	943.98	1.10	1.82	9.5	135	250	248	58	76
4-1	95	947.77	1.25	2.07	9.5	136	247	248	66	76
4-1	100	951.56	1.20	1.98	9.5	136	248	248	61	76
4-2	105	955.35	1.20	1.98	9.5	137	249	247	60	76
4-2	110	959.14	1.20	1.99	9.5	136	249	240	60	76
4-3	115	962.93	1.05	1.74	9.0	136	249	247	59	76
4-3	120	966.72	1.05	1.74	9.0	136	248	248	59	76
$\bar{Q} =$		$V_m = 970.62$	1.13	$\Delta H = 1.87$	9.0	$T_s = 135.71$				$T_m = 70.17$

Run	Initialization Values			Test Run Times			ORSAT System			Sample Train Components			Nozzle Calibration		
	Meter Temp	Oxygen Content	Moisture Content	Start Time	End Time		Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dn	Tech.	Nozzle No.	Date
Run 3	74	19.5	10.0	1433	1646		NA			480534	7-1	0.210		1	522
Run 2														2	620
														3	#1
														Avg. in.	

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	834	854	783	701	801	763	967	
Initial wt., g	696	798	773	694	799	762	953	
Difference	138	56	10	2	2	1	14	223

Air Flows	
ACFM	224, 267
DSCFM	160, 081



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 1

Project	ArcelorMittal Minoreca Mine Inc.									
Sample Location	Indurating Furnace Stack B SV015									
Date	06/25/15	Meter ID	C-12	Probe ID	5-3	Bar Press.	28.40	in. Hg	28.40	in. Hg
Test	2	Meter Y	1.0066	Pilot Tube No.	5-3	Stat Press.	-0.90	in. H2O	0.000	at 15 in. Hg
Operators	RMP/RBS	Orifice dH@	1.9074	Pilot Cp	0.84	Posttest	0.000	at 5 in. Hg	Posttest	0.000
		Liner Type:	Glass			Posttest Pilot leak Check Pos	Pass	@ >3" w.c	Posttest Pilot leak Check Neg	Pass

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft ³	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft ³	Sample Train Vacuum in. Hg	Stack Temp T _s , °F	Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	Moisture Content, %
Start Time	0756	695.91												
1	5.0	699.63	1.150	1.82	3.76	699.67	*	136	*	*	*	64	64	11.9
2	10.0	703.51	1.100	1.74	3.68	703.35	*	137	*	*	*	64	64	11.9
3	15.0	707.26	1.100	1.74	3.68	707.03	*	137	*	*	*	65	64	11.9
4	20.0	711.03	1.150	1.82	3.77	710.80	*	137	*	*	*	66	64	11.9
5	25.0	714.62	0.990	1.57	3.50	714.30	*	136	*	*	*	68	65	11.9
6	30.0	718.13	1.000	1.59	3.52	717.82	*	137	*	*	*	69	65	11.9
7	35.0	721.75	1.100	1.75	3.70	721.52	*	137	*	*	*	69	66	11.9
8	40.0	725.27	1.000	1.59	3.53	725.06	*	136	*	*	*	70	66	11.9
9	45.0	728.62	0.930	1.48	3.41	728.47	*	136	*	*	*	71	67	11.9
10	50.0	731.92	0.900	1.44	3.37	731.83	*	135	*	*	*	72	67	11.9
11	55.0	735.00	0.770	1.23	3.12	734.95	*	135	*	*	*	72	67	11.9
12	60.0	738.04	0.770	1.23	3.12	738.06	*	135	*	*	*	73	68	11.9
13	65.0	742.04	1.300	2.09	4.06	742.12	*	134	*	*	*	70	68	11.9
14	70.0	746.10	1.250	1.99	3.96	746.09	*	136	*	*	*	73	69	11.9
15	75.0	750.13	1.300	2.09	4.06	750.15	*	135	*	*	*	74	69	11.9
16	80.0	754.12	1.300	2.09	4.07	754.21	*	134	*	*	*	75	70	11.9
17	85.0	757.90	1.100	1.77	3.74	757.96	*	135	*	*	*	75	70	11.9
18	90.0	761.68	1.100	1.77	3.75	761.71	*	134	*	*	*	76	70	11.9
19	95.0	765.59	1.200	1.93	3.92	765.62	*	135	*	*	*	72	71	11.9
20	100.0	769.49	1.200	1.93	3.90	769.52	*	135	*	*	*	75	71	11.9
21	105.0	773.38	1.200	1.93	3.92	773.44	*	135	*	*	*	76	71	11.9
22	110.0	777.21	1.200	1.94	3.92	777.36	*	134	*	*	*	77	71	11.9
23	115.0	780.66	1.000	1.62	3.58	780.95	*	134	*	*	*	77	72	11.9
24	120.0	784.35	0.980	1.59	3.55	784.50	*	134	*	*	*	77	72	11.9
End Time	1013													
Run Time	120		Avg DH=	1.74			Avg Ts=	135.38				Avg Tm=	69.81	

MOISTURE RECOVERY DATA :

Integrated Gas Sampling Data :														
Bag No.	NA	Filter No.	4Q0494	Impinger										
Bag Vol.	---	Nozzle No.	T-1	F _{final} wt., g	830	856	2	856	780	700	802	6	Desiccant	Total
Leak Rate	NA	Nozzle Dn.	0.210	Initial wt., g	696	803	803	771	699	699	801	764	965	
				Difference	134	53	53	9	1	1	1	1	24	223

* Data Recorded on Field Data Sheet



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 2

Project	AcelorMittal Minoroa Mine Inc.									
Sample Location	Indurating Furnace Stack B SV015									
Date	06/25/15	Meter ID	C-12	Probe ID	5-3	Bar.Press.	28.40	in. Hg	Sample Train Leak Rate, cfm:	
Test	2	Meter Y	1.0066	Pilot Tube No.	5-3	Stat.Press.	-0.90	in. H2O	Pretest	0.000 at 15 in. Hg
Operators	RMP/RBS	Orifice dh@	1.9074	Pilot Cp	0.84				Posttest	0.000 at 10 in. Hg
		Liner Type:	Glass						Pretest Pilot leak Check Pos	Pass @ >3" w.c
									Posttest Pilot leak Check Neg	Pass @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft ³	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft ³	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	Moisture Content, %
Start Time	1105	784.65												
1	5.0	788.57	1.200	1.96	3.94	788.59	*	136	*	*	*	72	71	11.0
2	10.0	792.50	1.200	1.96	3.94	792.52	*	135	*	*	*	74	72	11.0
3	15.0	796.42	1.150	1.88	3.86	796.38	*	135	*	*	*	76	72	11.0
4	20.0	800.37	1.200	1.96	3.95	800.33	*	136	*	*	*	77	72	11.0
5	25.0	804.25	1.150	1.88	3.87	804.21	*	136	*	*	*	78	73	11.0
6	30.0	808.06	1.100	1.81	3.79	808.00	*	136	*	*	*	78	73	11.0
7	35.0	811.89	1.200	1.97	3.96	811.96	*	136	*	*	*	76	74	11.0
8	40.0	815.84	1.200	1.97	3.96	815.92	*	136	*	*	*	78	74	11.0
9	45.0	819.88	1.150	1.89	3.88	819.80	*	136	*	*	*	79	74	11.0
10	50.0	823.74	1.200	1.97	3.97	823.77	*	136	*	*	*	79	74	11.0
11	55.0	827.60	1.100	1.81	3.80	827.57	*	135	*	*	*	80	75	11.0
12	60.0	831.31	1.050	1.73	3.72	831.29	*	135	*	*	*	80	75	11.0
13	65.0	835.21	1.150	1.90	3.90	835.19	*	135	*	*	*	77	75	11.0
14	70.0	838.88	1.150	1.89	3.89	839.08	*	135	*	*	*	79	75	11.0
15	75.0	842.78	1.100	1.81	3.81	842.88	*	135	*	*	*	80	75	11.0
16	80.0	846.65	1.100	1.82	3.81	846.69	*	135	*	*	*	80	75	11.0
17	85.0	850.18	0.930	1.53	3.50	850.20	*	135	*	*	*	80	76	11.0
18	90.0	853.67	0.930	1.53	3.50	853.70	*	136	*	*	*	80	76	11.0
19	95.0	857.46	1.100	1.81	3.81	857.51	*	136	*	*	*	77	76	11.0
20	100.0	861.26	1.100	1.81	3.80	861.31	*	136	*	*	*	79	76	11.0
21	105.0	865.00	1.000	1.65	3.63	864.94	*	136	*	*	*	79	76	11.0
22	110.0	868.73	1.050	1.73	3.72	868.66	*	135	*	*	*	79	76	11.0
23	115.0	872.31	0.890	1.47	3.42	872.09	*	136	*	*	*	79	76	11.0
24	120.0	875.80	0.900	1.48	3.44	875.53	*	136	*	*	*	79	76	11.0
End Time	1320													
Run Time	120		Avg DH=	1.80			Avg Ts=	135.58				Avg Tm=	76.29	

Integrated Gas Sampling Data :

Bag No.	NA	Filter No.	4Q0538
Bag Vol.	---	Nozzle No.	T-1
Leak Rate	NA	Nozzle Dn.	0.210

MOISTURE RECOVERY DATA :

Impinger	
Final wt., g	813
Initial wt., g	667
Difference	146

1	2	3	4	5	6	Desiccant	Total
	791	767	641	764	754		969
	743	756	639	764	755		954
	48	11	2	0	-1	15	221

* Data Recorded on Field Data Sheet



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 3

Project	AreslorMital Minorca Mine Inc.										Meter ID	C-12	Probe ID	5-3	Bar.Press.	28.40	in. Hg	Sample Train Leak Rate, cfm:
Sample Location	Indurating Furnace Stack B SV015										Meter Y	1.0066	Pilot. Tube No.	5-3	Stat Press.	-0.90	in. H2O	Pretest
Date	06/25/15										Orifice dH@	1.9074	Pilot Cp	0.84				Posttest
Test	2										Run #	3	Liner Type:	Glass				Pretest Pilot leak Check Pos
Operators	RMP/RBS																	Posttest Pilot leak Check Neg

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F				Moisture Content, %	
									Filter	Probe	Impinger Outlet	Meter Inlet		Meter Outlet
Start Time	1433	876.24												
1	5.0	879.92	1.100	1.81	3.79	880.03	*	136	*	*	*	74	74	10.8
2	10.0	883.79	1.100	1.81	3.79	883.82	*	136	*	*	*	74	74	10.8
3	15.0	887.62	1.050	1.73	3.70	887.53	*	136	*	*	*	75	74	10.8
4	20.0	891.41	1.050	1.73	3.70	891.23	*	137	*	*	*	75	74	10.8
5	25.0	894.92	0.910	1.50	3.45	894.69	*	135	*	*	*	76	74	10.8
6	30.0	898.31	0.890	1.47	3.42	898.11	*	135	*	*	*	76	74	10.8
7	35.0	902.11	1.150	1.90	3.89	901.99	*	135	*	*	*	75	74	10.8
8	40.0	905.98	1.150	1.89	3.88	905.87	*	136	*	*	*	77	74	10.8
9	45.0	909.75	1.100	1.81	3.80	909.68	*	136	*	*	*	78	74	10.8
10	50.0	913.63	1.150	1.90	3.89	913.57	*	135	*	*	*	78	74	10.8
11	55.0	917.46	1.100	1.82	3.81	917.38	*	135	*	*	*	78	75	10.8
12	60.0	921.25	1.150	1.90	3.90	921.28	*	135	*	*	*	78	75	10.8
13	65.0	925.23	1.300	2.15	4.14	925.42	*	136	*	*	*	76	75	10.8
14	70.0	929.37	1.300	2.14	4.13	929.55	*	136	*	*	*	79	75	10.8
15	75.0	933.46	1.250	2.07	4.07	933.62	*	135	*	*	*	79	75	10.8
16	80.0	937.51	1.250	2.07	4.06	937.69	*	136	*	*	*	79	75	10.8
17	85.0	941.51	1.100	1.82	3.82	941.50	*	135	*	*	*	79	75	10.8
18	90.0	945.34	1.100	1.82	3.82	945.32	*	135	*	*	*	79	76	10.8
19	95.0	949.26	1.250	2.07	4.07	949.39	*	136	*	*	*	76	76	10.8
20	100.0	953.27	1.200	1.98	3.97	953.36	*	136	*	*	*	79	76	10.8
21	105.0	957.28	1.200	1.98	3.98	957.34	*	137	*	*	*	80	76	10.8
22	110.0	961.26	1.200	1.99	3.99	961.33	*	136	*	*	*	80	76	10.8
23	115.0	965.28	1.050	1.74	3.73	965.07	*	136	*	*	*	80	76	10.8
24	120.0	968.86	1.050	1.74	3.73	968.80	*	136	*	*	*	79	76	10.8
End Time	1646													
Run Time	120		Avg DH=	1.87			Avg Ts	135.71				Avg Trm=	76.17	

Integrated Gas Sampling Data :

Bag No.	NA	Filter No.	4Q0539
Bag Vol.	---	Nozzle No.	T-1
Leak Rate	NA	Nozzle Dn.	0.210
			cc/min

MOISTURE RECOVERY DATA :

Impinger	1
Final wt., g	834
Initial wt., g	696
Difference	138

* Data Recorded on Field Data Sheet

EPA METHOD 29

FIELD DATA SHEET



Project: Arcelor Mittal Minorca Mine
 Meter ID: C-7
 Meter Y: 1.0091
 Office H@: 1.0055
 Run: 1
 Operators: RMD/AB5
 Date: 6-2-2015
 Sample Train Leak Rate (cfm): Pretest 0.0 at 1.0 in Hg, Posttest 0.0 at 7 in Hg, Pitot (3 in.) Pos. Neg. ☒

Bar. Pres: 29.35 in Hg
 Stat. Pres: -0.90 in H₂O
 Probe Lgth: 5 ft
 Imp TC: 36.60
 Liner Type: ☒ Glass ☐ S.S. ☐ Other

Sample Point	Sample Time Δt	Meter Volume V_m , π	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Probe	Filter	Impinger Outlet	Meter Inlet	Meter Outlet	Oxygen Content, %
1-1	5	200.41	0.96	1.43	5.0	142	246	248	66	71	70	
1-1	10	203.40	0.99	1.47	5.0	141	245	248	67	72	71	
1-2	15	210.42	1.00	1.49	5.0	143	245	248	63	73	71	
1-2	20	214.31	1.05	1.52	5.5	142	244	248	63	74	71	
1-3	25	217.95	0.93	1.39	5.0	141	245	248	61	74	71	
1-3	30	221.44	0.94	1.41	5.5	140	245	247	59	75	71	
2-1	35	224.62	1.02	1.50	5.0	140	245	249	65	75	72	
2-1	40	228.50	1.08	1.57	5.5	142	244	247	65	76	72	
2-2	45	232.12	1.05	1.52	5.5	143	245	246	62	77	72	
2-2	50	235.72	1.05	1.52	6.0	143	244	247	61	77	72	
2-3	55	239.27	0.93	1.40	5.5	141	246	248	59	79	73	
2-3	60	242.74	0.92	1.36	5.5	142	247	248	59	78	73	
3-1	65	246.30	1.05	1.58	5.5	141	246	249	60	77	73	
3-1	70	250.04	1.10	1.65	6.0	142	246	248	58	78	74	
3-2	75	253.56	0.91	1.32	5.5	142	244	247	58	79	74	
3-2	80	257.21	0.92	1.47	6.0	140	245	248	59	79	74	
3-3	85	260.66	0.81	1.23	5.5	139	244	248	59	79	74	
3-3	90	263.82	0.80	1.21	5.5	139	245	248	60	79	74	
4-1	95	267.36	1.05	1.59	5.5	140	242	250	64	78	74	
4-1	100	270.92	1.05	1.56	6.0	142	244	248	60	79	74	
4-2	105	274.31	0.97	1.46	5.5	142	245	245	61	79	75	
4-2	110	277.83	0.96	1.45	6.0	142	246	251	62	79	75	
4-3	115	281.20	0.84	1.27	5.5	142	246	250	63	79	75	
4-3	120	284.50	0.84	1.26	5.5	143	247	240	63	79	75	
\bar{O}_2		$V_m = 240.9$	$\bar{O}_2 = 0.97$	$\Delta H = 1.45$		$T_s = 141.51$					$T_m = 74.92$	

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration	
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time	Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dn	Filter No.	Nozzle No.	Nozzle Dn		Tech	Date
71	12.5	12.3		15.11	17.20	NA			400535	T-3	0.210					12/15	12/15
Run 1																	
Run 2																	

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	5021	9017	8012	6005	7603	740	10682	
Initial wt., g	6602	761	402	683	762	739	1066	
Difference	159	56	10	2	1	16	245	

Air Flows	
ACFM	210,804
DSCFM	150,503



EPA METHOD 29

FIELD DATA SHEET

Project	Arcelor Mittal Minorca Mine	Meter ID	C-7	Probe ID	S-2	Bar. Pres	in Hg
Smpl Loc	Furnace Street C	Meter Y	1.0091	Pitot No.	S-2	Stat. Pres	in H ₂ O
Test No.	3	Run	2	Pitot Cp	0.84	Probe Lgth	ft
Date	6-23-2015	Operators	2401RB5	Liner Type:	<input checked="" type="checkbox"/> Glass <input type="checkbox"/> S.S. <input type="checkbox"/> Other	Imp TC	38600

Sample Train Leak Rate (cfm)	
Pretest 0.0 at 15 in Hg	
Posttest 2.0 at 5 in Hg	
Pitot (3 in.) Pos. <input checked="" type="checkbox"/> Neg. <input type="checkbox"/>	

Sample Point	Sample Time Δt	Meter Volume v_m , π^3	Velocity ΔP , in H_2O	Orifice ΔH , in H_2O	Sample Vacuum, in Hg	Stack Temp. T_s , $^{\circ}F$	Sample Train Temperatures, $^{\circ}F$				Oxygen Content, %	
							Probe	Filter	Impinger Outlet	Meter Inlet		Meter Outlet
		205.03										
1-1	5	288.45	0.92	1.36	3.0	144	246	245	65	71	71	
1-1	10	291.89	0.92	1.36	3.0	143	247	247	60	73	71	
1-2	15	295.27	0.91	1.35	3.0	142	247	253	56	74	71	
1-2	20	299.57	0.90	1.34	3.0	142	245	249	56	76	72	
1-3	25	301.65	0.87	1.14	2.5	143	246	246	55	72	72	
1-3	30	304.68	0.74	1.10	2.5	144	244	248	56	78	72	
2-1	35	306.00	0.92	1.37	3.0	143	246	249	64	72	73	
2-1	40	311.41	0.96	1.43	3.0	144	245	247	58	78	73	
2-2	45	314.55	0.78	1.16	3.0	144	246	249	58	78	73	
2-2	50	317.64	0.75	1.12	3.0	144	245	246	59	78	73	
2-3	55	320.63	0.68	1.02	2.5	143	245	246	60	78	74	
2-3	60	323.61	0.68	1.01	2.5	144	245	246	64	76	73	
3-1	65	327.07	0.97	1.44	3.0	144	245	246	60	77	73	
3-1	70	330.57	0.99	1.47	3.0	145	245	248	60	78	73	
3-2	75	334.06	0.96	1.42	3.0	145	246	246	59	78	74	
3-2	80	337.54	0.97	1.44	3.0	144	246	247	59	79	75	
3-3	85	340.79	0.86	1.26	3.0	143	246	246	61	79	74	
3-3	90	344.05	0.86	1.29	3.0	143	245	246	64	77	74	
4-1	95	347.49	0.93	1.39	3.0	143	245	249	60	79	74	
4-1	100	350.72	0.96	1.43	3.5	144	244	244	60	79	74	
4-2	105	354.19	0.92	1.32	3.0	144	245	246	59	79	75	
4-2	110	357.68	0.95	1.42	3.5	143	245	249	59	80	75	
4-3	115	361.10	0.83	1.24	3.0	142	246	247	59	80	75	
4-3	120	364.49	0.82	1.23	3.0	142	244	246	59	80	75	
\bar{O}_2		$V_m = 7945$	0.87	$\Delta H = 1.30$		$T_s = 143.30$					$T_m = 75.54$	

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration			
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time	Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dn	Tech.	Nozzle No.			Tech.	Nozzle No.		
Run 1	71	18.5	12.7	1510	2020	NA			46042	7-2	0.210		1				2		
Run 2													3				3		
																	Avg. in.		

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	664	804	814	700	776	800	1032	
Initial wt., g	704	762	806	698	775	800	1021	
Difference	160	47	48	2	1	0	12	730

Air Flows	
ACFM	208.012
DSCFM	150.396

EPA METHOD 29

FIELD DATA SHEET

Project Aracelor Mital Minorca Mine Meter ID C-7 Probe ID S-2 Bar. Pres 750.37 in Hg
 Smp. Loc Turnuc Steek C Meter Y 10091 Pitot No. S-2 Stat. Pres -0.90 in H₂O
 Test No. 3 Run 3 Office H@ 14055 Pitot Cp 0.84 Probe Lgth 5 ft
 Date 6-2015 Operators RMP/RBS Liner Type: ☒ Glass ☐ S.S. ☐ Other ☐ Neg. ☒

Sample Point	Sample Time Δt	Meter Volume V_m , ft ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Probe	Filter	Impinger Outlet	Meter Inlet	Meter Outlet	Oxygen Content, %
1-1	5	364.81	0.90	1.32	3.0	142	243	243	56	64	63	
1-1	10	368.15	0.90	1.31	3.0	142	244	246	51	68	64	
1-2	15	374.26	0.85	1.25	2.5	141	244	247	51	70	65	
1-2	20	377.90	0.86	1.27	2.5	142	245	246	51	71	66	
1-3	25	381.06	0.72	1.14	2.5	142	246	246	52	72	66	
1-3	30	384.07	0.76	1.12	2.5	142	245	247	53	73	67	
2-1	35	387.41	0.91	1.35	2.5	141	246	246	52	71	68	
2-1	40	390.75	0.92	1.36	2.5	143	245	247	54	73	68	
2-2	45	394.09	0.90	1.33	2.5	143	247	247	55	74	69	
2-2	50	397.49	0.93	1.38	3.0	142	247	248	57	75	70	
2-3	55	400.73	0.82	1.22	2.5	142	247	248	56	75	70	
2-3	60	403.95	0.82	1.22	2.5	142	246	248	56	75	70	
3-1	65	407.32	0.91	1.35	3.0	142	246	249	64	73	71	
3-1	70	410.60	0.92	1.36	3.0	144	245	249	57	76	71	
3-2	75	414.03	0.92	1.37	3.0	143	244	247	50	76	72	
3-2	80	417.76	0.93	1.39	3.0	142	244	249	49	77	72	
3-3	85	420.76	0.82	1.22	3.0	142	246	247	48	77	72	
3-3	90	424.01	0.80	1.19	3.0	142	246	250	48	77	72	
4-1	95	427.30	0.87	1.30	3.0	143	246	249	53	75	72	
4-1	100	430.62	0.92	1.37	3.0	143	245	246	46	76	73	
4-2	105	433.94	0.87	1.30	3.0	143	245	246	49	77	73	
4-2	110	437.18	0.83	1.24	3.0	143	245	246	51	77	73	
4-3	115	440.19	0.73	1.09	3.0	143	245	247	52	77	73	
4-3	120	443.27	0.73	1.09	3.0	143	245	246	52	77	73	
\bar{Q}		V_m 446.46	0.86	ΔH 1.27		T_{avg} 143.3					T_m 71.61	

ID=		WMA-2816	13-80		Jan-1-13		18033				TIME= 11-01																
Initialization Values												Test Run Times				ORSAT System				Sample Train Components				Tech.		Nozzle Calibration	
Meter Temp		Oxygen Content		Moisture Content		Start Time		End Time		Bag No.		Bag Vol		cc/min * at 15 in Hg		Filter No.		Nozzle No.		Nozzle Dia		1		Nozzle No.		Date	
65		18.5		12.6		0803		1013		NA		—				400493		T-2		0.26				See		5-2	
Run 1																						3				7-1	
Run 2																						Avg. in					

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	822	611	610	605	764	740	955	
Initial wt., g	601	760	603	603	764	740	436	
Difference	161	51	7	2	0	0	19	270

Air Flows	
ACFM	200,350
DSCFM	148,646



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 1

Project	ArcelorMittal Minorca Mine Inc.									
Sample Location	Indurating Furnace Stack C SV016									
Date	06/23/15	Meter ID	C-7	Probe ID	5-2	Bar Press.	28.35	in. Hg	Sample Train Leak Rate, cfm:	
Test	3	Meter Y	1.0091	Pilot Tube No.	5-2	Stat Press.	-0.90	in. H ₂ O	0.000	at 10 in. Hg
Operators	RMP/RBS	Orifice dH@	1.8055	Pilot Cp	0.84				Posttest	0.000 at 7 in. Hg
		Liner Type:	Glass						Prefest Pilot leak Check Pos	Pass @ >3" w.c
									Posttest Pilot leak Check Neg	Pass @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F				Moisture Content, %	
									Filter	Probe	Impinger Outlet	Meter Inlet		Meter Outlet
Start Time	1511	200.41												
1	5.0	203.80	0.960	1.43	3.47	203.88	*	142	*	*	*	71	70	12.3
2	10.0	207.30	0.990	1.47	3.51	207.39	*	144	*	*	*	72	71	12.3
3	15.0	210.82	1.000	1.49	3.54	210.93	*	143	*	*	*	73	71	12.3
4	20.0	214.31	1.050	1.57	3.63	214.56	*	142	*	*	*	74	71	12.3
5	25.0	217.95	0.930	1.39	3.42	217.98	*	141	*	*	*	74	71	12.3
6	30.0	221.44	0.940	1.41	3.45	221.43	*	140	*	*	*	75	71	12.3
7	35.0	224.87	1.000	1.50	3.56	224.99	*	140	*	*	*	75	72	12.3
8	40.0	228.50	1.050	1.57	3.64	228.63	*	142	*	*	*	76	72	12.3
9	45.0	232.12	1.050	1.57	3.64	232.27	*	143	*	*	*	77	72	12.3
10	50.0	235.72	1.050	1.57	3.65	235.92	*	143	*	*	*	77	72	12.3
11	55.0	239.28	0.930	1.40	3.44	239.36	*	141	*	*	*	79	74	12.3
12	60.0	242.74	0.920	1.38	3.43	242.79	*	142	*	*	*	78	73	12.3
13	65.0	246.38	1.050	1.58	3.66	246.45	*	141	*	*	*	77	73	12.3
14	70.0	250.04	1.100	1.65	3.74	250.19	*	142	*	*	*	78	74	12.3
15	75.0	253.58	0.910	1.37	3.41	253.59	*	142	*	*	*	79	74	12.3
16	80.0	257.21	0.970	1.47	3.53	257.12	*	140	*	*	*	79	74	12.3
17	85.0	260.66	0.810	1.23	3.23	260.35	*	139	*	*	*	79	74	12.3
18	90.0	263.87	0.800	1.21	3.21	263.55	*	139	*	*	*	79	74	12.3
19	95.0	267.36	1.050	1.59	3.67	267.22	*	140	*	*	*	78	74	12.3
20	100.0	270.92	1.050	1.58	3.66	270.88	*	142	*	*	*	79	74	12.3
21	105.0	274.31	0.970	1.46	3.52	274.40	*	142	*	*	*	79	75	12.3
22	110.0	277.83	0.960	1.45	3.51	277.91	*	142	*	*	*	79	75	12.3
23	115.0	281.20	0.840	1.27	3.28	281.19	*	142	*	*	*	79	75	12.3
24	120.0	284.50	0.840	1.26	3.28	284.47	*	143	*	*	*	79	75	12.3
End Time	1720													
Run Time	120		Avg DH=	1.45			Avg Ts=	141.54				Avg Tm=	74.92	

MOISTURE RECOVERY DATA :

Bag No.		NA	Filter No.		4Q0525		Impinger			
Bag Vol.		---	Nozzle No.		T-2		Final wt., g		821	
Leak Rate		NA	Nozzle Dn.		0.210		Initial wt., g		662	
							Difference		159	
									1	
									2	
									3	
									4	
									5	
									6	
									740	
									763	
									762	
									739	
									1066	
									16	
									245	



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 2

Project	AcelorMittal Minorca Mine Inc.				Meter ID	C-7	Probe ID	5-2	Bar.Press.	28.35	in. Hg	Sample Train Leak Rate, cfm:
Sample Location	Indurating Furnace Stack C SV016				Meter Y	1.0091	Pilot Tube No.	5-2	Stat.Press.	-0.90	in. H2O	0.000 at 15 in. Hg
Date	06/23/15				Orifice dh@	1.8055	Pilot Cp	0.84				Posttest 0.000 at 5 in. Hg
Test	3				Run #	2	Liner Type:	Glass				Pretest Pilot leak Check Pos Pass @ >3" w.c
Operators	RMP/RBS											Posttest Pilot leak Check Neg Pass @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft ³	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft ³	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	Moisture Content, %
Start Time	1810	285.03												
1	5.0	288.45	0.920	1.36	3.38	288.41	*	144	*	*	*	71	71	12.7
2	10.0	291.89	0.920	1.36	3.38	291.79	*	143	*	*	*	73	71	12.7
3	15.0	295.27	0.910	1.35	3.37	295.16	*	142	*	*	*	74	71	12.7
4	20.0	298.57	0.900	1.34	3.36	298.51	*	142	*	*	*	76	72	12.7
5	25.0	301.65	0.770	1.14	3.11	301.62	*	143	*	*	*	77	72	12.7
6	30.0	304.68	0.740	1.10	3.05	304.67	*	144	*	*	*	78	72	12.7
7	35.0	308.00	0.920	1.37	3.41	308.08	*	143	*	*	*	77	73	12.7
8	40.0	311.41	0.960	1.43	3.48	311.55	*	144	*	*	*	78	73	12.7
9	45.0	314.55	0.780	1.16	3.14	314.69	*	144	*	*	*	78	73	12.7
10	50.0	317.64	0.750	1.12	3.08	317.76	*	144	*	*	*	78	73	12.7
11	55.0	320.63	0.660	1.02	2.96	320.72	*	143	*	*	*	78	73	12.7
12	60.0	323.61	0.680	1.01	2.93	323.65	*	143	*	*	*	78	74	12.7
13	65.0	327.07	0.970	1.44	3.50	327.15	*	144	*	*	*	76	73	12.7
14	70.0	330.57	0.990	1.47	3.52	330.68	*	145	*	*	*	77	73	12.7
15	75.0	334.06	0.960	1.42	3.47	334.15	*	145	*	*	*	78	73	12.7
16	80.0	337.54	0.970	1.44	3.50	337.65	*	144	*	*	*	78	74	12.7
17	85.0	340.79	0.860	1.28	3.30	340.94	*	143	*	*	*	79	75	12.7
18	90.0	344.05	0.860	1.29	3.30	344.25	*	143	*	*	*	79	74	12.7
19	95.0	347.48	0.930	1.39	3.43	347.68	*	143	*	*	*	77	74	12.7
20	100.0	350.72	0.960	1.43	3.48	351.16	*	144	*	*	*	79	74	12.7
21	105.0	354.19	0.920	1.37	3.41	354.57	*	144	*	*	*	79	75	12.7
22	110.0	357.68	0.950	1.42	3.47	358.05	*	143	*	*	*	80	75	12.7
23	115.0	361.10	0.830	1.24	3.25	361.30	*	142	*	*	*	80	75	12.7
24	120.0	364.48	0.820	1.23	3.23	364.53	*	142	*	*	*	80	75	12.7
End Time	2020													
Run Time	120		Avg DH=	1.30			Avg Ts=	143.88				Avg Tm=	75.54	

MOISTURE RECOVERY DATA :														
Integrated Gas Sampling Data :				Impinger	1	2	3	4	5	6	Desiccant	Total		
Bag No.	NA	Filter No.	4Q0492											
Bag Vol.	---	Nozzle No.	T-2		864	809	814	700	776	800	1033			
Leak Rate	NA	Nozzle Dn.	0.210		704	762	806	698	775	800	1021			
					160	47	8	2	1	0	12	230		

* Data Recorded on Field Data Sheet



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 3

Project	Arelor/Mital Minorca Mine Inc.				Meter ID	C-7	Probe ID	5-2	Bar.Press.	28.37	in. Hg	Sample Train Leak Rate, cfm:
Sample Location	Indurating Furnace Stack C SV016				Meter Y	1.0091	Pilot. Tube No.	5-2	Stat Press.	-0.90	in. H2O	Pretest
Date	06/24/15				Orifice dH@	1.8055	Pilot Cp	0.84	Pretest	0.000 at 15 in. Hg		
Test	3 Run # 3				Orifice dH@	1.8055	Pilot Cp	0.84	Posttest	0.000 at 5 in. Hg		
Operators	RMP/RBS				Liner Type:	Glass			Pretest Pilot leak Check Pos	PASS @ >3" w.c		
					Liner Type:	Glass			Posttest Pilot leak Check Neg	PASS @ >3" w.c		

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F				Moisture Content, %	
									Filter	Probe	Impinger Outlet	Meter Inlet		Meter Outlet
Start Time	0803	364.81												
1	5.0	368.15	0.900	1.32	3.31	368.12	*	142	*	*	*	64	63	12.6
2	10.0	371.48	0.900	1.31	3.30	371.42	*	142	*	*	*	68	64	12.6
3	15.0	374.76	0.850	1.25	3.22	374.64	*	141	*	*	*	70	65	12.6
4	20.0	377.98	0.860	1.27	3.25	377.89	*	142	*	*	*	71	66	12.6
5	25.0	381.06	0.770	1.14	3.08	380.97	*	142	*	*	*	72	66	12.6
6	30.0	384.07	0.760	1.12	3.06	384.04	*	142	*	*	*	73	67	12.6
7	35.0	387.41	0.910	1.35	3.36	387.40	*	141	*	*	*	71	68	12.6
8	40.0	390.75	0.920	1.36	3.37	390.77	*	143	*	*	*	73	68	12.6
9	45.0	394.09	0.900	1.33	3.34	394.11	*	143	*	*	*	74	69	12.6
10	50.0	397.49	0.930	1.38	3.40	397.51	*	142	*	*	*	74	69	12.6
11	55.0	400.73	0.820	1.22	3.20	400.71	*	142	*	*	*	75	70	12.6
12	60.0	403.95	0.820	1.22	3.20	403.91	*	142	*	*	*	75	70	12.6
13	65.0	407.32	0.910	1.35	3.37	407.29	*	142	*	*	*	73	71	12.6
14	70.0	410.68	0.920	1.36	3.38	410.67	*	144	*	*	*	76	71	12.6
15	75.0	414.03	0.920	1.37	3.40	414.07	*	143	*	*	*	76	72	12.6
16	80.0	417.41	0.930	1.39	3.42	417.49	*	142	*	*	*	77	72	12.6
17	85.0	420.76	0.820	1.22	3.22	420.70	*	142	*	*	*	77	72	12.6
18	90.0	424.01	0.800	1.19	3.18	423.88	*	142	*	*	*	77	72	12.6
19	95.0	427.30	0.870	1.30	3.31	427.19	*	142	*	*	*	75	72	12.6
20	100.0	430.62	0.920	1.37	3.40	430.59	*	143	*	*	*	76	73	12.6
21	105.0	433.89	0.870	1.30	3.31	433.90	*	143	*	*	*	77	73	12.6
22	110.0	437.18	0.830	1.24	3.24	437.13	*	143	*	*	*	77	73	12.6
23	115.0	440.19	0.730	1.09	3.03	440.17	*	143	*	*	*	77	73	12.6
24	120.0	443.27	0.730	1.09	3.03	443.20	*	143	*	*	*	77	73	12.6
End Time	1013													
Run Time	120		Avg DH=	1.27			Avg Ts=	142.33				Avg Trm=	71.81	

Integrated Gas Sampling Data :

Bag No.	NA	Filter No.	4C0493
Bag Vol.	--- liters	Nozzle No.	T-2
Leak Rate	NA cc/min	Nozzle Dn.	0.210

MOISTURE RECOVERY DATA :

Impinger	1
Final wt., g	822
Initial wt., g	661
Difference	161

	1	2	3	4	5	6	Desiccant	Total
	822	811	810	685	764	740	955	
	661	760	803	683	764	740	936	
	161	51	7	2	0	0	19	240

* Data Recorded on Field Data Sheet



EPA METHOD 29

FIELD DATA SHEET

Project	Acclor Mittal Minorca Mine	Meter ID	C-7	Probe ID	5-2	Bar. Pres	8837	in Hg	Sample Train Leak Rate (cfm)
Smpl Loc	Furnace Stack 0	Meter Y	1-091	Pilot No.	8-2	Stat. Pres	-0.95	in H ₂ O	Pretest 6.0 at 15
Test No.	4	Run	1	Office H@	14055	Probe Lgth	5	ft	Posttest 0.0 at 3
Date	6-25-2015	Operators	RMD/RS	Liner Type:	<input checked="" type="checkbox"/> Glass <input type="checkbox"/> S.S. <input type="checkbox"/> Other	Imp TC	32600		Pilot (3 in.) Pos. <input type="checkbox"/> Neg. <input checked="" type="checkbox"/>

Sample Point	1-1	1-1	1-2	1-2	1-3	1-3	2-1	2-1	2-2	2-2	2-3	2-3	3-1	3-1	3-2	3-2	3-3	3-3	4-1	4-1	4-2	4-2	4-3	4-3
Sample Time Δt	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120
Meter Volume vm, ft ³	447.79	447.12	450.52	454.03	457.44	460.73	464.03	467.36	470.64	474.34	477.70	480.91	484.17	487.54	490.80	494.21	497.54	500.83	504.10	507.36	510.58	513.79	516.94	519.97
Velocity ΔP , in H ₂ O	0.40	1.35	1.43	1.05	1.44	1.05	1.44	1.36	1.35	1.33	1.45	1.45	1.45	1.26	1.25	1.32	1.29	1.26	1.13	1.17	1.23	1.24	1.24	1.12
Orifice ΔH , in H ₂ O	1.35	1.43	1.44	1.44	1.44	1.44	1.44	1.36	1.35	1.33	1.45	1.45	1.45	1.26	1.25	1.32	1.29	1.26	1.13	1.17	1.23	1.24	1.24	1.12
Sample Vacuum, in Hg	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Stack Temp. Ts, °F	149	151	150	151	150	151	151	151	151	151	149	149	149	149	149	149	149	149	149	149	149	149	149	149
Probe	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247
Filter	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247	247
Impinger Outlet	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
Meter Inlet	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Meter Outlet	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63
Oxygen Content, %																								

Sample Point	Sample Time Δt	Meter Volume v_m , ft ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Sample Train Temperatures, °F				Oxygen Content, %
							Probe	Filter	Impinger Outlet	Meter Inlet	
		443.79									
1-1	5	447.12	0.40	1.35	3.0	149	247	247	59	64	63
1-1	10	450.52	1.05	1.43	3.0	151	244	250	54	64	63
1-2	15	454.03	1.05	1.44	3.0	150	246	253	53	65	63
1-2	20	457.44	1.05	1.44	3.0	151	245	247	55	66	64
1-3	25	460.73	0.99	1.36	3.0	150	245	246	55	68	64
1-3	30	464.03	0.99	1.35	3.0	151	246	250	52	69	65
2-1	35	467.36	0.97	1.33	3.0	151	245	248	62	69	64
2-1	40	470.64	1.05	1.45	3.0	151	245	248	60	70	64
2-2	45	474.34	1.05	1.45	3.0	151	244	247	58	72	66
2-2	50	477.70	1.05	1.45	3.0	149	244	247	61	73	62
2-3	55	480.91	0.91	1.26	3.0	149	244	249	64	73	62
2-3	60	484.17	0.90	1.25	3.0	149	245	248	60	73	60
3-1	65	487.54	0.94	1.31	3.0	149	245	247	65	72	64
3-1	70	490.80	0.95	1.32	3.0	149	246	249	59	74	69
3-2	75	494.21	0.93	1.29	3.0	149	244	249	59	75	70
3-2	80	497.54	0.90	1.26	3.0	149	245	245	60	75	70
3-3	85	500.83	0.81	1.13	3.0	148	245	249	60	76	70
3-3	90	504.10	0.80	1.17	3.0	149	246	247	59	76	71
4-1	95	507.36	0.80	1.23	3.0	149	245	249	65	75	71
4-1	100	510.58	0.83	1.24	3.0	150	245	246	63	75	72
4-2	105	513.79	0.93	1.27	3.0	149	244	246	62	76	72
4-2	110	516.94	0.92	1.24	3.0	149	245	247	63	72	72
4-3	115	519.97	0.90	1.12	3.0	149	246	247	63	72	72
4-3	120	522.95	0.90	1.12	3.0	149	244	249	63	72	72
$\bar{\phi}$		$V_m=4.16$	0.94	$\Delta H=1.31$		$T_s=149.42$					$T_m=10.02$

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration			
Meter Temp	Oxygen Content	Moisture Content	Start Time	End Time	Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dn		Filter No.	Nozzle No.	Nozzle Dn		Tech	Nozzle No.		Date
64	18.5	15.3	0756	1013	NA			400495	T-1	0.210		400495	T-1	0.210		6/23	1-1		5-1
Run 1																	2		0.210
Run 2																	3		0.210
																	Avg. In.		0.210

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Total
Final wt., g	67.7	63.6	9.16	7.07	7.90	6.01	95.3
Initial wt., g	70.1	71.0	8.04	6.99	7.90	6.01	95.2
Difference	17.3	6.6	1.2	3	2	0	2.7

Air Flows	
ACFM	219.647
DSCFM	153.730



EPA METHOD 29

FIELD DATA SHEET

Project	Arcelor Mittal Minorca Mine	Meter ID	C-7	Probe ID	S-2	Bar. Pres	2840	in Hg
Smpl Loc	Furnace Stack 0	Meter Y	1.0091	Pitot No.	S-2	Stat. Pres	-0.95	in H ₂ O
Test No.	4	Run	2	Pitot Cp	0.64	Probe Lgh	5	ft
Date	6-25-2015	Operators	RM/RS	Liner Type:	<input checked="" type="checkbox"/> Glass <input type="checkbox"/> S.S. <input type="checkbox"/> Other	Imp TC	3860	

Sample Train Leak Rate (cfm)	
Pretest 0.0	at 15 in Hg
Posttest 0.0	at 8 in Hg
Pitot (3 in.) Pos.	<input checked="" type="checkbox"/> Neg. <input type="checkbox"/>

Sample Point	Sample Time Δt	Meter Volume Vm, m ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. Ts, °F	Probe	Filter	Impinger Outlet	Meter Inlet	Meter Outlet	Oxygen Content, %
1-1	5	516.82	1.00	1.41	6.0	150	246	248	66	72	72	
1-1	10	530.31	1.05	1.46	6.0	149	250	248	64	71	72	
1-2	15	535.72	1.05	1.40	6.0	144	249	248	62	76	72	
1-2	20	537.23	1.00	1.41	6.0	150	247	248	60	72	73	
1-3	25	540.61	0.92	1.30	6.0	150	246	250	60	70	73	
1-3	30	543.94	0.93	1.32	6.0	151	246	248	58	70	73	
2-1	35	546.92	0.72	1.09	6.0	151	245	246	65	75	73	
2-1	40	549.96	0.74	1.11	6.0	151	246	250	63	72	73	
2-2	45	553.01	0.72	1.09	6.0	150	246	244	62	70	73	
2-2	50	556.66	0.76	1.10	6.0	150	245	248	60	70	73	
2-3	55	560.07	0.70	0.99	6.0	150	247	246	61	74	73	
2-3	60	561.65	0.65	0.92	6.0	149	244	248	61	74	74	
3-1	65	565.39	1.05	1.49	6.0	149	245	248	66	72	74	
3-1	70	568.70	1.05	1.49	6.0	149	243	248	64	70	71	
3-2	75	572.10	1.16	1.56	6.6	149	245	247	64	74	74	
3-2	80	575.36	1.05	1.49	6.5	150	245	247	63	90	74	
3-3	85	579.21	0.95	1.35	6.0	149	243	247	64	74	74	
3-3	90	582.52	0.92	1.31	6.0	149	243	247	61	74	74	
4-1	95	586.04	1.05	1.49	6.5	149	247	248	63	72	74	
4-1	100	589.55	1.05	1.49	6.5	150	246	250	57	74	75	
4-2	105	593.15	1.10	1.56	6.5	150	245	250	56	74	75	
4-2	110	596.72	1.05	1.49	7.0	149	245	248	58	74	75	
4-3	115	600.24	1.05	1.49	7.0	149	244	247	60	74	75	
4-3	120	603.74	1.00	1.47	7.0	149	245	248	62	74	75	
\bar{Q}		598.50	0.95	$\Delta H = 3.5$		$T_s = 149.63$					$T_m = 56.7$	

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration			
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time	Bag No.	Bag Vol	cc/min * at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dn	Tech.	Nozzle No.						
72	18.5	14.7		1105	1320	NA			480537	T-2	0.210								
Run 1																			
Run 2																			

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	643	744	804	644	755	740	947	
Initial wt., g	661	731	741	682	754	740	933	
Difference	162	57	13	2	1	0	14	269

Air Flows	
ACFM	220.149
DSCFM	154.925



EPA METHOD 29

FIELD DATA SHEET

Project	Arcelor Mittal Minors Mine	Meter ID	C-7	Probe ID	S-2	Bar Pres	28.40	In Hg	Sample Train Leak Rate (cfm)
Smpl Loc	Furnace Stack D	Meter Y	100041	Pilot No.	S-2	Stat Pres	-0.95	In H ₂ O	Pretest 0.0 at 15 In Hg
Test No.	4	Run	3	Office H@	12065	Pilot Cp	0.80	Probe Lgth	Posttest 0.0 at 10 In Hg
Date	6-25-15	Operators	P-M/1205	Liner Type:	<input checked="" type="checkbox"/> Glass <input type="checkbox"/> SIS <input type="checkbox"/> Other	Imp TC	3860	Pilot (3 In.) Pos.	<input checked="" type="checkbox"/> Neg. <input type="checkbox"/>

Sample Point	Sample Time Δt	Meter Volume V_m , ft ³	Velocity ΔP , in H ₂ O	Orifice ΔH , in H ₂ O	Sample Vacuum, in Hg	Stack Temp. T_s , °F	Sample Train Temperatures, °F				Oxygen Content, %	
							Probe	Filter	Impinger Outlet	Meter Inlet		Meter Outlet
		601.06										
1-1	5	607.56	1.05	1.44	4.0	150	245	242	66	72	72	
1-1	10	611.06	1.05	1.49	4.0	150	245	242	65	73	72	
1-2	15	614.36	1.00	1.42	4.0	150	245	251	64	74	72	
1-2	20	610.01	1.00	1.42	4.0	151	244	242	64	74	72	
1-3	25	621.40	0.96	1.32	8.5	150	245	242	63	75	72	
1-3	30	624.82	0.96	1.32	8.5	150	246	246	63	75	72	
2-1	35	628.11	1.00	1.42	4.5	151	246	246	63	75	72	
2-1	40	631.67	1.05	1.49	4.0	152	245	248	63	76	72	
2-2	45	635.05	1.05	1.49	4.0	152	246	249	63	77	72	
2-2	50	638.50	1.10	1.52	4.5	151	245	249	63	77	72	
2-3	55	642.17	1.05	1.49	4.5	151	245	249	63	77	72	
2-3	60	645.65	1.00	1.43	4.5	150	244	249	62	77	73	
3-1	65	649.98	0.93	1.33	4.0	150	246	242	66	76	73	
3-1	70	652.36	0.94	1.34	4.5	151	248	242	59	72	73	
3-2	75	655.25	0.94	0.91	7.0	151	244	248	52	78	73	
3-2	80	658.07	0.64	0.91	6.5	151	245	248	58	78	73	
3-3	85	660.63	0.62	0.84	6.0	150	246	248	60	78	73	
3-3	90	663.56	0.63	0.90	6.0	150	244	249	60	78	73	
4-1	95	666.64	0.82	1.12	7.0	150	245	249	66	72	74	
4-1	100	669.85	0.84	1.20	8.0	151	245	242	63	78	74	
4-2	105	673.00	0.83	1.14	8.0	152	245	250	61	79	74	
4-2	110	676.14	0.81	1.16	8.0	151	244	247	60	79	74	
4-3	115	679.21	0.71	1.02	8.0	150	245	248	61	79	74	
4-3	120	682.11	0.67	0.96	8.0	151	249	246	62	78	75	
$\bar{Q} =$		$V_m = 1203$	0.67	$\Delta H = 1.27$		$T_s = 6.67$					$T_m = 7.71$	

Initialization Values				Test Run Times				ORSAT System				Sample Train Components				Nozzle Calibration	
Meter Temp	Oxygen Content	Moisture Content		Start Time	End Time	Bag No.	Bag Vol	col/min* at 15 in Hg	Filter No.	Nozzle No.	Nozzle Dn	Filler No.	Nozzle No.	Nozzle Dn		Tech.	Date
72	16.5	14.2		1433	1646	NA			42840	4240	0.210					1	See
Run 2																2	See
																3	H-1
Avg. In.																	

Moisture Recovery Data:

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	845	717	746	703	772	400	100	
Initial wt., g	704	716	745	699	776	600	449	
Difference	141	51	1	4	1	0	12	760

Air Flows		DSCFM	
ACFM	212.700	449	449
	212.826	449	449

149,333



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 1

Project	ArcelorMittal Minorca Mine Inc.									
Sample Location	Indurating Furnace Stack D SV017									
Date	06/25/15	Meter ID	C-7	Probe ID	5-2	Bar Press.	28.40	in. Hg	Sample Train Leak Rate, cfm:	
Test	4	Meter Y	1.0091	Pilot Tube No.	5-2	Stat Press.	-0.95	in. H ₂ O	Pretest	0.000 at 15 in. Hg
Operators	RMP/RBS	Orifice dH@	1.8055	Pilot Cp	0.84				Posttest	0.000 at 5 in. Hg
		Liner Type:	Glass						Pretest Pilot leak Check Pos	Pass @ >3" w.c
									Posttest Pilot leak Check Neg	Pass @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F				Moisture Content, %	
									Filter	Probe	Impinger Outlet	Meter Inlet		Meter Outlet
Start Time	0756	443.79												
1	5.0	447.12	0.980	1.35	3.34	447.13	*	148	*	*	*	64	63	15.3
2	10.0	450.52	1.050	1.43	3.44	450.57	*	151	*	*	*	64	63	15.3
3	15.0	454.03	1.050	1.44	3.45	454.02	*	150	*	*	*	65	63	15.3
4	20.0	457.44	1.050	1.44	3.45	457.47	*	151	*	*	*	66	64	15.3
5	25.0	460.73	0.990	1.36	3.36	460.83	*	150	*	*	*	68	64	15.3
6	30.0	464.03	0.980	1.35	3.34	464.17	*	151	*	*	*	69	65	15.3
7	35.0	467.36	0.970	1.33	3.33	467.50	*	151	*	*	*	69	66	15.3
8	40.0	470.84	1.050	1.45	3.47	470.97	*	151	*	*	*	70	66	15.3
9	45.0	474.34	1.050	1.45	3.49	474.45	*	151	*	*	*	72	66	15.3
10	50.0	477.70	1.050	1.45	3.49	477.93	*	149	*	*	*	73	67	15.3
11	55.0	480.91	0.910	1.26	3.25	481.19	*	149	*	*	*	73	67	15.3
12	60.0	484.47	0.900	1.25	3.24	484.42	*	148	*	*	*	73	68	15.3
13	65.0	487.54	0.940	1.31	3.31	487.73	*	149	*	*	*	72	69	15.3
14	70.0	490.90	0.950	1.32	3.33	491.06	*	149	*	*	*	74	69	15.3
15	75.0	494.21	0.930	1.29	3.30	494.35	*	149	*	*	*	75	70	15.3
16	80.0	497.54	0.900	1.26	3.25	497.60	*	148	*	*	*	75	70	15.3
17	85.0	500.83	0.810	1.13	3.08	500.69	*	148	*	*	*	76	70	15.3
18	90.0	504.10	0.800	1.12	3.07	503.76	*	148	*	*	*	76	71	15.3
19	95.0	507.38	0.880	1.23	3.22	506.98	*	149	*	*	*	73	71	15.3
20	100.0	510.58	0.930	1.29	3.30	510.27	*	150	*	*	*	75	72	15.3
21	105.0	513.79	0.930	1.30	3.31	513.58	*	149	*	*	*	76	72	15.3
22	110.0	516.94	0.920	1.29	3.29	516.88	*	149	*	*	*	77	72	15.3
23	115.0	519.97	0.800	1.12	3.07	519.95	*	149	*	*	*	77	72	15.3
24	120.0	522.95	0.800	1.12	3.07	523.03	*	149	*	*	*	77	72	15.3
End Time	1013													
Run Time	120		Avg DH=	1.31			Avg Ts=	149.42				Avg Tm=	70.02	

Integrated Gas Sampling Data :										MOISTURE RECOVERY DATA :			
Bag No.	NA	Filter No.	4Q0495	Impinger						1	2	3	4
Bag Vol.	NA	Nozzle No.	T-2	Final wt., g	877	836	702	780	Desiccant	877	836	702	780
Leak Rate	NA	Nozzle Dn.	0.210	Initial wt., g	704	770	699	778		704	770	699	778
				Difference	173	66	3	2		173	66	3	2
													277

* Data Recorded on Field Data Sheet



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 2

Project	AcelorMittal Minorca Mine Inc.				Meter ID	C-7	Probe ID	5-2	Bar.Press.	28.40	in. Hg	Sample Train Leak Rate, cfm:
Sample Location	Indurating Furnace Stack D SV017				Meter Y	1.0091	Pilot Tube No.	5-2	Stat.Press.	-0.95	in. H2O	0.000 at 15 in. Hg
Date	06/25/15				Orifice dh@	1.8055	Pilot Cp	0.84				Posttest 0.000 at 8 in. Hg
Test	4				Run #	2	Liner Type:	Glass				Pretest Pilot leak Check Pos Pass @ >3" w.c
Operators	RMP/RBS											Posttest Pilot leak Check Neg Pass @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H2O	Orifice DH in. H2O	Ideal Point Volume Vm, ft3	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Filter	Probe	Impinger Outlet	Meter Inlet	Meter Outlet	Moisture Content, %
Start Time	1105	523.29												
1	5.0	526.82	1.000	1.41	3.44	526.73	*	150	*	*	*	72	72	14.7
2	10.0	530.31	1.050	1.48	3.53	530.26	*	149	*	*	*	74	72	14.7
3	15.0	533.77	1.050	1.48	3.53	533.79	*	149	*	*	*	76	72	14.7
4	20.0	537.23	1.000	1.41	3.45	537.24	*	150	*	*	*	77	73	14.7
5	25.0	540.61	0.920	1.30	3.32	540.56	*	150	*	*	*	78	73	14.7
6	30.0	543.94	0.930	1.32	3.34	543.90	*	151	*	*	*	78	73	14.7
7	35.0	546.92	0.770	1.09	3.04	546.93	*	151	*	*	*	75	73	14.7
8	40.0	549.96	0.790	1.11	3.07	550.00	*	151	*	*	*	77	73	14.7
9	45.0	553.01	0.770	1.09	3.04	553.03	*	150	*	*	*	78	73	14.7
10	50.0	556.06	0.780	1.10	3.06	556.09	*	150	*	*	*	78	73	14.7
11	55.0	559.07	0.700	0.99	2.90	558.99	*	150	*	*	*	79	73	14.7
12	60.0	561.85	0.650	0.92	2.80	561.78	*	149	*	*	*	79	74	14.7
13	65.0	565.39	1.050	1.49	3.56	565.34	*	149	*	*	*	77	74	14.7
14	70.0	568.70	1.050	1.49	3.55	568.89	*	149	*	*	*	78	74	14.7
15	75.0	572.26	1.100	1.56	3.64	572.53	*	149	*	*	*	79	74	14.7
16	80.0	575.76	1.050	1.49	3.55	576.08	*	150	*	*	*	80	74	14.7
17	85.0	579.21	0.950	1.35	3.39	579.47	*	149	*	*	*	79	74	14.7
18	90.0	582.52	0.920	1.31	3.33	582.80	*	149	*	*	*	79	74	14.7
19	95.0	586.04	1.050	1.49	3.56	586.36	*	149	*	*	*	77	74	14.7
20	100.0	589.55	1.050	1.49	3.55	589.90	*	150	*	*	*	79	75	14.7
21	105.0	593.15	1.100	1.56	3.64	593.55	*	150	*	*	*	79	75	14.7
22	110.0	596.72	1.050	1.49	3.56	597.11	*	149	*	*	*	79	75	14.7
23	115.0	600.29	1.050	1.49	3.56	600.67	*	149	*	*	*	79	75	14.7
24	120.0	603.79	1.000	1.42	3.47	604.14	*	149	*	*	*	79	75	14.7
End Time	1320													
Run Time	120		Avg DH=	1.35			Avg Ts=	149.83				Avg Tm=	75.67	

Integrated Gas Sampling Data :

Bag No.	NA	Filter No.	4Q0537
Bag Vol.	NA	Nozzle No.	T-2
Leak Rate	NA	Nozzle Dn.	0.210

MOISTURE RECOVERY DATA :

Impinger	
Final wt., g	
Initial wt., g	
Difference	

	1	2	3	4	5	6	Desiccant	Total
1	843	788	804	684	755	740	947	
	661	731	791	682	754	740	933	
	182	57	13	2	1	0	14	269

* Data Recorded on Field Data Sheet



EPA METHOD 5/29 - FIELD DATA SHEET - RUN 3

Project	Areslor/Mital Minorca Mine Inc.			Meter ID	C-7	Probe ID	5-2	Bar.Press.	28.37	in. Hg	Sample Train Leak Rate, cfm:
Sample Location	Indurating Furnace Stack D SV017			Meter Y	1.0091	Pilot. Tube No.	5-2	Stat Press.	-0.95	in. H2O	0.000 at 15 in. Hg
Date	06/25/15			Orifice dH@	1.8055	Pilot Cp	0.84				Pretest 0.000 at 10 in. Hg
Test	4			Run #	3	Liner Type:	Glass				Posttest Pilot leak Check Pos PASS @ >3" w.c
Operators	RMP/RBS										Posttest Pilot leak Check Neg PASS @ >3" w.c

Sample Point	Sample Time DT	Actual Meter Vol Vm, ft3	Velocity Head DP, in. H ₂ O	Orifice DH in. H ₂ O	Ideal Point Volume Vm, ft ³	Ideal Meter Vol Vm, ft3	Sample Train Vacuum in. Hg	Stack Temp Ts, °F	Sample Train Temperatures, °F				Moisture Content, %	
									Filter	Probe	Impinger Outlet	Meter Inlet		Meter Outlet
Start Time	1433	604.08												
1	5.0	607.56	1.050	1.49	3.54	607.62	*	150	*	*	*	72	72	14.2
2	10.0	611.06	1.050	1.49	3.54	611.16	*	150	*	*	*	73	72	14.2
3	15.0	614.56	1.000	1.42	3.46	614.62	*	150	*	*	*	74	72	14.2
4	20.0	618.01	1.000	1.42	3.46	618.08	*	151	*	*	*	74	72	14.2
5	25.0	621.40	0.960	1.37	3.39	621.47	*	150	*	*	*	75	72	14.2
6	30.0	624.82	0.960	1.37	3.40	624.87	*	150	*	*	*	75	72	14.2
7	35.0	628.11	1.000	1.42	3.46	628.33	*	151	*	*	*	75	72	14.2
8	40.0	631.67	1.050	1.49	3.55	631.88	*	152	*	*	*	76	72	14.2
9	45.0	635.05	1.050	1.49	3.55	635.43	*	152	*	*	*	77	72	14.2
10	50.0	638.58	1.100	1.57	3.64	639.07	*	151	*	*	*	77	72	14.2
11	55.0	642.17	1.050	1.49	3.56	642.62	*	151	*	*	*	77	72	14.2
12	60.0	645.65	1.000	1.43	3.47	646.09	*	150	*	*	*	77	73	14.2
13	65.0	648.98	0.930	1.33	3.35	649.44	*	150	*	*	*	76	73	14.2
14	70.0	652.36	0.940	1.34	3.36	652.81	*	151	*	*	*	77	73	14.2
15	75.0	655.25	0.640	0.91	2.78	655.59	*	151	*	*	*	78	73	14.2
16	80.0	658.07	0.640	0.91	2.78	658.37	*	151	*	*	*	78	73	14.2
17	85.0	660.83	0.620	0.89	2.74	661.11	*	150	*	*	*	78	73	14.2
18	90.0	663.56	0.630	0.90	2.76	663.87	*	150	*	*	*	78	73	14.2
19	95.0	666.69	0.820	1.17	3.15	667.02	*	150	*	*	*	77	74	14.2
20	100.0	669.85	0.840	1.20	3.19	670.20	*	151	*	*	*	78	74	14.2
21	105.0	673.00	0.830	1.18	3.17	673.37	*	152	*	*	*	79	74	14.2
22	110.0	676.14	0.810	1.16	3.13	676.50	*	151	*	*	*	79	74	14.2
23	115.0	679.21	0.710	1.02	2.94	679.44	*	150	*	*	*	79	74	14.2
24	120.0	682.11	0.670	0.96	2.85	682.29	*	151	*	*	*	79	75	14.2
End Time	1646													
Run Time	120		Avg DH=	1.27			Avg Ts=	150.67				Avg Trm=	74.71	

Integrated Gas Sampling Data :

Bag No.	NA	Filter No.	4C0540
Bag Vol.	NA	Nozzle No.	T-2
Leak Rate	NA	Nozzle Dn.	0.210

MOISTURE RECOVERY DATA :

Impinger	1	2	3	4	5	6	Desiccant	Total
Final wt., g	885	777	796	703	777	800	1001	
Initial wt., g	704	726	785	699	776	800	989	
Difference	181	51	11	4	1	0	12	260

* Data Recorded on Field Data Sheet

Appendix C

Laboratory Reports and Sample Chain of Custody

Laboratory Results Summary of EPA Method 29 Mercury Analysis

From Sub-Contracted Mercury Analysis

Indurating Furnace Stack A (SV014)

Test 1 - Mercury

Testing on 6/23-24/2015

Method 29 Mercury Mass Determination

Front Half (Filterable)

Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blank (MHg _{fthb})
Analysis #1, Total	--	µg	1.29	1.02	1.01	< 0.1
Analysis #2, Total	--	µg	1.29	1.03	1.02	< 0.1
Front Half Net Mass Hg, Average	MHg _{fthm}	µg	1.29	1.03	1.02	< 0.1
Back Half						
Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blanks
10% H ₂ O ₂ / 5% HNO ₃						
Analysis #1, Total µg	--	µg	2.15	2.75	3.38	< 0.1
Analysis #2, Total µg	--	µg	2.15	2.74	3.37	< 0.1
Net Mass Average	MHg _{bh2}	µg	2.15	2.75	3.38	< 0.1
Empty Impinger						
Analysis #1, Total µg	--	µg	< 0.2	< 0.2	< 0.2	< 0.2
Analysis #2, Total µg	--	µg	< 0.2	< 0.2	< 0.2	< 0.2
Net Mass Average	MHg _{bh3A}	µg	< 0.2	< 0.2	< 0.2	< 0.2
KMnO ₄						
Analysis #1, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Analysis #2, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Net Mass Average	MHg _{bh3B}	µg	< 0.5	< 0.5	< 0.5	< 0.5
HCl						
Analysis #1, Total	--	µg	1.54	0.41	0.85	< 0.4
Analysis #2, Total	--	µg	1.54	0.41	0.85	< 0.4
Net Mass Average	MHg _{bh3C}	µg	1.54	0.41	0.85	< 0.4
Total Back Half Net Mass Hg, Average MHg _{bhm} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C})						
	MHg _{bhm}	µg	4.39	3.86	4.93	
Blank Correction Determination						
Back Half Blank MHg _{bhb} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C}) blanks	MHg _{bhb}	µg	0.00			
			5% of the Total Net Mass			MHg _{fthb} +MHg _{bhb}
	--	µg	0.28	0.24	0.30	0.00
Total Blank Correction Amount ⁽¹⁾						
	MHg _{blank}	µg	0.00	0.00	0.00	
Mercury Mass Determinations						
Front Half (Filterable) Mercury Mass MHg _{fth} = MHg _{fthm} - MHg _{fthb}	MHg _{fth}	µg	1.29	1.03	1.02	
Back Half Mercury Mass MHg _{bh} = MHg _{bhm} - MHg _{bhb}	MHg _{bh}	µg	4.39	3.86	4.93	
Final Total Mercury Mass ⁽²⁾ MHg _t = (MHg _{fthm} + MHg _{bhm}) - MHg _{blank}	MHg _t	µg	5.68	4.88	5.94	

Note: The "<" sign indicates the mass is below method detection limits. All calculations forward use the detection limit for concentration and emission determinations and no blank correction is made.

(1) If the total of the measured blank values (MHg_{fthb}+MHg_{bhb}) is in the range of 0.0 to 0.6µg then use the total; if it exceeds 0.6µg, use the greater of (I) or (II). (I) 0.6µg (II) the lesser of (a) (MHg_{fthb}+MHg_{bhb}) or (b) 5% of the sample value.

(2) EPA Method 29 does not include calculations and/or specifications for blank correcting the front half and back half Hg mass independently, therefore the Total Mercury Loading may not necessarily be equal to (MHg_{fth}+MHg_{bh}).

Laboratory Results Summary of EPA Method 29 Mercury Analysis

From Sub-Contracted Mercury Analysis

Indurating Furnace Stack B (SV015)

Test 2 - Mercury

Testing on June 25, 2015

Method 29 Mercury Mass Determination

Front Half (Filterable)

Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blank (MHg _{fthb})
Analysis #1, Total	--	µg	1.10	1.14	0.795	< 0.1
Analysis #2, Total	--	µg	1.10	1.13	0.790	< 0.1
Front Half Net Mass Hg, Average	MHg _{fthm}	µg	1.10	1.14	0.79	< 0.1
Back Half						
Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blanks
10% H ₂ O ₂ / 5% HNO ₃						
Analysis #1, Total µg	--	µg	3.54	3.25	3.43	< 0.1
Analysis #2, Total µg	--	µg	3.56	3.29	3.46	< 0.1
Net Mass Average	MHg _{bh2}	µg	3.55	3.27	3.45	< 0.1
Empty Impinger						
Analysis #1, Total µg	--	µg	< 0.2	< 0.2	< 0.2	< 0.2
Analysis #2, Total µg	--	µg	< 0.2	< 0.2	< 0.2	< 0.2
Net Mass Average	MHg _{bh3A}	µg	< 0.2	< 0.2	< 0.2	< 0.2
KMnO ₄						
Analysis #1, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Analysis #2, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Net Mass Average	MHg _{bh3B}	µg	< 0.5	< 0.5	< 0.5	< 0.5
HCl						
Analysis #1, Total	--	µg	1.90	1.97	1.16	< 0.4
Analysis #2, Total	--	µg	1.88	1.92	1.13	< 0.4
Net Mass Average	MHg _{bh3C}	µg	1.89	1.95	1.15	< 0.4
Total Back Half Net Mass Hg, Average MHg _{bhm} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C})	MHg _{bhm}	µg	6.14	5.92	5.29	
Blank Correction Determination						
Back Half Blank MHg _{bhb} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C}) blanks	MHg _{bhb}	µg	0.00			
			5% of the Total Net Mass			MHg _{fthb} +MHg _{bhb}
	--	µg	0.36	0.35	0.30	0.00
Total Blank Correction Amount ⁽¹⁾	MHg _{blank}	µg	0.00	0.00	0.00	
Mercury Mass Determinations						
Front Half (Filterable) Mercury Mass MHg _{fth} = MHg _{fthm} - MHg _{fthb}	MHg _{fth}	µg	1.10	1.14	0.79	
Back Half Mercury Mass MHg _{bh} = MHg _{bhm} - MHg _{bhb}	MHg _{bh}	µg	6.14	5.92	5.29	
Final Total Mercury Mass ⁽²⁾ MHg _t = (MHg _{fthm} + MHg _{bhm}) - MHg _{blank}	MHg _t	µg	7.24	7.05	6.08	

Note: The "<" sign indicates the mass is below method detection limits. All calculations forward use the detection limit for concentration and emission determinations and no blank correction is made.

(1) If the total of the measured blank values (MHg_{fthb}+MHg_{bhb}) is in the range of 0.0 to 0.6µg then use the total; if it exceeds 0.6µg, use the greater of (I) or (II). (I) 0.6µg (II) the lesser of (a) (MHg_{fthb}+MHg_{bhb}) or (b) 5% of the sample value.

(2) EPA Method 29 does not include calculations and/or specifications for blank correcting the front half and back half Hg mass independently, therefore the Total Mercury Loading may not necessarily be equal to (MHg_{fth}+MHg_{bh}).

Laboratory Results Summary of EPA Method 29 Mercury Analysis

From Sub-Contracted Mercury Analysis

Indurating Furnace Stack C (SV016)

Test 3 - Mercury

Testing on 6/23-24/2015

Method 29 Mercury Mass Determination

Front Half (Filterable)

Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blank (MHg _{fthb})
Analysis #1, Total	--	µg	1.30	0.952	0.400	< 0.1
Analysis #2, Total	--	µg	1.30	0.948	0.401	< 0.1
Front Half Net Mass Hg, Average	MHg _{fthm}	µg	1.30	0.950	0.401	< 0.1
Back Half						
Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blanks
10% H ₂ O ₂ / 5% HNO ₃						
Analysis #1, Total µg	--	µg	3.98	4.08	4.16	< 0.1
Analysis #2, Total µg	--	µg	4.01	4.10	4.21	< 0.1
Net Mass Average	MHg _{bh2}	µg	4.00	4.09	4.19	< 0.1
Empty Impinger						
Analysis #1, Total µg	--	µg	< 0.2	0.247	< 0.2	< 0.2
Analysis #2, Total µg	--	µg	< 0.2	0.250	< 0.2	< 0.2
Net Mass Average	MHg _{bh3A}	µg	< 0.2	0.249	< 0.2	< 0.2
KMnO ₄						
Analysis #1, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Analysis #2, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Net Mass Average	MHg _{bh3B}	µg	< 0.5	< 0.5	< 0.5	< 0.5
HCl						
Analysis #1, Total	--	µg	3.88	3.79	4.14	< 0.4
Analysis #2, Total	--	µg	3.80	3.75	4.10	< 0.4
Net Mass Average	MHg _{bh3C}	µg	3.84	3.77	4.12	< 0.4
Total Back Half Net Mass Hg, Average MHg _{bhm} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C})	MHg _{bhm}	µg	8.54	8.61	9.01	
Blank Correction Determination						
Back Half Blank MHg _{bhb} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C}) blanks	MHg _{bhb}	µg	0.00			
			5% of the Total Net Mass			MHg _{fthb} +MHg _{bhb}
	--	µg	0.49	0.48	0.47	0.00
Total Blank Correction Amount ⁽¹⁾	MHg _{blank}	µg	0.00	0.00	0.00	
Mercury Mass Determinations						
Front Half (Filterable) Mercury Mass MHg _{fth} = MHg _{fthm} - MHg _{fthb}	MHg _{fth}	µg	1.30	0.95	0.40	
Back Half Mercury Mass MHg _{bh} = MHg _{bhm} - MHg _{bhb}	MHg _{bh}	µg	8.54	8.61	9.01	
Final Total Mercury Mass ⁽²⁾ MHg _t = (MHg _{fthm} + MHg _{bhm}) - MHg _{blank}	MHg _t	µg	9.84	9.56	9.41	

Note: The "<" sign indicates the mass is below method detection limits. All calculations forward use the detection limit for concentration and emission determinations and no blank correction is made.

(1) If the total of the measured blank values (MHg_{fthb}+MHg_{bhb}) is in the range of 0.0 to 0.6µg then use the total; if it exceeds 0.6µg, use the greater of (I) or (II). (I) 0.6µg (II) the lesser of (a) (MHg_{fthb}+MHg_{bhb}) or (b) 5% of the sample value.

(2) EPA Method 29 does not include calculations and/or specifications for blank correcting the front half and back half Hg mass independently, therefore the Total Mercury Loading may not necessarily be equal to (MHg_{fth}+MHg_{bh}).

Laboratory Results Summary of EPA Method 29 Mercury Analysis

From Sub-Contracted Mercury Analysis

Indurating Furnace Stack D (SV017)

Test 4 - Mercury

Performance Testing on June 25, 2015

Method 29 Mercury Mass Determination

Front Half (Filterable)

Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blank (MHg _{fthb})
Analysis #1, Total	--	µg	< 0.1	< 0.1	< 0.1	< 0.1
Analysis #2, Total	--	µg	< 0.1	< 0.1	< 0.1	< 0.1
Front Half Net Mass Hg, Average	MHg _{fthm}	µg	< 0.1	< 0.1	< 0.1	< 0.1
Back Half						
Inputs	Symbol	Units	Run 1	Run 2	Run 3	Blanks
10% H ₂ O ₂ / 5% HNO ₃						
Analysis #1, Total µg	--	µg	4.18	4.27	4.17	< 0.1
Analysis #2, Total µg	--	µg	4.20	4.29	4.21	< 0.1
Net Mass Average	MHg _{bh2}	µg	4.19	4.28	4.19	< 0.1
Empty Impinger						
Analysis #1, Total µg	--	µg	< 0.2	< 0.2	0.258	< 0.2
Analysis #2, Total µg	--	µg	< 0.2	< 0.2	0.261	< 0.2
Net Mass Average	MHg _{bh3A}	µg	< 0.2	< 0.2	0.260	< 0.2
KMnO ₄						
Analysis #1, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Analysis #2, Total µg	--	µg	< 0.5	< 0.5	< 0.5	< 0.5
Net Mass Average	MHg _{bh3B}	µg	< 0.5	< 0.5	< 0.5	< 0.5
HCl						
Analysis #1, Total	--	µg	6.95	6.36	5.54	< 0.4
Analysis #2, Total	--	µg	6.90	6.23	5.44	< 0.4
Net Mass Average	MHg _{bh3C}	µg	6.93	6.30	5.49	< 0.4
Total Back Half Net Mass Hg, Average MHg _{bhm} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C})	MHg _{bhm}	µg	11.82	11.28	10.44	
Blank Correction Determination						
Back Half Blank MHg _{bhb} = M(Hg _{bh2} +Hg _{bh3A} +Hg _{bh3B} +Hg _{bh3C}) blanks	MHg _{bhb}	µg	0.00			
			5% of the Total Net Mass			MHg _{fthb} +MHg _{bhb}
	--	µg	0.60	0.57	0.53	0.00
Total Blank Correction Amount ⁽¹⁾	MHg _{blank}	µg	0.00	0.00	0.00	
Mercury Mass Determinations						
Front Half (Filterable) Mercury Mass MHg _{fth} = MHg _{fthm} - MHg _{fthb}	MHg _{fth}	µg	< 0.10	< 0.10	< 0.10	
Back Half Mercury Mass MHg _{bh} = MHg _{bhm} - MHg _{bhb}	MHg _{bh}	µg	11.82	11.28	10.44	
Final Total Mercury Mass ⁽²⁾ MHg _t = (MHg _{fthm} + MHg _{bhm}) - MHg _{blank}	MHg _t	µg	11.92	11.38	10.54	

Note: The "<" sign indicates the mass is below method detection limits. All calculations forward use the detection limit for concentration and emission determinations and no blank correction is made.

(1) If the total of the measured blank values (MHg_{fthb}+MHg_{bhb}) is in the range of 0.0 to 0.6µg then use the total; if it exceeds 0.6µg, use the greater of (I) or (II). (I) 0.6µg (II) the lesser of (a) (MHg_{fthb}+MHg_{bhb}) or (b) 5% of the sample value.

(2) EPA Method 29 does not include calculations and/or specifications for blank correcting the front half and back half Hg mass independently, therefore the Total Mercury Loading may not necessarily be equal to (MHg_{fth}+MHg_{bh}).

Barr Engineering

5150 West 76th Street
Edina, MN 55439

Project Number: 23/69-1638.001.002

Mercury

EPA Method 29 Analysis

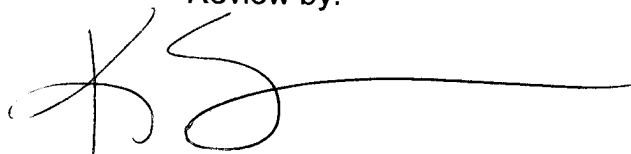
Analytical Report
25283



Element One, Inc.
6319-D Carolina Beach Rd., Wilmington, NC 28412
910-793-0128 FAX: 910-792-6853 e1lab@e1lab.com


The following data for Analytical Report 25283
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

A handwritten signature in black ink, appearing to be 'KS' followed by a long horizontal stroke.

Katie Strickland, B.S. Chemist
July 17, 2015

Report Reviewed and Finalized By:

A handwritten signature in black ink, appearing to be 'Ken Smith' in a cursive style.

Ken Smith, Laboratory Director
July 17, 2015

SUMMARY OF RESULTS

Summary of Analysis

Stack A - Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front Half µg	5% HNO ₃ / 10% H ₂ O ₂ µg	Empty Impinger µg	KMnO ₄ µg	HCl µg
Run 1	#1	4.99	1.29	2.15	< 0.2	< 0.5	1.54
	#2		1.29	2.15	< 0.2	< 0.5	1.54
Run 2	#1	4.18	1.02	2.75	< 0.2	< 0.5	0.414
	#2		1.03	2.74	< 0.2	< 0.5	0.410
Run 3	#1	5.24	1.01	3.38	< 0.2	< 0.5	0.853
	#2		1.02	3.37	< 0.2	< 0.5	0.853

Stack B - Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front Half µg	5% HNO ₃ / 10% H ₂ O ₂ µg	Empty Impinger µg	KMnO ₄ µg	HCl µg
Run 1	#1	6.54	1.10	3.54	< 0.2	< 0.5	1.90
	#2		1.10	3.56	< 0.2	< 0.5	1.88
Run 2	#1	6.35	1.14	3.25	< 0.2	< 0.5	1.97
	#2		1.13	3.29	< 0.2	< 0.5	1.92
Run 3	#1	5.38	0.795	3.43	< 0.2	< 0.5	1.16
	#2		0.790	3.46	< 0.2	< 0.5	1.13

Summary of Analysis

Stack C - Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front Half µg	5% HNO ₃ / 10% H ₂ O ₂ µg	Empty Impinger µg	KMnO ₄ µg	HCl µg
Run 1	#1	9.13	1.30	3.98	< 0.2	< 0.5	3.88
	#2		1.30	4.01	< 0.2	< 0.5	3.80
Run 2	#1	9.06	0.952	4.08	0.247	< 0.5	3.79
	#2		0.948	4.10	0.250	< 0.5	3.75
Run 3	#1	8.70	0.400	4.16	< 0.2	< 0.5	4.14
	#2		0.401	4.21	< 0.2	< 0.5	4.10

Stack D - Summary of Method 29 Mercury Analysis

Run Number		Average Total Catch, µg	Front Half µg	5% HNO ₃ / 10% H ₂ O ₂ µg	Empty Impinger µg	KMnO ₄ µg	HCl µg
Run 1	#1	11.1	< 0.1	4.18	< 0.2	< 0.5	6.95
	#2		< 0.1	4.20	< 0.2	< 0.5	6.90
Run 2	#1	10.6	< 0.1	4.27	< 0.2	< 0.5	6.36
	#2		< 0.1	4.29	< 0.2	< 0.5	6.23
Run 3	#1	9.94	< 0.1	4.17	0.258	< 0.5	5.54
	#2		< 0.1	4.21	0.261	< 0.5	5.44
Reagent Blank	#1	< 0.5	< 0.1	< 0.1	< 0.2	< 0.5	< 0.4
	#2		< 0.1	< 0.1	< 0.2	< 0.5	< 0.4

ANALYTICAL NARRATIVE

Element One Analytical Narrative

Client:	Barr Engineering	Element One #:	25283
Client ID:	23/69-1638.001.002	Analyst:	DAM
Method:	Method 29	Dates Received:	06/30 & 07/02/15
Analytes:	Hg	Dates Analyzed:	07/13-15/15

Summary of Analysis

The Method 29 samples were digested, prepared, and analyzed according to Method 29 protocol. Samples were analyzed for mercury on a PerkinElmer FIMS-100 CVAA mercury analyzer.

Detection Limits

The FIMS-100 CVAA instrument reporting limit for mercury was 0.004 µg per aliquot analyzed.

Analysis QA/QC

Duplicate analyses relative percent difference (RPD) and spike sample recovery data are summarized in the Quality Control Section. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. The reported results relate only to the items tested or calibrated.

QUALITY CONTROL SUMMARY

Summary of Quality Control Data

Mercury Duplicate Analysis RPD

(Method 29 QC limits: < 10% for RPD)

Run Number	Front half	5% HNO ₃ / 10% H ₂ O ₂	Empty Impinger	KMnO ₄	HCl
Stack A-M29-R1	0.0%	0.2%	NA	NA	0.5%
Stack A-M29-R2	0.2%	0.3%	NA	NA	0.9%
Stack A-M29-R3	0.3%	0.3%	NA	NA	0.0%
Stack B-M29-R1	0.3%	0.7%	NA	NA	0.8%
Stack B-M29-R2	0.6%	1.4%	NA	NA	2.8%
Stack B-M29-R3	0.6%	0.7%	NA	NA	2.5%
Stack C-M29-R1	0.4%	0.9%	NA	NA	2.0%
Stack C-M29-R2	0.4%	0.4%	1.3%	NA	1.1%
Stack C-M29-R3	0.2%	1.0%	NA	NA	0.9%
Stack D-M29-R1	NA	0.4%	NA	NA	0.6%
Stack D-M29-R2	NA	0.6%	NA	NA	2.0%
Stack D-M29-R3	NA	1.0%	1.1%	NA	1.8%
Reagent Blank	NA	NA	NA	NA	NA

Mercury Spike Recoveries

(Method 29 QC limits: 75-125% for Spike Recoveries)

Run Number		Front half	5% HNO ₃ / 10% H ₂ O ₂	Empty Impinger	KMnO ₄	HCl
Stack A-M29-R3	#1	96%	93%	97%	93%	93%
	#2	97%	93%	98%	94%	92%
Stack B-M29-R3	#1	101%	84%	96%	97%	94%
	#2	99%	85%	96%	98%	93%
Stack C-M29-R3	#1	115%	94%	97%	90%	91%
	#2	116%	95%	98%	90%	90%
Stack D-M29-R3	#1	97%	85%	93%	99%	87%
	#2	95%	86%	94%	99%	88%

SAMPLE CUSTODY

BARR

Request for Laboratory Analytical Services

Nº 20122

25283

Report Results To		Check One:		
<input type="checkbox"/> Barr Engineering Company 3128 14th Avenue East Hibbing, MN 55435-4803 (218) 262-8600		<input checked="" type="checkbox"/> Barr Engineering Company 5150 West 76th Street Edina, MN 55439-2330 (952) 832-2600		
Attention: Ben Wilke		952-832-2885		
(Print Name)		(Direct Phone No.)		
Special Instructions and/or specific regulatory requirements: (method, limit of detection, etc.) PM-Barr Hq-Element One				
Sample Identification	Date/Time Collected	Beaker Media I.D. #	Type	
			Grab	Comp. QC
1. T1 R1	6/23/15	142	X	X
2. T1 R2	6/23/15	222	X	X
3. T1 R3	6/24/15	502	X	X
4. T2 R1	6/24/15	527	X	X
5. T2 R2	6/24/15	KO	X	X
6. T2 R3	6/24/15	14	X	X
7. T3 R1	6/23/15	Sg	X	X
8. T3 R2	6/23/15	LJ	X	X
9. T3 R3	6/24/15	568	X	X
10. T4 R1	6/24/15	94	X	X
Collected by: (Print Name) Ben Wilke		Date/Time: 6/24/15		
Collector's Signature: [Signature]		Date/Time: 6/24/15		
Laboratory: Barr / Element One		Method of Shipment: <input type="checkbox"/> Sampler <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> UPS Other: _____		
Sample Condition upon Receipt: <input checked="" type="checkbox"/> Acceptable <input type="checkbox"/> Other (explain) _____		Received at Lab by: [Signature] 7-10-15 1005		
Samples received in good condition. No empty containers.		Received at Lab by: [Signature] 7-10-15 1005		
Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy		Version 1 - Control 07/01/14		

Send Invoice To	Project Number
Barr Engineering Company Attn: Accounts Payable 4700 West 77th Street Minneapolis, MN 55435-4803 Ph. (952) 832-2600 Fax (952) 832-2601 Barr Project Contact: (Print Name) Ben Wilke	23 / 69 - 1638.00 001 002

METHOD	SAMPLE FRACTION
M5 M29	Filter Fil Accutone
Total No. of Containers	
Number Remarks	
2 400515	
2 400490	
2 400491	
2 400494	
2 400538	
2 400539	
2 400525	
2 400492	
2 400493	
2 400495	

BARR

Request for Laboratory Analytical Services

25283
Nº 20123

Report Results To

Check One:
☐ Barr Engineering Company
3128 14th Avenue East
Hibbing, MN 55435-4803
(218) 262-8600
Attention: Ben Wilke
(Print Name)
☒ Barr Engineering Company
5150 West 76th Street
Edina, MN 55439-2330
(952) 832-2600
952-832-2885
(Direct Phone No.)

Send Invoice To

Project Number 23 / 69-1638.00 001 002
Barr Engineering Company
Attn: Accounts Payable
4700 West 77th Street
Minneapolis, MN 55435-4803
Ph. (952) 832-2600 Fax (952) 832-2601
Barr Project Contact: (Print Name) Ben Wilke

Special Instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)
fm - Barr
H3 - Element One

METHOD

SAMPLE FRACTION

Sample Identification

Date/Time Collected

Seal/Label I.D. #

Type
Grab
Comp.
QC

25 M29
Filter
FH Accrue
Total No. of Containers
Number Remarks

1. T4 R2

6/24/15

283

X

X

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

2. T4 R3

437

X

X

1

1

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1

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1

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1

3. Blank

X

X

X

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1

4. Blank

X

X

X

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5. Blank

X

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6. Blank

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7. Blank

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8. Blank

X

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9. Blank

X

X

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1

10. Blank

X

X

X

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1

1

Chain of Custody

Collected by (Print Name): Ben Wilke
Collector's Signature: [Signature]
Date/Time: 6/26/15
Laboratory: Barr / Element One
Method of Shipment: ☐ Sampler ☒ FedEx ☐ UPS Other: _____
Sample Condition upon Receipt: ☐ Acceptable ☐ Other (explain)

Relinquished by: [Signature]
Received by: [Signature]
Date/Time: 7/2/15 @ 12:00
Received at Lab by: Lisa Anton
Date/Time: 7-10-15 1005

BARR

Request for Laboratory Analytical Services

25283
Nº 20121

Report Results To

Check One:
☐ Barr Engineering Company
 3128 14th Avenue East
 Hibbing, MN 55435-4803
 (218) 262-8600
 Attention: Ben Willke
 (Print Name)
 952-832-2885
 (Direct Phone No.)

Send Invoice To

Project Number 23 / 69 - 1638.00 0010 002
 Barr Engineering Company
 Attn: Accounts Payable
 4700 West 77th Street
 Minneapolis, MN 55435-4803
 Ph. (952) 832-2600 Fax (952) 832-2601
 Barr Project Contact: (Print Name) Ben Willke

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

Hg only

W:\Business Units\EMS\Subunit Admin\Technical & Support Services\Air Sampling\Datashets\Other\COG.CDR RL.G 07-01-14

Sample Identification	Date/Time Collected	Media I.D. #	Type			METHOD	SAMPLE FRACTION	Remarks
			Grab	Comp.	QC			
1. Stack A T1R1	6/23/15		X			M29-Hg		
2. Stack A T1R2	6/23/15		X					
3. Stack A T1R3	6/24/15		X					
4. Stack B T2R1	6/25/15		X					
5. Stack B T2R2	↓		X					
6. Stack B T2R3	6/23/15		X					
7. Stack C T3R1	6/23/15		X					
8. Stack C T3R2	6/23/15		X					
9. Stack C T3R3	6/24/15		X					
10. Stack D T4R1	6/25/15		X					

Chain of Custody	Collected by (Print Name):	Collector's Signature:	Date/Time:	Relinquished by:	Received by:	Date/Time:
Method of Shipment: <input checked="" type="checkbox"/> Samper <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> UPS <input type="checkbox"/> Other: _____	Ben Willke	<i>Ben Willke</i>	6/26/15	Pat Lavelle	Pat Lavelle	6/30/15 1200
Sample Condition upon Receipt: <input type="checkbox"/> Acceptable <input type="checkbox"/> Other (explain): _____						

Received at Lab by: 2 containers gold container 7.1.15 11:30 6/15
 Ben Willke 7.1.15 1040

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy Samples received in gold container. No empty container. Version 1 - Created 07/01/14

elementOne

BARR

Request for Laboratory Analytical Services

25283
No 20120

Report Results To

Check One:

☐ Barr Engineering Company
3128 14th Avenue East
Hibbing, MN 55435-4803
(218) 262-8600

☒ Barr Engineering Company
5150 West 76th Street
Edina, MN 55439-2330
(952) 832-2600

Attention: Ben Wilk (Print Name)
952-832-2885 (Direct Phone No.)

Send Invoice To

Project Number 23 / 69 - 1638.00 001 002

Barr Engineering Company
Attn: Accounts Payable
4700 West 77th Street
Minneapolis, MN 55435-4803
Ph. (952) 832-2600 Fax (952) 832-2601

Barr Project Contact: (Print Name) Ben Wilk

Special instructions and/or specific regulatory requirements:
(method, limit of detection, etc.)

Hg only

Sample Identification	Date/Time Collected	Media I.D. #	Type			METH	SAMPLE FRACTION		Total No. of Containers	Remarks
			Grab	Comp.	QC					
1. Stock D T4R2	6/25/15		X						5	
2. Stock D T4R3	6/25/15		X						5	
3. DE H2O Blank	6/24/15		X						1	
4. 8N HCL Blank			X						1	
5. 0.1N HNO3 Blank			X						1	
6. 5% HNO3 / 10% H2O2 Blank			X						1	
7. 4% KMnO4 / 10% H2SO4 Blank			X						1	
8. X										
9.										
10.										

Chain of Custody

Collected by (Print Name): Ben Wilk

Collector's Signature: [Signature] Date/Time: 6/26/15

Laboratory: Element One

Method of Shipment: ☒ FedEx ☐ UPS ☐ Other: _____

Sample Condition upon Receipt: ☐ Acceptable ☐ Other (explain): _____

Relinquished by: [Signature] Received by: [Signature] Date/Time: 6/30/15 1200

Received at Lab by: [Signature] Date/Time: 7.1.15 1040

Distribution: White-Original Accompanies Shipment to Lab; Yellow - Field Copy

Version 1 - Changed 07/31/14

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ANALYTICAL DATA

Analytical Calculations

Mercury-

$$\text{Mercury Results } (\mu\text{g}) = \frac{\text{CVAA Results } (\mu\text{g}) * \text{Final Volume (mL)}}{\text{Aliquot (mL)}}$$

Where-

CVAA Results= Raw sample reading (μg)--*Hg-Data Sheet*

Aliquot= Sample Aliquot (Alq.)--*Hg-Data Sheet*

Final Volume=Final Volume (FV)*--*Sample Submission*

* With the exception of the BH fraction where-
=Received Volume (BV)--*Sample Submission*

Analytical Calculations

Spike Recovery-

$$\text{Spike (\%)} = \frac{(\text{Spiked Result } (\mu\text{g/L}) - \text{Sample Result } (\mu\text{g/L}))}{\text{Spike Amount } (\mu\text{g/L})} \times 100$$

Where-

Spike Result = Raw sample concentration (ppb) -- *Hg-Client Printouts*

Sample Result = Raw sample concentration (ppb) -- *Hg-Client Printouts*

Spike Amount-- *Hg-Run Sheet*

Duplicate Analysis RPD-

$$\text{RPD (\%)} = \frac{(\text{Duplicate Result } (\mu\text{g/L}) - \text{Sample Result } (\mu\text{g/L}))}{\text{Average } (\mu\text{g/L})} \times 100$$

Where-

Sample Result and Duplicate Results=Raw sample concentration (ppb) -- *Hg-Client Printouts*

$$\text{Average} = \frac{(\text{Duplicate} + \text{Sample Results})}{2}$$

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AIR TESTING SAMPLE SUBMISSION FORM

Lab ID 25283

Analysis Due Date 07.17.15
QA/QC/Report Due Date 07.21.15

Client Barr Engineering
Project No 2369-1638.001.002

Date Received 6.30 & 07.02.15
Time Received 1130 & 1040

HNO₃ Lot 51114070
Volume Marked Y / N

HF Lot 5114070
Volume Loss Y / N ?

HCl Lot: 9264

Ref. Method:
29

Sample Identification

1	Stack A-M29-T1-R1	4	Stack B-M29-T2-R1	7	Stack C-M29-T3-R1
2	Stack A-M29-T1-R2	5	Stack B-M29-T2-R2	8	Stack C-M29-T3-R2
	Stack A-M29-T1-R2 Duplicate		Stack B-M29-T2-R2 Duplicate		Stack C-M29-T3-R2 Duplicate
3	Stack A-M29-T1-R3	6	Stack B-M29-T2-R3	9	Stack C-M29-T3-R3
	Stack A-M29-T1-R3 Spike		Stack B-M29-T2-R3 Spike		Stack C-M29-T3-R3 Spike

Analyses Requested

Samples 1-9 Hg

Runs / FB	Fill / Ace (FH)		HNO ₃ (FH)		5% HNO ₃ /10% H ₂ O ₂ (BH)			HNO ₃ (A)		KMnO ₄ (B)		HCl (C)	
	pH <2.0	Y / N	pH <2.0	Y / N	pH <2.0	Y / N		pH <2.0	Y / N	pH <2.0	Y / N	pH <2.0	Y / N
Lab ID	Fill ID	BV ml	BV ml	FV ml	BV ml	Used	FV ml	BV ml	FV ml	BV ml	FV ml	BV ml	FV ml
1			90	100	480			100	200	410	500	230	400
2.D			102		470			100		390		185	
3.S			108		490			102		395		220	
4			96		510			94		390		225	
5.D			98		480			102		340		210	
6.S			110		510			104		360		200	
7			96		530			106		425		220	
8.D			108		520			108		385		225	
9.S			104		530			88		395		225	

Lab Communications

PM Analysis completed by Client ---Reconstitute C2 in HNO₃ and combine with FH---LLB

CRB+SS spiked with 100uL of Hg SA @ 25 ppm (033015-6) PM 7/16/15

Rec C1+C2 7-10-15 1005; Rec C3 7-14-15 1435 ZAB

Fractions Received: Runs C4, C5A, C5B, C5C---RB; C8A, C8B, C9, C10, C11---07.09.15 LLB

SS Page 1 of 2
7/9/2015 4:25:31 PM
SS by ZAB
Labeled By/Date 7-9-15

FH Prep By/Date 7/17/15 A Prep By/Date 7/17/15
BH Prep By/Date 7/10/15 B Prep By/Date 7/16/15
BH/FH Prep By/Date 7/10/15 C Prep By/Date 7/13/15
PM Prep By/Date 7/10/15 ID Verification By/Date 7/10/15
cleaned glassware 7/16/15

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Analysis Due Date 07.17.15

QA/QC/Report Due Date 07.21.15

Client Barr Engineering
Project No 23/69-1638.001.002

Date Received 6.30 & 07.02.15
Time Received 1130 & 1040

HNO₃ Lot: 1114070 HF Lot: 5114040 HCl Lot: 97264
Volume Marked Y/N Volume Loss Y/N? Ref. Method: 29

Sample Identification

10	Stack D-M29-T4-R1	13	Reagent Blank
11	Stack D-M29-T4-R2		
	Stack D-M29-T4-R2 Duplicate		
12	Stack D-M29-T4-R3		
	Stack D-M29-T4-R3 Spike		

Analyses Requested Samples 10-13 Hg

Runs / FB	Fill / Ace (FH)		HNO ₃ (FH)		5% HNO ₃ /10% H ₂ O ₂ (BH)			HNO ₃ (A)		KMnO ₄ (B)		HCl (C)	
	pH <2.0	Y / N	pH <2.0	Y / N	pH <2.0 Y / N			pH <2.0	Y / N	pH <2.0	Y / N	pH <2.0	Y / N
Lab ID	Fil ID	BV ml	BV ml	FV ml	BV ml	Used	FV ml	BV ml	FV ml	BV ml	FV ml	BV ml	FV ml
10			94	100	580			112	200	350	500	220	400
11.D			184	↓	520			104	↓	335	↓	230	↓
12.S			118	↓	560			110	↓	340	↓	210	↓

M-29 Reagent Blank

Lab ID	Fraction	BV, ml	FV, ml	Comments
13	C 7 FH Acetone Blank			
	C 8A FH 0.1N HNO ₃	225	100	100 mg coded down
	C 8A A 0.1N HNO ₃	225		
	C 8B B DI H ₂ O	115	100+33	100 mg of ClO + 33 mg of CSB
	C 9 BH 5% HNO ₃ /10% H ₂ O ₂	90		
	C 10 B 4% KMnO ₄ /10% H ₂ SO ₄	140	100+33	100 mg of ClO + 33 mg of CSB
	C 11 C 8N HCl DI H ₂ O	220	100	
	C 12 FH Filter			

Lab Communications

SS Page 2 of 2
7/9/2015 4:25:21 PM
SS by ZAB
Labeled By/Date 7/9/15

FH Prep By/Date 7/10/15 A Prep By/Date 7/10/15
BH Prep By/Date 7/10/15 B Prep By/Date 7/10/15
BH/FH Prep By/Date 7/10/15 C Prep By/Date 7/10/15
PM Prep By/Date ID Verification By/Date 7/10/15

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Method 29 Microwave Worksheet

Lab ID # e 25283

Client: Barr

Date Digested: 7-16-15 Initials: DH Worksheet Prepared by: DH

Auto Sample Loc.	Sample Lab ID	Sample Weight (g)	# of filters digested	Spike	Prep Volume (ml)	Weight In Micro / Weight Out Micro	Units				
	25283-6		1								
	-7		1								
	-8		1								
	-9		1								
	-10		1								
	-11		1								
	-12		1								
	-13(g)		1 of 3								
NA											
HF lot: 5714040				HNO ₃ lot: 1114070							

Element One, Inc. Form 104 - Revision 1.0

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MERCURY BATCH DIGESTION - RUN WORKSHEET

Date Prepared/Digested: 7/13/15 Prep By: AM/ice SIF File #: 071315-1
 Block #1 Temperature: 93.02 Start Time: 9:00 Machine ID: #1
 Block #2 Temperature: 91.56 Stop Time: 10:30 Batch Analyst: DAW
 Block #3 Temperature: 93.21 Typed By: AM Verified By: KAM

A/S	Curve & QC's	0.4ug/ml working std		BV, ml	FV, ml	Standard Lot Numbers
1	Lab BLK (3/ batch)	0		40	40	Standard #1 (for working std) Lot #: <u>1530904</u>
2	0.004 ug	0.01ml		40	40	Working Standard
3	0.04 ug	0.10ml		40	40	Lot #: <u>071315-1</u> by <u>AM</u>
4	0.08 ug	0.20ml		40	40	Standard #2 (QC #2):
5	0.16 ug	0.40ml		40	40	Lot #: <u>071315-2</u>
6	0.20ug	0.50ml		40	40	Standard #3 (QC #3): Lot #: <u>071315-3</u>
7	QC #2= 0.08ug	0.2ml #2 std		40	40	
8	QC #3= 0.08ug	0.2ml #3 std		40	40	Curve prepared by: <u>AM</u>

Initial Review By: AMDate: 7/13/15Time: 3:55pmFinal QC Review By: LAMDate: 07.13.15Time: 5:01Comments: 25285-DET,

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike ug
✓ 9	<u>25247-1FH</u>				↓	100	
10	<u>-1FH</u>				↓	↓	
✓ 11	<u>-1FH</u>				↓	↓	
✓ 12	<u>25241-3</u>				10	1	
13	<u>-3+</u>				↓	↓	
14	<u>-3</u>				5	↓	
15	<u>-3+</u>				↓	↓	
✓ 16	<u>25250-3</u>				20	1	
17	<u>-3+</u>				↓	↓	
✓ 18	<u>25255-6</u>				10	↓	
19	<u>-6+</u>				↓	↓	

NOTES: Lab blanks and spikes must be prepared with each batch digestion**Spike for Hg,** Use calibration working 0.4ug/ml standard at the rate of 0.20ml per 40ml sample.**Digestion chemicals to be added in order at the following rate per 40ml volumes.** H_2SO_4 @ 2.0ml..... HNO_3 @ 1.0ml..... Persulfate @ 3.0ml..... $KMnO_4$ @ 6.0ml H_2SO_4 Lot # 54271e HNO_3 Lot # 1114070 HCl Lot #: 972604Persulfate Lot # 061515-5 $KMnO_4$ Lot # 070215-5 Hydrox Lot#: 070215-4

Clear samples after digestion with 3.2ml of Hydroxylamine solution.

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 081315-1

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike µg
20	2555-6				5	1	
21	-6+				↓	↓	
22	21791-23 G				205	5	TV=10
23	1160				1	1	TV=0.008
24	25283-1B1A				4	480	
25	-2BH					470	
26	-2BH					↓	
27	-3BH					490	
28	-3BH					↓	
29	-4BH					510	
30	-5BH					480	
31	-5BH					↓	
32	-6BH					510	
33	-6BH					↓	
34	-7BH					530	
35	-8BH					520	
36	-8BH					↓	
37	-9BH					530	
38	-9BH					↓	
39	-10BH					580	
40	-11BH					520	
41	-11BH					↓	
42	-12BH					500	
43	-12BH					↓	
44	-13BH					90	
45	-1A					200	
46	-2A						
47	-2AD						
48	-3A						
49	-3A-1						
50	-4A						
51	-5A						
52	-5AD						
53	-6A						
54	-6A				↓	↓	

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 071315-1

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike µg
✓ 55	25283-7A				4	200	
56	-8A						
57	-8AD						
58	-9A						
59	-9A+						
60	-10A						
61	-11A						
62	-11AD						
63	-12A						
64	-12A+						
65	-13A					✓	
✓ 66	25283-1B					500	
67	-2B						
68	-2BD						
69	-3B						
70	-3B+						
71	-4B						
72	-5B						
73	-5BD						
74	-6B						
75	-6B+						
76	-7B						
77	-8B						
78	-8BD						
79	-9B						
80	-9B+						
81	-10B						
82	-11B						
83	-11BD						
84	-12B						
85	-12B+						
86	-13B						
87	25256157-TOTALB				4	✓	
88	-TOTALB+				0.2	✓	
✓ 89	25256		05207/50	4	0.0416	✓	

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 071315-1

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike µg
90	25216/55/24	TRC RB			4	1	
91	↓	TRC RB			0.2	1	
92	25216		0.532/50	4	0.0424	1	
93	25235-1		0.516/50	↓	0.0413	1	
94	-1 +		↓	↓	↓	↓	
95	25266		0.542/50	↓	0.0434	↓	
96	25258-BLK				20	1	
97	↓ BLK				↓	↓	
98	25288				↓	↓	
99	- +				↓	↓	
100	-Dup				↓	↓	
101							
102							
103							
104							
105							
106							

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MERCURY BATCH DIGESTION - RUN WORKSHEET

Date Prepared/Digested: 7.14.15Prep By: DAKSIF File #: 0715157Block #1 Temperature: 95.14Start Time: 830Machine ID: #2Block #2 Temperature: 95.22Stop Time: 1000Batch Analyst: DAKBlock #3 Temperature: 93.12Typed By: DAKVerified By: LAU

A/S	Curve & QC's	0.4ug/ml working std		BV, ml	FV, ml	Standard Lot Numbers
1	Lab BLK (3/ batch)	0		40	40	Standard #1 (for working std)
2	0.004 ug	0.01ml		40	40	Lot #: <u>1330908</u>
3	0.04 ug	0.10ml		40	40	Working Standard
4	0.08 ug	0.20ml		40	40	Lot #: <u>0713151</u> by <u>DAK</u>
5	0.16 ug	0.40ml		40	40	Standard #2 (QC #2):
6	0.20ug	0.50ml		40	40	Lot #: <u>0713152</u>
						Standard #3 (QC #3):
						Lot #: <u>0713153</u>
7	QC #2= 0.08ug	0.2ml #2 std		40	40	
8	QC #3= 0.08ug	0.2ml #3 std		40	40	Curve prepared by: <u>DAK</u>

Initial Review By: DAKLAUDate: 7.15.15Time: 6:45pmFinal QC Review By: LAUDate: 7.16.15Time: 10:59

Comments: not wet started again @ 39
25299/302/299 TOT #1 LBP
wet rerun from 89 → 104 → Realign

A/S	LAB #	Client	W/FV	Ali Used	ml used	Sample Vol, ml	Spike ug
✓ 9	<u>2535-1</u>				<u>0.4</u>		
10	<u>-1D</u>						
11	<u>-2</u>						
12	<u>-2A</u>						
✓ 13	<u>2535-1C</u>				<u>4</u>	<u>400</u>	
14	<u>-2C</u>						
15	<u>-2CD</u>						
16	<u>-3C</u>						
17	<u>-3C+</u>						
18	<u>-4C</u>						
19	<u>-5C</u>						

NOTES: Lab blanks and spikes must be prepared with each batch digestion**Spike for Hg,** Use calibration working 0.4ug/ml standard at the rate of 0.20ml per 40ml sample.**Digestion chemicals to be added in order at the following rate per 40ml volumes.**H₂SO₄ @ 2.0ml..... HNO₃ @ 1.0ml..... Persulfate @ 3.0ml..... KMnO₄ @ 6.0mlH₂SO₄ Lot # 5427L HNO₃ Lot # 1114670 HCl Lot # 97264Persulfate Lot # 6161515-5 KMnO₄ Lot # 030215-5 Hydrox Lot # 070215-4

Clear samples after digestion with 3.2ml of Hydroxylamine solution.

SIF File #: ²⁷¹⁵¹⁵⁻¹
~~274415-1~~

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike µg
✓ 20	25283-50D				4	400	
✓ 21	-6C				↓	↓	
22	-6C+				↓	↓	
23	-7C				↓	↓	
24	-8C				↓	↓	
25	-8C D				↓	↓	
26	-9C				↓	↓	
27	-9C+				↓	↓	
28	-10C				↓	↓	
29	-11C				↓	↓	
30	-11C D				↓	↓	
31	-12C				↓	↓	
32	-12C+				↓	↓	
33	-13C				↓	↓	
✓ 34	24791-23 QCL				0.05	5	TV=10
✓ 35	11L QCL				1	1	TV=0.008
✓ 36	25267-FJ-BLK				20	1	
✓ 37	↓ BLK+				↓	↓	
✓ 38	25267-F				↓	↓	
39	-G				↓	↓	
40	-G D				↓	↓	
41	-H				↓	↓	
42	-H+				↓	↓	
43	-I				↓	↓	
44	-J				↓	↓	
✓ 45	25288-BLK				20	1	
✓ 46	↓ - BLK+				↓	↓	
✓ 47	25267-A-E-TOTCRS				4	1	
✓ 48	↓ - TOTCRS+				0.2	↓	
✓ 49	25267-A		0.5162/50	4	0.0413	↓	
50	-B		0.5177/50	↓	0.0414	↓	
51	-B D		↓	↓	↓	↓	
52	-C		0.5142/50	↓	0.0411	↓	
53	-C+		↓	↓	↓	↓	
54	-D		0.5259/50	↓	0.0421	↓	

071515-1
071415-1

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike µg
✓ 55	25267-E		0.5268/50	4	0.0421	1	
✓ 56	25267-F-J-TOTLRB				4	1	
57	25267-F				0.2		
✓ 58	25267-F		0.5077/50	4	0.0406	1	
59	-G		0.5366/50		0.0423	1	
60	-H		0.5333/50		0.0427	1	
61	-I		0.5079/50		0.0406	1	
62	-J		0.5094/50	✓	0.0404	✓	
63	25279-22/23-TOTLRB				4	1	
64	25279-22/23-TOTLRB				0.2	1	
✓ 65	25302		0.5074/50	4	0.0422	1	
66	-J		✓	✓	0.0422	✓	
✓ 67	25246-LRB				4	100	
68	-LRB				1.6	1	
69	-5 FH				4	1	
70	-6 FH					1	
71	-6 FH(D)					1	
72	-7 FH					1	
73	-7 FH					1	
74	-8 FH					1	
75	-13 FH					1	
76	-14 FH					1	
77	-14 FH(D)					1	
78	-15 FH					1	
79	-15 FH					1	
80	-16 FH					1	
81	-17 FH					1	
82	-18 FH					1	
✓ 83	25316-1 BU				4	480	
84	-2 BU				1	460	
85	-2 BUD					✓	
86	-3 BU					490	
87	-3 BUD					✓	
✓ 88	-4 BU					200	
89	-1A	Reanalysis			✓	200	

SIF File #: 071515-1

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike μ g
90	25316-2A		Re aliquot		4	200	
91	-2AD		↓		↓	↓	
92	-3A						
93	-3A+						
94	-4A					↓	
95	-1B					500	
96	-2B					↓	
97	-2BD					↓	
98	-3B					↓	
99	-3B+					↓	
100	-4B				↓	↓	
101	25213-1		10.3738/100	8	.8299	1	
102	-1D		↓	↓	↓	↓	
103	-2		10.4599/100	8	.8367	↓	
104	-2+		↓	↓	↓	↓	
105							
106							

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MERCURY BATCH DIGESTION - RUN WORKSHEET

Date Prepared/Digested: 7.16.15 Prep By: DAM/KAM SIF File #: 071715-1
 Block #1 Temperature: 94.41 Start Time: 8:00 Machine ID: #2
 Block #2 Temperature: 93.97 Stop Time: 10:00 Batch Analyst: DAM
 Block #3 Temperature: _____ Typed By: DAM Verified By: KAM

A/S	Curve & QC's	0.4ug/ml working std		BV, ml	FV, ml	Standard Lot Numbers
1	Lab BLK (3/ batch)	0		40	40	Standard #1 (for working std) Lot #: 1330904
2	0.004 ug	0.01ml		40	40	Working Standard
3	0.04 ug	0.10ml		40	40	Lot #: 071315-1 by: DAM
4	0.08 ug	0.20ml		40	40	Standard #2 (QC #2):
5	0.16 ug	0.40ml		40	40	Lot #: 071315-2
6	0.20ug	0.50ml		40	40	Standard #3 (QC #3): Lot #: 071315-3
7	QC #2= 0.08ug	0.2ml #2 std		40	40	
8	QC #3= 0.08ug	0.2ml #3 std		40	40	Curve prepared by: DAM

Initial Review By: DAM Date: 7.17.15 Time: 1:45 PM
 Final QC Review By: KS/LAW Date: 7.17.15 Time: 1600
 Comments: 25304-3, 25307-29

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike µg
9	25304-3				10	↓	
10	-3 +				10	↓	
11	-3				5	↓	
12	-3 +				5	↓	
13	25307-1 FH				0.020	100	
14	-2 FH				0.090	↓	
15	-2 FHD				↓	↓	
16	25307-3 DH				2	580	
17	-3 BH+				↓	↓	
18	25307-9 A				4	200	
19	-9 A +				↓	↓	

NOTES: Lab blanks and spikes must be prepared with each batch digestion

Spike for Hg, Use calibration working 0.4ug/ml standard at the rate of 0.20ml per 40ml sample.

Digestion chemicals to be added in order at the following rate per 40ml volumes.

H₂SO₄ @ 2.0ml..... HNO₃ @ 1.0ml..... Persulfate @ 3.0ml..... KMnO₄ @ 6.0ml

H₂SO₄ Lot # 54276 HNO₃ Lot # 146344 HCl Lot #: 97264

Persulfate Lot # 061515-5 KMnO₄ Lot # 070215-5 Hydrox Lot #: 070215-4

Clear samples after digestion with 3.2ml of Hydroxylamine solution.

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MERCURY BATCH DIGESTION - RUN WORKSHEET

SIF File #: 070751

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike μ g
20	25307-1C				4	400	
21	-2C						
22	-2C dup						
23	-3C						
24	-3C +						
25	-4C						
26	-5C						
27	-5C dup						
28	-6C						
29	-6C +						
30	-7C						
31	-8C						
32	-8C dup						
33	-9C						
34	-9C +						
35	-10C						
36	-11C						
37	-11C dup						
38	-12C						
39	-12C +						
40	-13C						
41	24791-23 QC				0.050	16.5	16.5
42	1/2 QC				1	1	16.5
43	25319-1				0.4189	1	
44	-2				0.4119		
45	-2 dup				0.4076		
46	-3				0.4053		
47	-3 +				0.4082		
48	25316 LRB FH				4	100	
49	-LRB FH +						
50	-1 FH						
51	-2 FH						
52	-2 FH dup						
53	-3 FH						
54	-3 FH +						

SIF File #: 071715-1

A/S	LAB #	Client	Wt/FV	Ali Used	ml used	Sample Vol, ml	Spike µg
55	25316-4 FH				41	100	
56	25283 LAB FH						
57	-LAB FH +						
58	-1 FH						
59	-2 FH						
60	-2 FH dup						
61	-3 FH						
62	-3 FH +						
63	-4 FH						
64	-5 FH						
65	-5 FH dup						
66	-6 FH						
67	-6 FH +						
68	-7 FH						
69	-8 FH						
70	-8 FH dup						
71	-9 FH						
72	-9 FH +						
73	-10 FH						
74	-11 FH						
75	-11 FH dup						
76	-12 FH						
77	-12 FH +						
78	-13 FH				↓	↓	
79	25307-9				0.05	5	
80	-29				0.1		
81	-29				0.2	↓	
82							
83							
84							
85							
86							
87							
88							
89							

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
Calib Blank	7/13/2015	11:28:27 AM	3.67E-05			µg			2.82E-05			4.52E-05		
STD1 = .004ug	7/13/2015	11:30:07 AM	0.0012704			µg			0.0012748			0.001266		
STD2 = .04ug	7/13/2015	11:31:48 AM	0.0126803			µg			0.0127287			0.0126319		
STD3 = .08ug	7/13/2015	11:33:41 AM	0.0254918			µg			0.0255409			0.0254427		
STD4 = .16ug	7/13/2015	11:35:35 AM	0.0478319			µg			0.0477216			0.0479422		
STD5 = .2ug	7/13/2015	11:37:30 AM	0.0618445			µg			0.0619289			0.0617602		
Reagent Blank	7/13/2015	11:39:24 AM	-7.98E-06	-2.60E-05	-2.60E-05	µg			1.40E-06	4.57E-06	4.57E-06	-1.74E-05	-5.66E-05	-5.66E-05
0.004ug = DL	7/13/2015	11:41:04 AM	0.0011772	0.0038375	0.0038375	µg			0.0011791	0.0038435	0.0038435	0.0011754	0.0038315	0.0038315
0.080ug = QC STD 2	7/13/2015	11:42:48 AM	0.0255838	0.0833979	0.0833979	µg			0.0255512	0.0832918	0.0832918	0.0256164	0.0835041	0.0835041
0.080ug = QC STD 3	7/13/2015	11:44:44 AM	0.0243039	0.0792256	0.0792256	µg			0.024228	0.0789782	0.0789782	0.0243797	0.0794729	0.0794729
Reagent Blank	7/13/2015	11:46:38 AM	1.38E-05	4.51E-05	4.51E-05	µg			1.41E-05	4.61E-05	4.61E-05	1.35E-05	4.41E-05	4.41E-05
0.004ug = DL	7/13/2015	12:06:40 PM	0.0012367	0.0040314	0.0040314	µg			0.0012112	0.0039484	0.0039484	0.0012622	0.0041144	0.0041144
0.080ug = QC STD 2	7/13/2015	12:08:23 PM	0.0257467	0.083929	0.083929	µg			0.0255886	0.0834134	0.0834134	0.0259049	0.0844446	0.0844446
Reagent Blank	7/13/2015	12:10:17 PM	8.84E-05	0.000288	0.000288	µg			3.16E-05	0.0001032	0.0001032	0.0001451	0.0004729	0.0004729
25283- 1 BH	7/13/2015	12:20:55 PM	0.0054943	0.0179362	2.152345	µg	4	480	0.0054988	0.0179509	2.1541028	0.0054898	0.0179216	2.1505872
25283- 2 BH	7/13/2015	12:22:39 PM	0.0071599	0.0233659	2.7454874	µg	4	470	0.0071715	0.0234036	2.7499179	0.0071483	0.0233281	2.7410569
25283- 2 BH DUP	7/13/2015	12:24:22 PM	0.0071879	0.023457	2.7561923	µg	4	470	0.0071497	0.0233325	2.7415667	0.007226	0.0235814	2.7708179
25283- 3 BH	7/13/2015	12:26:06 PM	0.0084358	0.0275249	3.3717992	µg	4	490	0.0084465	0.0275599	3.3760882	0.008425	0.0274899	3.3675102
25283- 3 BH SPK	7/13/2015	12:27:51 PM	0.031276	0.1019795	12.492485	µg	4	490	0.0311728	0.101643	12.451274	0.0313792	0.1023159	12.533696
0.004ug = DL	7/13/2015	12:29:44 PM	0.0012181	0.0039708	0.0039708	µg			0.0011997	0.0039108	0.0039108	0.0012365	0.0040307	0.0040307
0.080ug = QC STD 2	7/13/2015	12:31:27 PM	0.0255569	0.0833102	0.0833102	µg			0.025679	0.0837083	0.0837083	0.0254348	0.0829121	0.0829121
Reagent Blank	7/13/2015	12:33:20 PM	2.23E-05	7.26E-05	7.26E-05	µg			2.68E-05	8.73E-05	8.73E-05	1.78E-05	5.80E-05	5.80E-05
25283- 4 BH	7/13/2015	12:35:02 PM	0.0085398	0.0278639	3.5526534	µg	4	510	0.0085107	0.0277691	3.5405564	0.0085689	0.0279588	3.5647504
25283- 5 BH	7/13/2015	12:36:48 PM	0.0083552	0.0272624	3.2714822	µg	4	480	0.0082971	0.0270727	3.2487218	0.0084134	0.027452	3.2942426
25283- 5 BH DUP	7/13/2015	12:38:33 PM	0.0079882	0.026066	3.1279168	µg	4	480	0.0079125	0.0258192	3.0983092	0.0080639	0.0263127	3.1575244
25283- 6 BH	7/13/2015	12:40:16 PM	0.0082843	0.027031	3.4464474	µg	4	510	0.0082552	0.0269363	3.4343838	0.0083133	0.0271256	3.4585109
25283- 6 BH SPK	7/13/2015	12:41:54 PM	0.0290287	0.0946536	12.068333	µg	4	510	0.028934	0.0943448	12.028959	0.0291234	0.0949624	12.107707
25283- 7 BH	7/13/2015	12:43:45 PM	0.0092421	0.0301533	3.995318	µg	4	530	0.0091992	0.0300135	3.9767854	0.009285	0.0302932	4.0138506
25283- 8 BH	7/13/2015	12:45:35 PM	0.0096392	0.0314477	4.0881998	µg	4	520	0.0096184	0.0313801	4.0794137	0.0096599	0.0315153	4.0969859
25283- 8 BH DUP	7/13/2015	12:47:25 PM	0.0094371	0.0307889	4.0025569	µg	4	520	0.0094121	0.0307076	3.9919836	0.009462	0.0308702	4.0131301
25283- 9 BH	7/13/2015	12:49:17 PM	0.009682	0.0315875	4.185341	µg	4	530	0.0096316	0.031423	4.1635504	0.0097325	0.0317519	4.2071316
25283- 9 BH SPK	7/13/2015	12:51:09 PM	0.032838	0.1070711	14.186919	µg	4	530	0.0327941	0.1069281	14.167972	0.0328819	0.1072141	14.205865
0.004ug = DL	7/13/2015	12:53:02 PM	0.0011767	0.0038359	0.0038359	µg			0.0011692	0.0038112	0.0038112	0.0011843	0.0038605	0.0038605
0.080ug = QC STD 2	7/13/2015	12:54:45 PM	0.025507	0.0831476	0.0831476	µg			0.025376	0.0827204	0.0827204	0.0256381	0.0835748	0.0835748
Reagent Blank	7/13/2015	12:56:39 PM	1.04E-05	3.40E-05	3.40E-05	µg			8.71E-06	2.84E-05	2.84E-05	1.21E-05	3.96E-05	3.96E-05
25283- 10 BH	7/13/2015	12:58:20 PM	0.0088555	0.0288931	4.1895016	µg	4	580	0.0088394	0.0288405	4.1818772	0.0088716	0.0289457	4.1971259
25283- 11 BH	7/13/2015	1:00:02 PM	0.0100976	0.0329422	4.2824837	µg	4	520	0.0100697	0.0328511	4.2706421	0.0101256	0.0330333	4.2943254
25283- 11 BH DUP	7/13/2015	1:01:56 PM	0.0107212	0.0349749	4.5467351	µg	4	520	0.0106368	0.0346999	4.5109925	0.0108055	0.0352498	4.5824777
25283- 12 BH	7/13/2015	1:03:49 PM	0.0102751	0.0335208	4.1900996	µg	4	500	0.0102248	0.0333566	4.1695763	0.0103255	0.033685	4.210623
25283- 12 BH SPK	7/13/2015	1:05:43 PM	0.0313162	0.1021103	12.763783	µg	4	500	0.0312192	0.1017942	12.724269	0.0314131	0.1024264	12.803297
25283- 13 BH	7/13/2015	1:07:38 PM	6.76E-05	0.0002462	0.0055403	µg	4	90	7.12E-05	0.0002581	0.0058063	6.39E-05	0.0002344	0.0052744
25283- 1A	7/13/2015	1:09:22 PM	0.0004171	0.0013856	0.0692794	µg	4	200	0.0004257	0.0014136	0.0706787	0.0004085	0.0013576	0.06788
25283- 2A	7/13/2015	1:11:08 PM	0.0007705	0.0025376	0.1268797	µg	4	200	0.0007622	0.0025105	0.125527	0.0007788	0.0025646	0.1282324
25283- 2A DUP	7/13/2015	1:12:53 PM	0.0007467	0.0024601	0.1230029	µg	4	200	0.0007385	0.0024332	0.1216621	0.0007549	0.0024869	0.1243436
25283- 3A	7/13/2015	1:14:35 PM	0.0004059	0.001349	0.0674502	µg	4	200	0.0003898	0.0012966	0.0648295	0.0004219	0.0014014	0.0700709
0.004ug = DL	7/13/2015	1:16:15 PM	0.001153	0.0037585	0.0037585	µg			0.001141	0.0037194	0.0037194	0.001165	0.0037975	0.0037975
0.080ug = QC STD 2	7/13/2015	1:17:58 PM	0.0253425	0.0826113	0.0826113	µg			0.0252215	0.0822167	0.0822167	0.0254635	0.0830058	0.0830058
Reagent Blank	7/13/2015	1:19:51 PM	-1.23E-05	-4.00E-05	-4.00E-05	µg			-9.68E-06	-3.16E-05	-3.16E-05	-1.49E-05	-4.85E-05	-4.85E-05
25283- 3A SPK	7/13/2015	1:21:30 PM	0.0239037	0.0779473	3.8973636	µg	4	200	0.0237939	0.0775892	3.8794598	0.0240136	0.0783053	3.9152674
25283- 4A	7/13/2015	1:23:20 PM	0.0004338	0.00144	0.0720013	µg	4	200	0.0004291	0.0014247	0.0712344	0.0004385	0.0014554	0.0727682
25283- 5A	7/13/2015	1:25:00 PM	0.0006535	0.0021563	0.1078144	µg	4	200	0.0006423	0.0021196	0.1059809	0.0006648	0.002193	0.109648
25283- 5A DUP	7/13/2015	1:26:40 PM	0.0007129	0.00235	0.117502	µg	4	200	0.0006992	0.0023053	0.1152636	0.0007267	0.0023948	0.1197404
25283- 6A	7/13/2015	1:28:20 PM	0.0006682	0.0022042	0.110209	µg	4	200	0.0006286	0.0020752	0.1037612	0.0007078	0.0023331	0.1166568
25283- 6A SPK	7/13/2015	1:30:01 PM	0.023563	0.0768366	3.8418311	µg	4	200	0.0234696	0.0765321	3.8266066	0.0236564	0.0771411	3.8570557
25283- 7A	7/13/2015	1:31:53 PM	0.0009822	0.0032278	0.1613923	µg	4	200	0.0009745	0.0032028	0.1601377	0.0009899	0.0032529	0.162647
25283- 8A	7/13/2015	1:33:35 PM	0.0015175	0.0049727	0.2486337	µg	4	200	0.0015076	0.0049405	0.2470268	0.0015273	0.0050048	0.2502405
25283- 8A DUP	7/13/2015	1:35:17 PM	0.0015373	0.0050372	0.2518598	µg	4	200	0.0015219	0.004987	0.2493517	0.0015527	0.0050874	0.2543679
25283- 9A	7/13/2015	1:37:01 PM	0.0008944	0.0029415	0.1470765	µg	4	200	0.0009067	0.0029816	0.1490812	0.0008821	0.0029014	0.1450718
0.004ug = DL	7/13/2015	1:38:43 PM	0.0011451	0.0037329	0.0037329	µg			0.0011332	0.003694	0.003694	0.0011571	0.0037718	0.0037718
0.080ug = QC STD 2	7/13/2015	1:40:26 PM	0.0243699	0.079441	0.079441	µg			0.0241999	0.0788866	0.0788866	0.02454	0.0799954	0.0799954
Reagent Blank	7/13/2015	1:42:20 PM	1.24E-05	4.03E-05	4.03E-05	µg			1.45E-06	4.74E-06	4.74E-06	2.33E-05	7.59E-05	7.59E-05
25283- 9A SPK	7/13/2015	1:44:02 PM	0.0238655	0.0778228	3.8911379	µg	4	200	0.0237599	0.0774783	3.873915	0.0239712	0.0781672	3.9083608
25283- 10A	7/13/2015	1:45:56 PM	0.0010198	0.0033503	0.1675133	µg	4	200	0.0010125	0.0033266	0.166331	0.001027	0.0033739	0.1686955
25283- 11A	7/13/2015	1:47:40 PM	0.0008889	0.0029235	0.1461748	µg	4	200	0.0008813	0.0028988	0.1449395	0.0008964	0.0029482	0.1474101
25283- 11A DUP	7/13/2015	1:49:25 PM	0.0008912	0.0029311	0.1465548	µg	4	200	0.0008803	0.0028956	0.1447818	0.0009021	0.0029666	0.1483277
25283- 12A	7/13/2015	1:51:06 PM	0.0015863	0.0051972	0.259859	µg	4	200	0.0015776	0.0051685	0.2584258	0.0015951	0.0052258	0.2612922
25283-														

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
25283- 5B DUP	7/13/2015	2:13:31 PM	0.0008335	0.0027431	0.34289	µg	4	500	0.0008103	0.0026673	0.333417	0.0008568	0.0028189	0.352363
25283- 6B	7/13/2015	2:15:15 PM	0.0011938	0.0039176	0.4897027	µg	4	500	0.0012003	0.0039389	0.4923625	0.0011873	0.0038963	0.4870428
25283- 6B SPK	7/13/2015	2:16:58 PM	0.0239454	0.0780832	9.7603996	µg	4	500	0.0238176	0.0776663	9.7082926	0.0240733	0.0785001	9.8125065
25283- 7B	7/13/2015	2:18:52 PM	0.0005571	0.0018421	0.2302595	µg	4	500	0.0005628	0.0018607	0.2325884	0.0005514	0.0018234	0.2279307
25283- 8B	7/13/2015	2:20:37 PM	0.0004667	0.0015472	0.1934005	µg	4	500	0.0004654	0.0015432	0.1928958	0.0004679	0.0015512	0.1939053
25283- 8B DUP	7/13/2015	2:22:18 PM	0.0004711	0.0015618	0.1952189	µg	4	500	0.0004725	0.0015663	0.1957873	0.0004697	0.0015572	0.1946504
0.004ug = DL	7/13/2015	2:23:57 PM	0.0011185	0.0036462	0.0036462	µg			0.0011113	0.0036226	0.0036226	0.0011258	0.0036698	0.0036698
0.080ug = QC STD 2	7/13/2015	2:25:40 PM	0.0238096	0.0776144	0.0776144	µg			0.0237226	0.0773309	0.0773309	0.0238966	0.0778979	0.0778979
Reagent Blank	7/13/2015	2:27:34 PM	-6.07E-06	-1.98E-05	-1.98E-05	µg			-5.69E-07	-1.85E-06	-1.85E-06	-1.16E-05	-3.77E-05	-3.77E-05
25283- 9B	7/13/2015	2:29:14 PM	0.000337	0.0011245	0.1405577	µg	4	500	0.0003372	0.0011253	0.1406684	0.0003367	0.0011236	0.1404471
25283- 9B SPK	7/13/2015	2:30:52 PM	0.0202217	0.0718123	8.976533	µg	4	500	0.0220371	0.0718624	8.982794	0.0220064	0.0717622	8.9702721
25283- 10B	7/13/2015	2:32:41 PM	0.0011741	0.0038534	0.4816751	µg	4	500	0.00111642	0.0038212	0.4776439	0.001184	0.0038857	0.4857063
25283- 11B	7/13/2015	2:34:20 PM	0.0009434	0.0031012	0.3876499	µg	4	500	0.0009279	0.0030509	0.3813587	0.0009588	0.0031515	0.393941
25283- 11B DUP	7/13/2015	2:36:01 PM	0.000806	0.0026535	0.331686	µg	4	500	0.0007961	0.0026212	0.3276493	0.0008159	0.0026858	0.3357228
25283- 12B	7/13/2015	2:37:41 PM	0.0010345	0.0033984	0.4247969	µg	4	500	0.0010225	0.0033593	0.4199117	0.0010465	0.0034375	0.4296821
25283- 12B SPK	7/13/2015	2:39:22 PM	0.0242506	0.0790779	9.8847386	µg	4	500	0.0241803	0.0788489	9.856111	0.0243208	0.0793069	9.9133661
25283- 13B	7/13/2015	2:41:14 PM	0.0001032	0.0003624	0.0453027	µg	4	500	8.16E-05	0.0002921	0.036509	0.0001248	0.0004328	0.0540964
0.004ug = DL	7/13/2015	2:46:31 PM	0.001132	0.0036901	0.0036901	µg			0.0011244	0.0036653	0.0036653	0.0011397	0.003715	0.003715
0.080ug = QC STD 2	7/13/2015	2:48:14 PM	0.0235487	0.0767639	0.0767639	µg			0.0235081	0.0766316	0.0766316	0.0235893	0.0768962	0.0768962
Reagent Blank	7/13/2015	2:50:07 PM	2.53E-05	8.25E-05	8.25E-05	µg			3.52E-05	0.0001146	0.0001146	1.54E-05	5.03E-05	5.03E-05
Calib Blank	7/15/2015	11:48:53 AM	5.32E-05			µg			5.07E-05			5.57E-05		
STD 1= .004 ug	7/15/2015	11:50:34 AM	0.0012267			µg			0.0012324			0.001221		
STD 2= .04 ug	7/15/2015	11:52:15 AM	0.0120064			µg			0.0121065			0.0119063		
STD 3= .08 ug	7/15/2015	11:54:08 AM	0.0236631			µg			0.0237833			0.023543		
STD 4= .16 ug	7/15/2015	11:56:02 AM	0.0473315			µg			0.0473755			0.0472874		
STD 5= .20 ug	7/15/2015	11:57:57 AM	0.0587336			µg			0.059182			0.0582852		
Reagent Blank	7/15/2015	11:59:51 AM	2.08E-06	7.06E-06	7.06E-06	µg			-3.33E-05	-0.0001131	-0.0001131	3.75E-05	0.0001272	0.0001272
0.004ug = DL	7/15/2015	12:01:31 PM	0.0012077	0.0040974	0.0040974	µg			0.0012197	0.004138	0.004138	0.0011957	0.0040567	0.0040567
0.080ug = QC STD 2	7/15/2015	12:03:15 PM	0.0241227	0.0818407	0.0818407	µg			0.0241172	0.0818221	0.0818221	0.0241282	0.0818593	0.0818593
0.080ug = QC STD 3	7/15/2015	12:05:12 PM	0.0240162	0.0814795	0.0814795	µg			0.0242492	0.08227	0.08227	0.0237832	0.080689	0.080689
Reagent Blank	7/15/2015	12:07:05 PM	1.30E-05	4.41E-05	4.41E-05	µg			1.49E-05	5.05E-05	5.05E-05	1.11E-05	3.77E-05	3.77E-05
25283-1C	7/15/2015	12:15:44 PM	0.004543	0.0154058	1.5405809	µg	4	400	0.0045548	0.0154459	1.5445914	0.0045311	0.0153657	1.5365704
25283-2C	7/15/2015	12:17:28 PM	0.001173	0.0039726	0.3972562	µg	4	400	0.0012028	0.0040737	0.4073696	0.0011432	0.0038714	0.3871428
25283-2C DUP	7/15/2015	12:19:13 PM	0.0012168	0.0041211	0.4121063	µg	4	400	0.0012221	0.0041391	0.413909	0.0012115	0.004103	0.4103037
25283-3C	7/15/2015	12:20:59 PM	0.0025164	0.0085305	0.8530452	µg	4	400	0.0025163	0.0085299	0.8529897	0.0025166	0.008531	0.8531007
25283-3C SPK	7/15/2015	12:22:42 PM	0.0244123	0.0828164	8.281642	µg	4	400	0.0245147	0.0831639	8.3163872	0.0243099	0.082469	8.2468968
25283-4C	7/15/2015	12:24:33 PM	0.0055784	0.0189187	1.8918707	µg	4	400	0.0056019	0.0189985	1.8998519	0.0055549	0.0188389	1.8838894
0.004ug = DL	7/15/2015	12:26:13 PM	0.0011589	0.0039316	0.0039316	µg			0.0011512	0.0039055	0.0039055	0.0011666	0.0039578	0.0039578
0.080ug = QC STD 2	7/15/2015	12:27:56 PM	0.0232815	0.0789869	0.0789869	µg			0.0233902	0.0793557	0.0793557	0.0231728	0.0786181	0.0786181
Reagent Blank	7/15/2015	12:29:50 PM	3.04E-05	0.0001033	0.0001033	µg			4.14E-05	0.0001406	0.0001406	1.94E-05	6.60E-05	6.60E-05
25283-5C	7/15/2015	12:31:29 PM	0.0057433	0.0194781	1.9478064	µg	4	400	0.0058234	0.0197498	1.9749847	0.0056632	0.0192063	1.9206282
25283-5C DUP	7/15/2015	12:33:10 PM	0.0056925	0.0193058	1.9305797	µg	4	400	0.0056807	0.0192657	1.9265735	0.0057043	0.0193459	1.9345858
25283-6C	7/15/2015	12:34:51 PM	0.0033683	0.0114205	1.1420453	µg	4	400	0.0034101	0.0115625	1.156247	0.0033264	0.0112784	1.1278436
25283-6C SPK	7/15/2015	12:36:33 PM	0.0253737	0.086078	8.6077978	µg	4	400	0.0255236	0.0865865	8.6586484	0.0252238	0.0855695	8.5569472
25283-7C	7/15/2015	12:38:26 PM	0.0113232	0.038409	3.8408965	µg	4	400	0.0114381	0.0387989	3.8798883	0.0112082	0.038019	3.8019046
25283-8C	7/15/2015	12:40:19 PM	0.0111099	0.0376855	3.7685495	µg	4	400	0.0111707	0.0378917	3.7891664	0.0110492	0.0374793	3.7479327
25283-8C DUP	7/15/2015	12:42:12 PM	0.0109468	0.0371321	3.7132132	µg	4	400	0.0110315	0.0374195	3.7419455	0.0108621	0.0368448	3.6844808
25283-9C	7/15/2015	12:44:06 PM	0.0121336	0.0411585	4.115849	µg	4	400	0.012191	0.0413532	4.1353187	0.0120762	0.0409638	4.0963792
25283-9C SPK	7/15/2015	12:46:01 PM	0.0334779	0.1135731	11.357312	µg	4	400	0.0336752	0.1142425	11.424248	0.0332806	0.1129038	11.290376
25283-10C	7/15/2015	12:47:56 PM	0.0204123	0.0692454	6.9245423	µg	4	400	0.0204757	0.0694608	6.9460798	0.0203488	0.06903	6.9030049
0.004ug = DL	7/15/2015	12:49:49 PM	0.0011209	0.0038028	0.0038028	µg			0.001175	0.0039865	0.0039865	0.0010667	0.003619	0.003619
0.080ug = QC STD 2	7/15/2015	12:51:33 PM	0.022738	0.0771431	0.0771431	µg			0.0229468	0.0778515	0.0778515	0.0225293	0.0764348	0.0764348
Reagent Blank	7/15/2015	12:53:26 PM	2.11E-05	7.15E-05	7.15E-05	µg			1.14E-05	3.87E-05	3.87E-05	3.07E-05	0.0001042	0.0001042
25283-11C	7/15/2015	12:55:09 PM	0.0185491	0.0629242	6.2924164	µg	4	400	0.0187341	0.063552	6.3552027	0.018364	0.0622963	6.22963
25283-11C DUP	7/15/2015	12:57:05 PM	0.018592	0.0630699	6.306993	µg	4	400	0.0186659	0.0633205	6.3320466	0.0185182	0.0628194	6.2819395
25283-12C	7/15/2015	12:59:02 PM	0.0161941	0.0549344	5.4934352	µg	4	400	0.0163394	0.0554274	5.5427398	0.0160487	0.0544413	5.4441307
25283-12C SPK	7/15/2015	1:00:55 PM	0.0368667	0.1250701	12.507009	µg	4	400	0.0367235	0.1245843	12.458431	0.0370098	0.1255559	12.555587
25283-13C	7/15/2015	1:02:44 PM	3.08E-05	9.74E-05	0.0097351	µg	4	400	3.94E-05	0.0001266	0.0126618	2.21E-05	6.81E-05	0.0068083
0.004ug = DL	7/15/2015	1:13:08 PM	0.0010806	0.003666	0.003666	µg			0.0010692	0.0036273	0.0036273	0.0010919	0.0037046	0.0037046
0.080ug = QC STD 2	7/15/2015	1:14:51 PM	0.0233903	0.0793559	0.0793559	µg			0.0232836	0.0789942	0.0789942	0.0234969	0.0797177	0.0797177
Reagent Blank	7/15/2015	1:16:45 PM	-1.92E-05	-6.51E-05	-6.51E-05	µg			-2.52E-05	-8.56E-05	-8.56E-05	-1.32E-05	-4.47E-05	-4.47E-05
Calib Blank	7/17/2015	10:32:09 AM	0.0001273			µg			9.22E-05			0.0001624		
STD 1= .004 ug	7/17/2015	10:33:49 AM	0.0012962			µg			0.0013141			0.0012784		
STD 2= .04 ug	7/17/2015	10:35:30 AM	0.0125715			µg			0.0128055			0.0123376		
STD 3= .08 ug	7/17/2015	10:37:24 AM	0.025529			µg			0.0259545			0.0251034		
STD 4= .16 ug	7/17/2015	10:39:18 AM	0.0502787			µg			0.0511014			0.0494561		
STD 5= .20 ug	7/17/2015	10:41:14 AM	0.0621911			µg			0.0635107			0.0608716		
Reagent Blank	7/17/2015	10:43:07 AM	-2.06E-05	-6.57E-05	-6.57E-05	µg			-1.79E-05	-5.73E-05	-5.73E-05	-2.32E-05	-7.41E-05	-7.41E-05
0.004ug = DL	7/17/2015	10:44:47 AM	0.0012375	0.0039551	0.0039551	µg			0.0012752	0.004				

PerkinElmer FIMS-100 CVAA Mercury Analyzer

Sample_ID	Date	Time	Mean_Sig	Mean_Rd	Mean_Rt	Units	Alq.	Vol.	Sig 1	Reading-1	Result-1	Sig 2	Reading-2	Result-2
0.004ug = DL	7/17/2015	12:41:27 PM	0.0011599	0.0037068	0.0037068	µg			0.0011068	0.0035374	0.0035374	0.0012129	0.0038762	0.0038762
0.080ug = QC STD 2	7/17/2015	12:43:10 PM	0.0232999	0.0744638	0.0744638	µg			0.0233594	0.0746539	0.0746539	0.0232404	0.0742738	0.0742738
Reagent Blank	7/17/2015	12:45:04 PM	-3.91E-05	-0.000125	-0.000125	µg			-6.09E-05	-0.0001946	-0.0001946	-1.73E-05	-5.54E-05	-5.54E-05
25283- 2 FH	7/17/2015	12:46:46 PM	0.0131164	0.0419841	1.0496013	µg	4	100	0.0130901	0.0419002	1.0475042	0.0131426	0.0420679	1.0516983
25283- 2 FH DUP	7/17/2015	12:48:41 PM	0.0128019	0.0409792	1.024479	µg	4	100	0.012788	0.0409348	1.0233691	0.0128158	0.0410236	1.0255889
25283- 3 FH	7/17/2015	12:50:35 PM	0.0126836	0.040601	1.015026	µg	4	100	0.0126627	0.0405342	1.0133562	0.0127045	0.0406678	1.0166958
25283- 3 FH SPK	7/17/2015	12:52:30 PM	0.0368395	0.1178006	2.9450143	µg	4	100	0.0367326	0.1174587	2.9364678	0.0369465	0.1181424	2.9535608
25283- 4 FH	7/17/2015	12:54:22 PM	0.0137381	0.0439711	1.0992768	µg	4	100	0.0137561	0.0440286	1.1007141	0.0137201	0.0439136	1.0978395
25283- 5 FH	7/17/2015	12:56:12 PM	0.0141901	0.0454157	1.1353921	µg	4	100	0.0142295	0.0455416	1.1385394	0.0141507	0.0452898	1.1322448
25283- 5 FH DUP	7/17/2015	12:58:01 PM	0.0140606	0.0450019	1.125047	µg	4	100	0.0140462	0.0449557	1.1238936	0.0140751	0.045048	1.1262004
25283- 6 FH	7/17/2015	12:59:51 PM	0.0098982	0.0316991	0.7924784	µg	4	100	0.0099262	0.0317886	0.7947152	0.0098702	0.0316097	0.7902415
25283- 6 FH SPK	7/17/2015	1:01:42 PM	0.0349038	0.1116142	2.7903542	µg	4	100	0.0350687	0.1121413	2.8035328	0.0347388	0.111087	2.7771756
25283- 7 FH	7/17/2015	1:03:33 PM	0.0162173	0.0518942	1.2973553	µg	4	100	0.0162458	0.0519853	1.2996316	0.0161888	0.0518032	1.295079
0.004ug = DL	7/17/2015	1:08:47 PM	0.0012014	0.0038395	0.0038395	µg			0.001209	0.0038639	0.0038639	0.0011937	0.003815	0.003815
0.080ug = QC STD 2	7/17/2015	1:10:31 PM	0.0238624	0.0762616	0.0762616	µg			0.0237494	0.0759003	0.0759003	0.0239755	0.0766228	0.0766228
Reagent Blank	7/17/2015	1:12:25 PM	-3.01E-05	-9.62E-05	-9.62E-05	µg			-3.99E-05	-0.0001276	-0.0001276	-2.03E-05	-6.48E-05	-6.48E-05
25283- 8 FH	7/17/2015	1:14:05 PM	0.0117752	0.037698	0.9424493	µg	4	100	0.011815	0.037825	0.9456244	0.0117355	0.037571	0.9392743
25283- 8 FH DUP	7/17/2015	1:15:57 PM	0.0118721	0.0380077	0.9501916	µg	4	100	0.0118982	0.0380909	0.9522717	0.0118461	0.0379245	0.9481115
25283- 9 FH	7/17/2015	1:17:49 PM	0.0049915	0.0160178	0.4004461	µg	4	100	0.0049862	0.0160011	0.4000287	0.0049967	0.0160345	0.4008635
25283- 9 FH SPK	7/17/2015	1:19:32 PM	0.0339163	0.1084583	2.7114577	µg	4	100	0.0338955	0.1083918	2.7097941	0.0339371	0.1085249	2.7131214
25283- 10 FH	7/17/2015	1:21:26 PM	0.000268	0.0009222	0.0230562	µg	4	100	0.0002447	0.0008478	0.0211956	0.0002913	0.0009967	0.0249168
25283- 11 FH	7/17/2015	1:23:09 PM	0.0003513	0.0011883	0.0297081	µg	4	100	0.0003634	0.001227	0.0306739	0.0003392	0.0011497	0.0287423
25283- 11 FH DUP	7/17/2015	1:24:53 PM	0.0004371	0.0014627	0.0365681	µg	4	100	0.0004611	0.0015392	0.0384797	0.0004132	0.0013863	0.0346564
25283- 12 FH	7/17/2015	1:26:37 PM	0.0008494	0.0027802	0.069506	µg	4	100	0.0008317	0.0027238	0.0680942	0.0008671	0.0028367	0.0709178
25283- 12 FH SPK	7/17/2015	1:28:21 PM	0.0240171	0.0768215	1.9205386	µg	4	100	0.0242855	0.0776794	1.9419862	0.0237487	0.0759636	1.8990911
25283- 13 FH	7/17/2015	1:30:13 PM	1.03E-05	9.88E-05	0.0024694	µg	4	100	-2.50E-06	5.77E-05	0.0014429	2.32E-05	0.0001398	0.0034958
0.004ug = DL	7/17/2015	1:31:52 PM	0.0012022	0.0038422	0.0038422	µg			0.0012193	0.0038968	0.0038968	0.0011852	0.0037876	0.0037876
0.080ug = QC STD 2	7/17/2015	1:33:36 PM	0.0231726	0.0740568	0.0740568	µg			0.0232358	0.0742589	0.0742589	0.0231093	0.0738547	0.0738547
Reagent Blank	7/17/2015	1:35:30 PM	-2.67E-05	-8.53E-05	-8.53E-05	µg			-1.25E-05	-4.01E-05	-4.01E-05	-4.08E-05	-0.0001305	-0.0001305

Appendix D

Instrument Output

Indurating Furnace Stack A (SV014)

Test Date: 6/23-24/2015

Average Raw Analyzer Results

Run	O ₂ , %	CO ₂ , %	Run Times
1	19.5	1.2	1923-2023
2	19.5	1.2	0802-0902
3	19.6	1.1	0921-1021

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %
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6/22/15 16:33	20.92	0.11	
6/22/15 16:34	20.91	0.10	
6/22/15 16:35	20.91	0.11	
6/22/15 16:36	20.90	0.11	
6/22/15 16:37	20.90	0.11	
6/22/15 16:38	20.88	0.11	
6/22/15 16:39	20.86	0.12	
6/23/15 7:49	0.08	0.04	
6/23/15 7:50	0.04	0.03	
6/23/15 7:51	0.03	0.04	
6/23/15 7:52	17.08	3.54	
6/23/15 7:53	22.66	4.62	Analyzer Cal
6/23/15 7:54	22.20	4.62	High O2
6/23/15 7:55	15.51	6.87	
6/23/15 7:56	9.49	8.96	Mid O2, High Co2
6/23/15 7:57	17.95	6.09	
6/23/15 7:58	22.19	4.88	Mid CO2
6/23/15 7:59	17.25	2.80	
6/23/15 8:00	0.06	0.05	
6/23/15 8:01	0.03	0.05	
6/23/15 8:02	0.03	0.05	
6/23/15 8:03	0.03	0.05	
6/23/15 8:04	0.02	0.05	
6/23/15 8:05	2.06	0.05	
6/23/15 8:06	0.03	0.04	
6/23/15 8:07	0.03	0.04	
6/23/15 8:08	0.03	0.03	
6/23/15 8:09	0.02	0.04	
6/23/15 8:10	0.03	0.04	
6/23/15 8:11	0.02	0.04	
6/23/15 8:12	0.03	0.04	
6/23/15 8:13	0.02	0.04	
6/23/15 8:14	0.01	0.05	
6/23/15 8:15	0.02	0.04	
6/23/15 8:16	0.02	0.04	
6/23/15 8:17	1.61	0.05	
6/23/15 8:18	-0.01	0.04	
6/23/15 8:19	-0.02	0.04	
6/23/15 8:20	-0.02	0.04	
6/23/15 8:21	0.13	0.04	
6/23/15 8:22	-0.03	0.04	
6/23/15 8:23	-0.03	0.05	
6/23/15 8:24	-0.03	0.04	
6/23/15 8:25	2.99	0.06	
6/23/15 8:26	-0.01	0.04	

Indurating Furnace Stack A (SV014)

Test Date: 6/23-24/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 8:27	1.09	0.14	
6/23/15 8:28	-0.03	0.03	
6/23/15 8:29	-0.03	0.05	
6/23/15 8:30	-0.03	0.05	
6/23/15 8:31	11.92	0.18	
6/23/15 8:32	0.01	0.06	
6/23/15 8:33	-0.01	0.05	
6/23/15 8:34	1.22	0.05	
6/23/15 8:35	0.03	0.04	Zero
6/23/15 8:36	6.94	0.06	
6/23/15 8:37	20.14	0.14	
6/23/15 19:11	21.94	4.82	System Bias Check
6/23/15 19:12	21.95	4.83	
6/23/15 19:13	21.95	4.82	High O2, Mid CO2
6/23/15 19:14	1.36	0.23	
6/23/15 19:15	0.09	0.10	
6/23/15 19:16	0.05	0.09	Zero O2 and CO2
6/23/15 19:17	0.03	0.08	
6/23/15 19:18	0.02	0.08	
6/23/15 19:19	0.01	0.07	
6/23/15 19:20	0.01	0.07	
6/23/15 19:21	0.02	0.08	
6/23/15 19:22	-0.01	0.08	
6/23/15 19:23	14.29	0.94	
6/23/15 19:24	19.38	1.18	Run 1, Stack A
6/23/15 19:25	19.40	1.18	Run 1
6/23/15 19:26	19.40	1.18	Run 1
6/23/15 19:27	19.40	1.20	Run 1
6/23/15 19:28	19.40	1.22	Run 1
6/23/15 19:29	19.40	1.22	Run 1
6/23/15 19:30	19.41	1.21	Run 1
6/23/15 19:31	19.41	1.22	Run 1
6/23/15 19:32	19.41	1.22	Run 1
6/23/15 19:33	19.42	1.21	Run 1
6/23/15 19:34	19.43	1.19	Run 1
6/23/15 19:35	19.45	1.18	Run 1
6/23/15 19:36	19.46	1.16	Run 1
6/23/15 19:37	19.48	1.15	Run 1
6/23/15 19:38	19.47	1.16	Run 1
6/23/15 19:39	19.47	1.16	Run 1
6/23/15 19:40	19.47	1.16	Run 1
6/23/15 19:41	19.47	1.17	Run 1
6/23/15 19:42	19.46	1.18	Run 1
6/23/15 19:43	19.45	1.19	Run 1
6/23/15 19:44	19.45	1.19	Run 1
6/23/15 19:45	19.44	1.21	Run 1
6/23/15 19:46	19.44	1.21	Run 1
6/23/15 19:47	19.44	1.21	Run 1
6/23/15 19:48	19.46	1.18	Run 1
6/23/15 19:49	19.47	1.17	Run 1
6/23/15 19:50	19.47	1.17	Run 1
6/23/15 19:51	19.47	1.16	Run 1
6/23/15 19:52	19.48	1.15	Run 1

Indurating Furnace Stack A (SV014)

Test Date: 6/23-24/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 19:53	19.50	1.14	Run 1
6/23/15 19:54	19.51	1.13	Run 1
6/23/15 19:55	19.52	1.13	Run 1
6/23/15 19:56	19.52	1.13	Run 1
6/23/15 19:57	19.53	1.13	Run 1
6/23/15 19:58	19.54	1.12	Run 1
6/23/15 19:59	19.54	1.12	Run 1
6/23/15 20:00	19.54	1.10	Run 1
6/23/15 20:01	19.54	1.09	Run 1
6/23/15 20:02	19.54	1.10	Run 1
6/23/15 20:03	19.54	1.09	Run 1
6/23/15 20:04	19.54	1.10	Run 1
6/23/15 20:05	19.54	1.12	Run 1
6/23/15 20:06	19.53	1.14	Run 1
6/23/15 20:07	19.55	1.12	Run 1
6/23/15 20:08	19.54	1.12	Run 1
6/23/15 20:09	19.54	1.13	Run 1
6/23/15 20:10	19.54	1.12	Run 1
6/23/15 20:11	19.54	1.12	Run 1
6/23/15 20:12	19.54	1.11	Run 1
6/23/15 20:13	19.54	1.10	Run 1
6/23/15 20:14	19.54	1.10	Run 1
6/23/15 20:15	19.54	1.11	Run 1
6/23/15 20:16	19.54	1.12	Run 1
6/23/15 20:17	19.53	1.13	Run 1
6/23/15 20:18	19.53	1.12	Run 1
6/23/15 20:19	19.53	1.12	Run 1
6/23/15 20:20	19.53	1.11	Run 1
6/23/15 20:21	19.53	1.12	Run 1
6/23/15 20:22	19.53	1.12	Run 1
6/23/15 20:23	19.54	1.13	Run 1
6/23/15 20:24	17.83	1.01	
6/23/15 20:25	21.12	4.73	
6/23/15 20:26	21.97	4.82	
6/23/15 20:27	21.97	4.83	
6/23/15 20:28	21.98	4.83	High O2, Mid CO2
6/23/15 20:29	21.98	4.83	
6/23/15 20:30	2.07	0.37	
6/23/15 20:31	0.10	0.10	
6/23/15 20:32	0.06	0.09	Zero O2 and CO2
6/23/15 20:33	0.03	0.09	
6/23/15 20:34	0.03	0.07	
6/23/15 20:35	0.02	0.07	
6/23/15 20:36	0.01	0.06	
6/23/15 20:37	0.02	0.06	
6/23/15 20:38	0.00	0.06	
6/23/15 20:39	0.00	0.06	
6/24/2015 7:00	20.76	0.11	
6/24/2015 7:01	16.19	0.09	
6/24/2015 7:02	0.02	0.05	
6/24/2015 7:03	-0.03	0.03	
6/24/2015 7:04	18.05	4.10	Analyzer Cal
6/24/2015 7:05	22.20	4.83	High O2

Indurating Furnace Stack A (SV014)

Test Date: 6/23-24/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/24/2015 7:06	13.03	7.14	
6/24/2015 7:07	9.43	8.96	Mid O2, High CO2
6/24/2015 7:08	20.86	5.17	
6/24/2015 7:09	22.22	4.88	Mid CO2
6/24/2015 7:10	6.38	0.90	
6/24/2015 7:11	-0.03	0.04	
6/24/2015 7:12	-0.03	0.04	
6/24/2015 7:13	0.52	0.04	
6/24/2015 7:14	-0.08	0.03	
6/24/2015 7:15	-0.06	0.03	
6/24/2015 7:16	-0.17	0.03	
6/24/2015 7:17	-0.17	0.03	
6/24/2015 7:18	-0.15	0.04	
6/24/2015 7:19	-0.10	0.04	
6/24/2015 7:20	1.32	0.28	
6/24/2015 7:21	-0.10	0.03	
6/24/2015 7:22	-0.10	0.03	
6/24/2015 7:23	-0.06	0.04	
6/24/2015 7:24	-0.10	0.03	
6/24/2015 7:25	2.50	0.14	
6/24/2015 7:26	-0.10	0.03	
6/24/2015 7:27	-0.10	0.03	Zero
6/24/2015 7:28	13.70	0.08	
6/24/2015 7:29	18.92	1.78	System Bias Check
6/24/2015 7:30	22.04	4.80	
6/24/2015 7:31	22.06	4.82	
6/24/2015 7:32	22.03	4.77	High O2, Mid CO2
6/24/2015 7:33	3.38	0.65	
6/24/2015 7:34	-0.04	0.06	
6/24/2015 7:35	0.54	0.08	Zero O2 and CO2
6/24/2015 7:36	-0.08	0.03	
6/24/2015 7:37	-0.10	0.03	
6/24/2015 7:38	-0.11	0.04	
6/24/2015 7:39	-0.12	0.04	
6/24/2015 7:40	-0.12	0.03	
6/24/2015 7:41	-0.12	0.04	
6/24/2015 7:42	-0.12	0.04	
6/24/2015 7:43	-0.04	0.04	
6/24/2015 7:44	-0.14	0.03	
6/24/2015 7:45	-0.09	0.04	
6/24/2015 7:46	18.63	1.13	
6/24/2015 7:47	19.44	1.16	
6/24/2015 7:48	19.45	1.18	
6/24/2015 7:49	19.46	1.19	
6/24/2015 7:50	19.47	1.19	
6/24/2015 7:51	19.48	1.18	
6/24/2015 7:52	19.49	1.16	
6/24/2015 7:53	19.52	1.16	
6/24/2015 7:54	19.54	1.15	
6/24/2015 7:55	19.54	1.14	
6/24/2015 7:56	19.54	1.13	
6/24/2015 7:57	19.53	1.15	
6/24/2015 7:58	19.52	1.16	

Indurating Furnace Stack A (SV014)

Test Date: 6/23-24/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/24/2015 7:59	19.49	1.18	
6/24/2015 8:00	19.48	1.19	
6/24/2015 8:01	19.48	1.19	
6/24/2015 8:02	19.50	1.17	
6/24/2015 8:03	19.51	1.16	Run 2
6/24/2015 8:04	19.53	1.16	Run 2
6/24/2015 8:05	19.53	1.16	Run 2
6/24/2015 8:06	19.53	1.15	Run 2
6/24/2015 8:07	19.53	1.15	Run 2
6/24/2015 8:08	19.52	1.16	Run 2
6/24/2015 8:09	19.54	1.15	Run 2
6/24/2015 8:10	19.54	1.15	Run 2
6/24/2015 8:11	19.54	1.15	Run 2
6/24/2015 8:12	19.53	1.16	Run 2
6/24/2015 8:13	19.54	1.15	Run 2
6/24/2015 8:14	19.53	1.16	Run 2
6/24/2015 8:15	19.49	1.20	Run 2
6/24/2015 8:16	19.48	1.22	Run 2
6/24/2015 8:17	19.49	1.21	Run 2
6/24/2015 8:18	19.52	1.19	Run 2
6/24/2015 8:19	19.54	1.17	Run 2
6/24/2015 8:20	19.55	1.15	Run 2
6/24/2015 8:21	19.56	1.13	Run 2
6/24/2015 8:22	19.56	1.11	Run 2
6/24/2015 8:23	19.56	1.12	Run 2
6/24/2015 8:24	19.55	1.14	Run 2
6/24/2015 8:25	19.54	1.16	Run 2
6/24/2015 8:26	19.51	1.19	Run 2
6/24/2015 8:27	19.50	1.21	Run 2
6/24/2015 8:28	19.51	1.20	Run 2
6/24/2015 8:29	19.49	1.21	Run 2
6/24/2015 8:30	19.48	1.22	Run 2
6/24/2015 8:31	19.52	1.20	Run 2
6/24/2015 8:32	19.53	1.19	Run 2
6/24/2015 8:33	19.54	1.20	Run 2
6/24/2015 8:34	19.54	1.17	Run 2
6/24/2015 8:35	19.54	1.16	Run 2
6/24/2015 8:36	19.54	1.16	Run 2
6/24/2015 8:37	19.55	1.15	Run 2
6/24/2015 8:38	19.55	1.15	Run 2
6/24/2015 8:39	19.55	1.15	Run 2
6/24/2015 8:40	19.55	1.16	Run 2
6/24/2015 8:41	19.56	1.15	Run 2
6/24/2015 8:42	19.56	1.16	Run 2
6/24/2015 8:43	19.54	1.17	Run 2
6/24/2015 8:44	19.54	1.18	Run 2
6/24/2015 8:45	19.52	1.21	Run 2
6/24/2015 8:46	19.52	1.20	Run 2
6/24/2015 8:47	19.52	1.18	Run 2
6/24/2015 8:48	19.54	1.17	Run 2
6/24/2015 8:49	19.54	1.16	Run 2
6/24/2015 8:50	19.54	1.16	Run 2
6/24/2015 8:51	19.54	1.16	Run 2

Indurating Furnace Stack A (SV014)

Test Date: 6/23-24/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/24/2015 8:52	19.55	1.16	Run 2
6/24/2015 8:53	19.54	1.16	Run 2
6/24/2015 8:54	19.54	1.16	Run 2
6/24/2015 8:55	19.54	1.16	Run 2
6/24/2015 8:56	19.53	1.17	Run 2
6/24/2015 8:57	19.50	1.20	Run 2
6/24/2015 8:58	19.49	1.21	Run 2
6/24/2015 8:59	19.49	1.21	Run 2
6/24/2015 9:00	19.48	1.20	Run 2
6/24/2015 9:01	19.48	1.20	Run 2
6/24/2015 9:02	19.48	1.22	Run 2
6/24/2015 9:03	19.47	1.22	System Bias Check
6/24/2015 9:04	17.91	1.08	
6/24/2015 9:05	20.97	4.68	
6/24/2015 9:06	22.05	4.82	
6/24/2015 9:07	22.06	4.82	High O2, Mid CO2
6/24/2015 9:08	2.54	0.47	
6/24/2015 9:09	-0.03	0.07	
6/24/2015 9:10	-0.06	0.04	Zero O2 and CO2
6/24/2015 9:11	-0.10	0.04	
6/24/2015 9:12	-0.10	0.04	
6/24/2015 9:13	-0.10	0.03	
6/24/2015 9:14	-0.10	0.03	
6/24/2015 9:15	-0.10	0.03	
6/24/2015 9:16	-0.10	0.04	
6/24/2015 9:17	-0.12	0.03	
6/24/2015 9:18	-0.12	0.03	
6/24/2015 9:19	1.26	0.14	
6/24/2015 9:20	19.33	1.12	
6/24/2015 9:21	19.49	1.15	
6/24/2015 9:22	19.52	1.15	Run 3
6/24/2015 9:23	19.54	1.15	Run 3
6/24/2015 9:24	19.54	1.14	Run 3
6/24/2015 9:25	19.58	1.10	Run 3
6/24/2015 9:26	19.60	1.09	Run 3
6/24/2015 9:27	19.60	1.09	Run 3
6/24/2015 9:28	19.58	1.10	Run 3
6/24/2015 9:29	19.59	1.12	Run 3
6/24/2015 9:30	19.57	1.15	Run 3
6/24/2015 9:31	19.55	1.16	Run 3
6/24/2015 9:32	19.55	1.16	Run 3
6/24/2015 9:33	19.55	1.15	Run 3
6/24/2015 9:34	19.55	1.15	Run 3
6/24/2015 9:35	19.55	1.15	Run 3
6/24/2015 9:36	19.56	1.12	Run 3
6/24/2015 9:37	19.56	1.14	Run 3
6/24/2015 9:38	19.55	1.15	Run 3
6/24/2015 9:39	19.55	1.15	Run 3
6/24/2015 9:40	19.56	1.14	Run 3
6/24/2015 9:41	19.57	1.14	Run 3
6/24/2015 9:42	19.58	1.13	Run 3
6/24/2015 9:43	19.56	1.15	Run 3
6/24/2015 9:44	19.57	1.14	Run 3

Indurating Furnace Stack A (SV014)

Test Date: 6/23-24/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/24/2015 9:45	19.55	1.15	Run 3
6/24/2015 9:46	19.56	1.15	Run 3
6/24/2015 9:47	19.58	1.14	Run 3
6/24/2015 9:48	19.59	1.13	Run 3
6/24/2015 9:49	19.61	1.11	Run 3
6/24/2015 9:50	19.61	1.09	Run 3
6/24/2015 9:51	19.61	1.10	Run 3
6/24/2015 9:52	19.61	1.10	Run 3
6/24/2015 9:53	19.61	1.10	Run 3
6/24/2015 9:54	19.61	1.12	Run 3
6/24/2015 9:55	19.58	1.15	Run 3
6/24/2015 9:56	19.60	1.12	Run 3
6/24/2015 9:57	19.59	1.11	Run 3
6/24/2015 9:58	19.61	1.10	Run 3
6/24/2015 9:59	19.61	1.10	Run 3
6/24/2015 10:00	19.60	1.11	Run 3
6/24/2015 10:01	19.59	1.13	Run 3
6/24/2015 10:02	19.57	1.14	Run 3
6/24/2015 10:03	19.56	1.15	Run 3
6/24/2015 10:04	19.58	1.15	Run 3
6/24/2015 10:05	19.58	1.13	Run 3
6/24/2015 10:06	19.60	1.10	Run 3
6/24/2015 10:07	19.60	1.09	Run 3
6/24/2015 10:08	19.61	1.09	Run 3
6/24/2015 10:09	19.61	1.09	Run 3
6/24/2015 10:10	19.61	1.10	Run 3
6/24/2015 10:11	19.60	1.11	Run 3
6/24/2015 10:12	19.60	1.12	Run 3
6/24/2015 10:13	19.60	1.12	Run 3
6/24/2015 10:14	19.61	1.12	Run 3
6/24/2015 10:15	19.61	1.09	Run 3
6/24/2015 10:16	19.61	1.09	Run 3
6/24/2015 10:17	19.62	1.09	Run 3
6/24/2015 10:18	19.62	1.08	Run 3
6/24/2015 10:19	19.62	1.09	Run 3
6/24/2015 10:20	19.61	1.10	Run 3
6/24/2015 10:21	19.61	1.11	Run 3
6/24/2015 10:22	19.61	1.13	
6/24/2015 10:23	19.62	1.15	
6/24/2015 10:24	19.61	1.15	
6/24/2015 10:25	16.62	2.07	
6/24/2015 10:26	22.04	4.81	
6/24/2015 10:27	22.06	4.82	
6/24/2015 10:28	22.07	4.84	High O2, Mid CO2
6/24/2015 10:29	6.64	1.36	
6/24/2015 10:30	-0.02	0.09	
6/24/2015 10:31	-0.04	0.08	Zero O2 and CO2
6/24/2015 10:32	-0.08	0.06	
6/24/2015 10:33	-0.10	0.06	

Indurating Furnace Stack B (SV015)

Test Date: 6/25/2015

Average Raw Analyzer Results

Run	O ₂ , %	CO ₂ , %	Run Times
1	19.2	1.5	0755-0855
2	19.3	1.5	0914-1014
3	19.3	1.4	1104-1204

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %
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6/24/15 16:30	20.84	0.10	
6/25/15 6:32	20.78	0.10	
6/25/15 6:33	20.68	0.10	
6/25/15 6:34	20.68	0.10	
6/25/15 6:35	20.41	0.11	
6/25/15 6:36	20.77	0.09	
6/25/15 6:37	20.80	0.10	
6/25/15 6:38	20.84	0.10	
6/25/15 6:39	20.84	0.10	
6/25/15 6:40	21.20	1.84	
6/25/15 6:41	22.20	4.84	Analyzer Cals
6/25/15 6:42	22.25	4.85	High O2
6/25/15 6:43	21.20	3.30	
6/25/15 6:44	14.29	5.45	
6/25/15 6:45	9.45	8.96	Mid O2, High CO2
6/25/15 6:46	15.33	6.66	
6/25/15 6:47	22.24	4.88	
6/25/15 6:48	22.25	4.87	Mid CO2
6/25/15 6:49	4.32	0.53	
6/25/15 6:50	0.01	0.05	
6/25/15 6:51	0.01	0.05	
6/25/15 6:52	0.01	0.05	
6/25/15 6:53	4.69	0.15	
6/25/15 6:54	-0.07	0.04	
6/25/15 6:55	6.99	0.20	
6/25/15 6:56	-0.06	0.05	
6/25/15 6:57	-0.08	0.05	
6/25/15 6:58	0.94	0.06	
6/25/15 6:59	-0.10	0.05	
6/25/15 7:00	0.46	0.05	
6/25/15 7:01	-0.11	0.03	
6/25/15 7:02	-0.11	0.03	
6/25/15 7:03	-0.11	0.03	
6/25/15 7:04	-0.07	0.05	
6/25/15 7:05	-0.11	0.03	
6/25/15 7:06	6.05	2.90	
6/25/15 7:07	-0.09	0.06	
6/25/15 7:08	-0.09	0.05	Zero O2, CO2,
6/25/15 7:09	16.37	3.76	
6/25/15 7:10	22.22	4.88	
6/25/15 7:11	20.22	2.21	
6/25/15 7:12	20.45	4.24	
6/25/15 7:13	22.07	4.82	
6/25/15 7:14	22.07	4.83	
6/25/15 7:15	22.06	4.83	System Bias Check

Indurating Furnace Stack B (SV015)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 7:16	22.06	4.83	High O2, Mid CO2
6/25/15 7:17	21.38	4.52	
6/25/15 7:18	0.29	0.13	
6/25/15 7:19	-0.03	0.07	
6/25/15 7:20	0.22	0.09	Zero O2 CO2
6/25/15 7:21	0.15	0.06	
6/25/15 7:22	-0.10	0.06	
6/25/15 7:23	-0.10	0.06	
6/25/15 7:24	-0.10	0.04	
6/25/15 7:25	-0.10	0.04	
6/25/15 7:26	-0.09	0.05	
6/25/15 7:27	-0.10	0.03	
6/25/15 7:28	-0.11	0.04	
6/25/15 7:29	12.86	0.90	
6/25/15 7:30	19.28	1.29	
6/25/15 7:31	19.32	1.28	
6/25/15 7:32	19.29	1.32	
6/25/15 7:33	19.30	1.33	
6/25/15 7:34	19.29	1.36	
6/25/15 7:35	19.28	1.38	
6/25/15 7:36	19.28	1.41	
6/25/15 7:37	19.27	1.42	
6/25/15 7:38	19.28	1.42	
6/25/15 7:39	19.27	1.43	
6/25/15 7:40	19.27	1.44	
6/25/15 7:41	19.27	1.43	
6/25/15 7:42	19.28	1.42	
6/25/15 7:43	19.28	1.44	
6/25/15 7:44	19.28	1.43	
6/25/15 7:45	19.27	1.42	
6/25/15 7:46	19.27	1.42	
6/25/15 7:47	19.27	1.43	
6/25/15 7:48	19.25	1.48	
6/25/15 7:49	19.25	1.49	
6/25/15 7:50	19.23	1.50	
6/25/15 7:51	19.22	1.51	
6/25/15 7:52	19.25	1.49	
6/25/15 7:53	19.25	1.48	
6/25/15 7:54	19.27	1.45	
6/25/15 7:55	19.28	1.42	
6/25/15 7:56	19.28	1.40	Run 1
6/25/15 7:57	19.27	1.42	Run 1
6/25/15 7:58	19.27	1.44	Run 1
6/25/15 7:59	19.24	1.49	Run 1
6/25/15 8:00	19.22	1.51	Run 1
6/25/15 8:01	19.22	1.52	Run 1
6/25/15 8:02	19.21	1.52	Run 1
6/25/15 8:03	19.25	1.48	Run 1
6/25/15 8:04	19.26	1.48	Run 1
6/25/15 8:05	19.27	1.46	Run 1
6/25/15 8:06	19.26	1.44	Run 1
6/25/15 8:07	19.27	1.47	Run 1
6/25/15 8:08	19.23	1.50	Run 1

Indurating Furnace Stack B (SV015)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 8:09	19.25	1.50	Run 1
6/25/15 8:10	19.24	1.51	Run 1
6/25/15 8:11	19.27	1.49	Run 1
6/25/15 8:12	19.25	1.48	Run 1
6/25/15 8:13	19.27	1.43	Run 1
6/25/15 8:14	19.27	1.44	Run 1
6/25/15 8:15	19.26	1.48	Run 1
6/25/15 8:16	19.22	1.51	Run 1
6/25/15 8:17	19.21	1.56	Run 1
6/25/15 8:18	19.20	1.58	Run 1
6/25/15 8:19	19.20	1.56	Run 1
6/25/15 8:20	19.21	1.56	Run 1
6/25/15 8:21	19.21	1.54	Run 1
6/25/15 8:22	19.20	1.55	Run 1
6/25/15 8:23	19.20	1.53	Run 1
6/25/15 8:24	19.21	1.51	Run 1
6/25/15 8:25	19.22	1.51	Run 1
6/25/15 8:26	19.20	1.55	Run 1
6/25/15 8:27	19.20	1.56	Run 1
6/25/15 8:28	19.20	1.56	Run 1
6/25/15 8:29	19.20	1.54	Run 1
6/25/15 8:30	19.20	1.56	Run 1
6/25/15 8:31	19.19	1.58	Run 1
6/25/15 8:32	19.19	1.58	Run 1
6/25/15 8:33	19.20	1.56	Run 1
6/25/15 8:34	19.21	1.53	Run 1
6/25/15 8:35	19.21	1.53	Run 1
6/25/15 8:36	19.20	1.55	Run 1
6/25/15 8:37	19.21	1.52	Run 1
6/25/15 8:38	19.21	1.51	Run 1
6/25/15 8:39	19.22	1.51	Run 1
6/25/15 8:40	19.23	1.51	Run 1
6/25/15 8:41	19.25	1.50	Run 1
6/25/15 8:42	19.24	1.49	Run 1
6/25/15 8:43	19.27	1.45	Run 1
6/25/15 8:44	19.26	1.46	Run 1
6/25/15 8:45	19.24	1.52	Run 1
6/25/15 8:46	19.25	1.53	Run 1
6/25/15 8:47	19.22	1.54	Run 1
6/25/15 8:48	19.23	1.54	Run 1
6/25/15 8:49	19.25	1.50	Run 1
6/25/15 8:50	19.27	1.45	Run 1
6/25/15 8:51	19.28	1.41	Run 1
6/25/15 8:52	19.29	1.39	Run 1
6/25/15 8:53	19.29	1.41	Run 1
6/25/15 8:54	19.28	1.43	Run 1
6/25/15 8:55	19.28	1.44	Run 1
6/25/15 8:56	17.24	1.54	
6/25/15 8:57	21.88	4.80	
6/25/15 8:58	22.05	4.84	
6/25/15 8:59	22.05	4.85	System Bias Check
6/25/15 9:00	22.07	4.86	High O2, Mid CO2
6/25/15 9:01	4.99	1.01	

Indurating Furnace Stack B (SV015)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 9:02	-0.02	0.10	
6/25/15 9:03	-0.04	0.08	Zero O2 CO2
6/25/15 9:04	-0.09	0.05	
6/25/15 9:05	-0.10	0.05	
6/25/15 9:06	-0.10	0.05	
6/25/15 9:07	-0.10	0.05	
6/25/15 9:08	-0.09	0.06	
6/25/15 9:09	-0.10	0.05	
6/25/15 9:10	-0.10	0.06	
6/25/15 9:11	-0.11	0.05	
6/25/15 9:12	-0.10	0.05	
6/25/15 9:13	0.95	0.15	
6/25/15 9:14	19.01	1.41	
6/25/15 9:15	19.24	1.42	Run 2
6/25/15 9:16	19.27	1.40	Run 2
6/25/15 9:17	19.27	1.41	Run 2
6/25/15 9:18	19.26	1.43	Run 2
6/25/15 9:19	19.26	1.43	Run 2
6/25/15 9:20	19.27	1.43	Run 2
6/25/15 9:21	19.26	1.45	Run 2
6/25/15 9:22	19.27	1.47	Run 2
6/25/15 9:23	19.25	1.49	Run 2
6/25/15 9:24	19.26	1.48	Run 2
6/25/15 9:25	19.27	1.47	Run 2
6/25/15 9:26	19.26	1.46	Run 2
6/25/15 9:27	19.29	1.42	Run 2
6/25/15 9:28	19.29	1.42	Run 2
6/25/15 9:29	19.30	1.41	Run 2
6/25/15 9:30	19.31	1.41	Run 2
6/25/15 9:31	19.30	1.42	Run 2
6/25/15 9:32	19.30	1.43	Run 2
6/25/15 9:33	19.27	1.47	Run 2
6/25/15 9:34	19.27	1.46	Run 2
6/25/15 9:35	19.26	1.49	Run 2
6/25/15 9:36	19.25	1.52	Run 2
6/25/15 9:37	19.26	1.51	Run 2
6/25/15 9:38	19.24	1.52	Run 2
6/25/15 9:39	19.27	1.49	Run 2
6/25/15 9:40	19.27	1.48	Run 2
6/25/15 9:41	19.26	1.47	Run 2
6/25/15 9:42	19.25	1.48	Run 2
6/25/15 9:43	19.25	1.49	Run 2
6/25/15 9:44	19.25	1.50	Run 2
6/25/15 9:45	19.26	1.50	Run 2
6/25/15 9:46	19.27	1.49	Run 2
6/25/15 9:47	19.26	1.50	Run 2
6/25/15 9:48	19.27	1.47	Run 2
6/25/15 9:49	19.26	1.48	Run 2
6/25/15 9:50	19.24	1.51	Run 2
6/25/15 9:51	19.24	1.53	Run 2
6/25/15 9:52	19.27	1.50	Run 2
6/25/15 9:53	19.27	1.49	Run 2
6/25/15 9:54	19.27	1.48	Run 2

Indurating Furnace Stack B (SV015)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 9:55	19.27	1.44	Run 2
6/25/15 9:56	19.27	1.45	Run 2
6/25/15 9:57	19.27	1.47	Run 2
6/25/15 9:58	19.28	1.46	Run 2
6/25/15 9:59	19.28	1.45	Run 2
6/25/15 10:00	19.27	1.47	Run 2
6/25/15 10:01	19.27	1.48	Run 2
6/25/15 10:02	19.27	1.49	Run 2
6/25/15 10:03	19.27	1.49	Run 2
6/25/15 10:04	19.27	1.48	Run 2
6/25/15 10:05	19.27	1.48	Run 2
6/25/15 10:06	19.27	1.44	Run 2
6/25/15 10:07	19.27	1.44	Run 2
6/25/15 10:08	19.27	1.45	Run 2
6/25/15 10:09	19.27	1.48	Run 2
6/25/15 10:10	19.27	1.47	Run 2
6/25/15 10:11	19.27	1.45	Run 2
6/25/15 10:12	19.26	1.48	Run 2
6/25/15 10:13	19.25	1.51	Run 2
6/25/15 10:14	19.26	1.51	Run 2
6/25/15 10:15	17.51	1.32	
6/25/15 10:16	21.27	4.75	
6/25/15 10:17	22.06	4.83	
6/25/15 10:18	22.06	4.83	System Bias Check
6/25/15 10:19	22.07	4.84	High O2, Mid CO2
6/25/15 10:20	13.08	2.75	
6/25/15 10:21	0.03	0.10	
6/25/15 10:22	-0.03	0.09	Zero O2 CO2
6/25/15 10:23	-0.06	0.08	
6/25/15 10:24	-0.08	0.06	
6/25/15 10:25	-0.09	0.07	
6/25/15 10:26	-0.10	0.06	
6/25/15 10:27	-0.10	0.05	
6/25/15 10:28	-0.10	0.05	
6/25/15 10:29	-0.09	0.04	
6/25/15 10:30	-0.10	0.04	
6/25/15 10:31	12.17	0.96	
6/25/15 10:32	19.21	1.40	
6/25/15 10:33	19.26	1.37	
6/25/15 10:34	19.28	1.34	
6/25/15 10:35	19.29	1.36	
6/25/15 10:36	19.31	1.36	
6/25/15 10:37	19.28	1.40	
6/25/15 10:38	19.28	1.42	
6/25/15 10:39	19.28	1.43	
6/25/15 10:40	19.28	1.43	
6/25/15 10:41	19.31	1.40	
6/25/15 10:42	19.33	1.37	
6/25/15 10:43	19.34	1.34	
6/25/15 10:44	19.33	1.33	
6/25/15 10:45	19.34	1.34	
6/25/15 10:46	19.34	1.35	
6/25/15 10:47	19.34	1.36	

Indurating Furnace Stack B (SV015)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 10:48	19.33	1.38	
6/25/15 10:49	19.32	1.39	
6/25/15 10:50	19.32	1.39	
6/25/15 10:51	19.31	1.41	
6/25/15 10:52	19.32	1.40	
6/25/15 10:53	19.32	1.38	
6/25/15 10:54	19.33	1.36	
6/25/15 10:55	19.33	1.37	
6/25/15 10:56	19.33	1.37	
6/25/15 10:57	19.33	1.38	
6/25/15 10:58	19.33	1.39	
6/25/15 10:59	19.33	1.40	
6/25/15 11:00	19.32	1.41	
6/25/15 11:01	19.31	1.42	
6/25/15 11:02	19.29	1.43	
6/25/15 11:03	19.29	1.43	
6/25/15 11:04	19.28	1.45	
6/25/15 11:05	19.27	1.47	Run 3
6/25/15 11:06	19.28	1.45	Run 3
6/25/15 11:07	19.28	1.45	Run 3
6/25/15 11:08	19.28	1.44	Run 3
6/25/15 11:09	19.31	1.40	Run 3
6/25/15 11:10	19.32	1.38	Run 3
6/25/15 11:11	19.33	1.37	Run 3
6/25/15 11:12	19.32	1.39	Run 3
6/25/15 11:13	19.32	1.40	Run 3
6/25/15 11:14	19.31	1.42	Run 3
6/25/15 11:15	19.30	1.43	Run 3
6/25/15 11:16	19.27	1.45	Run 3
6/25/15 11:17	19.27	1.46	Run 3
6/25/15 11:18	19.27	1.47	Run 3
6/25/15 11:19	19.26	1.48	Run 3
6/25/15 11:20	19.27	1.45	Run 3
6/25/15 11:21	19.28	1.43	Run 3
6/25/15 11:22	19.27	1.42	Run 3
6/25/15 11:23	19.27	1.42	Run 3
6/25/15 11:24	19.28	1.42	Run 3
6/25/15 11:25	19.28	1.43	Run 3
6/25/15 11:26	19.28	1.44	Run 3
6/25/15 11:27	19.27	1.47	Run 3
6/25/15 11:28	19.28	1.45	Run 3
6/25/15 11:29	19.28	1.43	Run 3
6/25/15 11:30	19.30	1.39	Run 3
6/25/15 11:31	19.32	1.38	Run 3
6/25/15 11:32	19.33	1.38	Run 3
6/25/15 11:33	19.33	1.37	Run 3
6/25/15 11:34	19.33	1.36	Run 3
6/25/15 11:35	19.33	1.35	Run 3
6/25/15 11:36	19.33	1.37	Run 3
6/25/15 11:37	19.30	1.42	Run 3
6/25/15 11:38	19.27	1.47	Run 3
6/25/15 11:39	19.27	1.47	Run 3
6/25/15 11:40	19.27	1.47	Run 3

Indurating Furnace Stack B (SV015)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 11:41	19.28	1.44	Run 3
6/25/15 11:42	19.30	1.42	Run 3
6/25/15 11:43	19.31	1.38	Run 3
6/25/15 11:44	19.30	1.40	Run 3
6/25/15 11:45	19.32	1.39	Run 3
6/25/15 11:46	19.32	1.39	Run 3
6/25/15 11:47	19.32	1.37	Run 3
6/25/15 11:48	19.34	1.35	Run 3
6/25/15 11:49	19.33	1.36	Run 3
6/25/15 11:50	19.33	1.36	Run 3
6/25/15 11:51	19.31	1.39	Run 3
6/25/15 11:52	19.29	1.42	Run 3
6/25/15 11:53	19.28	1.43	Run 3
6/25/15 11:54	19.31	1.41	Run 3
6/25/15 11:55	19.32	1.40	Run 3
6/25/15 11:56	19.33	1.37	Run 3
6/25/15 11:57	19.33	1.36	Run 3
6/25/15 11:58	19.33	1.36	Run 3
6/25/15 11:59	19.33	1.35	Run 3
6/25/15 12:00	19.34	1.35	Run 3
6/25/15 12:01	19.34	1.35	Run 3
6/25/15 12:02	19.33	1.38	Run 3
6/25/15 12:03	19.33	1.41	Run 3
6/25/15 12:04	19.33	1.38	Run 3
6/25/15 12:05	19.30	1.35	
6/25/15 12:06	19.28	1.35	
6/25/15 12:07	18.72	0.41	
6/25/15 12:08	21.82	4.77	
6/25/15 12:09	22.05	4.82	
6/25/15 12:10	22.05	4.82	System Bias Check
6/25/15 12:11	22.05	4.82	High O2, Mid CO2
6/25/15 12:12	11.42	8.24	
6/25/15 12:13	9.41	8.89	
6/25/15 12:14	9.37	8.89	
6/25/15 12:15	0.62	0.47	
6/25/15 12:16	-0.03	0.11	
6/25/15 12:17	-0.05	0.09	Zero O2 CO2
6/25/15 12:18	-0.08	0.07	
6/25/15 12:19	-0.10	0.05	
6/25/15 12:20	-0.10	0.03	
6/25/15 12:21	-0.10	0.04	
6/25/15 12:22	-0.10	0.03	
6/25/15 12:23	-0.10	0.04	
6/25/15 12:24	-0.10	0.04	
6/25/15 12:25	-0.10	0.03	
6/25/15 12:26	14.30	2.12	
6/25/15 12:27	17.99	2.58	

Indurating Furnace Stack C (SV016)

Test Date: 6/23/2015

Average Raw Analyzer Results

Run	O ₂ , %	CO ₂ , %	Run Times
1	18.5	2.1	1510-1610
2	18.6	2.1	1629-1729
3	18.6	2.1	1809-1909
TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/22/15 16:33	20.92	0.11	
6/22/15 16:34	20.91	0.10	
6/22/15 16:35	20.91	0.11	
6/22/15 16:36	20.90	0.11	
6/22/15 16:37	20.90	0.11	
6/22/15 16:38	20.88	0.11	
6/22/15 16:39	20.86	0.12	
6/23/15 7:49	0.08	0.04	
6/23/15 7:50	0.04	0.03	
6/23/15 7:51	0.03	0.04	
6/23/15 7:52	17.08	3.54	
6/23/15 7:53	22.66	4.62	Analyzer Cal
6/23/15 7:54	22.20	4.62	High O2
6/23/15 7:55	15.51	6.87	
6/23/15 7:56	9.49	8.96	Mid O2, High CO2
6/23/15 7:57	17.95	6.09	
6/23/15 7:58	22.19	4.88	Mid CO2
6/23/15 7:59	17.25	2.80	
6/23/15 8:00	0.06	0.05	
6/23/15 8:01	0.03	0.05	
6/23/15 8:02	0.03	0.05	
6/23/15 8:03	0.03	0.05	
6/23/15 8:04	0.02	0.05	
6/23/15 8:05	2.06	0.05	
6/23/15 8:06	0.03	0.04	
6/23/15 8:07	0.03	0.04	
6/23/15 8:08	0.03	0.03	
6/23/15 8:09	0.02	0.04	
6/23/15 8:10	0.03	0.04	
6/23/15 8:11	0.02	0.04	
6/23/15 8:12	0.03	0.04	
6/23/15 8:13	0.02	0.04	
6/23/15 8:14	0.01	0.05	
6/23/15 8:15	0.02	0.04	
6/23/15 8:16	0.02	0.04	
6/23/15 8:17	1.61	0.05	
6/23/15 8:18	-0.01	0.04	
6/23/15 8:19	-0.02	0.04	
6/23/15 8:20	-0.02	0.04	
6/23/15 8:21	0.13	0.04	
6/23/15 8:22	-0.03	0.04	
6/23/15 8:23	-0.03	0.05	
6/23/15 8:24	-0.03	0.04	
6/23/15 8:25	2.99	0.06	
6/23/15 8:26	-0.01	0.04	
6/23/15 8:27	1.09	0.14	

Indurating Furnace Stack C (SV016)

Test Date: 6/23/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 8:28	-0.03	0.03	
6/23/15 8:29	-0.03	0.05	
6/23/15 8:30	-0.03	0.05	
6/23/15 8:31	11.92	0.18	
6/23/15 8:32	0.01	0.06	
6/23/15 8:33	-0.01	0.05	
6/23/15 8:34	1.22	0.05	
6/23/15 8:35	0.03	0.04	Zero
6/23/15 8:36	6.94	0.06	
6/23/15 8:37	20.14	0.14	
6/23/15 8:38	21.34	4.73	System Bias Check
6/23/15 8:39	21.99	4.82	High O2, Mid CO2
6/23/15 8:40	21.05	4.30	
6/23/15 8:41	0.33	0.13	
6/23/15 8:42	0.07	0.10	
6/23/15 8:43	0.04	0.09	
6/23/15 8:44	0.34	0.07	
6/23/15 8:45	0.04	0.06	
6/23/15 8:46	0.03	0.04	
6/23/15 8:47	0.01	0.04	
6/23/15 8:48	0.01	0.05	
6/23/15 8:49	0.00	0.06	
6/23/15 8:50	0.12	0.12	Zero
6/23/15 8:51	0.29	0.10	
6/23/15 8:52	-0.02	0.06	
6/23/15 12:21	21.99	4.82	
6/23/15 12:22	21.99	4.82	System Bias Check
6/23/15 12:23	21.99	4.82	High O2, Mid CO2
6/23/15 12:24	19.21	4.05	
6/23/15 12:25	0.21	0.13	
6/23/15 12:26	0.10	0.09	
6/23/15 12:27	0.07	0.08	Zero
6/23/15 12:28	0.05	0.07	
6/23/15 12:29	0.04	0.07	
6/23/15 12:30	0.03	0.06	
6/23/15 12:31	0.03	0.05	
6/23/15 12:32	0.03	0.04	
6/23/15 12:33	0.02	0.04	
6/23/15 12:34	0.04	0.05	
6/23/15 12:35	0.02	0.04	
6/23/15 12:36	0.01	0.06	
6/23/15 12:37	10.65	1.21	
6/23/15 12:38	18.58	2.00	
6/23/15 12:39	18.62	2.01	
6/23/15 15:00	18.52	2.18	
6/23/15 15:01	18.52	2.19	
6/23/15 15:02	18.52	2.20	
6/23/15 15:03	18.52	2.21	
6/23/15 15:04	18.53	2.20	
6/23/15 15:05	18.53	2.20	
6/23/15 15:06	18.52	2.20	
6/23/15 15:07	18.54	2.16	
6/23/15 15:08	18.53	2.15	

Indurating Furnace Stack C (SV016)

Test Date: 6/23/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 15:09	18.53	2.15	
6/23/15 15:10	18.52	2.16	
6/23/15 15:11	18.46	2.25	Run 1
6/23/15 15:12	18.46	2.26	Run 1
6/23/15 15:13	18.43	2.31	Run 1
6/23/15 15:14	18.42	2.33	Run 1
6/23/15 15:15	18.43	2.31	Run 1
6/23/15 15:16	18.44	2.28	Run 1
6/23/15 15:17	18.47	2.20	Run 1
6/23/15 15:18	18.49	2.16	Run 1
6/23/15 15:19	18.50	2.16	Run 1
6/23/15 15:20	18.51	2.17	Run 1
6/23/15 15:21	18.47	2.22	Run 1
6/23/15 15:22	18.48	2.23	Run 1
6/23/15 15:23	18.47	2.22	Run 1
6/23/15 15:24	18.47	2.21	Run 1
6/23/15 15:25	18.46	2.21	Run 1
6/23/15 15:26	18.50	2.20	Run 1
6/23/15 15:27	18.51	2.20	Run 1
6/23/15 15:28	18.51	2.19	Run 1
6/23/15 15:29	18.53	2.16	Run 1
6/23/15 15:30	18.53	2.15	Run 1
6/23/15 15:31	18.54	2.14	Run 1
6/23/15 15:32	18.53	2.15	Run 1
6/23/15 15:33	18.54	2.13	Run 1
6/23/15 15:34	18.55	2.11	Run 1
6/23/15 15:35	18.56	2.11	Run 1
6/23/15 15:36	18.57	2.12	Run 1
6/23/15 15:37	18.54	2.15	Run 1
6/23/15 15:38	18.55	2.12	Run 1
6/23/15 15:39	18.57	2.10	Run 1
6/23/15 15:40	18.55	2.11	Run 1
6/23/15 15:41	18.55	2.10	Run 1
6/23/15 15:42	18.53	2.11	Run 1
6/23/15 15:43	18.52	2.10	Run 1
6/23/15 15:44	18.53	2.10	Run 1
6/23/15 15:45	18.54	2.11	Run 1
6/23/15 15:46	18.55	2.11	Run 1
6/23/15 15:47	18.57	2.07	Run 1
6/23/15 15:48	18.59	2.04	Run 1
6/23/15 15:49	18.60	2.01	Run 1
6/23/15 15:50	18.59	2.01	Run 1
6/23/15 15:51	18.59	2.00	Run 1
6/23/15 15:52	18.60	1.99	Run 1
6/23/15 15:53	18.59	2.01	Run 1
6/23/15 15:54	18.61	2.01	Run 1
6/23/15 15:55	18.60	2.05	Run 1
6/23/15 15:56	18.60	2.06	Run 1
6/23/15 15:57	18.59	2.09	Run 1
6/23/15 15:58	18.58	2.11	Run 1
6/23/15 15:59	18.56	2.14	Run 1
6/23/15 16:00	18.55	2.15	Run 1
6/23/15 16:01	18.54	2.15	Run 1

Indurating Furnace Stack C (SV016)

Test Date: 6/23/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 16:02	18.54	2.14	Run 1
6/23/15 16:03	18.54	2.12	Run 1
6/23/15 16:04	18.55	2.11	Run 1
6/23/15 16:05	18.54	2.11	Run 1
6/23/15 16:06	18.53	2.13	Run 1
6/23/15 16:07	18.51	2.16	Run 1
6/23/15 16:08	18.49	2.19	Run 1
6/23/15 16:09	18.48	2.22	Run 1
6/23/15 16:10	18.50	2.20	Run 1
6/23/15 16:11	18.52	2.18	
6/23/15 16:12	17.51	2.84	
6/23/15 16:13	21.93	4.81	
6/23/15 16:14	21.95	4.82	
6/23/15 16:15	21.96	4.82	System Bias Check
6/23/15 16:16	21.96	4.82	High O2, Mid CO2
6/23/15 16:17	3.26	0.62	
6/23/15 16:18	0.15	0.09	
6/23/15 16:19	0.11	0.08	Zero O2 and CO2
6/23/15 16:20	0.09	0.07	
6/23/15 16:21	0.08	0.07	
6/23/15 16:22	0.06	0.07	
6/23/15 16:23	0.05	0.06	
6/23/15 16:24	0.05	0.06	
6/23/15 16:25	0.07	0.06	
6/23/15 16:26	0.05	0.05	
6/23/15 16:27	0.04	0.05	
6/23/15 16:28	9.78	1.18	
6/23/15 16:29	18.53	2.02	
6/23/15 16:30	18.60	1.99	Run 2
6/23/15 16:31	18.61	1.99	Run 2
6/23/15 16:32	18.60	2.01	Run 2
6/23/15 16:33	18.61	2.01	Run 2
6/23/15 16:34	18.60	2.03	Run 2
6/23/15 16:35	18.58	2.07	Run 2
6/23/15 16:36	18.58	2.09	Run 2
6/23/15 16:37	18.56	2.10	Run 2
6/23/15 16:38	18.56	2.11	Run 2
6/23/15 16:39	18.57	2.09	Run 2
6/23/15 16:40	18.58	2.08	Run 2
6/23/15 16:41	18.56	2.09	Run 2
6/23/15 16:42	18.57	2.08	Run 2
6/23/15 16:43	18.58	2.07	Run 2
6/23/15 16:44	18.57	2.08	Run 2
6/23/15 16:45	18.58	2.06	Run 2
6/23/15 16:46	18.58	2.05	Run 2
6/23/15 16:47	18.58	2.06	Run 2
6/23/15 16:48	18.59	2.04	Run 2
6/23/15 16:49	18.59	2.04	Run 2
6/23/15 16:50	18.59	2.04	Run 2
6/23/15 16:51	18.58	2.06	Run 2
6/23/15 16:52	18.56	2.10	Run 2
6/23/15 16:53	18.56	2.10	Run 2
6/23/15 16:54	18.56	2.10	Run 2

Indurating Furnace Stack C (SV016)

Test Date: 6/23/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 16:55	18.56	2.11	Run 2
6/23/15 16:56	18.55	2.11	Run 2
6/23/15 16:57	18.53	2.12	Run 2
6/23/15 16:58	18.53	2.12	Run 2
6/23/15 16:59	18.53	2.11	Run 2
6/23/15 17:00	18.54	2.11	Run 2
6/23/15 17:01	18.54	2.11	Run 2
6/23/15 17:02	18.54	2.10	Run 2
6/23/15 17:03	18.55	2.09	Run 2
6/23/15 17:04	18.55	2.09	Run 2
6/23/15 17:05	18.57	2.07	Run 2
6/23/15 17:06	18.57	2.07	Run 2
6/23/15 17:07	18.59	2.04	Run 2
6/23/15 17:08	18.57	2.06	Run 2
6/23/15 17:09	18.58	2.07	Run 2
6/23/15 17:10	18.57	2.08	Run 2
6/23/15 17:11	18.56	2.10	Run 2
6/23/15 17:12	18.57	2.10	Run 2
6/23/15 17:13	18.57	2.10	Run 2
6/23/15 17:14	18.56	2.11	Run 2
6/23/15 17:15	18.58	2.10	Run 2
6/23/15 17:16	18.57	2.10	Run 2
6/23/15 17:17	18.59	2.08	Run 2
6/23/15 17:18	18.59	2.06	Run 2
6/23/15 17:19	18.59	2.05	Run 2
6/23/15 17:20	18.58	2.08	Run 2
6/23/15 17:21	18.57	2.11	Run 2
6/23/15 17:22	18.57	2.13	Run 2
6/23/15 17:23	18.56	2.14	Run 2
6/23/15 17:24	18.58	2.09	Run 2
6/23/15 17:25	18.56	2.10	Run 2
6/23/15 17:26	18.57	2.07	Run 2
6/23/15 17:27	18.57	2.09	Run 2
6/23/15 17:28	18.55	2.12	Run 2
6/23/15 17:29	18.55	2.10	Run 2
6/23/15 17:30	17.51	2.93	
6/23/15 17:31	21.92	4.79	
6/23/15 17:32	21.93	4.81	
6/23/15 17:33	21.95	4.81	System Bias Check
6/23/15 17:34	21.95	4.82	High O2, Mid CO2
6/23/15 17:35	4.96	0.99	
6/23/15 17:36	0.16	0.10	
6/23/15 17:37	0.12	0.08	Zero O2 and CO2
6/23/15 17:38	0.10	0.08	
6/23/15 17:39	0.09	0.07	
6/23/15 17:40	0.07	0.07	
6/23/15 17:41	0.07	0.08	
6/23/15 17:42	0.06	0.06	
6/23/15 17:43	0.08	0.07	
6/23/15 17:44	0.05	0.06	
6/23/15 17:45	5.38	0.67	
6/23/15 17:46	18.55	1.96	
6/23/15 17:47	18.61	1.97	

Indurating Furnace Stack C (SV016)

Test Date: 6/23/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 17:48	18.63	1.97	
6/23/15 17:49	18.64	1.99	
6/23/15 17:50	18.63	2.01	
6/23/15 17:51	19.21	1.42	Ambient
6/23/15 17:52	20.72	0.12	Ambient
6/23/15 17:53	20.73	0.11	Ambient
6/23/15 17:54	20.73	0.11	Ambient
6/23/15 17:55	20.74	0.11	Ambient
6/23/15 17:56	18.85	1.88	Ambient
6/23/15 17:57	18.65	2.02	
6/23/15 17:58	18.63	2.04	
6/23/15 17:59	18.63	2.02	
6/23/15 18:00	18.63	1.98	
6/23/15 18:01	18.63	1.99	
6/23/15 18:02	18.61	2.04	
6/23/15 18:03	18.62	2.04	
6/23/15 18:04	18.65	2.00	
6/23/15 18:05	18.65	1.98	
6/23/15 18:06	18.66	1.97	
6/23/15 18:07	18.67	1.95	
6/23/15 18:08	18.66	1.97	
6/23/15 18:09	18.66	2.00	
6/23/15 18:10	18.64	2.03	Run 3
6/23/15 18:11	18.63	2.04	Run 3
6/23/15 18:12	18.62	2.05	Run 3
6/23/15 18:13	18.63	2.05	Run 3
6/23/15 18:14	18.61	2.07	Run 3
6/23/15 18:15	18.62	2.05	Run 3
6/23/15 18:16	18.60	2.07	Run 3
6/23/15 18:17	18.62	2.04	Run 3
6/23/15 18:18	18.62	2.04	Run 3
6/23/15 18:19	18.62	2.04	Run 3
6/23/15 18:20	18.63	2.04	Run 3
6/23/15 18:21	18.63	2.04	Run 3
6/23/15 18:22	18.59	2.08	Run 3
6/23/15 18:23	18.58	2.11	Run 3
6/23/15 18:24	18.57	2.11	Run 3
6/23/15 18:25	18.58	2.09	Run 3
6/23/15 18:26	18.59	2.07	Run 3
6/23/15 18:27	18.57	2.10	Run 3
6/23/15 18:28	18.58	2.08	Run 3
6/23/15 18:29	18.57	2.08	Run 3
6/23/15 18:30	18.57	2.09	Run 3
6/23/15 18:31	18.58	2.08	Run 3
6/23/15 18:32	18.55	2.11	Run 3
6/23/15 18:33	18.56	2.09	Run 3
6/23/15 18:34	18.57	2.09	Run 3
6/23/15 18:35	18.55	2.11	Run 3
6/23/15 18:36	18.56	2.13	Run 3
6/23/15 18:37	18.58	2.09	Run 3
6/23/15 18:38	18.59	2.06	Run 3
6/23/15 18:39	18.59	2.06	Run 3
6/23/15 18:40	18.60	2.06	Run 3

Indurating Furnace Stack C (SV016)

Test Date: 6/23/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/23/15 18:41	18.59	2.07	Run 3
6/23/15 18:42	18.60	2.07	Run 3
6/23/15 18:43	18.60	2.07	Run 3
6/23/15 18:44	18.58	2.10	Run 3
6/23/15 18:45	18.59	2.11	Run 3
6/23/15 18:46	18.59	2.09	Run 3
6/23/15 18:47	18.59	2.07	Run 3
6/23/15 18:48	18.60	2.06	Run 3
6/23/15 18:49	18.59	2.07	Run 3
6/23/15 18:50	18.60	2.08	Run 3
6/23/15 18:51	18.59	2.10	Run 3
6/23/15 18:52	18.59	2.11	Run 3
6/23/15 18:53	18.57	2.11	Run 3
6/23/15 18:54	18.58	2.09	Run 3
6/23/15 18:55	18.59	2.06	Run 3
6/23/15 18:56	18.58	2.10	Run 3
6/23/15 18:57	18.56	2.11	Run 3
6/23/15 18:58	18.55	2.10	Run 3
6/23/15 18:59	18.56	2.10	Run 3
6/23/15 19:00	18.57	2.10	Run 3
6/23/15 19:01	18.56	2.12	Run 3
6/23/15 19:02	18.55	2.12	Run 3
6/23/15 19:03	18.53	2.14	Run 3
6/23/15 19:04	18.54	2.13	Run 3
6/23/15 19:05	18.54	2.14	Run 3
6/23/15 19:06	18.53	2.15	Run 3
6/23/15 19:07	18.55	2.13	Run 3
6/23/15 19:08	18.54	2.13	Run 3
6/23/15 19:09	18.54	2.15	Run 3
6/23/15 19:10	18.92	4.04	
6/23/15 19:11	21.94	4.82	System Bias Check
6/23/15 19:12	21.95	4.83	
6/23/15 19:13	21.95	4.82	High O2, Mid CO2
6/23/15 19:14	1.36	0.23	
6/23/15 19:15	0.09	0.10	
6/23/15 19:16	0.05	0.09	Zero O2 and CO2
6/23/15 19:17	0.03	0.08	
6/23/15 19:18	0.02	0.08	
6/23/15 19:19	0.01	0.07	
6/23/15 19:20	0.01	0.07	
6/23/15 19:21	0.02	0.08	
6/23/15 19:22	-0.01	0.08	
6/23/15 19:23	14.29	0.94	

Indurating Furnace Stack D (SV017)

Test Date: 6/25/2015

Average Raw Analyzer

Run	O ₂ , %	CO ₂ , %	Run Times
1	18.1	2.6	1229-1329
2	18.1	2.5	1432-1532
3	18.1	2.5	1553-1653
TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/24/15 16:30	20.84	0.10	
6/25/15 6:32	20.78	0.10	
6/25/15 6:33	20.68	0.10	
6/25/15 6:34	20.68	0.10	
6/25/15 6:35	20.41	0.11	
6/25/15 6:36	20.77	0.09	
6/25/15 6:37	20.80	0.10	
6/25/15 6:38	20.84	0.10	
6/25/15 6:39	20.84	0.10	
6/25/15 6:40	21.20	1.84	
6/25/15 6:41	22.20	4.84	Analyzer Cal
6/25/15 6:42	22.25	4.85	
6/25/15 6:43	21.20	3.30	
6/25/15 6:44	14.29	5.45	
6/25/15 6:45	9.45	8.96	Mid O2, High CO2
6/25/15 6:46	15.33	6.66	
6/25/15 6:47	22.24	4.88	
6/25/15 6:48	22.25	4.87	Mid CO2
6/25/15 6:49	4.32	0.53	
6/25/15 6:50	0.01	0.05	
6/25/15 6:51	0.01	0.05	
6/25/15 6:52	0.01	0.05	
6/25/15 6:53	4.69	0.15	
6/25/15 6:54	-0.07	0.04	
6/25/15 6:55	6.99	0.20	
6/25/15 6:56	-0.06	0.05	
6/25/15 6:57	-0.08	0.05	
6/25/15 6:58	0.94	0.06	
6/25/15 6:59	-0.10	0.05	
6/25/15 7:00	0.46	0.05	
6/25/15 7:01	-0.11	0.03	
6/25/15 7:02	-0.11	0.03	
6/25/15 7:03	-0.11	0.03	
6/25/15 7:04	-0.07	0.05	
6/25/15 7:05	-0.11	0.03	
6/25/15 7:06	6.05	2.90	
6/25/15 7:07	-0.09	0.06	
6/25/15 7:08	-0.09	0.05	Zero
6/25/15 7:09	16.37	3.76	
6/25/15 7:10	22.22	4.88	
6/25/15 7:11	20.22	2.21	
6/25/15 7:12	20.45	4.24	
6/25/15 7:13	22.07	4.82	
6/25/15 7:14	22.07	4.83	
6/25/15 12:06	19.28	1.35	
6/25/15 12:07	18.72	0.41	

Indurating Furnace Stack D (SV017)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 12:08	21.82	4.77	
6/25/15 12:09	22.05	4.82	
6/25/15 12:10	22.05	4.82	System Bias Check
6/25/15 12:11	22.05	4.82	High O2, Mid CO2
6/25/15 12:12	11.42	8.24	
6/25/15 12:13	9.41	8.89	
6/25/15 12:14	9.37	8.89	
6/25/15 12:15	0.62	0.47	
6/25/15 12:16	-0.03	0.11	
6/25/15 12:17	-0.05	0.09	Zero
6/25/15 12:18	-0.08	0.07	
6/25/15 12:19	-0.10	0.05	
6/25/15 12:20	-0.10	0.03	
6/25/15 12:21	-0.10	0.04	
6/25/15 12:22	-0.10	0.03	
6/25/15 12:23	-0.10	0.04	
6/25/15 12:24	-0.10	0.04	
6/25/15 12:25	-0.10	0.03	
6/25/15 12:26	14.30	2.12	
6/25/15 12:27	17.99	2.58	
6/25/15 12:28	18.05	2.57	
6/25/15 12:29	18.05	2.56	
6/25/15 12:30	18.09	2.53	Run 1
6/25/15 12:31	18.11	2.51	Run 1
6/25/15 12:32	18.08	2.54	Run 1
6/25/15 12:33	18.08	2.55	Run 1
6/25/15 12:34	18.06	2.57	Run 1
6/25/15 12:35	18.05	2.58	Run 1
6/25/15 12:36	18.05	2.58	Run 1
6/25/15 12:37	18.05	2.58	Run 1
6/25/15 12:38	18.04	2.61	Run 1
6/25/15 12:39	18.05	2.61	Run 1
6/25/15 12:40	18.05	2.59	Run 1
6/25/15 12:41	18.06	2.57	Run 1
6/25/15 12:42	18.05	2.58	Run 1
6/25/15 12:43	18.04	2.59	Run 1
6/25/15 12:44	18.04	2.62	Run 1
6/25/15 12:45	18.03	2.62	Run 1
6/25/15 12:46	18.04	2.59	Run 1
6/25/15 12:47	18.04	2.61	Run 1
6/25/15 12:48	18.05	2.60	Run 1
6/25/15 12:49	18.05	2.60	Run 1
6/25/15 12:50	18.05	2.58	Run 1
6/25/15 12:51	18.05	2.59	Run 1
6/25/15 12:52	18.05	2.60	Run 1
6/25/15 12:53	18.05	2.61	Run 1
6/25/15 12:54	18.05	2.59	Run 1
6/25/15 12:55	18.05	2.59	Run 1
6/25/15 12:56	18.05	2.60	Run 1
6/25/15 12:57	18.05	2.58	Run 1
6/25/15 12:58	18.05	2.57	Run 1
6/25/15 12:59	18.05	2.57	Run 1
6/25/15 13:00	18.06	2.57	Run 1

Indurating Furnace Stack D (SV017)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 13:01	18.10	2.57	Run 1
6/25/15 13:02	18.10	2.58	Run 1
6/25/15 13:03	18.09	2.58	Run 1
6/25/15 13:04	18.10	2.58	Run 1
6/25/15 13:05	18.09	2.58	Run 1
6/25/15 13:06	18.10	2.57	Run 1
6/25/15 13:07	18.08	2.58	Run 1
6/25/15 13:08	18.09	2.58	Run 1
6/25/15 13:09	18.11	2.57	Run 1
6/25/15 13:10	18.12	2.52	Run 1
6/25/15 13:11	18.12	2.50	Run 1
6/25/15 13:12	18.11	2.51	Run 1
6/25/15 13:13	18.11	2.51	Run 1
6/25/15 13:14	18.09	2.53	Run 1
6/25/15 13:15	18.06	2.58	Run 1
6/25/15 13:16	18.06	2.59	Run 1
6/25/15 13:17	18.07	2.58	Run 1
6/25/15 13:18	18.08	2.58	Run 1
6/25/15 13:19	18.06	2.58	Run 1
6/25/15 13:20	18.07	2.58	Run 1
6/25/15 13:21	18.07	2.57	Run 1
6/25/15 13:22	18.05	2.58	Run 1
6/25/15 13:23	18.06	2.57	Run 1
6/25/15 13:24	18.06	2.56	Run 1
6/25/15 13:25	18.08	2.56	Run 1
6/25/15 13:26	18.05	2.58	Run 1
6/25/15 13:27	18.05	2.58	Run 1
6/25/15 13:28	18.05	2.59	Run 1
6/25/15 13:29	18.05	2.62	Run 1
6/25/15 13:30	17.41	2.45	
6/25/15 13:31	19.97	4.46	
6/25/15 13:32	22.05	4.82	System Bias Check
6/25/15 13:33	22.05	4.82	High O2, Mid CO2
6/25/15 13:34	2.06	0.38	
6/25/15 13:35	-0.01	0.10	Zero
6/25/15 13:36	-0.03	0.08	
6/25/15 13:37	-0.04	0.05	
6/25/15 13:38	-0.07	0.05	
6/25/15 13:39	-0.09	0.04	
6/25/15 13:40	-0.10	0.03	
6/25/15 13:41	-0.10	0.03	
6/25/15 13:42	-0.09	0.04	
6/25/15 13:43	-0.10	0.04	
6/25/15 13:44	13.62	1.95	
6/25/15 13:45	18.07	2.51	
6/25/15 13:46	18.08	2.52	
6/25/15 13:47	18.08	2.54	
6/25/15 13:48	18.11	2.51	
6/25/15 13:49	18.07	2.53	
6/25/15 13:50	18.07	2.55	
6/25/15 13:51	18.08	2.54	
6/25/15 13:52	18.07	2.54	
6/25/15 13:53	18.06	2.57	

Indurating Furnace Stack D (SV017)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %
6/25/15 13:54	18.09	2.54
6/25/15 13:55	18.08	2.53
6/25/15 13:56	18.10	2.52
6/25/15 13:57	18.09	2.52
6/25/15 13:58	18.07	2.56
6/25/15 13:59	18.06	2.57
6/25/15 14:00	18.07	2.57
6/25/15 14:01	18.06	2.59
6/25/15 14:02	18.06	2.60
6/25/15 14:03	18.05	2.58
6/25/15 14:04	18.06	2.58
6/25/15 14:05	18.07	2.57
6/25/15 14:06	18.08	2.56
6/25/15 14:07	18.07	2.55
6/25/15 14:08	18.09	2.52
6/25/15 14:09	18.07	2.55
6/25/15 14:10	18.09	2.57
6/25/15 14:11	18.09	2.55
6/25/15 14:12	18.09	2.55
6/25/15 14:13	18.07	2.56
6/25/15 14:14	18.07	2.56
6/25/15 14:15	18.09	2.55
6/25/15 14:16	18.11	2.54
6/25/15 14:17	18.11	2.53
6/25/15 14:18	18.11	2.53
6/25/15 14:19	18.11	2.52
6/25/15 14:20	18.11	2.51
6/25/15 14:21	18.11	2.51
6/25/15 14:22	18.12	2.51
6/25/15 14:23	18.12	2.50
6/25/15 14:24	18.12	2.50
6/25/15 14:25	18.12	2.50
6/25/15 14:26	18.11	2.51
6/25/15 14:27	18.11	2.54
6/25/15 14:28	18.10	2.56
6/25/15 14:29	18.08	2.58
6/25/15 14:30	18.09	2.57
6/25/15 14:31	18.09	2.55
6/25/15 14:32	18.11	2.52
6/25/15 14:33	18.12	2.51
6/25/15 14:34	18.11	2.52
6/25/15 14:35	18.11	2.53
6/25/15 14:36	18.10	2.53
6/25/15 14:37	18.09	2.54
6/25/15 14:38	18.08	2.57
6/25/15 14:39	18.08	2.56
6/25/15 14:40	18.08	2.55
6/25/15 14:41	18.05	2.56
6/25/15 14:42	18.07	2.56
6/25/15 14:43	18.08	2.56
6/25/15 14:44	18.05	2.58
6/25/15 14:45	18.07	2.55
6/25/15 14:46	18.08	2.53

Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2
Run 2

Indurating Furnace Stack D (SV017)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 14:47	18.10	2.52	Run 2
6/25/15 14:48	18.09	2.52	Run 2
6/25/15 14:49	18.11	2.51	Run 2
6/25/15 14:50	18.11	2.51	Run 2
6/25/15 14:51	18.11	2.51	Run 2
6/25/15 14:52	18.11	2.54	Run 2
6/25/15 14:53	18.11	2.56	Run 2
6/25/15 14:54	18.11	2.55	Run 2
6/25/15 14:55	18.12	2.51	Run 2
6/25/15 14:56	18.11	2.54	Run 2
6/25/15 14:57	18.12	2.52	Run 2
6/25/15 14:58	18.12	2.51	Run 2
6/25/15 14:59	18.13	2.50	Run 2
6/25/15 15:00	18.15	2.48	Run 2
6/25/15 15:01	18.12	2.51	Run 2
6/25/15 15:02	18.12	2.52	Run 2
6/25/15 15:03	18.10	2.53	Run 2
6/25/15 15:04	18.09	2.53	Run 2
6/25/15 15:05	18.08	2.56	Run 2
6/25/15 15:06	18.11	2.55	Run 2
6/25/15 15:07	18.10	2.57	Run 2
6/25/15 15:08	18.07	2.57	Run 2
6/25/15 15:09	18.09	2.53	Run 2
6/25/15 15:10	18.12	2.49	Run 2
6/25/15 15:11	18.09	2.52	Run 2
6/25/15 15:12	18.08	2.55	Run 2
6/25/15 15:13	18.07	2.57	Run 2
6/25/15 15:14	18.05	2.59	Run 2
6/25/15 15:15	18.05	2.58	Run 2
6/25/15 15:16	18.06	2.56	Run 2
6/25/15 15:17	18.10	2.52	Run 2
6/25/15 15:18	18.10	2.52	Run 2
6/25/15 15:19	18.10	2.52	Run 2
6/25/15 15:20	18.10	2.53	Run 2
6/25/15 15:21	18.12	2.52	Run 2
6/25/15 15:22	18.09	2.56	Run 2
6/25/15 15:23	18.08	2.57	Run 2
6/25/15 15:24	18.08	2.58	Run 2
6/25/15 15:25	18.09	2.58	Run 2
6/25/15 15:26	18.09	2.56	Run 2
6/25/15 15:27	18.08	2.56	Run 2
6/25/15 15:28	18.08	2.54	Run 2
6/25/15 15:29	18.09	2.54	Run 2
6/25/15 15:30	18.10	2.54	Run 2
6/25/15 15:31	18.11	2.53	Run 2
6/25/15 15:32	18.11	2.53	Run 2
6/25/15 15:33	18.11	2.52	
6/25/15 15:34	18.15	2.49	
6/25/15 15:35	18.12	2.52	
6/25/15 15:36	16.44	2.44	
6/25/15 15:37	21.93	4.80	
6/25/15 15:38	22.05	4.82	
6/25/15 15:39	22.05	4.83	

Indurating Furnace Stack D (SV017)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 15:40	22.05	4.83	High O2, Mid CO2
6/25/15 15:41	2.39	0.46	
6/25/15 15:42	0.03	0.10	Zero
6/25/15 15:43	-0.03	0.10	
6/25/15 15:44	-0.04	0.08	
6/25/15 15:45	-0.04	0.07	
6/25/15 15:46	-0.05	0.05	
6/25/15 15:47	-0.07	0.05	
6/25/15 15:48	-0.08	0.06	
6/25/15 15:49	-0.09	0.05	
6/25/15 15:50	-0.08	0.06	
6/25/15 15:51	-0.09	0.06	
6/25/15 15:52	1.90	0.40	
6/25/15 15:53	17.79	2.48	
6/25/15 15:54	18.06	2.45	Run 3
6/25/15 15:55	18.05	2.50	Run 3
6/25/15 15:56	18.06	2.50	Run 3
6/25/15 15:57	18.09	2.50	Run 3
6/25/15 15:58	18.10	2.51	Run 3
6/25/15 15:59	18.10	2.52	Run 3
6/25/15 16:00	18.10	2.52	Run 3
6/25/15 16:01	18.12	2.51	Run 3
6/25/15 16:02	18.13	2.47	Run 3
6/25/15 16:03	18.14	2.46	Run 3
6/25/15 16:04	18.12	2.51	Run 3
6/25/15 16:05	18.11	2.52	Run 3
6/25/15 16:06	18.12	2.50	Run 3
6/25/15 16:07	18.16	2.47	Run 3
6/25/15 16:08	18.18	2.45	Run 3
6/25/15 16:09	18.16	2.46	Run 3
6/25/15 16:10	18.14	2.48	Run 3
6/25/15 16:11	18.14	2.49	Run 3
6/25/15 16:12	18.16	2.48	Run 3
6/25/15 16:13	18.17	2.47	Run 3
6/25/15 16:14	18.18	2.44	Run 3
6/25/15 16:15	18.17	2.43	Run 3
6/25/15 16:16	18.20	2.41	Run 3
6/25/15 16:17	18.19	2.42	Run 3
6/25/15 16:18	18.21	2.39	Run 3
6/25/15 16:19	18.16	2.44	Run 3
6/25/15 16:20	18.15	2.47	Run 3
6/25/15 16:21	18.16	2.48	Run 3
6/25/15 16:22	18.15	2.51	Run 3
6/25/15 16:23	18.15	2.51	Run 3
6/25/15 16:24	18.16	2.48	Run 3
6/25/15 16:25	18.19	2.44	Run 3
6/25/15 16:26	18.15	2.48	Run 3
6/25/15 16:27	18.14	2.47	Run 3
6/25/15 16:28	18.17	2.46	Run 3
6/25/15 16:29	18.17	2.42	Run 3
6/25/15 16:30	18.14	2.45	Run 3
6/25/15 16:31	18.14	2.48	Run 3
6/25/15 16:32	18.15	2.48	Run 3

Indurating Furnace Stack D (SV017)

Test Date: 6/25/2015

TIMESTAMP	O ₂ Avg %	CO ₂ Avg %	
6/25/15 16:33	18.16	2.48	Run 3
6/25/15 16:34	18.14	2.49	Run 3
6/25/15 16:35	18.14	2.48	Run 3
6/25/15 16:36	18.16	2.47	Run 3
6/25/15 16:37	18.15	2.48	Run 3
6/25/15 16:38	18.15	2.49	Run 3
6/25/15 16:39	18.15	2.48	Run 3
6/25/15 16:40	18.14	2.49	Run 3
6/25/15 16:41	18.17	2.46	Run 3
6/25/15 16:42	18.14	2.46	Run 3
6/25/15 16:43	18.15	2.45	Run 3
6/25/15 16:44	18.14	2.47	Run 3
6/25/15 16:45	18.12	2.55	Run 3
6/25/15 16:46	18.07	2.67	Run 3
6/25/15 16:47	18.10	2.54	Run 3
6/25/15 16:48	18.15	2.48	Run 3
6/25/15 16:49	18.17	2.46	Run 3
6/25/15 16:50	18.17	2.47	Run 3
6/25/15 16:51	18.18	2.45	Run 3
6/25/15 16:52	18.21	2.41	Run 3
6/25/15 16:53	18.23	2.39	Run 3
6/25/15 16:54	17.43	2.19	
6/25/15 16:55	20.23	4.52	
6/25/15 16:56	22.02	4.82	
6/25/15 16:57	22.04	4.82	System Bias Check
6/25/15 16:58	22.05	4.82	High O2, Mid CO2
6/25/15 16:59	9.35	1.95	
6/25/15 17:00	0.05	0.11	
6/25/15 17:01	-0.01	0.10	Zero
6/25/15 17:02	-0.03	0.09	
6/25/15 17:03	-0.04	0.09	
6/25/15 17:04	-0.04	0.08	
6/25/15 17:05	-0.05	0.08	
6/25/15 17:06	-0.06	0.07	
6/25/15 17:07	-0.07	0.06	
6/25/15 17:08	-0.08	0.07	
6/25/15 17:09	-0.07	0.07	
6/25/15 17:10	-0.09	0.06	
6/25/15 17:11	-0.01	0.08	

Appendix E

Calibration Data



Routine Dry Gas Meter Calibration

Control Module: C-7 Leak checks Barometric Press. -- 29.34
Date: 06/19/15 Negative Pass >5 W.C. Previous Y -- 1.0192
Technician: JAR2 Positive - Pass > in.Hg Previous Delta H -- 1.7927

Orifice Diff Pressure H	Wet Test Volume, Ft³	Dry Gas Meter Temp, F		Wet Test Meter Temp, F	Dry Gas Volume Ft³	Elapsed Time of Cal. Point		Meter Coefficient Y	Orifice Coefficient dH@
		Inlet	Outlet						
Nominal 0.500	Initial 8182.00	Initial 77.0	Initial 72.0	Initial 72.0	Initial 78.410			1.0131	1.6179
Actual 0.50	Final 8189.00	Final 78.0	Final 73.0	Final 72.0	Final 85.350	Minutes 16	SEC 36.97		
	Total 7.00	Average 77.5	Average 72.5	Average 72.0	Total 6.940	Minutes 16.62			
		75.0							
Nominal 1.000	Initial 8173.00	Initial 74.0	Initial 70.0	Initial 71.5	Initial 69.520			1.0130	1.7613
Actual 1.00	Final 8181.00	Final 78.0	Final 71.0	Final 72.0	Final 77.420	Minutes 13.0	SEC 59.44		
	Total 8.00	Average 76.0	Average 70.5	Average 71.8	Total 7.900	13.99			
		73.3 Tm							
Nominal 2.000	Initial 8219.00	Initial 84.0	Initial 75.0	Initial 71.5	Initial 105.310			1.0080	1.8670
Actual 2.00	Final 8224.00	Final 82.0	Final 75.0	Final 71.5	Final 110.315	Minutes 6	SEC 23.75		
	Total 5.00	Average 83.0	Average 75.0	Average 71.5	Total 5.005	6.40			
		79.0 Tm							
Nominal 3.000	Initial 8190.00	Initial 79.0	Initial 73.0	Initial 71.5	Initial 86.350			1.0070	1.8741
Actual 3.00	Final 8196.00	Final 83.0	Final 73.0	Final 71.5	Final 92.325	Minutes 6.0	SEC 16.01		
	Total 6.00	Average 81.0	Average 73.0	Average 71.5	Total 5.975	6.27			
		77.0 Tm							
Nominal 4.000	Initial 8198.00	Initial 83.0	Initial 73.0	Initial 71.5	Initial 94.320			1.0046	1.9074
Actual 4.00	Final 8208.00	Final 84.0	Final 74.0	Final 71.5	Final 104.305	Minutes 9.0	SEC 7.78		
	Total 10.00	Average 83.5	Average 73.5	Average 71.5	Total 9.985	9.13			
		78.5 Tm		Average				1.0091	1.8055



Routine Dry Gas Meter Calibration

Control Module: C-12 Leak checks Barometric Press. -- 28.67
Date: 06/18/15 Negative PASS >5 W.C. Previous Y -- 1.0031
Technician: RBS Positive - PASS > in.Hg Previous Delta H -- 1.9187

Orifice Diff Pressure H	Wet Test Volume, Ft³	Dry Gas Meter Temp, F		Wet Test Meter Temp, F	Dry Gas Volume Ft³	Elapsed Time of Cal. Point		Meter Coefficient Y	Orifice Coefficient dH@
		Inlet	Outlet						
Nominal 0.500	Initial 1879.00	Initial 76.0	Initial 74.0	Initial 71.0	Initial 331.020			1.0083	1.8485
Actual 0.50	Final 1884.00	Final 76.0	Final 74.0	Final 71.0	Final 336.010	Minutes 12	SEC 34.93		
	Total 5.00	Average 76.0	Average 74.0	Average 71.0	Total 4.990	Minutes 12.58			
		75.0							
Nominal 1.000	Initial 1873.00	Initial 78.0	Initial 74.0	Initial 71.0	Initial 325.030			1.0059	1.8860
Actual 1.00	Final 1878.00	Final 76.0	Final 74.0	Final 71.0	Final 330.030	Minutes 8.0	SEC 59.21		
	Total 5.00	Average 77.0	Average 74.0	Average 71.0	Total 5.000	8.99			
		75.5 Tm							
Nominal 2.000	Initial 1837.00	Initial 74.0	Initial 71.0	Initial 71.0	Initial 288.170			1.0002	1.9217
Actual 2.00	Final 1842.00	Final 75.0	Final 71.0	Final 71.0	Final 293.160	Minutes 6	SEC 23.78		
	Total 5.00	Average 74.5	Average 71.0	Average 71.0	Total 4.990	6.40			
		72.8 Tm							
Nominal 3.000	Initial 1856.00	Initial 74.0	Initial 71.0	Initial 71.0	Initial 308.150			1.0183	1.9540
Actual 3.00	Final 1861.00	Final 78.0	Final 73.0	Final 71.0	Final 313.050	Minutes 5.0	SEC 16.28		
	Total 5.00	Average 76.0	Average 72.0	Average 71.0	Total 4.900	5.27			
		74.0 Tm							
Nominal 4.000	Initial 1862.00	Initial 78.0	Initial 73.0	Initial 71.0	Initial 314.050			1.0002	1.9268
Actual 4.00	Final 1872.00	Final 78.0	Final 73.0	Final 71.0	Final 324.030	Minutes 9.0	SEC 4.49		
	Total 10.00	Average 78.0	Average 73.0	Average 71.0	Total 9.980	9.07			
		75.5 Tm		Average				1.0066	1.9074




PYROMETER CALIBRATION

Pyrometer Number: C-7 Date: 12/23/2014
Pyrometer Reference: CL-300-100F Technician: DAH

Reference (°F)	Reference (°C)	Pyrometer ° F	
		Reading	Pass/Fail
1000	538	999	Pass
950	510	948	Pass
900	482	899	Pass
850	454	849	Pass
800	427	799	Pass
750	399	749	Pass
700	371	700	Pass
650	343	649	Pass
600	316	598	Pass
550	288	547	Pass
500	260	496	Pass
450	232	446	Pass
400	204	397	Pass
350	177	347	Pass
300	149	299	Pass
250	121	249	Pass
200	93	198	Pass
150	67	149	Pass
100	38	96	Pass
50	10	47	Pass
0	-18	1	Pass
-50	-46	-52	Pass

Pass/Fail based on +/- 0.75% of Renkin value

Technician signature: 
QA signature: 



PYROMETER CALIBRATION

Pyrometer Number: C-12 Date: 12/23/2014
Pyrometer Reference: CL-300-100F Technician: DAH

Reference (°F)	Reference (°C)	Pyrometer ° F	
		Reading	Pass/Fail
1000	538	1005	Pass
950	510	955	Pass
900	482	904	Pass
850	454	854	Pass
800	427	803	Pass
750	399	754	Pass
700	371	704	Pass
650	343	654	Pass
600	316	602	Pass
550	288	550	Pass
500	260	500	Pass
450	232	450	Pass
400	204	400	Pass
350	177	350	Pass
300	149	302	Pass
250	121	252	Pass
200	93	201	Pass
150	67	150	Pass
100	38	99	Pass
50	10	50	Pass
0	-18	1	Pass
-50	-46	-48	Pass

Pass/Fail based on +/- 0.75% of Renkin value

Technician signature: 
QA signature: 



THERMOCOUPLE CALIBRATION

Meter In

THERMOCOUPLE ID T-C7-I

Cal Date: 12/31/2014

CALIBRATION TECHNICIAN: DAH

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. B4116012

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points	20	70	150
Reference Deg F (To)	20	70	150
Probe Temp (deg F)	22.0	70.0	149.0
Difference (degrees)	2.0	0.0	1.0
TC Meets Method 5 Specifications: (± 5.4 °F)			

Technician signature *David Harley*

QA signature *[Signature]*



THERMOCOUPLE CALIBRATION

Meter Out

THERMOCOUPLE ID T-C7-O

Cal Date: 12/31/2014

CALIBRATION TECHNICIAN: DAH

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. B4116012

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points	20	70	150
Reference Deg F (To)	20	70	150
Probe Temp (deg F)	22.0	69.0	149.0
Difference (degrees)	2.0	1.0	1.0
TC Meets Method 5 Specifications: (± 5.4 °F)			

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

Meter In

THERMOCOUPLE ID T-C12-I

Cal Date: 12/31/2014

CALIBRATION TECHNICIAN: DAH

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. B4116012

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points

20

70

150

Reference Deg F (To)

20

70

150

Probe Temp (deg F)

21.0

69.0

149.0

Difference (degrees)

1.0

1.0

1.0

TC Meets Method 5 Specifications: (± 5.4 °F)

YES

YES

YES

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

Meter Out

THERMOCOUPLE ID T-C12-O

Cal Date: 12/31/2014

CALIBRATION TECHNICIAN: DAH

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. B4116012

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points	20	70	150
Reference Deg F (To)	20	70	150
Probe Temp (deg F)	22.0	69.0	149.0
Difference (degrees)	2.0	1.0	1.0

TC Meets Method 5 Specifications: (± 5.4 °F)	YES	YES	YES
---	-----	-----	-----

Technician signature *David Harbor*

QA signature *[Signature]*

Emission Measurement Center (EMC) Approved Alternate Method (ALT-009)
Alternative Method 5 Post-Test Calibration
Indurating Furnace Stack A (SV014)
Control Module C-12
Test 1

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test date	-	-	6/23/2015	6/23/2015	6/24/2015
Test period	-	-	1511 - 1720	1810 - 2020	803 - 1013
Total run time	t	min	120	120	120
Total sample volume measured by dry gas meter	V _m	acf	89.0	87.7	85.9
Absolute average dry gas meter temp	T _m	°F	76.1	76.0	72.0
Absolute average dry gas meter temp	T _m	°R	535.8	535.6	531.6
Barometric pressure	P _b	inches Hg	28.4	28.4	28.4
Conversion factor (29.92/528)(0.75) ²	---	(in Hg/°R) cfm ²	0.0319	0.0319	0.0319
Average orifice meter differential	Δ h _{avg}	in. H ₂ O	1.73	1.70	1.63
Orifice meter calibration coefficient	Δ H _@	in. H ₂ O	1.91	1.91	1.91
Dry molecular weight of stack gas	M _d	lb/lb-mole	28.96	28.96	28.96
Dry molecular weight of air	---	lb/lb-mole	29.00	29.00	29.00
Specific gravity of mercury	---	Dimensionless	13.60	13.60	13.60
Dry gas meter calibration check value	Y _{qa}	Dimensionless	0.9943	1.0024	0.9959
Dry gas meter calibration factor	Y	Dimensionless	1.0066	1.0066	1.0066
Average of Y _{qa} 's from test run series	0.9975	$Y_{qa} = \frac{t}{V_m} \sqrt{\frac{0.0319 \cdot T_m}{\Delta H_{@} (P_b + \frac{\Delta h_{avg}}{13.6})} \frac{29}{M_d}} \cdot (\sqrt{\Delta h_{avg}})$			
Dry gas meter calibration factor	1.0066				
% difference between average Y _{qa} 's and Y	0.91%				
(must be within ± 5%)					

Emission Measurement Center (EMC) Approved Alternate Method (ALT-009)
Alternative Method 5 Post-Test Calibration
Indurating Furnace Stack B (SV015)
Control Module C-12
Test 2

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test date	-	-	6/25/2015	6/25/2015	6/25/2015
Test period	-	-	756 - 1013	1105 - 1320	1433 - 1646
Total run time	t	min	120	120	120
Total sample volume measured by dry gas meter	V _m	acf	88.4	91.2	92.6
Absolute average dry gas meter temp	T _m	°F	69.8	76.3	76.2
Absolute average dry gas meter temp	T _m	°R	529.5	536.0	535.8
Barometric pressure	P _b	inches Hg	28.4	28.4	28.4
Conversion factor (29.92/528)(0.75) ²	---	(in Hg/°R) cfm ²	0.0319	0.0319	0.0319
Average orifice meter differential	Δ h _{avg}	in. H ₂ O	1.74	1.80	1.87
Orifice meter calibration coefficient	Δ H _@	in. H ₂ O	1.91	1.91	1.91
Dry molecular weight of stack gas	M _d	lb/lb-mole	29.00	29.00	29.00
Dry molecular weight of air	---	lb/lb-mole	29.00	29.00	29.00
Specific gravity of mercury	---	Dimensionless	13.60	13.60	13.60
Dry gas meter calibration check value	Y _{qa}	Dimensionless	0.9966	0.9904	0.9925
Dry gas meter calibration factor	Y	Dimensionless	1.0066	1.0066	1.0066
Average of Y _{qa} 's from test run series	0.9932	$Y_{qa} = \frac{t}{V_m} \sqrt{\frac{0.0319 \cdot T_m}{\Delta H_{@} (P_b + \frac{\Delta h_{avg}}{13.6})} \frac{29}{M_d}} \cdot (\sqrt{\Delta h_{avg}})$			
Dry gas meter calibration factor	1.0066				
% difference between average Y _{qa} 's and Y	1.34%				
(must be within ± 5%)					

Emission Measurement Center (EMC) Approved Alternate Method (ALT-009)
Alternative Method 5 Post-Test Calibration
Indurating Furnace Stack C (SV016)
Control Module C-7
Test 3

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test date	-	-	6/23/2015	6/23/2015	6/24/2015
Test period	-	-	1511 - 1720	1810 - 2020	803 - 1013
Total run time	t	min	120	120	120
Total sample volume measured by dry gas meter	V _m	acf	84.1	79.5	78.5
Absolute average dry gas meter temp	T _m	°F	74.9	75.5	71.8
Absolute average dry gas meter temp	T _m	°R	534.6	535.2	531.5
Barometric pressure	P _b	inches Hg	28.4	28.4	28.4
Conversion factor (29.92/528)(0.75) ²	---	(in Hg/°R) cfm ²	0.0319	0.0319	0.0319
Average orifice meter differential	Δ h _{avg}	in. H ₂ O	1.45	1.30	1.27
Orifice meter calibration coefficient	Δ H _@	in. H ₂ O	1.81	1.81	1.81
Dry molecular weight of stack gas	M _d	lb/lb-mole	29.08	29.08	29.08
Dry molecular weight of air	---	lb/lb-mole	29.00	29.00	29.00
Specific gravity of mercury	---	Dimensionless	13.60	13.60	13.60
Dry gas meter calibration check value	Y _{qa}	Dimensionless	0.9893	0.9912	0.9890
Dry gas meter calibration factor	Y	Dimensionless	1.0091	1.0091	1.0091
Average of Y _{qa} 's from test run series	0.9898	$Y_{qa} = \frac{t}{V_m} \sqrt{\frac{0.0319 \cdot T_m}{\Delta H_{@} (P_b + \frac{\Delta h_{avg}}{13.6})} \frac{29}{M_d}} \cdot (\sqrt{\Delta h_{avg}})$			
Dry gas meter calibration factor	1.0091				
% difference between average Y _{qa} 's and Y	1.91%				
(must be within ± 5%)					

Emission Measurement Center (EMC) Approved Alternate Method (ALT-009)
Alternative Method 5 Post-Test Calibration
Indurating Furnace Stack D (SV017)
Control Module C-7
Test 4

Input Data	Symbol	Units	Run 1	Run 2	Run 3
Test date	-	-	6/25/2015	6/25/2015	6/25/2015
Test period	-	-	756 - 1013	1105 - 1320	1433 - 1646
Total run time	t	min	120	120	120
Total sample volume measured by dry gas meter	V _m	acf	79.2	80.5	78.0
Absolute average dry gas meter temp	T _m	°F	70.0	75.7	74.7
Absolute average dry gas meter temp	T _m	°R	529.7	535.3	534.4
Barometric pressure	P _b	inches Hg	28.4	28.4	28.4
Conversion factor (29.92/528)(0.75) ²	---	(in Hg/°R) cfm ²	0.0319	0.0319	0.0319
Average orifice meter differential	Δ h _{avg}	in. H ₂ O	1.31	1.35	1.27
Orifice meter calibration coefficient	Δ H _@	in. H ₂ O	1.81	1.81	1.81
Dry molecular weight of stack gas	M _d	lb/lb-mole	29.13	29.13	29.13
Dry molecular weight of air	---	lb/lb-mole	29.00	29.00	29.00
Specific gravity of mercury	---	Dimensionless	13.60	13.60	13.60
Dry gas meter calibration check value	Y _{qa}	Dimensionless	0.9903	0.9950	0.9947
Dry gas meter calibration factor	Y	Dimensionless	1.0091	1.0091	1.0091
Average of Y _{qa} 's from test run series	0.9933	$Y_{qa} = \frac{t}{V_m} \sqrt{\frac{0.0319 \cdot T_m}{\Delta H_{@} (P_b + \frac{\Delta h_{avg}}{13.6})} \frac{29}{M_d}} \cdot (\sqrt{\Delta h_{avg}})$			
Dry gas meter calibration factor	1.0091				
% difference between average Y _{qa} 's and Y (must be within ± 5%)	1.56%				



S-Type Pitot Tube Geometry Check

Pitot Tube Number: 5-2

Length: 5 ft

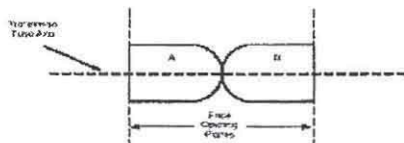
Function: M-5 Probe / Free

Inspection Date: 1/20/15

Technician: BRAW

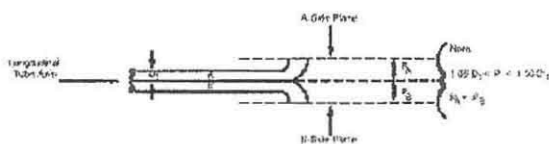
1. Are face openings perpendicular to tube axis?

☒ YES (go to 2) ☐ NO (go to 1a)



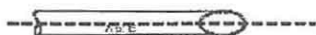
2. Are face openings parallel to longitudinal axis?

☒ YES (go to 3) ☐ NO (go to 2a)



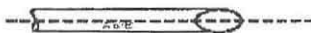
3. Are legs of equal length?

☒ YES (go to 4) ☐ NO (go to 3a)



4. Are center-lines of legs coincident?

☒ YES (go to 5) ☐ NO (go to 4a)



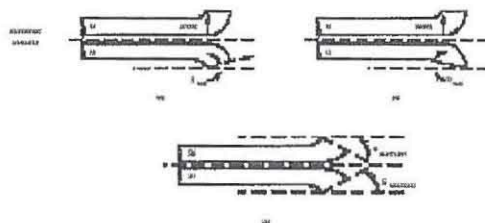
1a. If NO, is angle less than 10°?

☐ YES (go to 2) ☐ NO (discontinue use)



2a. If NO, is angle less than 5°?

☐ YES (go to 3) ☐ NO (discontinue use)



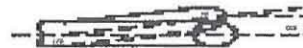
3a. If NO, is difference less than 1/8 inch?

☐ YES (go to 4) ☐ NO (discontinue use)



4a. If NO, are center-lines of face openings less than 1/32 inch?

☐ YES (go to 5) ☐ NO (discontinue use)



5. Does this pitot tube pass all of the above criteria?

☒ YES ☐ NO

Technician Signature: BRAW

QA Signature: [Signature]



S-Type Pitot Tube Geometry Check

Pitot Tube Number: 5-3

Length: 5 ft

Function: M-5 Probe / Free

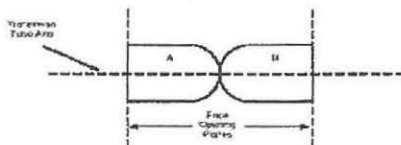
Inspection Date: 1/20/15

Technician: BAW

1. Are face openings perpendicular to tube axis?

☒ YES (go to 2)

☐ NO (go to 1a)



1a. If NO, is angle less than 10°?

☐ YES (go to 2)

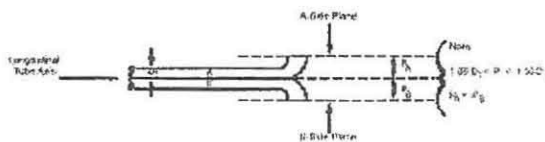
☐ NO (discontinue use)



2. Are face openings parallel to longitudinal axis?

☒ YES (go to 3)

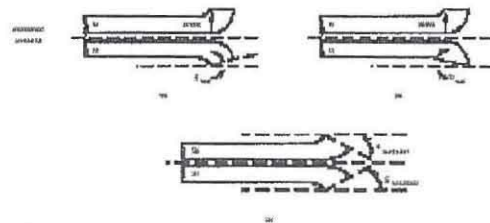
☐ NO (go to 2a)



2a. If NO, is angle less than 5°?

☐ YES (go to 3)

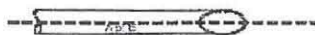
☐ NO (discontinue use)



3. Are legs of equal length?

☒ YES (go to 4)

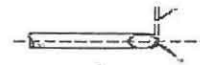
☐ NO (go to 3a)



3a. If NO, is difference less than 1/8 inch?

☐ YES (go to 4)

☐ NO (discontinue use)



4. Are center-lines of legs coincident?

☒ YES (go to 5)

☐ NO (go to 4a)



4a. If NO, are center-lines of face openings less than 1/32 inch?

☐ YES (go to 5)

☐ NO (discontinue use)



5. Does this pitot tube pass all of the above criteria?

☒ YES

☐ NO

Technician Signature: BAW

QA Signature: BAW



THERMOCOUPLE CALIBRATION

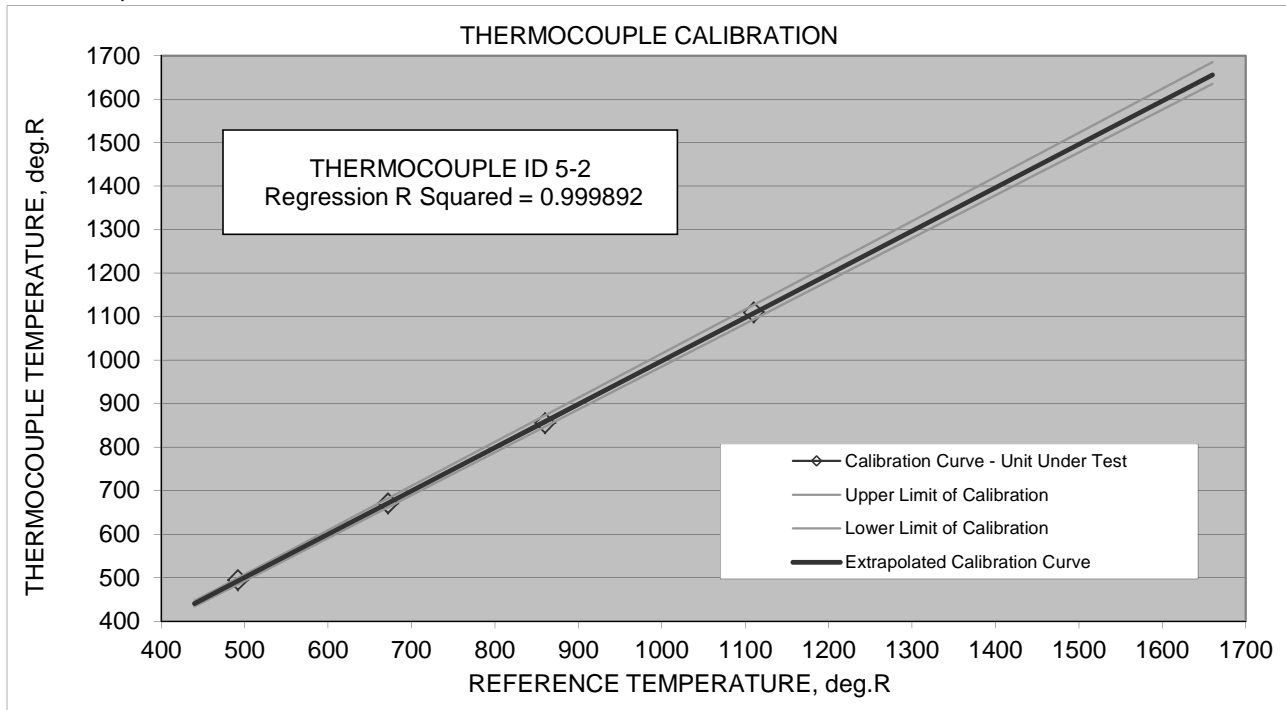
THERMOCOUPLE ID 5-2

Cal Date: 12/23/2014

Probe

CALIBRATION TECHNICIAN: RBS

REFERENCE STANDARDS	TRACEABILITY		DATE	LABORATORY	
Hart Scientific 9103-A s/n A1B289	Report No. B4116012		1/16/2014	Hart Scientific	
Hart Scientific 9140 s/n A1B086	Report No. T10-0105-1		12/18/2013	Hart Scientific	
Temperature Calibration Points	32	212	400	650	Ambient
Reference Deg F (To)	32	212	400	650	70
Probe Temp (deg F)	34	211	395	650	71
Reference Temp (deg R) deg F + 460	492	672	860	1110	530
Probe Temp (deg R), deg F + 460	494	671	855	1110	531
Difference (degrees)	-2	1	5	0	-1
% Diff Abs. T	0.4%	0.1%	0.6%	0.0%	0.2%
Is difference less than 1.5% at all measured points?	YES				



Are extrapolated limits less than 1.5%? YES

FAHRENHEIT
CALIBRATION RANGE
-20 1200

If not acceptable, describe corrective action:

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

THERMOCOUPLE ID 5-3

Cal Date: 12/23/2014

Probe

CALIBRATION TECHNICIAN: RBS

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. B4116012

Report No. T10-0105-1

DATE

1/16/2014

12/18/2013

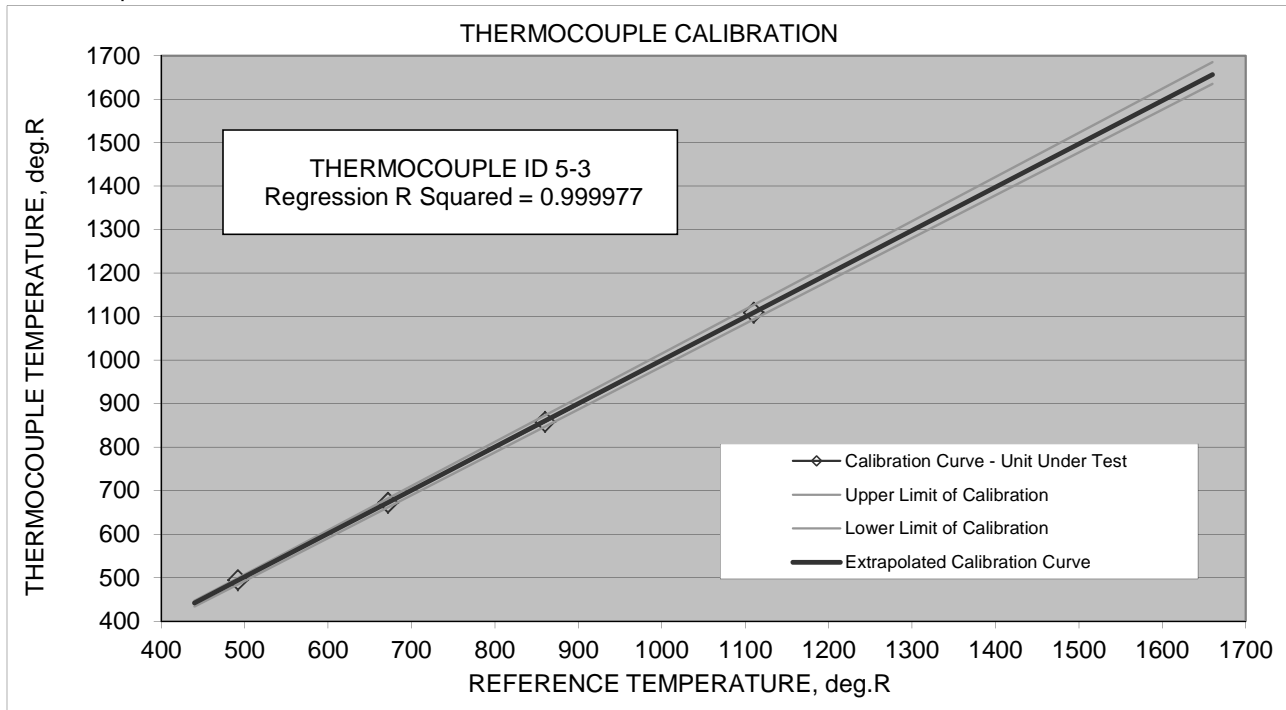
LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points

	32	212	400	650	Ambient
Reference Deg F (To)	32	212	400	650	70
Probe Temp (deg F)	34	212	398	649	71
Reference Temp (deg R) deg F + 460	492	672	860	1110	530
Probe Temp (deg R), deg F + 460	494	672	858	1109	531
Difference (degrees)	-2	0	2	1	-1
% Diff Abs. T	0.4%	0.0%	0.2%	0.1%	0.2%
Is difference less than 1.5% at all measured points?	YES				



Are extrapolated limits less than 1.5%? YES

FAHRENHEIT
CALIBRATION RANGE
-20 1200

If not acceptable, describe corrective action:

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

Impinger Outlet

THERMOCOUPLE ID TIO-1

Cal Date: 1/13/2015

Umbilical 200-2

CALIBRATION TECHNICIAN: RBS

REFERENCE STANDARDS

TRACEABILITY

DATE

LABORATORY

Hart Scientific 9103-A s/n A1B289

Report No. B4116012

1/16/2014

Hart Scientific

Hart Scientific 9140 s/n A1B086

Report No. T10-0105-1

12/18/2013

Hart Scientific

Temperature Calibration Points

20

70

150

Reference Deg F (To)

20

70

150

Probe Temp (deg F)

22.0

70.0

150.0

Difference (degrees)

2.0

0.0

0.0

TC Meets Method 5 Specifications: (± 2.0 °F)

YES

YES

YES

Technician signature

QA signature



THERMOCOUPLE CALIBRATION

Impinger Outlet

THERMOCOUPLE ID TIO-3860

Cal Date: 12/31/2014

Umbilical 300-2

CALIBRATION TECHNICIAN: RBS

REFERENCE STANDARDS

Hart Scientific 9103-A s/n A1B289

Hart Scientific 9140 s/n A1B086

TRACEABILITY

Report No. B4116012

Report No. T10-0105-1

DATE

12/27/2013

12/18/2013

LABORATORY

Hart Scientific

Hart Scientific

Temperature Calibration Points	20	70	150
Reference Deg F (To)	20	70	150
Probe Temp (deg F)	21.0	70.0	150.0
Difference (degrees)	1.0	0.0	0.0
TC Meets Method 5 Specifications: (± 2.0 °F)			

Technician signature

QA signature

Nozzle Calibration
Indurating Furnace Stack A (SV014)
Test 1

Nozzle Calibration

Nozzle No.

T-1

Used for Runs:

1

 -

3

Point Measurement, inches

1	0.209
2	0.210
3	0.210
Average	0.210

Test Date 6/23-24/15

Date Measured: 6/23/2015

Technician: BAW

Signature: 

Nozzle Calibration
Indurating Furnace Stack B (SV015)
Test 2

Nozzle Calibration

Nozzle No.

T-1

Used for Runs:

1

 -

3

Point Measurement, inches

1	0.209
2	0.210
3	0.210
Average	0.210

Test Date 6/25/2015

Date Measured: 6/23/2015

Technician: BAW

Signature: 

Nozzle Calibration
Indurating Furnace Stack C (SV016)
Test 3

Nozzle Calibration

Nozzle No.

T-2

Used for Runs:

1

 -

3

Point Measurement, inches

1	0.210
2	0.210
3	0.210
Average	0.210

Test Date 6/23-24/15

Date Measured: 6/23/2015

Technician: BAW

Signature: 

Nozzle Calibration
Indurating Furnace Stack D (SV017)
Test 4

Nozzle Calibration

Nozzle No.

T-2

Used for Runs:

1

 -

3

Point Measurement, inches

1	0.210
2	0.210
3	0.210
Average	0.210

Test Date 6/25/2015

Date Measured: 6/23/2015

Technician: BAW

Signature: 

Field Barometer Calibration
 Calibration to PRINCO Mercury Barometer
 Barr Engineering Company Edina Field Office

		Reference PRINCO		Field Barometer					
Date	Technician	Observation Time	Station Pressure	ID	Time	Barometric Pressure	Condition	Remarks	Offset tolerance +/- 0.10
6/5/15	RMP	0839	29.31	BA-26	0839	29.30	In Calibration	As Found	-0.01
8/3/15	RMP	1225	29.03	BA-26	1225	29.05	In Calibration	As Found	0.02



EPA METHOD 3A

ANALYZER CALIBRATION and BIAS CORRECTED RESULTS

(Oxygen)

Project ArcelorMittal Minorca Mine Inc.
 Sample Loc. Indurating Furnace Stack A (SV014)
 Date 6/23-24/2015
 Operators JAR2

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CC81142	9.5
High Gas	CA02368	22.2

Analyzer Model / SN Servomex 1440
 Analyzer span 0- 22.2 %

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration

22.19

Note: Difference must be less than +/- 2 percent of span

6/23/2015

TEST RUNS	1	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	0.0	0.0	0.15%
Mid Range		9.5	9.5	0.0	0.08%
High Gas		22.2	22.2	0.0	0.07%

6/24/2015

Test Runs	2-3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	-0.1	0.1	0.45%
Mid-range		9.5	9.4	0.1	0.34%
High-range:		22.2	22.2	0.0	0.06%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw O ₂ %	Bias Corrected Average, O ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	0.0	0.1	0.08%	0.1	0.12%	0.05%	19.5	19.7
Upscale Gas	22.2	22.0	-1.14%	22.0	-1.02%	0.12%		
TEST RUN 2								
Zero Gas	-0.1	0.5	2.87%	-0.1	0.16%	-2.71%	19.5	19.6
Upscale Gas	22.2	22.0	-0.77%	22.1	-0.64%	0.13%		
TEST RUN 3								
Zero Gas	-0.1	-0.1	0.16%	0.0	0.27%	0.11%	19.6	19.7
Upscale Gas	22.2	22.1	-0.64%	22.1	-0.60%	0.03%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100



EPA METHOD 3A

ANALYZER CALIBRATION and BIAS CORRECTED RESULTS

(CO₂)

Project ArcelorMittal Minorca Mine Inc.
 Sample Loc. Indurating Furnace Stack A (SV014)
 Date 6/23-24/2015
 Operators JAR2

Analyzer Model / SN Servomex 1440
 Analyzer span 0- 9.0

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CA02368	4.9
High Gas	CC81142	9.0

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration 4.93

Note: Difference must be less than +/- 2 percent of span

6/23/2015

TEST RUNS	1	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	0.0	0.0	0.49%
Mid Range		4.9	4.9	0.0	0.53%
High Gas		9.0	9.0	0.0	0.21%

6/24/2015

Test Runs	2-3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	0.0	0.0	0.38%
Mid-range		4.9	4.9	0.0	0.55%
High-range:		9.0	9.0	0.0	0.23%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw CO ₂ %	Bias Corrected Average, CO ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	0.0	0.1	0.53%	0.1	0.52%	-0.01%	1.2	1.1
Upscale Gas	4.9	4.8	-0.66%	4.8	-0.54%	0.12%		
TEST RUN 2								
Zero Gas	0.0	0.1	0.46%	0.0	0.05%	-0.41%	1.2	1.2
Upscale Gas	4.9	4.8	-1.20%	4.8	-0.66%	0.54%		
TEST RUN 3								
Zero Gas	0.0	0.0	0.05%	0.1	0.49%	0.44%	1.1	1.1
Upscale Gas	4.9	4.8	-0.66%	4.8	-0.49%	0.17%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100

CO₂



EPA METHOD 3A

ANALYZER CALIBRATION and BIAS CORRECTED RESULTS

(Oxygen)

Project ArcelorMittal Minorca Mine Inc.
Sample Loc. Indurating Furnace Stack B (SV015)
Date 6/25/2015
Operators JAR2

Analyzer Model / SN Servomex 1440
Analyzer span 0- 22.2 %

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CC81142	9.5
High Gas	CA02368	22.2

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration

22.19

Note: Difference must be less than +/- 2 percent of span

TEST RUNS	1 - 3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	-0.1	0.1	0.41%
Mid Range		9.5	9.4	0.1	0.28%
High Gas		22.2	22.2	0.1	0.26%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw O ₂ %	Bias Corrected Average, O ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	-0.1	0.2	1.41%	0.0	0.23%	-1.19%	19.2	19.3
Upscale Gas	22.2	22.1	-0.83%	22.1	-0.81%	0.02%		
TEST RUN 2								
Zero Gas	-0.1	0.0	0.23%	0.0	0.26%	0.04%	19.3	19.4
Upscale Gas	22.2	22.1	-0.81%	22.1	-0.79%	0.02%		
TEST RUN 3								
Zero Gas	-0.1	0.0	0.26%	0.0	0.19%	-0.07%	19.3	19.4
Upscale Gas	22.2	22.1	-0.79%	22.0	-0.89%	-0.10%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100



EPA METHOD 3A

ANALYZER CALIBRATION and BIAS CORRECTED RESULTS

(CO₂)

Project ArcelorMittal Minorca Mine Inc.
Sample Loc. Indurating Furnace Stack B (SV015)
Date 6/25/2015
Operators JAR2

Analyzer Model / SN Servomex 1440
Analyzer span 0- 9.0

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CA02368	4.9
High Gas	CC81142	9.0

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration

4.93

Note: Difference must be less than +/- 2 percent of span

TEST RUNS	1 - 3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	0.0	0.0	0.52%
Mid Range		4.9	4.9	0.1	0.68%
High Gas		9.0	9.0	0.0	0.23%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw CO ₂ %	Bias Corrected Average, CO ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	0.0	0.1	0.43%	0.1	0.39%	-0.04%	1.5	1.5
Upscale Gas	4.9	4.8	-0.48%	4.9	-0.12%	0.36%		
TEST RUN 2								
Zero Gas	0.0	0.1	0.39%	0.1	0.45%	0.06%	1.5	1.4
Upscale Gas	4.9	4.9	-0.12%	4.8	-0.29%	-0.17%		
TEST RUN 3								
Zero Gas	0.0	0.1	0.45%	0.1	0.49%	0.04%	1.4	1.4
Upscale Gas	4.9	4.8	-0.29%	4.8	-0.55%	-0.27%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100

CO₂



EPA METHOD 3A
ANALYZER CALIBRATION and BIAS CORRECTED RESULTS
(Oxygen)

Project ArcelorMittal Minorca Mine Inc.
Sample Loc. Indurating Furnace Stack C (SV016)
Date 6/23/2015
Operators JAR2

Analyzer Model / SN Servomex 1440
Analyzer span 0- 22.2 %

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CC81142	9.5
High Gas	CA02368	22.2

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration 22.2

Note: Difference must be less than +/- 2 percent of span

TEST RUNS	1 - 3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	0.0	0.0	0.15%
Mid Range		9.5	9.5	0.0	0.08%
High Gas		22.2	22.2	0.0	0.07%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw O ₂ %	Bias Corrected Average, O ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	0.0	0.1	0.38%	0.1	0.35%	-0.03%	18.5	18.7
Upscale Gas	22.2	22.0	-0.95%	22.0	-1.11%	-0.16%		
TEST RUN 2								
Zero Gas	0.0	0.1	0.35%	0.1	0.40%	0.05%	18.6	18.8
Upscale Gas	22.2	22.0	-1.11%	21.9	-1.16%	-0.05%		
TEST RUN 3								
Zero Gas	0.0	0.1	0.40%	0.1	0.08%	-0.32%	18.6	18.8
Upscale Gas	22.2	21.9	-1.16%	22.0	-1.14%	0.03%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100



EPA METHOD 3A

ANALYZER CALIBRATION and BIAS CORRECTED RESULTS

(CO₂)

Project ArcelorMittal Minorca Mine Inc.
Sample Loc. Indurating Furnace Stack C (SV016)
Date 6/23/2015
Operators JAR2

Analyzer Model / SN Servomex 1440
Analyzer span 0- 9.0

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CA02368	4.9
High Gas	CC81142	9.0

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration 4.93

Note: Difference must be less than +/- 2 percent of span

TEST RUNS	1 - 3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	0.0	0.0	0.49%
Mid Range		4.9	4.9	0.0	0.53%
High Gas		9.0	9.0	0.0	0.21%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw CO ₂ %	Bias Corrected Average, CO ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	0.0	0.1	0.82%	0.1	0.37%	-0.44%	2.1	2.1
Upscale Gas	4.9	4.8	-0.72%	4.8	-0.69%	0.03%		
TEST RUN 2								
Zero Gas	0.0	0.1	0.37%	0.1	0.39%	0.02%	2.1	2.1
Upscale Gas	4.9	4.8	-0.69%	4.8	-0.75%	-0.05%		
TEST RUN 3								
Zero Gas	0.0	0.1	0.39%	0.1	0.53%	0.14%	2.1	2.1
Upscale Gas	4.9	4.8	-0.75%	4.8	-0.66%	0.09%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100

CO₂



EPA METHOD 3A

ANALYZER CALIBRATION and BIAS CORRECTED RESULTS

(Oxygen)

Project ArcelorMittal Minorca Mine Inc.
Sample Loc. Indurating Furnace Stack D (SV017)
Date 6/25/2015
Operators JAR2

Analyzer Model / SN Servomex 1440
Analyzer span 0- 22.2 %

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CC81142	9.5
High Gas	CA02368	22.2

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration

22.19

Note: Difference must be less than +/- 2 percent of span

TEST RUNS	1 - 3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	-0.1	0.1	0.41%
Mid Range		9.5	9.4	0.1	0.28%
High Gas		22.2	22.2	0.1	0.26%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw O ₂ %	Bias Corrected Average, O ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	-0.1	0.0	0.19%	0.0	0.38%	0.19%	18.1	18.2
Upscale Gas	22.2	22.0	-0.89%	22.1	-0.87%	0.02%		
TEST RUN 2								
Zero Gas	-0.1	0.0	0.38%	0.0	0.54%	0.15%	18.1	18.2
Upscale Gas	22.2	22.1	-0.87%	22.1	-0.88%	0.00%		
TEST RUN 3								
Zero Gas	-0.1	0.0	0.54%	0.0	0.38%	-0.16%	18.1	18.3
Upscale Gas	22.2	22.1	-0.88%	22.1	-0.87%	0.01%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100

O2



EPA METHOD 3A

ANALYZER CALIBRATION and BIAS CORRECTED RESULTS

(CO₂)

Project ArcelorMittal Minorca Mine Inc.
Sample Loc. Indurating Furnace Stack D (SV017)
Date 6/25/2015
Operators JAR2

Analyzer Model / SN Servomex 1440
Analyzer span 0- 9.0

	Cylinder	
	Serial No.	Certified Value
Zero Gas	000000FGU774	0.0
Mid Range	CA02368	4.9
High Gas	CC81142	9.0

ANALYZER CALIBRATION DATA

Bias and Drift Calibration Gas Concentration

4.93

Note: Difference must be less than +/- 2 percent of span

TEST RUNS	1 - 3	Cylinder Value	Analyzer Calibration Response	Absolute Difference	Difference, % of Span
Zero Gas		0.0	0.0	0.0	0.52%
Mid Range		4.9	4.9	0.1	0.68%
High Gas		9.0	9.0	0.0	0.23%

SYSTEM CALIBRATION BIAS AND DRIFT DATA:

Note: System Cal bias cannot exceed +/- 5 percent of span. Drift cannot exceed +/- 3 percent of span

	Analyzer Cal Response, PPM	Initial Values		Final Values		Drift, Percent of span	Measured Run Average, Raw CO ₂ %	Bias Corrected Average, CO ₂ %
		System Cal Response, PPM	System Cal Cal. Bias % of Span	System Cal Response, PPM	System Cal Cal. Bias % of Span			
TEST RUN 1								
Zero Gas	0.0	0.1	0.49%	0.1	0.55%	0.06%	2.6	2.6
Upscale Gas	4.9	4.8	-0.55%	4.8	-0.57%	-0.01%		
TEST RUN 2								
Zero Gas	0.0	0.1	0.55%	0.1	0.60%	0.05%	2.5	2.5
Upscale Gas	4.9	4.8	-0.57%	4.8	-0.39%	0.17%		
TEST RUN 3								
Zero Gas	0.0	0.1	0.60%	0.1	0.60%	0.00%	2.5	2.5
Upscale Gas	4.9	4.8	-0.39%	4.8	-0.54%	-0.14%		

System Calibration Bias = [(System Cal. Response - Analyzer Cal. Response) / Span] x 100

Drift = [(Final System Cal. Response - Initial System Cal Response) / Span] x 100

CO₂

Report Of Analysis
EPA Protocol Gas Mixtures

BARR01

TO: Barr Engineering Co
Attn: Benjamin Wiltse
5150 West 76th Street
Edina, MN 55439-2900
(952) 832-2885

REPORT NO: 66125-02

REPORT DATE: March 2, 2015

CUSTOMER PO NO: BAW01272015

CYLINDER NUMBER: CC81142

CYLINDER SIZE: 150A (141 std cu ft)

CYLINDER PRESSURE: 2000 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD		ANALYZER MAKE, MODEL, S/N, DETECTION	REPLICATE ANALYSIS DATA
Carbon dioxide	8.98 ± 0.09 %	GMIS	SRM 1674b	Varian Model 3400	<u>2/18/2015</u>
			Samp#: 7-H-39	Serial # 10680	8.98 %
			Cyl#: CC116770	Thermal Conductivity	8.97 %
			7.99 ± 0.08 %	Gas Chromotography	8.98 %
			Exp: 3/18/2022	Exp: 6/17/2019	<u>LAST CAL DATE: 2/3/2015</u> \bar{x} : 8.98 %
Oxygen	9.51 ± 0.05 %	GMIS	SRM 2658a	Varian Model 3800	<u>2/19/2015</u>
			Samp#: 72-D-37	Serial # None	9.52 %
			Cyl#: CC51181	Thermal Conductivity	9.50 %
			10.06 ± 0.05 %	Gas Chromotography	9.51 %
			Exp: 5/6/2021	Exp: 6/1/2017	<u>LAST CAL DATE: 1/23/2015</u> \bar{x} : 9.51 %
Nitrogen	Balance				

CERTIFICATION DATE: February 18, 2015

EPA EXPIRATION DATE: February 19, 2023

ppm = μ mole/mole

% = mole-%

 \bar{x} = EPA weighted mean

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA600/R-12/531, dated May 2012.

The above analyses should not be used if the cylinder pressure is less than 100 psig.

ANALYST:

M.S. Calhoun

APPROVED:

J. T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

Report Of Analysis
EPA Protocol Gas Mixtures

BARR01

TO: Barr Engineering Co
Attn: Benjamin Wiltse
5150 West 76th Street
Edina, MN 55439-2900
(952) 832-2885

REPORT NO: 65320-01

REPORT DATE: August 13, 2014

CUSTOMER PO NO: BAW07172014

CYLINDER NUMBER: CA02368

CYLINDER SIZE: 150A (141 std cu ft)

CYLINDER PRESSURE: 2000 psig

COMPONENT	CONCENTRATION (v/v) ± EPA UNCERTAINTY	REFERENCE STANDARD		ANALYZER MAKE, MODEL, S/N, DETECTION	REPLICATE ANALYSIS DATA
Carbon dioxide	4.93 ± 0.05 %	GMIS	SRM 1674b	Varian Model 3400	<u>8/7/2014</u>
			Samp#: 7-H-39	Serial # 10680	4.93 %
			Cyl#: CC116770	Thermal Conductivity	4.94 %
			7.99 ± 0.08 %	Gas Chromotography	4.93 %
			Exp: 3/18/2022	Exp: 6/17/2019	<u>LAST CAL DATE: 8/7/2014</u> \bar{x} : 4.93 %
Oxygen	22.19 ± 0.22 %	GMIS	SRM 2659a	Varian Model 3800	<u>8/12/2014</u>
			Samp#: 71-D-23	Serial # None	22.12 %
			Cyl#: CC88824	Thermal Conductivity	22.18 %
			24.92 ± 0.25 %	Gas Chromotography	22.26 %
			Exp: 2/25/2021	Exp: 1/1/2016	<u>LAST CAL DATE: 7/16/2014</u> \bar{x} : 22.19 %
Nitrogen	Balance				

CERTIFICATION DATE: August 7, 2014

EPA EXPIRATION DATE: August 8, 2022

ppm = μ mole/mole

% = mole-%

 \bar{x} = EPA weighted mean

The above analyses were performed in accordance with Procedure G1 of the EPA Traceability Protocol, Report Number EPA600/R-12/531, dated May 2012.

The above analyses should not be used if the cylinder pressure is less than 100 psig.

ANALYST:

M.S. Calhoun

APPROVED:

J. T. Marrin

The only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

Field Barometer Calibration
 Calibration to PRINCO Mercury Barometer
 Barr Engineering Company Edina Field Office

		Reference PRINCO		Field Barometer					
Date	Technician	Observation Time	Station Pressure	ID	Time	Barometric Pressure	Condition	Remarks	Offset tolerance +/- 0.10
6/5/15	RMP	0839	29.31	BA-26	0839	29.30	In Calibration	As Found	-0.01
8/3/15	RMP	1225	29.03	BA-26	1225	29.05	In Calibration	As Found	0.02

Appendix F

Process Operating Data

Air Performance Test Form

Operating Data Summary for Process Sources

Facility Information (please print)

Company Name: ArcelorMittal Minorca Mine Inc.

Equipment ID No: SV014

Test date(s): 6/23/15-6/24/15

Equipment and Operating Data

- Process Equipment Description: Indurating Furnace Stack A
- Were the process and control equipment operated consistent with normal procedures? ☒ Yes ☐ No If no, explain: _____
- Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, pounds per hour, pressure, air flow, etc.
- Date(s) and procedure(s) of last maintenance/cleaning within 6 months:
☒ Remains unchanged from info. provided in test plan
- Process rate (amount of raw material or finished product per hour, wet or dry basis) while combusting (list fuel type(s) and ratios as appropriate) _____

Process Parameter: list type and units	Run 1	Run 2	Run 3	Run 4	Average
Fired Pellet Production Rate, LTPH	367	360	357	-	361
Fuel Input (list units)					
Heat Input (10 ⁶ British thermal units/hour)					

- Summarize control equipment operating data documented during testing. Values reported should reflect maximum, minimum, averages, or as approved in the test plan. (See test plan and approval letter)

Examples of APC equipment and parameters generally monitored. Monitor as in test plan and/or approval letter.

- Scrubber (list type of scrubber): DP (in. w.c.) and feed rate (gpm and psig)
- Baghouse, Cyclone, and Multi-clone: DP (in. w.c.)
- Catalytic Incinerator : (°F_{in} , °F_{out}) and Thermal Incinerator: (°F_{temperature})
- ESP: Number and identity of operating field(s)

APC and parameter monitored	Run 1	Run 2	Run 3	Run 4	Average
Scrubber Water Flow Rate, gpm	818.4	821.4	839.8	-	826.5
Scrubber Differential Pressure, in. w.c.	1.8	1.7	1.7	-	1.7
List pollutant & averaging basis.--should reflect permit	Run 1	Run 2	Run 3	Run 4	Average
Continuous Opacity Monitor(list hourly average)					
Monitor (list averaging basis):					
Monitor (list averaging basis):					

Abbreviations: APC=air pollution control
lbs.-pounds

gpm.=gallons per minute
psig=pressure per square inch gauge

in. w.c.=inches of water column
ΔP=pressure drop

Note: This form provides only a summary of the operating conditions during the performance test. Additional and more detailed records are required to meet the requirements of Minn. R. 7017.2035, subp. 3. This form is to be submitted as part of the performance test report

Air Performance Test Form

Operating Data Summary for Process Sources

Facility Information (please print)

Company Name: ArcelorMittal Minorca Mine Inc.

Equipment ID No: SV016

Test date(s): 6/23/15-6/24/15

Equipment and Operating Data

- Process Equipment Description: Indurating Furnace Stack C
- Were the process and control equipment operated consistent with normal procedures? ☒ Yes ☐ No If no, explain: _____
- Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, pounds per hour, pressure, air flow, etc.
- Date(s) and procedure(s) of last maintenance/cleaning within 6 months:
☒ Remains unchanged from info. provided in test plan
- Process rate (amount of raw material or finished product per hour, wet or dry basis) while combusting (list fuel type(s) and ratios as appropriate) _____

Process Parameter: list type and units	Run 1	Run 2	Run 3	Run 4	Average
Fired Pellet Production Rate, LTPH	367	360	357	-	361
Fuel Input (list units)					
Heat Input (10 ⁶ British thermal units/hour)					

- Summarize control equipment operating data documented during testing. Values reported should reflect maximum, minimum, averages, or as approved in the test plan. (See test plan and approval letter)

Examples of APC equipment and parameters generally monitored. Monitor as in test plan and/or approval letter.

- Scrubber (list type of scrubber): DP (in. w.c.) and feed rate (gpm and psig)
- Baghouse, Cyclone, and Multi-clone: DP (in. w.c.)
- Catalytic Incinerator : (°F_{in} , °F_{out}) and Thermal Incinerator: (°F_{temperature})
- ESP: Number and identity of operating field(s)

APC and parameter monitored	Run 1	Run 2	Run 3	Run 4	Average
Scrubber Water Flow Rate, gpm	837.1	844.6	802.2	-	828.0
Scrubber Differential Pressure, in. w.c.	1.8	1.8	1.8	-	1.8
List pollutant & averaging basis.--should reflect permit	Run 1	Run 2	Run 3	Run 4	Average
Continuous Opacity Monitor(list hourly average)					
Monitor (list averaging basis):					
Monitor (list averaging basis):					

Abbreviations: APC=air pollution control
lbs.-pounds

gpm.=gallons per minute
psig=pressure per square inch gauge

in. w.c.=inches of water column
ΔP=pressure drop

Note: This form provides only a summary of the operating conditions during the performance test. Additional and more detailed records are required to meet the requirements of Minn. R. 7017.2035, subp. 3. This form is to be submitted as part of the performance test report

timestamp	A110CV02CNVYR_SCALE_LSTHR_VAL0		
6/23/2015 16:00	384	Run 1	1511-1720
6/23/2015 17:00	361		
6/23/2015 18:00	357		
Average Run 1	367		
6/23/2015 19:00	351	Run 2	1810-2020
6/23/2015 20:00	374		
6/23/2015 21:00	355		
Average Run 2	360		
6/24/2015 9:00	369	Run 3	0803-1013
6/24/2015 10:00	359		
6/24/2015 11:00	342		
Average Run 3	357		

timestamp	A108DC01DIFF_PRES15MN_AVG_VAL0	Furnace Stack A	A108DC01FLOW_WATER15MN_AVG_VAL0	Furnace Stack A	A108DC03DIFF_PRES15MN_AVG_VAL0	Furnace Stack C	A108DC03FLOW_WATER15MN_AVG_VAL0	Furnace Stack C
6/23/2015 15:00	1.7	820.2		1.7		837.4		
6/23/2015 15:15	1.8	819.8		1.7		837.8		
6/23/2015 15:30	1.8	818.5		1.8		837.8		
6/23/2015 15:45	1.9	818.9		1.8		837.8		
6/23/2015 16:00	1.8	818.5		1.8		838.2		
6/23/2015 16:15	1.7	818.0		1.7		837.8		
6/23/2015 16:30	1.8	818.0		1.8		837.4		
6/23/2015 16:45	1.8	818.0		1.8		837.4		
6/23/2015 17:00	1.8	818.0		1.8		836.9		
6/23/2015 17:15	1.8	816.3		1.8		834.3		
6/23/2015 17:30	1.8	818.5		1.8		835.2		
Run 1 Average	1.8	818.4		1.8		837.1		
6/23/2015 18:00	1.7	818.5		1.8		835.2		
6/23/2015 18:15	1.7	818.0		1.8		834.7		
6/23/2015 18:30	1.7	818.0		1.8		834.7		
6/23/2015 18:45	1.7	818.5		1.7		835.6		
6/23/2015 19:00	1.7	818.9		1.8		835.6		
6/23/2015 19:15	1.7	819.3		1.7		835.2		
6/23/2015 19:30	1.7	819.3		1.8		835.6		
6/23/2015 19:45	1.7	818.9		1.8		836.0		
6/23/2015 20:00	1.7	818.9		1.8		834.7		
6/23/2015 20:15	1.8	818.9		1.8		835.2		
6/23/2015 20:30	1.7	848.4		1.8		937.6		
Run 2 Average	1.7	821.4		1.8		844.6		
6/24/2015 8:00	1.7	842.2		1.8		825.5		
6/24/2015 8:15	1.7	840.4		1.8		833.0		
6/24/2015 8:30	1.7	840.0		1.8		809.2		
6/24/2015 8:45	1.7	840.0		1.8		800.0		
6/24/2015 9:00	1.7	840.4		1.8		798.7		
6/24/2015 9:15	1.6	840.4		1.7		796.0		
6/24/2015 9:30	1.7	840.0		1.8		793.4		
6/24/2015 9:45	1.7	838.7		1.8		790.3		
6/24/2015 10:00	1.7	838.7		1.8		789.0		
6/24/2015 10:15	1.7	837.4		1.8		786.8		
Run 3 Average	1.7	839.8		1.8		802.2		

Air Performance Test Form

Operating Data Summary for Process Sources

Facility Information (please print)

Company Name: ArcelorMittal Minorca Mine Inc.

Equipment ID No: SV015

Test date(s): 06/25/15

Equipment and Operating Data

1. Process Equipment Description: Indurating Furnace Stack B

2. Were the process and control equipment operated consistent with normal procedures? ☒ Yes ☐ No If no, explain:

3. Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, pounds per hour, pressure, air flow, etc.

4. Date(s) and procedure(s) of last maintenance/cleaning within 6 months:

☒ Remains unchanged from info. provided in test plan

5. Process rate (amount of raw material or finished product per hour, wet or dry basis) while combusting (list fuel type(s) and ratios as appropriate)

Process Parameter: list type and units	Run 1	Run 2	Run 3	Run 4	Average
Fired Pellet Production Rate, LTPH	361	350	345	-	352
Fuel Input (list units)					
Heat Input (10 ⁶ British thermal units/hour)					

6. Summarize control equipment operating data documented during testing. Values reported should reflect maximum, minimum, averages, or as approved in the test plan. (See test plan and approval letter)

Examples of APC equipment and parameters generally monitored. Monitor as in test plan and/or approval letter.

· Scrubber (list type of scrubber): DP (in. w.c.) and feed rate (gpm and psig) · Baghouse, Cyclone, and Multi-clone: DP (in. w.c.)
· Catalytic Incinerator : (°F_{in} , °F_{out}) and Thermal Incinerator: (°F_{temperature}) · ESP: Number and identity of operating field(s)

APC and parameter monitored	Run 1	Run 2	Run 3	Run 4	Average
Scrubber Water Flow Rate, gpm	853.4	852.6	853.1	-	853.0
Scrubber Differential Pressure, in.w.c.	2.0	2.1	2.0	-	2.0
List pollutant & averaging basis.--should reflect permit	Run 1	Run 2	Run 3	Run 4	Average
Continuous Opacity Monitor(list hourly average)					
Monitor (list averaging basis):					
Monitor (list averaging basis):					

Abbreviations: APC=air pollution control
lbs.-pounds

gpm.=gallons per minute
psig=pressure per square inch gauge

in. w.c.=inches of water column
ΔP=pressure drop

Note: This form provides only a summary of the operating conditions during the performance test. Additional and more detailed records are required to meet the requirements of Minn. R. 7017.2035, subp. 3. This form is to be submitted as part of the performance test report

Air Performance Test Form

Operating Data Summary for Process Sources

Facility Information (please print)

Company Name: ArcelorMittal Minorca Mine Inc.

Equipment ID No: SV017

Test date(s): 06/25/15

Equipment and Operating Data

- Process Equipment Description: Indurating Furnace Stack D
- Were the process and control equipment operated consistent with normal procedures? ☒ Yes ☐ No If no, explain: _____
- Include copy of production records or instrumentation which indicates rate of production or operation of the equipment, i.e. units per hour, pounds per hour, pressure, air flow, etc.
- Date(s) and procedure(s) of last maintenance/cleaning within 6 months:
☒ Remains unchanged from info. provided in test plan
- Process rate (amount of raw material or finished product per hour, wet or dry basis) while combusting (list fuel type(s) and ratios as appropriate) _____

Process Parameter: list type and units	Run 1	Run 2	Run 3	Run 4	Average
Fired Pellet Production Rate, LTPH	361	350	345	-	352
Fuel Input (list units)					
Heat Input (10 ⁶ British thermal units/hour)					

- Summarize control equipment operating data documented during testing. Values reported should reflect maximum, minimum, averages, or as approved in the test plan. (See test plan and approval letter)

Examples of APC equipment and parameters generally monitored. Monitor as in test plan and/or approval letter.

- Scrubber (list type of scrubber): DP (in. w.c.) and feed rate (gpm and psig)
- Baghouse, Cyclone, and Multi-clone: DP (in. w.c.)
- Catalytic Incinerator : (°F_{in} , °F_{out}) and Thermal Incinerator: (°F_{temperature})
- ESP: Number and identity of operating field(s)

APC and parameter monitored	Run 1	Run 2	Run 3	Run 4	Average
Scrubber Water Flow Rate, gpm	856.0	856.2	855.6	-	855.9
Scrubber Differential Pressure, in. w.c.	1.7	1.7	1.7	-	1.7
List pollutant & averaging basis.--should reflect permit	Run 1	Run 2	Run 3	Run 4	Average
Continuous Opacity Monitor(list hourly average)					
Monitor (list averaging basis):					
Monitor (list averaging basis):					

Abbreviations: APC=air pollution control
lbs.-pounds

gpm.=gallons per minute
psig=pressure per square inch gauge

in. w.c.=inches of water column
ΔP=pressure drop

Note: This form provides only a summary of the operating conditions during the performance test. Additional and more detailed records are required to meet the requirements of Minn. R. 7017.2035, subp. 3. This form is to be submitted as part of the performance test report

timestamp	A110CV02CNVYR_SCALE_LSTHR_VAL0		
6/25/2015 8:00	351	Run 1	0756-1013
6/25/2015 9:00	371		
6/25/2015 10:00	366		
6/25/2015 11:00	354		
Run 1 Average	361		
6/25/2015 12:00	353	Run 2	1105-1320
6/25/2015 13:00	349		
6/25/2015 14:00	348		
Run 2 Average	350		
6/25/2015 15:00	345	Run 3	1433-1646
6/25/2015 16:00	347		
6/25/2015 17:00	342		
Run 3 Average	345		

timestamp	A108DC02DIFF_PRES15MN_AVG_VAL0	A108DC02FLOW_WATER15MN_AVG_VAL0	Furnace Stack B	A108DC04DIFF_PRES15MN_AVG_VAL0	A108DC04FLOW_WATER15MN_AVG_VAL0	Furnace Stack D
6/25/2015 7:45	2.0	854.5	1.7	857.1		
6/25/2015 8:00	2.0	854.1	1.7	856.7		
6/25/2015 8:15	2.0	853.6	1.7	856.7		
6/25/2015 8:30	2.0	853.2	1.7	855.4		
6/25/2015 8:45	2.0	853.6	1.7	855.4		
6/25/2015 9:00	2.1	853.2	1.7	855.8		
6/25/2015 9:15	2.1	853.2	1.7	855.4		
6/25/2015 9:30	2.1	852.7	1.7	855.8		
6/25/2015 9:45	2.0	853.6	1.7	855.8		
6/25/2015 10:00	2.1	852.7	1.7	855.4		
6/25/2015 10:15	2.1	852.7	1.7	856.7		
Run 1 Average	2.0	853.4	1.7	856.0		
6/25/2015 11:00	2.1	852.7	1.7	857.1		
6/25/2015 11:15	2.1	852.3	1.7	856.7		
6/25/2015 11:30	2.0	852.7	1.7	855.8		
6/25/2015 11:45	2.0	852.7	1.7	856.3		
6/25/2015 12:00	2.1	853.2	1.7	855.4		
6/25/2015 12:15	2.1	853.6	1.7	856.3		
6/25/2015 12:30	2.1	852.7	1.7	856.3		
6/25/2015 12:45	2.0	852.3	1.7	855.4		
6/25/2015 13:00	2.1	852.3	1.7	856.3		
6/25/2015 13:15	2.1	852.3	1.7	857.1		
6/25/2015 13:30	2.1	851.4	1.7	855.8		
Run 2 Average	2.1	852.6	1.7	856.2		
6/25/2015 14:30	2.1	858.9	1.7	857.6		
6/25/2015 14:45	2.0	858.9	1.7	857.1		
6/25/2015 15:00	2.0	854.5	1.7	855.8		
6/25/2015 15:15	2.0	851.9	1.7	855.4		
6/25/2015 15:30	2.1	851.4	1.7	855.4		
6/25/2015 15:45	2.1	851.4	1.7	854.9		
6/25/2015 16:00	2.1	851.9	1.7	855.4		
6/25/2015 16:15	2.1	851.9	1.7	854.9		
6/25/2015 16:30	2.0	850.5	1.7	854.5		
6/25/2015 16:45	2.0	851.4	1.7	854.9		
6/25/2015 17:00	2.1	851.9	1.7	855.4		
Run 3 Average	2.0	853.1	1.7	855.6		

Appendix G

EPA Method 30B

ArcelorMittal Minorca Mine Inc.
Virginia, Minnesota

Barr Engineering Co.
August 07, 2015

MERCURY TEST RESULTS SUMMARY
EPA Method 30B
Stack D (SV017)

Parameter	Run 1	Run 2	Run 3	Average
Test Date	6/25/2015	6/25/2015	6/25/2015	---
Test Period	756-1013	1110-1310	1433-1633	---
Test Duration, min.	120	120	120	---
Air Flow Rate				
acfm	219,600	220,100	212,800	217,500
scfm	180,200	180,500	174,000	178,233
dscfm	153,700	154,800	149,300	152,600
Mercury Sorbent Trap Loading, ng				
Trap A	327.60	289.00	307.00	307.87
Mercury Concentration, µg/dscm				
Trap A	5.9	5.2	5.5	5.5
Mercury Emissions Rate, lb/hr				
Trap A	0.0034	0.0030	0.0031	0.0032

EPA Method 30B Calculation Summary
Determination of Total Vapor Phase Mercury Emissions

Stack D (SV017)

Data Entry	Symbol	Units	Run 1	Run 2	Run 3	Test Average
Test Date	-	-	6/25/2015	6/25/2015	6/25/2015	---
Test Period	-	-	756-1013	1110-1310	1433-1633	---
Barometric Pressure	P _{bar}	in. Hg	28.40	28.40	28.40	28.40
Dry Volumetric Flowrate at Standard Conditions (EPA Method 2)	Q _d	dscfm	153,720	154,815	149,324	152,620

Trap A Results

	Symbol	Units	Run 1	Run 2	Run 3	Test Average
Actual Dry Gas Meter Volume	V _{mA}	liters	60.006	60.007	60.006	60.006
Dry Gas Meter Calibration Factor	Y _A	-	0.9917	0.9917	0.9917	0.9917
Average Meter Temperature	T _{mIA}	degrees F	73	75	73	73
Average Absolute Meter Temperature (R) T _{mIA} = T _{mIA} + 460	T _{mIA}	degrees R	533	535	533	533
Meter Volume at Standard Conditions V _{mstd A} = 17.64 x (V _{mA} x 0.03531) x Y _A x P _{bar} / T _{mIA}	V _{mstd A}	cubic feet	1.974	1.968	1.976	1.972
Laboratory Results						
Trap ID	---	---	OL255600	OL255920	OL255948	---
Mercury Sorbent Trap, Section 1	M _{1A}	ng	327.60	289.00	307.00	307.87
Mercury Sorbent Trap, Section 2	M _{2A}	ng	0.00	0.00	0.00	0.00
Mercury, Total amount collected	M _A	ng	327.60	289.00	307.00	307.87
Amount of Mercury in spiked traps-from laboratory	M _{spike A}	ng	0	0	0	---
Mercury Stack Concentration C _{(ug)A} = (M _A - M _{spikeA}) / 1000 / V _{mstdA} x 0.0283168	C _{(ug)A}	ug/dscm	5.862	5.187	5.487	5.512
Mercury Stack Concentration C _{(ppm)A} = (M _A - M _{spike A}) / 1000 / 200.5920 x 24.04 / (V _{mstd A} x 28.32)	C _{(ppm)A}	ppm	0.0007	0.0006	0.0007	0.0007
Mercury Emission Rate E _{(lb/hr)A} = (M _A - M _{spike A}) x (2.2046x10 ⁻¹² (lb/ng)) x Q _d x60 / V _{mstd A}	E _{(lb/hr)A}	lb/hr	0.0034	0.0030	0.0031	0.0032

Trap B Results

	Symbol	Units	Run 1	Run 2	Run 3	Test Average
Actual Dry Gas Meter Volume	V _{mB}	liters	60.053	59.998	59.992	60.014
Dry Gas Meter Calibration Factor	Y _B	-	0.9877	0.9877	0.9877	0.9877
Average Meter Temperature	T _{mIB}	degrees F	74	76	74	74
Average Absolute Meter Temperature (R) T _{mIB} = T _{mIB} + 460	T _{mIB}	degrees R	534	536	534	534
Meter Volume at Standard Conditions V _{mstd B} = 17.64 x (V _{mB} x 0.03531) x Y _B x P _{bar} / T _{mIB}	V _{mstd B}	cubic feet	1.964	1.956	1.964	1.961
Laboratory Results						
Trap ID	---	---	OL269401	OL269392	OL269460	---
Mercury Sorbent Trap, Section 1	M _{1B}	ng	430.50	*	434.90	432.70
Mercury Sorbent Trap, Section 2	M _{2B}	ng	1.00	0.00	4.30	1.77
Mercury, Total amount collected	M _B	ng	431.50	*	439.20	435.35
Amount of Mercury in spiked traps-from laboratory	M _{spike B}	ng	150	*	150	---
Mercury Stack Concentration C _{(ug)B} = (M _B - M _{spikeB}) / 1000 / V _{mstdB} x 0.0283168	C _{(ug)B}	ug/dscm	5.061	*	5.200	5.131
Mercury Stack Concentration C _{(ppm)B} = (M _B - M _{spike B}) / 1000 / 200.5920 x 24.04 / (V _{mstd B} x 28.32)	C _{(ppm)B}	ppm	0.0006	*	0.0006	0.0006
Mercury Emission Rate E _{(lb/hr)B} = (M _B - M _{spike B}) x (2.2046x10 ⁻¹² (lb/ng)) x Q _d x60 / V _{mstd B}	E _{(lb/hr)B}	lb/hr	0.0029	*	0.0029	0.0029

EPA Method 30B QA/QC Data

	Symbol	Units	Run 1	Run 2	Run 3	Test Average
A Train Breakthrough -- each run <10% B _A = M _{2A} / M _{1A} x 100	B _A	%	0.0	0.0	0.0	0.0
B Train Breakthrough -- each run <10% B _B = M _{2B} / M _{1B} x 100	B _B	%	0.2	*	1.0	0.6
Sample volume agreement -- each run +/- 20% SV = 100 - ((V _{mstd A} / V _{mstd B}) x 100)	SV	%	-0.5	-0.6	-0.6	-0.6
Field Recovery Test -- 3 run avg 85% < R > 115% R = (M _A / V _{mstd A} - M _B / V _{mstd B}) x V _{mstd A} / M _{spike A} x 100	R	%	70.3	*	89.4	79.8
Paired Trap Agreement -- each run <10% RD = ((C _{ugA} - C _{ugB}) / (C _{ugA} + C _{ugB})) x 100	RD	%	7.3	*	2.7	5.0

* Sample trap OL269392 was broken in the laboratory and unrecoverable

Sorbent Trap Analysis Report

Project Number: 2004143

Turn-around: Standard

Plant: Barr Engineering
Contact: Tom Kuchinski
Phone: 952.832.2727
Email: TKuchinski@barr.com

Date(s): 7/13/2015
Analyst(s): Jamie Taylor
Method: EPA 7473

[illegible]



EPA Method 30B
FIELD DATA SHEET

Project ARCELOR MITTAL MACT
Sample Location STACK D
Date 6/24/15 to 6/25/15
Operators JARR

Meter ID DV B
Meter A γ 0.9917
Meter B γ 0.9887
Sample Rate 0.5 lpm
Bar. Press. 28.37 * in. Hg
28.40

Test 9
Run 1

40.00

52.50

Sample Time ΔT	Meter A Volume Vma, liters	Meter B Volume Vmb, liters	Stack Temp $^{\circ}F$	Sample A Vacuum, in Hg	Sample B Vacuum, in Hg	Sorbent Ts, $^{\circ}F$	Probe Tp, $^{\circ}F$	Meter A Outlet Temp	Meter B Outlet Temp	Notes
(0756)	0	0								
5	2.48	2.56	150	2	2	300	300	71	72	
10	5.11	5.20	150	2	3	300	300	71	72	
15	7.60	7.65	149	2	3	300	300	72	72	
20	10.10	10.14	150	2	3	300	300	72	73	
25	12.58	12.55	150	2	3	300	300	72	73	
30	14.96	14.95	150	2	3	300	300	72	73	
35	17.45	17.46	151	2	3	300	300	72	73	
40	20.00	19.96	151	2	3	300	300	73	73	
45	22.59	22.47	151	2	3	300	300	73	74	
50	25.10	24.96	150	2	3	300	300	73	74	
55	27.50	27.47	149	2	3	300	300	73	74	
60	29.90	29.99	150	2	3	300	300	73	74	
65	32.30	32.50	149	2	3	300	300	74	74	
70	34.80	34.97	149	2	3	300	300	74	74	
75	37.37	37.42	148	2	3	300	300	74	75	
80	39.85	39.99	148	3	3	300	300	74	75	
85	42.53	42.53	148	3	3	300	300	74	75	
90	44.91	44.98	147	3	3	300	300	74	75	
95	47.40	47.60	147	3	3	300	300	74	75	
100	49.90	50.07	149	3	3	300	300	75	76	Port change
105	52.50	52.51	150	3	3	300	300	75	76	
110	55.07	54.95	149	3	3	300	300	75	76	
115	57.56	57.40	150	3	3	300	300	75	76	
120	60.006	60.053	149	3	3	300	300	76	77	
0710:13	Vma=60.006	Vmb=60.053	Ts=149.3333					Tma=73.3350	Tmb=74.2083	

Sample Train A Leak Rate (lpm)	Sample Train B Leak Rate (lpm)	Trap A ID	Trap B ID
Pretest <u>0.006</u> at <u>7</u> in Hg	Pretest <u>0.007</u> at <u>7</u> in Hg	<u>0L255600</u>	<u>0L269401</u>
Posttest <u>0.004</u> at <u>3</u> in Hg	Posttest <u>0.007</u> at <u>3</u> in Hg	Spike <input checked="" type="checkbox"/> Y <u> </u>	Spike <input checked="" type="checkbox"/> Y <u> </u>
		Spike Level <u> </u>	Spike Level <u>150 ng</u>

JARR
6/25/15



EPA Method 30B
FIELD DATA SHEET

Project ARCELOR MITTAL MACT
Sample Location STACK D
Date 6/25/15
Operators JARZ

Meter ID DV B
Meter A γ 0.9917
Meter B γ 0.9887
Sample Rate 0.5 lpm
Bar. Press. 28.40 in. Hg

Test 9
Run 2

Sample Time ΔT	Meter A Volume Vma, liters	Meter B Volume Vmb, liters	Stack Temp $^{\circ}F$	Sample A Vacuum, in Hg	Sample B Vacuum, in Hg	Sorbent Ts, $^{\circ}F$	Probe Tp, $^{\circ}F$	Meter A Outlet Temp	Meter B Outlet Temp	Notes
(11:10)	\emptyset	\emptyset								
5	2.54	2.39	146	2	2	300	300	75	76	
10	5.04	4.89	146	2	2	300	300	75	76	
15	7.54	7.43	148	2	2	300	300	75	76	
20	10.04	9.96	148	2	2	300	300	75	76	
25	12.56	12.51	148	2	2	300	300	75	76	
30	15.04	15.00	148	2	2	300	300	75	76	
35	17.49	17.48	148	2	2	300	300	75	76	
40	20.06	19.97	147	2	2	300	300	75	76	
45	22.60	22.49	147	2	2	300	300	75	76	
50	25.04	25.00	147	2	2	300	300	75	76	
55	27.52	27.50	147	2	2	300	300	75	76	
60	30.00	30.01	147	2	2	300	300	75	76	
65	32.48	32.49	147	2	2	300	300	75	76	
70	35.01	35.03	147	2	2	300	300	75	76	
75	37.55	37.48	147	2	2	300	300	75	76	
80	39.99	39.97	147	2	2	300	300	75	76	
85	42.56	42.49	147	2	2	300	300	75	76	
90	45.09	44.97	147	2	2	300	300	75	76	
95	47.52	47.49	148	2	2	300	300	75	76	
100	50.01	50.00	148	2	2	300	300	75	76	
105	52.60	52.49	148	2	2	300	300	75	76	
110	55.07	54.96	148	2	2	300	300	75	76	
115	57.55	57.48	148	2	2	300	300	75	76	
120	60.007	59.998	148	2	2	300	300	75	76	
\emptyset (13:10)	Vma=60.007	Vmb=59.998	Ts=147.3750					Tma=75.0000	Tmb=76.0000	

Sample Train A Leak Rate (lpm)	Sample Train B Leak Rate (lpm)	Trap A ID	Trap B ID
Pretest <u>0.000</u> at <u>5</u> in Hg	Pretest <u>0.004</u> at <u>5</u> in Hg	<u>DL 255920</u>	<u>DL 269392</u>
Posttest <u>0.000</u> at <u>3</u> in Hg	Posttest <u>0.009</u> at <u>3</u> in Hg	Spike Y/N <u>—</u>	Spike Y/N <u>—</u>
		Spike Level <u>—</u>	Spike Level <u>150 ng</u>

* JARZ
6/25/15



EPA Method 30B
FIELD DATA SHEET

Project ARCELOR MITTAL
Sample Location STACK D
Date 6/25/15
Operators JARZ

Meter ID DV B
Meter A γ 0.9917
Meter B γ 0.9897
Sample Rate 0.5 lpm
Bar. Press. 28.40 in. Hg

Test 9
Run 3

Sample Time ΔT	Meter A Volume Vma, liters	Meter B Volume Vmb, liters	Stack Temp °F	Sample A Vacuum, in Hg	Sample B Vacuum, in Hg	Sorbent Ts, °F	Probe Tp, °F	Meter A Outlet Temp	Meter B Outlet Temp	Notes
(14:33)	0	0								
5	2.63	2.60	148	2	2	300	300	72	73	
10	5.11	5.05	148	2	2	300	300	72	73	
15	7.54	7.51	148	2	2	300	300	72	73	
20	9.98	9.95	148	2	2	300	300	72	73	
25	12.47	12.44	148	2	2	300	300	72	73	
30	15.04	14.98	149	2	2	300	300	72	73	
35	17.55	17.47	149	2	2	300	300	73	73	
40	20.00	19.98	149	2	2	300	300	73	74	
45	22.50	22.50	149	2	2	300	300	73	74	
50	24.93	25.03	149	2	2	300	300	73	74	
55	27.48	27.56	148	2	2	300	300	73	74	
60	29.92	30.02	148	2	2	300	300	73	74	
65	32.51	32.48	147	2	2	300	300	73	74	
70	35.01	34.92	148	2	2	300	300	73	74	
75	37.57	37.43	148	2	2	300	300	73	74	
80	40.09	40.01	148	2	2	300	300	73	74	
85	42.53	42.55	148	2	2	300	300	73	74	
90	45.04	45.00	148	2	2	300	300	73	74	
95	47.48	47.43	148	2	2	300	300	73	74	
100	49.93	49.97	148	2	2	300	300	73	74	
105	52.46	52.44	148	2	2	300	300	73	74	
110	54.94	54.93	148	2	2	300	300	73	74	
115	57.48	57.49	148	2	2	300	300	73	74	
120	60.006	59.992	148	2	2	300	300	73	74	
0= 16.33	Vma= 60.006	Vmb= 59.992	Ts= 148.1667					Tma=	Tmb= 73.7093	

72.7500

Sample Train A Leak Rate (lpm)	Sample Train B Leak Rate (lpm)	Trap A ID	Trap B ID
Pretest <u>0.002</u> at <u>5</u> in Hg	Pretest <u>0.009</u> at <u>5</u> in Hg	<u>255948</u>	<u>269460</u>
Posttest <u>0.002</u> at <u>3</u> in Hg	Posttest <u>0.002</u> at <u>3</u> in Hg	Spike <u>Y</u>	Spike <u>N</u>
		Spike Level <u>—</u>	Spike Level <u>150 ng</u>

Appendix H

Stack Test Plan

David A. Herbst

From: Strzok, Ladislaus (MPCA) <Ladislaus.Strzok@state.mn.us>
Sent: Wednesday, July 01, 2015 10:51 AM
To: Johnson, Jaime; Tom Kuchinski; Michael J. Norstrem; Benjamin A. Wiltse
Subject: RE: Stack Testing - Minorca Mine

Jaime,

The evaluation of operational rates by the MPCA is driven by the average of all test runs when establishing/verifying operation limits/rates. This includes processes with inherent variability or in situations where specific production may have fluctuated. Regards,

Lad Strzok
Air Compliance Unit
Phone: 651-757-2295



Minnesota Pollution Control Agency

From: Johnson, Jaime [mailto:Jaime.Johnson@arcelormittal.com]
Sent: Tuesday, June 30, 2015 7:28 PM
To: Strzok, Ladislaus (MPCA); Tom Kuchinski; Michael J. Norstrem (MNorstrem@barr.com); Benjamin A. Wiltse; Johnson, Jaime
Subject: Stack Testing - Minorca Mine

Lad,

Thank you for calling back, and I'm sorry I missed the message until late. We decided to take the conservative approach so I think everything is OK. We had a run with lower production due to a hiccup in the plant – and we were not sure whether the required 340 tonnage was an average across the three runs or if it was per run. We have run another run once the plant was back to normal operations, so we should be OK! We have completed ALL of the anticipated testing within the test plan. We will submit the report in a timely fashion and we can follow-up once you have a chance to review that. Thank you for your patience as we worked through our schedule upsets.

Cheers,
Jaime

PLEASE NOTE MY NEW PHONE NUMBER
218-305-3337

PLEASE NOTE MY NEW EMAIL ADDRESS: Jaime.Johnson@arcelormittal.com

Jaime L. Johnson
Process Manager - Environmental

ArcelorMittal Minorca Mine Inc.
5950 Old U.S. Highway 53 | Virginia, MN 55792
T +1 218 305 3337 | F +1 218 749 5256
www.arcelormittal.com

"Wrinkles only go where the smiles have been" – Jimmy Buffett

"Happiness cannot be traveled to, owned, earned, worn, or consumed. Happiness is a spiritual experience of living every minute with love, grace, and gratitude" - Dennis Waitley

David A. Herbst

From: Strzok, Ladislaus (MPCA) <Ladislaus.Strzok@state.mn.us>
Sent: Thursday, June 25, 2015 2:01 PM
To: Johnson, Jaime; Tom Kuchinski; Benjamin A. Wiltse
Subject: RE: Stack Testing Minorca Mine

Jaime,

Thank you for the update.

Lad Strzok
Air Compliance Unit
Phone: 651-757-2295



Minnesota Pollution Control Agency

From: Johnson, Jaime [mailto:Jaime.Johnson@arcelormittal.com]
Sent: Thursday, June 25, 2015 1:59 PM
To: Strzok, Ladislaus (MPCA); Tom Kuchinski; Benjamin A. Wiltse; Johnson, Jaime
Subject: Stack Testing Minorca Mine

Lad,

Good afternoon! I wanted to keep you up to date in regards to the stack testing occurring at Minorca Mine. I've attached the initial schedule below. Per my voice message earlier in the week we actually tested stack A & C for two runs on Tuesday 23rd of June and finalized the third run on Wednesday morning 24th June. Due to some issues on Wednesday we did not run any tests for stacks B & D. Starting on Thursday 25 June we have two runs completed on stacks B & D and anticipate getting the last run in completed today as well. We are discussing with Barr how to handle the remaining IPER and Opacity testing per the schedule. If you have any questions please feel free to contact me by telephone at 218-305-3337.

Monday 6/22/2015	Tuesday 6/23/2015	Wednesday 6/24/2015	Thursday 6/25/2015	Friday 6/26/2015	Saturday 6/27/2015
Travel 0600-1000 Set-Up 1000-1600	Test Furnace Stack A & C 0630-1930 Testing for: MACT NOx MERCURY	Test Furnace Stack B & D 0630-1930 Testing for: MACT NOx MERCURY	Test Furnace Stack A & C 0630-1930 Testing for: IPER Opacity	Test Furnace Stack B & D 0630-1930 Testing for: IPER Opacity	Demobilization 0630-0900

MACT – Three 2-hour test runs per stack

Cheers
Jaime

PLEASE NOTE MY NEW PHONE NUMBER
218-305-3337

PLEASE NOTE MY NEW EMAIL ADDRESS: Jaime.Johnson@arcelormittal.com

David A. Herbst

From: Strzok, Ladislaus (MPCA) <Ladislaus.Strzok@state.mn.us>
Sent: Tuesday, June 23, 2015 3:25 PM
To: Johnson, Jaime; Tom Kuchinski; Benjamin A. Wiltse
Subject: RE: Minorca Mine Stack Test - NEED RESPONSE ASAP

Jaime,

Please proceed with your adjusted testing schedule, compliance will be determined from the average of 3 runs conducted across the 2 day period of 6/23-24/15 . Regards,

Lad Strzok
Air Compliance Unit
Phone: 651-757-2295



Minnesota Pollution Control Agency

From: Johnson, Jaime [mailto:Jaime.Johnson@arcelormittal.com]
Sent: Tuesday, June 23, 2015 2:34 PM
To: Strzok, Ladislaus (MPCA); Tom Kuchinski; Benjamin A. Wiltse
Cc: Johnson, Jaime
Subject: Minorca Mine Stack Test - NEED RESPONSE ASAP

Lad,

Good afternoon Lad. I have left you a voice message as well. We have run into some issues with our finished pellet scale today which has not allowed us to get a test completed. Our instrumentation shop is currently looking at the scale to identify if there are any issues. We are hoping to have and system back up and running between 2:30-3:00pm. With that being said, we're wondering if running one run today and complete the remaining two runs tomorrow morning.

What do you think?

Jaime

PLEASE NOTE MY NEW PHONE NUMBER
218-305-3337

PLEASE NOTE MY NEW EMAIL ADDRESS: Jaime.Johnson@arcelormittal.com

Jaime L. Johnson
Process Manager - Environmental

ArcelorMittal Minorca Mine Inc.
5950 Old U.S. Highway 53 | Virginia, MN 55792
T +1 218 305 3337 | F +1 218 749 5256
www.arcelormittal.com

"Wrinkles only go where the smiles have been" – Jimmy Buffett

David A. Herbst

From: Strzok, Ladislaus (MPCA) <Ladislaus.Strzok@state.mn.us>
Sent: Thursday, June 18, 2015 9:16 AM
To: 'Johnson, Jaime'
Cc: Tom Kuchinski; Benjamin A. Wiltse
Subject: RE: ArcelorMittal Stack Test Plan - June 2015
Attachments: ArcelorMittal June 2015 TPAL (updated).pdf

Hi Jaime & Tom,

Correct, at this time the MPCA does not require that audit samples be collected. The MPCA grants waivers on a test by test basis, thank you for reminding me to include this within the approval letter. Please find the attached (updated) TPAL including approval of your request as item No 2. Regards,

Lad Strzok
Air Compliance Unit, Industrial Division
Minnesota Pollution Control Agency (MPCA)
651-757-2295

From: Johnson, Jaime [mailto:Jaime.Johnson@arcelormittal.com]
Sent: Wednesday, June 17, 2015 3:46 PM
To: Strzok, Ladislaus (MPCA)
Cc: Tom Kuchinski; Benjamin A. Wiltse; Johnson, Jaime
Subject: FW: ArcelorMittal Stack Test Plan - June 2015
Importance: High

Lad,

Have you had the opportunity to look at this email below?? Any thoughts?

Jaime

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David A. Herbst

From: Strzok, Ladislaus (MPCA) <Ladislaus.Strzok@state.mn.us>
Sent: Thursday, June 04, 2015 10:49 AM
To: Johnson, Jaime
Cc: Benjamin A. Wiltse; Tom Kuchinski
Subject: TPAL: ArcelorMittal Stack Test Plan - June 2015
Attachments: ArcelorMittal June 2015 TPAL.pdf; Certifications Form.doc; Microfiche or CD-ROM Submittal Form.doc; Operating Data Summary - Combustion Sources.doc; Performance Test Report Completeness Criteria.doc

Hi Jamie,

Please read over the approval letter and let me know if there are any questions. Please include a copy within the final test report. Regards,

Lad Strzok
Air Compliance Unit
Phone: 651-757-2295



Minnesota Pollution Control Agency

From: Johnson, Jaime [mailto:Jaime.Johnson@arcelormittal.com]
Sent: Monday, June 01, 2015 1:12 PM
To: Strzok, Ladislaus (MPCA); Benjamin A. Wiltse
Cc: Johnson, Jaime; Tom Kuchinski
Subject: RE: ArcelorMittal Stack Test Plan - June 2015

Lad,

Thank you for your voice message in regards to the testing scheduled at Minorca Mine the week of 22nd June. Per your message you do not anticipate the need for a pre-test call, is that correct? It sounded like from your phone message that the test plan looked straight forward and that you don't have any questions or concerns. As you stated on the call, I'll expect to see the approval letter by the beginning of this week. Thank you again for following up! I look forward to receiving the approval letter. I will ask Barr if they have any questions that they have, and if so we can have a call otherwise I'll wait for the approval letter and I will keep you updated when testing occurs.

Cheers,
Jaime

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**Minnesota Pollution
Control Agency**

520 Lafayette Road
St. Paul, MN 55155-4194

Air Performance Test Form
Performance Test Plan Approval

Facility Information (please print)

Facility name: ArcelorMittal Minorca Mine Inc (Permit No. 13700062-003) AQ#: 257
Facility contact: Jamie Johnson, Environmental Engineer
Address: 5950 Old Highway 53 N (PO Box 1)
Phone: 218-305-3337
Unit(s) to be tested: Emissions testing of (EU 026): SV 014 and SV015, SV016, and SV017 for Filterable Particulate Matter (MACT) by M5, Total Particulate Matter by M5/202, Metals (Hg) by M29, NOx by M7E and Opacity by M9
Scheduled for: Week of June 22nd, 2015 at your facility located in: Virginia, Minnesota.

Test Plan

Submitted on (date): April 17, 2015 Discussed on (date): May 28, 2015

Your test plan has been approved by the Minnesota Pollution Control Agency (MPCA) as follows:

- ☐ Shortened test notification approved
☐ Test plan approved without modification
☒ Test plan approved with the following provisions:
1. Operate units at worst case conditions/typical operating rates, testing is not intended to reset current operating rates.
 2. The MPCA has waived the requirement to collect audit samples during the testing event.
 3. All periods indicating noncompliance with emission limits must be reported to the MPCA. This includes any periods of engineering tests. Operating at a rate other than that required by the current air permit must also be reported. Deviations ultimately need to be reported on the facility's semiannual deviation and annual compliance certification forms.
 4. Electronic submittal of the test report will be considered acceptable as allowed by the letter from the MPCA dated March 3, 2010. In addition to the information relating to the test required by the letter also please include the emission unit(s) tested and the test date(s) as part of the notification email.
 5. If a CD is submitted label should include: Facility Name, AQ File No., Emission Unit Designator, and Test Date.

Attached Forms

- | | |
|---|--|
| <input checked="" type="checkbox"/> Operating Data Summary – Combustion Sources | <input type="checkbox"/> Operating Data Summary – Waste Combustors |
| <input type="checkbox"/> Operating Data Summary – Process Sources | <input type="checkbox"/> Operating Data Summary – Asphalt Plants |
| <input checked="" type="checkbox"/> Certifications Form | <input checked="" type="checkbox"/> Microfiche/CD-ROM Submittal Form |
| <input checked="" type="checkbox"/> Performance Test Report Completeness Criteria | |

Note: Forms are also available at www.pca.state.mn.us/air/performancetest.html

Approved by:



Lad Strzok, Pollution Control Specialist
Compliance and Enforcement Unit
Minnesota Pollution Control Agency

Date: May 28, 2015 (updated 6/18/15)

Please contact me at 651-757-2295 if you have any questions regarding this approval.

Please be aware that enforcement action will be taken for performance test failures indicating emissions above applicable limits (excess actual emissions to the environment). Failures commonly result in assessment of a monetary penalty. Upon the first test failure, the Company should take immediate measures to minimize emissions. The measures taken should be documented, as they will become part of the record of corrective actions.

Hard Copy Performance Test Reports and Microfiche or CD Copy submittals will be addressed to:

Air Quality Compliance Tracking Coordinator
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

cc: Benjamin Wiltse, Barr (email)

Steven Palzkill, MPCA (email)

From: Johnson, Jaime
Sent: Friday, April 17, 2015 9:38 AM
To: Strzok, Ladislaus (MPCA)
Cc: jaime.johnson@arcelormittal.com; 'Benjamin A. Wiltse'
Subject: ArcelorMittal Stack Test Plan - June 2015

Lad,

Please find attached the Test Plan for ArcelorMittal Minorca Mine. We're planning to conduct testing in June 2015 MACT, mercury, IPER, and NOx. If you have any question please let me know. I would like to have a pre-test conference call the week of 16 June 2015.

Also, can you please confirm whether I need to submit this test plan to Air Quality Compliance Tracking Coordinator, or if to you is acceptable.

Cheers,
Jaime

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Jaime L. Johnson
Environmental Engineer

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Note: The information contained in this electronic mail transmission is intended for the use of the named individual or entity to which it is addressed and may contain information that is privileged or otherwise confidential. It is not intended for transmission to, or receipt by, any individual or entity other than the named addressee (or a person authorized to deliver it to the named addressee) except as otherwise expressly permitted in this electronic mail transmission. If you have received this electronic transmission in error, please delete it without copying or forwarding it, and notify the sender of the error by reply email to Jaime.johnson@arcelormittal.com. Thank you.

**Test Plan
for Determination of Particulate Matter, Nitrogen Oxides, and Mercury Emissions
Taconite Indurating Emissions Sources**

PART I: General Information

Emissions facility location	Facility contact	Testing company contact
ArcelorMittal Minorca Mine Inc. 5950 Old Highway 53 P.O. Box 1 Virginia, MN 55792	Jaime Johnson Environmental Engineer ArcelorMittal Minorca Mine Inc. P.O. Box 1 Virginia, MN 55792	Ben Wiltse Air Quality Technician Barr Engineering Company 4700 West 77 th Street Minneapolis, MN 55435

Minnesota Air Emissions Permit Number: 13700062-003 (issued March 18, 2011)
AQD File Number: 257

Proposed Testing Dates: June 23-26, 2015

Date Test Plan Created/Version: April 1, 2015 / Version 1

Reason emissions units are to be tested:

The emissions units, identified in the table below, will be tested to satisfy the testing requirements of the facility air emissions permit, Taconite MACT, and the Industrial Process Equipment Rules (IPER). This test is not intended to reset MACT control equipment operating parameters. Testing will also be performed to satisfy the MN Mercury Rule initial testing requirement.

The table also provides the emissions units' plant nomenclature, plant locations and permit identifications. Stack drawings showing stack dimensions and test port orientation and locations relative to airflow disturbances are attached.

Process unit nomenclature	Minorca ID	Emissions unit number	Stack vent number	Permit group number	Emissions unit location
A indurating furnace	108DC01	EU026	SV014	--	Bldg. 007 Pellet Plant
B indurating furnace	108DC02	EU026	SV015		
C indurating furnace	108DC03	EU026	SV016		
D indurating furnace	108DC04	EU026	SV017		

PART II: Testing Requirements

The following table identifies pollutants to be determined; all units represented by the MACT group to be tested, applicable emissions limit and units, and associated regulation for each emissions unit and stack vent.

Process unit nomenclature	Stack vent number	Minorca ID	Pollutant	Emissions Limit	Rule or Regulation
Indurating Furnace Stack A Stack B Stack C Stack D	SV014 SV015 SV016 SV017	108DC01 108DC02 108DC03 108DC04	FPM	0.01 gr/dscf airflow-weighted average for the four stack vents*	40 CFR Section 63.9590(a) Table 1; 40 CFR Section 63.9634(c)(1) Three 2-hour runs per stack
			TPM (MN Industrial Process Rule)	Limit will be determined by the less stringent of Minn. R. 7011.0730 Table 1 or Table 2	Minn. R. 7011.0610, subp. 1(A)(1) and 7011.0715, subp. 1(A) Three 1-hour runs per stack
			NO _x	1088 lbs/hr Combined emission rate from four stack vents	40 CFR pt. 52.21 BACT Minn. R. 7011.0610, subp. 1A(2) Three 1-hour runs per stack
			VE	20% opacity, except for one 6-minute period in any one hour period up to 60%	Minn. R. 7011.0610, subp. 1A(2) One 1-hour test run observing all four stack simultaneously
Indurating Furnace Stack A Stack B Stack C Stack D	SV014 SV015 SV016 SV017	108DC01 108DC02 108DC03 108DC04	Hg	NA	MN Mercury Rule Minn. R. 7019.3050 Three 2-hour runs per stack

Notes:

Stacks A and C will be tested simultaneously for FPM (MACT) and mercury. NO_x concentrations will be determined during the first three hours of MACT run time at stack A then the final 3 hours at Stack C. Sequence repeated for Stacks B and D. Following these tests, Stacks A and C will be tested simultaneously for TPM (IPER) and opacity. Sequence repeated for Stacks B and D. See schedule in Part VI.

Opacity determination will be made at the point where all four stack plumes meet.

Mercury testing is being performed to satisfy the Minnesota Mercury Rule. There is no specific emissions limit.

*Flow Weighted Average will be calculated using the following equation:

$$C_b = (\text{Summation of } (C_j * Q_i)) / (\text{Summation } Q_i); \text{ where } i=1$$

Where:

C_b = flow weighted mean concentration for all stacks from the source (gr/dscf)

C_j = average concentration during the performance test for stack "j" (gr/dscf)

Q_j = average volumetric flow rate of stack gas measured during the performance test (dscf/min)

n = number of stacks for the indurating furnace.

Part III: Operating Conditions

The following table provides the process operating rate and range during testing, emissions control equipment ID, control equipment type, and expected control parameter values during testing. During MACT testing, pressure drop and water flow will be reduced to the lower limit. It is not anticipated that this will affect the mercury emissions that will be tested simultaneous with the MACT testing.

Process unit nomenclature	Stack vent number <i>Control equipment ID</i>	Fired Pellet production rate Long tons per hour	Process operating rate range Long tons per shift	Control equipment type and <i>Manufacturer /Model</i>	Operating parameters and range Recorded as required by MACT*
Indurating furnace EU026 A, B, C and D stacks	SV014 CE014 SV015 CE015 SV016 CE016 SV017 CE017	Greater than 340	Max 4,053	Venturi scrubber <i>Environeering A33</i>	Pressure drop (in. w.c.) and water flow rate (gpm) —

*control device parametric values will be recorded for all sources during all testing.

Part IV: Test Methods

All tests will be performed using the following USEPA reference test methods.

Pollutant	Test Method ¹	
Filterable Particulate Matter (FPM)	Method 1	Sample and Velocity Traverses for Stationary Sources
	Method 2	Determination of Stack Gas Velocity and Volumetric Flow Rate
	Method 3 or 3A	Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources
	Method 4	Determination of Moisture Content in Stack Gases-in conjunction with EPA Method 5
	Method 5	Determination of Particulate Matter Emissions from Stationary Sources—filterable particulate (PM). The alternative post-test calibration procedure in EPA Method 5 will be used. Three 2-hour test runs per stack vent for MACT testing. Three 1-hour test runs per stack vent for IPER testing.
NO _x	Method 7E	Determination of Nitrogen Oxides Emissions (Instrumental Analyzer Procedure). Three one-hour runs per stack vent. Independent airflow measurements will be made coinciding with the 1 hour NO _x runs. Moisture data used to calculate dry standard airflow rates will be taken from corresponding particulate run.
Opacity	Method 9	Visual Determination of the Opacity of Emissions from Stationary Sources
Mercury	Method 29	Determination of Metals Emissions from Stationary Sources Three 2-hour test runs per stack vent tested simultaneously with Method 5 for MACT.
Total Particulate Matter (TPM)	Method 202	Dry Impinger Method for Determining Condensable Particulate Emissions from Stationary Sources Three 1-hour test runs per stack vent for IPER testing.

¹ Test methods can be found in 40 CFR 60 Appendix A and 40 CFR 51 Appendix M.

Part V: Continuous Emissions Monitors

There are no continuous emissions monitors currently installed on the sources to be tested.

Mr. Lad Strzok
August 6, 2015

Part VI: Other

Test Dates: June 22-26, 2015.

Monday 6/22/2015	Tuesday 6/23/2015	Wednesday 6/24/2015	Thursday 6/25/2015	Friday 6/26/2015	Saturday 6/27/2015
Travel 0600-1000 Set-Up 1000-1600	Test Furnace Stacks A and C (SV014 and SV016) using methods 5/29 and 7E 0630-1930	Test Furnace Stacks B and D (SV015 and SV017) using methods 5/29 and 7E 0630-1930	Test Furnace Stacks A and C (SV014 and SV016) using methods 5/202 and 9 0630-1930	Test Furnace Stacks B and D (SV015 and SV017) using methods 5/202 and 9 0630-1930	Demobilization 0630-0900 Travel 0900-1300

Pretest Meeting: ArcelorMittal and Barr Engineering contacts will make themselves available for a pretest meeting prior to June 16, 2015. At the preference of the MPCA, ArcelorMittal suggests the pretest meeting be conducted by telephone.

Maintenance: No major rehabilitation or cleaning before the test other than normal routine maintenance operations done on a routine basis will be conducted within 30 days prior to the test. A description of any necessary work done within 30 days prior to the test and the normal maintenance schedule followed will be included in the test report.

Test Reports: One complete PDF copy of the test report will be submitted on or before 45 calendar days after the date of the last test. Hard copies will be sent following the PDF submittal.

Test plans and report submittals will be addressed to:

Lad Strzok
Pollution Control Specialist
Land and Air Compliance Section
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-4194
Ladislaus.Strzok@state.mn.us

Closing Remarks

If there are questions or comments about the information provided, please contact me by telephone or e-mail.

Jaime Johnson
Process Manager - Environmental
ArcelorMittal Minorca Mine

Attachments:
Figures 1 & 2

c. Ben Wiltse – Barr Engineering

Appendix I

Project Participants and Contact Information

Project Participants and Contact Information

Minnesota Pollution Control Agency

Lad Strzok – Pollution Control Specialist

ArcelorMittal Minorca Mine Inc.

Jaime Johnson – Process Manager – Environmental

Barr Engineering Company

Tim Russell – Vice President/Chemical Engineer

Tom Kuchinski – Supervisor/Senior Air Quality Technician

Ben Wiltse – Air Quality Technician/Project Manager

Mike Norstrem – Air Quality Technician

Ryan Pantzke – Air Quality Technician

John Rooney – Air Quality Technician

Richard Skibsted – Air Quality Technician

CONTACT INFORMATION

MPCA	ArcelorMittal Minorca Mine Inc.	Barr Engineering Co.
Lad Strzok Pollution Control Specialist Land and Air Compliance Section—Industrial Division 520 Lafayette Rd. N. Saint Paul, Minnesota 55155 (651) 757-2295 Ladislaus.Strzok@state.mn.us	Jaime Johnson Process Manager-Environmental 5950 Old U.S. Highway 53 Virginia, MN 55792 (218) 749-5910 x283 (218) 749-5256 Jaime.Johnson@arcelormittal.com	Ben Wiltse Air Quality Technician 4700 W. 77 Street Minneapolis, MN 55435 (952) 832-2727 (952) 832-2601 bwiltse@barr.com