Coke Oven Information Collection Request Test Report

ArcelorMittal Burns Harbor, LLC
Coke Battery #2 Underfire Stack
Burns Harbor, Indiana
Project No. M162810B
September 7 through 15, 2016

mostardi platt

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Project No. M162810B

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1.0 EXECUTIVE SUMMARY

MOSTARDI PLATT conducted an Information Collection Request (ICR) emissions test program for ArcelorMittal Burns Harbor, LLC on the Coke Battery #2 Underfire Stack on September 7 through 15, 2016 at the ArcelorMittal Burns Harbor, LLC facility in Burns Harbor, Indiana. This report summarizes the results of the test program and test methods used.

The test sets, test dates, and test parameters are summarized below.

TEST INFORMATION			
Test Sets	**Test Dates**	**Test Methods**	**Test Parameter**
1, 2, and 3	9/7-13/16	USEPA Method 3A	Oxygen (O_2) and Carbon Dioxide (CO_2)
1	9/14-15/16	USEPA Methods 5 and 29	Filterable Particulate Matter (FPM), Total Suspended Metals (TSM) including Antimony (Sb), Arsenic (As), Beryllium (Be), Cadmium (Cd), Total Chromium (Cr), Cobalt (Co), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni), and Selenium (Se)
	9/14-15/16	USEPA Methods 201A and 202	Particulate Matter Less Than 2.5 Microns ($PM_{2.5}$), Condensable Particulate Matter (CPM), and Total Particulate Matter (TPM)
1	9/14-15/16	USEPA Method 10	Carbon Monoxide (CO)
2	9/7-8/16	USEPA Method 16	Hydrogen Sulfide (H_2S)
	9/7-8/16	USEPA SW 846 Method 0031	Volatile Organic Hazardous Air Pollutants (VOHAP) including Acrylonitrile, Benzene, Bromoform, Bromomethane, Carbon Disulfide, Carbon Tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Chloromethane, 1,2-Dichloroethane, 1,1 -Dichloroethane, 1,2-Dichloropropane, Ethylbenzene, Iodomethane, Methylene Chloride, Styrene, 1,1,2,2-Tetrachloroethane, Tetrachloroethane, Toluene, 1,1,1-Trichloroethane, 1,1,2 Trichloroethane, Trichloroethane, Vinyl Chloride, and mp-Xylene, and o-Xylene
	9/7-8/16	USEPA Method 6C	Sulfur Dioxide (SO_2)
	9/7-8/16	USEPA Method 316	Formaldehyde (HCHO)
	9/7-8/16	USEPA Method 320	Hydrogen Chloride (HCl), Hydrogen Fluoride (HF), Hydrogen Cyanide (HCN)
3	9/12-13/16	USEPA SW 846 Method 0010 and USEPA Method 23 combined	Dioxin/Furan (D/F) and Semi-Volatile Organic Compounds (SVOC) including Acenaphthene, Acenaphthylene, Anthracene, Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene, Perylene, and Pyrene
	9/12-13/16	USEPA Method 315	Toluene Soluble Organics (TSO)

The purpose of the test program was to determine emissions during normal operating conditions in order to satisfy the Section 114 ICR letter.

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Selected results of the test program are summarized below. A complete summary of emission test results follows the narrative portion of this report.

TEST RESULTS				
Test Set	**Test Method**	**Test Parameter**	**Emission Rates**	
1	USEPA Method 5/29	FPM	1.15E+02 mg/dscm	4.17E+01 lb/hr
		Sb	≤ 1.43E-03 mg/dscm	≤ 5.15E-04 lb/hr
		As	≤ 4.21E-03 mg/dscm	≤ 1.51E-03 lb/hr
		Be	≤ 3.58E-04 mg/dscm	≤ 1.29E-04 lb/hr
		Cd	≤ 3.58E-04 mg/dscm	≤ 1.29E-04 lb/hr
		Cr	2.49E-01 mg/dscm	8.96E-02 lb/hr
		Co	1.69E-03 mg/dscm	6.00E-04 lb/hr
		Pb	4.37E-03 mg/dscm	1.57E-03 lb/hr
		Mn	2.15E-02 mg/dscm	7.73E-03 lb/hr
		Hg	≤ 1.14E-02 mg/dscm	≤ 4.10E-03 lb/hr
		Ni	1.27E-01 mg/dscm	4.59E-02 lb/hr
		Se	≤ 4.02E-03 mg/dscm	≤ 1.43E-03 lb/hr
	USEPA Method 201A/202	$PM_{2.5}$	1.02E+02 mg/dscm	3.72E+01 lb/hr
		CPM	8.88E+01 mg/dscm	3.25E+01 lb/hr
		TPM	1.04E+02 mg/dscm	3.80E+01 lb/hr
	USEPA Method 3A	CO_2	6.1 %	
		O_2	8.8 %	
	USEPA Method 10	CO	44.2 ppmvd	1.85E+01 lb/hr

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TEST RESULTS				
Test Set	**Test Method**	**Test Parameter**	**Emission Rates**	
2	USEPA Method 16	H_2S	≤ 7.50E-01 ppmvd	≤ 4.87E-01 lb/hr
	SW 846 Method 0031	Acrylonitrile	≤ 3.95 E-05 mg/dscm	≤ 1.25E-02 lb/hr
		Benzene	≤ 3.57E-04 mg/dscm	≤ 1.32E-01 lb/hr
		Bromoform	≤ 3.23E-06 mg/dscm	≤ 1.20E-03 lb/hr
		Bromomethane	≤ 2.37E-05 mg/dscm	≤ 8.77E-03 lb/hr
		Carbon Disulfide	≤ 8.00E-05 mg/dscm	≤ 2.96E-02 lb/hr
		Carbon Tetrachloride	≤ 3.96E-06 mg/dscm	≤ 1.47E-03 lb/hr
		Chlorobenzene	≤ 3.73E-06 mg/dscm	≤ 1.38E-03 lb/hr
		Chloroethane	≤ 6.86E-06 mg/dscm	≤ 2.54E-03 lb/hr
		Chloroform	≤ 3.09E-06 mg/dscm	≤ 1.14E-03 lb/hr
		Chloromethane	≤ 1.73E-05 mg/dscm	≤ 6.41E-03 lb/hr
		1,2-Dichloroethane	≤ 3.55E-06 mg/dscm	≤ 1.31E-03 lb/hr
		1,1–Dichloroethylene	≤ 3.73 E-06 mg/dscm	≤ 1.38E-03 lb/hr
		1,2-Dichloropropane	≤ 3.73E-06 mg/dscm	≤ 1.38E-03 lb/hr
		Ethylbenzene	≤ 8.06E-06 mg/dscm	≤ 2.98E-03 lb/hr
		Iodomethane	≤ 4.59E-06 mg/dscm	≤ 1.70E-03 lb/hr
		Methylene Chloride*	See Data Quality Reference	See Data Quality Reference
		Styrene	2.07E-05 mg/dscm	7.66E-03 lb/hr
		Tetrachloroethylene	≤ 4.12E-06 mg/dscm	≤ 1.53E-03 lb/hr
		Toluene	≤ 1.12E-04 mg/dscm	≤ 4.15E-02 lb/hr
	SW 846 Method 0031	1,1,1-Trichloroethane	≤ 3.87E-06 mg/dscm	≤ 1.43E-03 lb/hr
		1,1,2 Trichloroethane	≤ 3.96E-06 mg/dscm	≤ 1.47E-03 lb/hr
		Trichloroethylene	≤ 3.73E-06 mg/dscm	≤ 1.38E-03 lb/hr
		1,1,2,2-Tetrachloroethane	≤ 6.86E-06 mg/dscm	≤ 2.54E-03 lb/hr
		Vinyl Chloride	≤ 3.18E-06 mg/dscm	≤ 1.18E-03 lb/hr
		m/p - Xylene	5.44E-05 mg/dscm	2.01E-02 lb/hr
		o - Xylene	1.42E-05 mg/dscm	5.27E-03 lb/hr
	USEPA Method 316	HCHO	≤ 1.00E-02 mg/dscm	≤ 2.97E-03 lb/hr
	USEPA Method 3A	CO_2	6.3 %	
		O_2	8.5 %	
	USEPA Method 6C	SO_2	552.7 ppmvd	5.52E+02 lb/hr
	USEPA Method 320	HCl	5.20E+00 mg/dscm	1.95E+00 lb/hr
		HF	3.39E-01 mg/dscm	1.27E-01 lb/hr
		HCN	8.25E-01 mg/dscm	3.10E-01 lb/hr

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TEST RESULTS				
Test Set	**Test Method**	**Test Parameter**	**Emission Rates**	
3	USEPA SW 846 Method 0010 and USEPA Method 23 combined	D/F	≤ 2.38E-04 ug/dscm	≤ 2.32E-09 lb/hr
		Acenaphthene	≤ 1.14E-05 ug/dscm	≤ 4.15E-04 lb/hr
		Acenaphthylene	4.69E-01 ug/dscm	1.72E-03 lb/hr
		Anthracene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Benz(a)anthracene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Benzo(a)pyrene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Benzo(b)fluoranthene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Benzo(g,h,i)perylene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Benzo(k)fluoranthene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Chrysene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Dibenz(a,h)anthracene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Fluoranthene	2.80E+00 ug/dscm	1.02E-03 lb/hr
		Fluorene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Indeno(1,2,3-cd)pyrene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Naphthalene	1.07E+02 ug/dscm	3.92E-02 lb/hr
		Phenanthrene	5.83E+00 ug/dscm	2.13E-03 lb/hr
		Perylene	≤ 1.14E-02 ug/dscm	≤ 4.15E-04 lb/hr
		Pyrene	≤ 2.67E+00 ug/dscm	≤ 9.67E-04 lb/hr
	Modified USEPA Method 315	TSO**	See Data Quality Reference	See Data Quality Reference
	USEPA Method 3A	CO_2	6.4 %	
	USEPA Method 3A	O_2	8.4 %	

*SW 846 Method 0031 Data Quality Reference: Methylene chloride ($MeCl_2$) results for all condensate samples were much higher than anticipated. It is believed that cross contamination occurred between the Method 23/0010 $MeCl_2$ samples and the Method 0031 condensate samples as these samples were transported to Maxxam Analytics, Inc. in the same batch. In addition, the methylene chloride which was used in the field recovery of Method 23/0010, was in close proximity to where the Method 0031 condensate samples were recovered. Consequently, the Method 0031 condensate data is not representative of actual emissions from the source

**Modified USEPA Method 315 Data Quality Reference: The reported Modified Method 315 (TSO) results in Section 3.0 do not fully account for the magnitude of the documented blank contamination value. Please see Section 2.0 and Maxxam Analytics' Modified Method 315 (TSO) White Paper dated March 10, 2017 found in Appendix A that states, "The toluene filter extractable blank 90% upper confidence interval of 11.18 mg of residue is 43 times the Method 315 acceptable methylene chloride blank value of 0.26 mg of residue. This suggests the use of toluene extraction solvent to be the cause of the high bias residue results."

"The toluene laboratory processed blank of 8.5 mg of residue is more than 17 times the methylene chloride laboratory processed blank of ≤0.5 mg of residue. This again, would suggest the use of the toluene extraction solvent to be the cause of the high bias residue results."

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The Stationary Source Audit Sample Program audit samples were obtained from ERA and submitted to Maxxam Analytical. The results of the audit samples were compared to the assigned value by ERA and found to be acceptable. The audit sample results and evaluation are appended to this report.

The identifications of individuals associated with the test program are summarized below.

TEST PERSONNEL INFORMATION		
Location	**Address**	**Contact**
Test Facility	ArcelorMittal Burns Harbor, LLC 250 West U.S. Highway 12 Burns Harbor, Indiana 46304	Mr. Jeff May Sr. Environmental Engineer (219) 787-4964 (phone)
Testing Company Representative	Mostardi Platt 888 Industrial Drive Elmhurst, Illinois 60126	Mr. Stuart L. Burton Senior Project Manager (630) 993-2100 (phone) sburton@mp-mail.com

The test crew consisted of Messrs. C. Trezak, B. Marlow, B. Garcia, B. Hendricks, C. Eldridge, D. Dixon, J. Aksamitowski, and S. Burton of Mostardi Platt.

2.0 TEST METHODOLOGY

Emission testing was conducted following the methods specified in 40 CFR, Part 60, Appendix A, 40 CFR, Part 51, Appendix M, 40 CFR, Part 63, Appendix A, and USEPA SW 846. Schematics of the test section diagram and sampling trains used are included in Appendix B and C, respectively. Calculation nomenclature and example calculations are found in Appendix D. Sample analysis data are included in Appendix E. Copies of reference method test data and field data sheets for each test run are included in Appendix F and G, respectively.

The following methodologies were used during the test program:

Method 1 Traverse Point Determination

Test measurement points were selected in accordance with Method 1. The characteristics of the measurement locations are summarized below.

TEST POINT INFORMATION						
Location	**Stack Diameter**	**Stack Area**	**Upstream Diameters**	**Downstream Diameters**	**Test Parameter**	**Number of Sampling Points**
Coke Battery #2 Underfire Stack	14.5 Feet	165.13 Square Feet	>0.5	>2.0	FPM, TPM, TSP, HCHO, D/F, SVOCS, TSO	24

An absence of cyclonic flow test was performed and the test location met the less than 20 degree requirement. The absence of cyclonic flow test is found in Appendix F. A single point was used for VOHAP, HCl, HF, HCN, and H_2S sampling.

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Gaseous Sampling

Stack CO_2, O_2, CO, and SO_2 were sampled using three points. The points were located 17%, 50%, and 83% of the stack diameter.

Method 2 Volumetric Flowrate Determination

Gas velocity was measured in accordance with Method 2, for purposes of calculating stack gas volumetric flow rate and emission rates on a lb/hr basis. An S-type pitot tube, differential pressure gauge, thermocouple and temperature readout were used to determine gas velocity at each sample point. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

Method 3A Oxygen (O_2)/Carbon Dioxide (CO_2) Determination

Stack gas molecular weight was determined in accordance with Method 3A. A Servomex analyzer was used to determine stack gas oxygen and carbon dioxide content and, by difference, nitrogen content. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H. Gas cylinder certifications are included in Appendix I.

Method 5 Filterable Particulate Matter Determination

Stack gas filterable particulate matter concentrations and emission rates were determined in accordance with Method 5. An Environmental Supply Company, Inc. sampling train was used to sample stack gas at an isokinetic rate, as specified in the Method. Particulate matter in the sample probe was recovered using an acetone wash. The probe wash and filter catch were analyzed by Mostardi Platt personnel in accordance with Method 5. Laboratory analysis data are found in Appendix E. Calibration data are presented in Appendix H.

Method 6C Sulfur Dioxide (SO_2) Determination

Stack gas sulfur dioxide concentrations and emission rates were determined in accordance with USEPA Method 6C, 40CFR60, Appendix A. A Thermo Scientific sulfur dioxide analyzer was used to determine sulfur dioxide concentrations, in the manner specified in the Method.

Stack gas was delivered to the analyzer via a Teflon® sampling line, heated to a minimum temperature of 250ºF. Excess moisture in the stack gas was removed using a refrigerated condenser. The entire system was calibrated in accordance with the Method, using certified calibration gases introduced at the probe, before and after each test run.

Calibration data are presented in Appendix H. Copies of the gas cylinder certifications are found in Appendix I.

Method 10 Carbon Monoxide (CO) Determination

Stack gas carbon monoxide concentrations and emission rates were determined in accordance with USEPA Method 10, 40CFR60, Appendix A. A Thermo Scientific carbon monoxide analyzer was used to determine carbon monoxide concentrations, in the manner specified in the Method.

Stack gas was delivered to the analyzer via a Teflon® sampling line, heated to a minimum temperature of 250ºF. Excess moisture in the stack gas was removed using a refrigerated condenser. The entire system was calibrated in accordance with the Method, using certified calibration gases introduced at the probe, before and after each test run.

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Calibration data are presented in Appendix H. Copies of the gas cylinder certifications are found in Appendix I.

Method 16 Hydrogen Sulfide (H_2S) Determination

Stack gas H_2S emissions were determined in accordance with Method 16. An in line SRI Instruments Model 8610C Gas Chromatograph was used to sample stack gas, in the manner specified in the Method. Analyses of the samples collected were conducted by Mostardi Platt. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H. Copies of the gas cylinder certifications are found in Appendix I.

Method 0010 Semi-Volatile Organics Determination and Method 23 Dioxin and Furan Determination

The SW-846-0010 sample train is a comprehensive sampling system based upon the design of units normally employed for sampling under Method 5, 40CFR60. The modified system consisted of a glass-lined probe, a high-efficiency glass fiber filter stage, a sorbent module, and four impingers. The XAD Resin sorbent module, one of the modifications to the basic system, permits trapping of volatile organic vapors, was mounted vertically atop the first impinger of the train. This impinger was empty and was used to collect the condensate that percolates through the sorbent resin module. Stack gas dioxin and furan concentrations and emission rates were determined in accordance with Method 23, 40 CFR, Part 60, Appendix A in conjunction with the USEPA SW 846 Method 0010 sampling train. A diagram of this system is appended.

The glass-lined probe was wrapped with heating wire and a stainless steel jacket and heated to a gas temperature of 250°F ± 25°F. The filter holder was equipped with a very coarse, fritted glass filter support and a tared glass fiber filter. The filter medium was a Pall Corporation type A/E glass microfibre filters exhibiting a ≥ 99.98% efficiency on 0.3 micron DOP smoke particles. The filter holder was contained in an electrically heated box, thermostatically maintained at a temperature of 250°F ± 25°F, which is sufficient to prevent water condensation in this portion of the train.

Downstream of the heated filter, the sampled gas passed through a water-cooled condenser and then to a sorbent module that was filled with 40 grams of XAD Resin sorbent. XAD Resin is a porous polymer resin capable of absorbing a broad range of organic species. A diagram of the sorbent module is appended. Before the sampled gas reached the sorbent resin, it was cooled to a temperature of <68°F. This condensed the water vapor in the sampled stream and, in turn, some organic vapor became entrained in the condensate. For this reason, the condensate was allowed to percolate through the resin bed prior to being discharged into a collection vessel. At the downstream side of the sorbent module, four impingers were connected in series and immersed in an ice bath. The first impinger, connected to the outlet of the sorbent module, was modified to have a very short stem so that the sampled gas would not bubble through the collected condensate. The second impinger was a modified version of a Greenburg-Smith design; initially, it was filled with 100 mls of deionized water. The third impinger was a Greenburg-Smith impinger with a tip. It was also filled with 100 mls of deionized water. The fourth impinger was filled with silica gel to absorb any remaining moisture.

The XAD-2 resin modules were prepared and packed by Maxxam Analytics, Inc. After sampling, the modules were then capped and shipped to the field for sample collection. Laboratory analysis data are found in Appendix E. Calibration data are presented in Appendix H.

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Method 29 Trace Metals Determination

Stack gas metals concentrations and emission rates were determined in accordance with Method 29 as part of a Method 5/29 sample train. An Environmental Supply Company, Inc. sampling train was used to sample stack gas, in the manner specified in the Method. Analyses of the samples collected were conducted by Maxxam Analytics of Mississauga, Ontario. Samples were analyzed for the following metals, using Inductively Coupled Argon Plasma emission spectroscopy (ICP): Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Nickel, and Selenium. Samples were analyzed for Mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). All of the equipment used was calibrated in accordance with the specifications of the Method. Laboratory sample analysis is found in Appendix E. Field data sheets are included in Appendix G. Calibration data are presented in Appendix H.

Method 201A Filterable Particulate Determination

Stack gas filterable particulate concentrations and emission rates were determined in accordance with Method 201A for determination of particulate matter less than 2.5 microns and greater than 2.5 microns. An Environmental Supply Company, Inc. sampling train was used to sample flue gas at a constant rate, as specified in the Method. Filterable particulate matter was separated into two fractions; one containing less than $PM_{2.5}$ and the second greater than $PM_{2.5}$. The fractions are totaled to represent filterable particulate matter. Laboratory analysis data are found in Appendix D. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix G.

Method 202 Condensable Particulate Matter Determination

Stack gas CPM concentrations and emission rates were determined in accordance with the Method 202, 40CFR51, Appendix M, in conjunction with Method 201A filterable particulate sampling.

The condensable particulate matter (CPM) was collected in impingers after filterable particulate material was collected using Method 5. The organic and aqueous fractions were then taken to dryness and weighed. The total of all fractions represents the CPM. Compared to the December 17, 1991 promulgated Method 202, this Method includes the addition of a condenser, followed by a water dropout impinger immediately after the final heated filter. One modified Greenburg Smith impinger and an ambient temperature filter follow the water dropout impinger. A schematic of the sampling train configured with these updates is found in the Appendix.

CPM was collected in the water dropout, modified Greenburg Smith impinger and ambient filter portion of the sampling train as described in this Method. The impinger contents were purged with nitrogen (N_2) immediately after sample collection to remove dissolved sulfur dioxide (SO_2) gases from the impingers. The impinger solution was then extracted with DI water, acetone, and hexane. The organic and aqueous fractions were dried and the residues weighed. The total of the aqueous, organic, and ambient filter fractions represents the CPM. Laboratory analysis data are found in Appendix E. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H.

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Method 0031 Volatile Organics Determination

Volatile organic concentration and emission rates were determined utilizing SW-846-0031 methodology. The SW-846-0031 sample train is designed as follows: heated sample probe with purge system, condenser coil, two tenax traps, a condensate knockout, a second condenser coil, an anasorb trap, and a second condensate knockout, followed by a silica gel impinger to remove any remaining moisture from the stack gas. A diagram of this system is appended.

The glass-lined probe was wrapped with heating wire and a stainless steel jacket and heated to a temperature of 266°F ± 41°F.

Downstream of the probe, the sampled gas passed through a water-cooled condenser and then through two tenax traps. Condensed water vapor was then collected in a condensate trap before passing through the second water-cooled condenser followed by the anasorb trap. Finally, any remaining moisture was collected in the second condensate trap.

All sorbent traps were prepared and packed by Maxxam Analytics, Inc. After sampling, the modules were then capped and shipped to Maxxam Analytics, Inc. for sample analysis.

The condensate knockout catch was collected and rinsed with DI water and stored in 40ml vials. These vials were filled close to the top to eliminate head space and prevent volatilization of the samples. Four pairs of traps were analyzed for each test run along with the condensate knockout.

Methylene chloride ($MeCl_2$) results for all condensate samples were much higher than anticipated. It is believed that cross contamination occurred between the Method 23/0010 $MeCl_2$ samples and the Method 0031 condensate samples as these samples were transported to Maxxam Analytics, Inc. in the same batch. In addition, the methylene chloride which was used in the field recovery of Method 23/0010, was in close proximity to where the Method 0031 condensate samples were recovered. Consequently, the Method 0031 condensate data is not representative of actual emissions from the source.

Laboratory analysis data are found in Appendix E. Calibration data are presented in Appendix H.

Modified Method 315 - Toluene Soluble Organics (TSO) Determination

Method 315 (Particulate and Methylene Chloride Extractable Matter (MCEM) from Selected Sources at Primary Aluminum Production Facilities) with USEPA required deviations was required to be conducted per the Coke ICR request. It should be noted the source tested was not a Primary Aluminum Production Facility. The USEPA required deviation from the standard method was substituting the use of Toluene for extraction instead of Methylene Chloride to determine emissions of Toluene Soluble Organics (TSO). Stack gas TSO concentration and emission rates were determined in accordance with the Modified Method 315. Probe temperature was maintained at 248F +/- 25F. An Environmental Supply Company, Inc. sampling train was used to sample stack gas, in the manner specified in the Method.

Analyses of the samples collected were conducted by Maxxam Analytics of Mississauga, Ontario. Method 315 has defined maximum allowed blank values for Methylene Chloride, as Methylene Chloride specifications have very low concentrations of “Residue After Evaporation.” USEPA required use of Toluene for extraction and although a high purity ACR Reagent grade Toluene was used for analysis, the residue after evaporation specification is multiple times higher than typical Methylene Chloride specifications. Maxxam Analytics’ Modified Method 315 report does use their default Method 315 term “DCM” (Methylene Chloride) for their TSO (Toluene Soluble

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Organics) results. Maxxam Analytics does not have the ability to change the report nomenclature per their regulations with being an accredited laboratory. The use of the term DCM in the Maxxam Analytics' report should be viewed as TSO.

Toluene blank concentrations were greater than allowed by the method for Methylene Chloride and Mostardi Platt evaluated how best to subtract a representative Toluene blank. The Modified method blanks of the Toluene were high and had values that were up to 65% of the reported sample results. Mostardi Platt used Maxxam's Toluene Method Blank from the Modified Method 315 testing instead of the highest allowed blank from the Methodology of 315. This was done to show the magnitude of contamination in the Toluene used in the M315 recovery. The Toluene Filter Extraction Blank and Toluene Laboratory Processed Blank that went through the filtration apparatus, are extremely elevated and therefore adds significant high bias to the results that technically justifies considering the overall Method 315 results, with the non-standard Toluene extraction solvent, to be suspect at a minimum and likely invalid. The reported Modified Method 315 (TSO) results do not fully account for the magnitude of the documented blank contamination value.

Please see Maxxam Analytics' Modified Method 315 (TSO) White Paper dated March 10, 2017 provided in Appendix A that states, "The toluene filter extractable blank 90% upper confidence interval of 11.18 mg of residue is 43 times the Method 315 acceptable methylene chloride blank value of 0.26 mg of residue. This suggests the use of toluene extraction solvent to be the cause of the high bias residue results."

"The toluene laboratory processed blank of 8.5 mg of residue is more than 17 times the methylene chloride laboratory processed blank of ≤0.5 mg of residue. This again, would suggest the use of the toluene extraction solvent to be the cause of the high bias residue results."

An example calculation is found in Appendix D. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data are presented in Appendix H. Copies of the gas cylinder certifications are found in Appendix I.

Method 316 Formaldehyde (HCHO) Determination

Stack gas HCHO concentrations and emission rates were determined in accordance with Method 316. Probe temperature was maintained at 248°F +/- 25°F. A filter bypass was utilized followed by four impingers, the first two were loaded with 100 mls of DI water each, followed by an empty third impinger, and silica gel was loaded in the fourth impinger to remove any remaining moisture. After sampling, DI water was then used to recover all sample surfaces. The first and second impinger contents were recovered separately to check for breakthrough of HCHO during sampling. Analysis of both sample fractions collected was conducted by Maxxam Analytics of Mississauga, Ontario. Laboratory data are found in Appendix E.

Method 320 Fourier Transform Infrared (FTIR) Detector HCl, HF, and HCN Determination

HCl, HF, and HCN samples were collected using Extractive Fourier transform infrared (FTIR) spectrometry following US EPA Method 320. FTIR data were collected using an MKS MultiGas 2030 FTIR spectrometer. A heated transfer line was used to collect the sample and deliver it to the FTIR, where data were collected at 0.5cm-1 resolution. Each spectrum was derived from the co-addition of 64 scans, with a new data point generated approximately every one minute.

Spiking was performed prior to each test run to verify the ability of the sampling system to quantitatively deliver a sample containing the requested analytes from the base of the probe to the FTIR. Analyte spiking assures the ability of the FTIR to quantify data in the presence of effluent gas.

Reference method data are found in Appendix F. All of the equipment used was calibrated in accordance with the specifications of the Method.

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3.0 TEST RESULTS SUMMARIES

Test Set 1

ArcelorMittal Burns Harbor LLC Burns Harbor, Indiana Coke Battery No. 2 Underfire Stack Gaseous Summary								
Test No.	Date	Start Time	End Time	CO ppmvd	CO_2 % (dry)	O_2 % (dry)	Flow dscfm	CO, lb/hr
1	09/14/16	10:00	13:41	49.0	6.1	9.0	94,466	20.2
2	09/15/16	08:20	12:00	41.2	6.2	8.8	96,241	17.3
3	09/15/16	13:14	16:55	42.4	6.1	8.8	96,973	17.9
Average				44.2	6.1	8.8	**95,893**	**18.5**

Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 5/29

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**9/14/16**	**9/15/16**	**9/15/16**	
Start Time	**10:05**	**8:50**	**13:45**	
End Time	**12:41**	**11:29**	**16:19**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	451.3	450.1	440.9	447.4
Flue Gas Moisture, percent by volume	17.8%	17.2%	16.9%	17.3%
Average Flue Pressure, in. Hg	29.36	29.52	29.52	29.47
Gas Sample Volume, dscf	116.169	121.567	117.816	118.517
Average Gas Velocity, ft/sec	20.407	20.486	20.383	20.425
Gas Volumetric Flow Rate, acfm	202,185	202,974	201,951	202,370
Gas Volumetric Flow Rate, dscfm	94,466	96,241	96,973	95,893
Gas Volumetric Flow Rate, scfm	114,942	116,168	116,764	115,958
Average %CO_2 by volume, dry basis	6.1	6.2	6.1	6.1
Average %O_2 by volume, dry basis	9.0	8.8	8.8	8.9
Isokinetic Variance	102.7	105.5	101.4	103.2
Filterable Particulate Matter (Method 5)				
grams collected	0.1361	0.2644	0.7592	0.3866
grains/acf	0.0084	0.0159	0.0477	0.0240
grains/dscf	0.0181	0.0336	0.0994	0.0504
mg/dscm	4.14E+01	7.68E+01	2.28E+02	1.15E+02
lb/hr	1.46E+01	2.77E+01	8.26E+01	4.17E+01

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 5/29

Source Condition	Normal	Normal	Normal	
Date	9/14/16	9/15/16	9/15/16	
Start Time	10:05	8:50	13:45	
End Time	12:41	11:29	16:19	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	451.3	450.1	440.9	447.4
Flue Gas Moisture, percent by volume	17.8%	17.2%	16.9%	17.3%
Average Flue Pressure, in. Hg	29.36	29.52	29.52	29.47
Gas Sample Volume, dscf	116.169	121.567	117.816	118.517
Average Gas Velocity, ft/sec	20.407	20.486	20.383	20.425
Gas Volumetric Flow Rate, acfm	202,185	202,974	201,951	202,370
Gas Volumetric Flow Rate, dscfm	94,466	96,241	96,973	95,893
Gas Volumetric Flow Rate, scfm	114,942	116,168	116,764	115,958
Average %CO_2 by volume, dry basis	6.1	6.2	6.1	6.1
Average %O_2 by volume, dry basis	9.0	8.8	8.8	8.9
Isokinetic Variance	102.7	105.5	101.4	103.2
Antimony (Sb) Emissions				
ug of sample collected	≤ 4.80	≤ 4.84	≤ 4.80	≤ 4.81
ppb	≤ 0.29	≤ 0.28	≤ 0.28	≤ 0.28
mg/dscm	≤ 1.46E-03	≤ 1.41E-03	≤ 1.44E-03	≤ 1.43E-03
lb/hr	≤ 5.16E-04	≤ 5.07E-04	≤ 5.23E-04	≤ 5.15E-04
Arsenic (As) Emissions				
ug of sample collected	≤ 12.98	≤ 18.80	≤ 10.73	≤ 14.17
ppb	≤ 1.27	≤ 1.75	≤ 1.03	≤ 1.35
mg/dscm	≤ 3.95E-03	≤ 5.46E-03	≤ 3.22E-03	≤ 4.21E-03
lb/hr	≤ 1.40E-03	≤ 1.97E-03	≤ 1.17E-03	≤ 1.51E-03
Beryllium (Be) Emissions				
ug of sample collected	≤ 1.20	≤ 1.20	≤ 1.20	≤ 1.20
ppb	≤ 0.97	≤ 0.93	≤ 0.96	≤ 0.95
mg/dscm	≤ 3.65E-04	≤ 3.49E-04	≤ 3.60E-04	≤ 3.58E-04
lb/hr	≤ 1.29E-04	≤ 1.26E-04	≤ 1.31E-04	≤ 1.29E-04
Cadmium (Cd) Emissions				
ug of sample collected	≤ 1.20	≤ 1.20	≤ 1.20	≤ 1.20
ppb	≤ 0.08	≤ 0.08	≤ 0.08	≤ 0.08
mg/dscm	≤ 3.65E-04	≤ 3.49E-04	≤ 3.60E-04	≤ 3.58E-04
lb/hr	≤ 1.29E-04	≤ 1.26E-04	≤ 1.31E-04	≤ 1.29E-04
Chromium (Cr) Emissions				
ug of sample collected	388.66	1619.25	528.53	845.48
ppb	54.62	217.45	73.24	115.10
mg/dscm	1.18E-01	4.70E-01	1.58E-01	2.49E-01
lb/hr	4.18E-02	1.70E-01	5.75E-02	8.96E-02

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 5/29

Source Condition	Normal	Normal	Normal	
Date	9/14/16	9/15/16	9/15/16	
Start Time	10:05	8:50	13:45	
End Time	12:41	11:29	16:19	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	451.3	450.1	440.9	447.4
Flue Gas Moisture, percent by volume	17.8%	17.2%	16.9%	17.3%
Average Flue Pressure, in. Hg	29.36	29.52	29.52	29.47
Gas Sample Volume, dscf	116.169	121.567	117.816	118.517
Average Gas Velocity, ft/sec	20.407	20.486	20.383	20.425
Gas Volumetric Flow Rate, acfm	202,185	202,974	201,951	202,370
Gas Volumetric Flow Rate, dscfm	94,466	96,241	96,973	95,893
Gas Volumetric Flow Rate, scfm	114,942	116,168	116,764	115,958
Average %CO_2 by volume, dry basis	6.1	6.2	6.1	6.1
Average %O_2 by volume, dry basis	9.0	8.8	8.8	8.9
Isokinetic Variance	102.7	105.5	101.4	103.2
Cobalt (Co) Emissions				
ug of sample collected	1.65	11.49	4.12	5.75
ppb	0.21	1.36	0.50	0.69
mg/dscm	5.02E-04	3.34E-03	1.23E-03	1.69E-03
lb/hr	2.00E-04	1.20E-03	4.00E-04	6.00E-04
Lead (Pb) Emissions				
ug of sample collected	12.96	19.16	12.04	14.72
ppb	0.46	0.65	0.42	0.51
mg/dscm	3.94E-03	5.57E-03	3.61E-03	4.37E-03
lb/hr	1.40E-03	2.00E-03	1.30E-03	1.57E-03
Manganese (Mn) Emissions				
ug of sample collected	23.54	134.74	60.64	72.97
ppb	3.13	17.12	7.95	9.40
mg/dscm	7.16E-03	3.91E-02	1.82E-02	2.15E-02
lb/hr	2.50E-03	1.41E-02	6.60E-03	7.73E-03
Nickel (Ni) Emissions				
ug of sample collected	149.16	842.06	308.66	433.29
ppb	18.56	100.14	37.88	52.19
mg/dscm	4.53E-02	2.45E-01	9.25E-02	1.27E-01
lb/hr	1.60E-02	8.82E-02	3.36E-02	4.59E-02
Selenium (Se) Emissions				
ug of sample collected	≤ 12.00	15.50	≤ 13.00	≤ 13.50
ppb	≤ 1.11	1.37	≤ 1.19	≤ 1.22
mg/dscm	≤ 3.65E-03	4.50E-03	≤ 3.90E-03	≤ 4.02E-03
lb/hr	≤ 1.30E-03	1.60E-03	≤ 1.40E-03	≤ 1.43E-03

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 5/29

Source Condition		**Normal**		**Normal**		**Normal**		
Date		**9/14/16**		**9/15/16**		**9/15/16**		
Start Time		**10:05**		**8:50**		**13:45**		
End Time		**12:41**		**11:29**		**16:19**		
		Run 1		**Run 2**		**Run 3**		**Average**
Stack Conditions								
Average Gas Temperature, °F		451.3		450.1		440.9		447.4
Flue Gas Moisture, percent by volume		17.8%		17.2%		16.9%		17.3%
Average Flue Pressure, in. Hg		29.36		29.52		29.52		29.47
Gas Sample Volume, dscf		116.169		121.567		117.816		118.517
Average Gas Velocity, ft/sec		20.407		20.486		20.383		20.425
Gas Volumetric Flow Rate, acfm		202,185		202,974		201,951		202,370
Gas Volumetric Flow Rate, dscfm		94,466		96,241		96,973		95,893
Gas Volumetric Flow Rate, scfm		114,942		116,168		116,764		115,958
Average %CO_2 by volume, dry basis		6.1		6.2		6.1		6.1
Average %O_2 by volume, dry basis		9.0		8.8		8.8		8.9
Isokinetic Variance		102.7		105.5		101.4		103.2
Mercury (Hg) Emissions								
ug of sample collected	≤	24.45	≤	42.04	≤	48.62	≤	38.37
ppb	≤	0.89	≤	1.46	≤	1.75	≤	1.37
mg/dscm	≤	7.43E-03	≤	1.22E-02	≤	1.46E-02	≤	1.14E-02
lb/hr	≤	2.60E-03	≤	4.40E-03	≤	5.30E-03	≤	4.10E-03

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Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 201A/202

Source Condition	Normal	Normal	Normal	
Date	9/14/16	9/15/16	9/15/16	
Start Time	10:00	8:20	13:14	
End Time	14:09	12:31	17:24	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	449.4	450.8	447.7	449.3
Flue Gas Moisture, percent by volume	18.0%	17.1%	17.1%	17.4%
Average Flue Pressure, in. Hg	29.36	29.36	29.36	29.36
Gas Sample Volume, dscf	78.483	79.099	80.019	79.200
Average Gas Velocity, ft/sec	21.162	20.782	20.934	20.959
Gas Volumetric Flow Rate, acfm	209,672	205,905	207,409	207,662
Gas Volumetric Flow Rate, dscfm	97,986	97,051	98,108	97,715
Gas Volumetric Flow Rate, scfm	119,438	117,110	118,371	118,306
Average %CO_2 by volume, dry basis	6.1	6.2	6.1	6.1
Average %O_2 by volume, dry basis	9.0	8.8	8.8	8.9
Isokinetic Variance	101.2	101.8	101.4	101.5
Filterable <PM2.5 (Method 201A)				
grams collected	0.0049	0.0319	0.0497	0.0288
grains/acf	0.0004	0.0029	0.0045	0.0026
grains/dscf	0.0010	0.0062	0.0096	0.0056
mg/dscm	2.20E+00	1.42E+01	2.19E+01	1.28E+01
lb/hr	8.07E-01	5.17E+00	8.05E+00	4.68E+00
Filterable >PM2.5 (Method 201A)				
grams collected	0.0099	0.0041	0.0016	0.0052
grains/acf	0.0009	0.0004	0.0001	0.0005
grains/dscf	0.0020	0.0008	0.0003	0.0010
mg/dscm	4.46E+00	1.83E+00	7.15E-01	2.33E+00
lb/hr	1.64E+00	6.64E-01	2.63E-01	8.55E-01
Total Filterable PM (Method 201A)				
grams collected	0.0148	0.0359	0.0513	0.0340
grains/acf	0.0014	0.0033	0.0047	0.0031
grains/dscf	0.0029	0.0070	0.0099	0.0066
mg/dscm	6.66E+00	1.60E+01	2.26E+01	1.51E+01
lb/hr	2.45E+00	5.83E+00	8.31E+00	5.53E+00
Condensable PM (Method 202)				
grams collected	0.2272	0.2406	0.1288	0.1989
grains/acf	0.0209	0.0221	0.0117	0.0182
grains/dscf	0.0447	0.0469	0.0248	0.0388
mg/dscm	1.02E+02	1.07E+02	5.68E+01	8.88E+01
lb/hr	3.75E+01	3.90E+01	2.09E+01	3.25E+01
Total PM<2.5 (Method 201A/202)				
grams collected	0.2321	0.2725	0.1785	0.2277
grains/acf	0.0213	0.0251	0.0163	0.0209
grains/dscf	0.0456	0.0531	0.0344	0.0444
mg/dscm	1.04E+02	1.22E+02	7.88E+01	1.02E+02
lb/hr	3.83E+01	4.42E+01	2.89E+01	3.72E+01
Total PM (Method 201A/202)				
grams collected	0.2420	0.2765	0.1801	0.2329
grains/acf	0.0222	0.0254	0.0164	0.0213
grains/dscf	0.0476	0.0539	0.0347	0.0454
mg/dscm	1.09E+02	1.23E+02	7.95E+01	1.04E+02
lb/hr	4.00E+01	4.49E+01	2.92E+01	3.80E+01

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Test Set 2

ArcelorMittal Burns Harbor LLC Burns Harbor, Indiana Coke Battery No. 2 Underfire Stack Gaseous Summary								
Test No.	Date	Start Time	End Time	SO_2 ppmvd	CO_2 % (dry)	O_2 % (dry)	Flow dscfm	SO_2, lb/hr
1	09/07/16	09:07	11:30	553.6	6.3	8.4	100,594	555.5
2	09/07/16	12:30	14:50	564.0	6.4	8.2	99,696	560.9
3	09/08/16	08:30	10:51	540.5	6.1	8.8	100,278	540.6
Average				552.7	6.3	8.5	**100,189**	**552.3**

Arcelor Mittal Burns Harbor LLC Burns Harbor, Indiana #2 Coke Battery Underfire Stack Hydrogen Sulfide Summary						
Run	Date	Start Time	End Time	H_2S (ppm)	SCFM	H_2S (lb/hr)
1	9/7/2016	9:07	11:52	< 5.00E-01	122,894	< 3.26E-01
2	9/7/2016	12:30	15:00	1.25E+00	122,295	8.10E-01
3	9/8/2016	8:30	11:10	< 5.00E-01	122,603	< 3.25E-01
Test average				**< 7.50E-01**	**122,597**	**< 4.87E-01**

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Total Average Run 1-3
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes	Sample Catch (ug)	Concentration (mg/dscm)	Flowrate, dscfm	Emissions lb/hr
Chloromethane	≤ 1.99	≤ 1.73E-02	100,197	≤ 6.41E-03
Vinyl Chloride	≤ 0.37	≤ 3.18E-03	100,197	≤ 1.18E-03
Bromomethane	≤ 2.72	≤ 2.37E-02	100,197	≤ 8.77E-03
Chloroethane	≤ 0.79	≤ 6.86E-03	100,197	≤ 2.54E-03
1,1-Dichloroethylene	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Iodomethane	≤ 0.53	≤ 4.59E-03	100,197	≤ 1.70E-03
Carbon Disulfide	≤ 9.19	≤ 8.00E-02	100,197	≤ 2.96E-02
Methylene Chloride(Dichloromethane)*	≤ 18.88	≤ 1.64E-01	100,197	≤ 6.08E-02
Chloroform	≤ 0.35	≤ 3.09E-03	100,197	≤ 1.14E-03
1,2-Dichloroethane	≤ 0.41	≤ 3.55E-03	100,197	≤ 1.31E-03
1,1,1-Trichloroethane	≤ 0.45	≤ 3.87E-03	100,197	≤ 1.43E-03
Carbon Tetrachloride	≤ 0.46	≤ 3.96E-03	100,197	≤ 1.47E-03
Benzene	≤ 40.95	≤ 3.57E-01	100,197	≤ 1.32E-01
1,1,2-Trichloroethane	≤ 0.46	≤ 3.96E-03	100,197	≤ 1.47E-03
1,2-Dichloropropane	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Trichloroethylene	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Toluene	≤ 12.87	≤ 1.12E-01	100,197	≤ 4.15E-02
Tetrachloroethylene	≤ 0.47	≤ 4.12E-03	100,197	≤ 1.53E-03
Chlorobenzene	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Ethylbenzene	≤ 0.93	≤ 8.06E-03	100,197	≤ 2.98E-03
m / p-Xylene	≤ 6.25	≤ 5.44E-02	100,197	≤ 2.01E-02
Styrene	≤ 2.38	≤ 2.07E-02	100,197	≤ 7.66E-03
o-Xylene	≤ 1.64	≤ 1.42E-02	100,197	≤ 5.27E-03
Bromoform	≤ 0.37	≤ 3.23E-03	100,197	≤ 1.20E-03
1,1,2,2-Tetrachloroethane	≤ 0.79	≤ 6.86E-03	100,197	≤ 2.54E-03
Acrylonitrile	≤ 3.89	≤ 3.39E-02	100,197	≤ 1.25E-02
Total Volatile Organic HAP	≤ **108.84**	≤ **9.47E-01**	**100,197**	≤ **3.51E-01**

*Methylene chloride (MeCl2) results for all condensate samples were much higher than anticipated. It is believed that cross contamination occurred between the Method 23/0010 MeCl2 samples and the Method 0031 condensate samples as these samples were transported to Maxxam Analytics, Inc. in the same batch. In addition, the methylene chloride which was used in the field recovery of Method 23/0010, was in close proximity to where the Method 0031 condensate samples were recovered. Consequently, the Method 0031 condensate data is not representative of actual emissions from the source.

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Run 1
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes		Sample Catch (ug)		Concentration (mg/dscm)	Flowrate, dscfm		Emissions lb/hr	Blank (ug)
Chloromethane	≤	4.70	≤	4.09E-02	100,649	≤	1.54E-02	0.00
Vinyl Chloride	≤	0.90	≤	7.81E-03	100,649	≤	2.94E-03	0.00
Bromomethane	≤	6.60	≤	5.74E-02	100,649	≤	2.16E-02	0.00
Chloroethane	≤	2.10	≤	1.83E-02	100,649	≤	6.90E-03	0.00
1,1-Dichloroethylene	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Iodomethane	≤	1.32	≤	1.15E-02	100,649	≤	4.33E-03	0.00
Carbon Disulfide	≤	10.59	≤	9.21E-02	100,649	≤	3.47E-02	0.00
Methylene Chloride(Dichloromethane)	≤	53.42	≤	4.65E-01	100,649	≤	1.75E-01	0.00
Chloroform	≤	0.89	≤	7.71E-03	100,649	≤	2.90E-03	0.00
1,2-Dichloroethane	≤	1.07	≤	9.28E-03	100,649	≤	3.50E-03	0.00
1,1,1-Trichloroethane	≤	1.11	≤	9.64E-03	100,649	≤	3.64E-03	0.00
Carbon Tetrachloride	≤	1.12	≤	9.75E-03	100,649	≤	3.68E-03	0.00
Benzene	≤	46.94	≤	4.08E-01	100,649	≤	1.54E-01	0.00
1,1,2-Trichloroethane	≤	1.12	≤	9.75E-03	100,649	≤	3.68E-03	0.00
1,2-Dichloropropane	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Trichloroethylene	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Toluene	≤	15.19	≤	1.32E-01	100,649	≤	4.98E-02	0.00
Tetrachloroethylene	≤	1.14	≤	9.90E-03	100,649	≤	3.73E-03	0.00
Chlorobenzene	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Ethylbenzene	≤	1.67	≤	1.45E-02	100,649	≤	5.48E-03	0.00
m / p-Xylene	≤	7.66	≤	6.66E-02	100,649	≤	2.51E-02	0.00
Styrene	≤	3.21	≤	2.79E-02	100,649	≤	1.05E-02	0.00
o-Xylene	≤	2.45	≤	2.13E-02	100,649	≤	8.02E-03	0.00
Bromoform	≤	0.90	≤	7.86E-03	100,649	≤	2.96E-03	0.00
1,1,2,2-Tetrachloroethane	≤	2.13	≤	1.86E-02	100,649	≤	7.00E-03	0.00
Acrylonitrile	≤	10.44	≤	9.08E-02	100,649	≤	3.42E-02	0.00
Total Volatile Organic HAP				**1.57E+00**			**5.93E-01**	
Sample volume (Vmstd, liters)		114.99						
Average % CO_2 by volume, dry		6.30						
Average % O_2 by volume, dry		8.40						

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Run 2
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes	Sample Catch (ug)		Concentration (mg/dscm)		Flowrate, dscfm	Emissions lb/hr		Blank (ug)
Chloromethane	≤	0.44	≤	3.83E-03	99,663	≤	1.43E-03	0.00
Vinyl Chloride	≤	0.11	≤	9.88E-04	99,663	≤	3.69E-04	0.00
Bromomethane	≤	0.67	≤	5.89E-03	99,663	≤	2.20E-03	0.00
Chloroethane	≤	0.14	≤	1.23E-03	99,663	≤	4.60E-04	0.00
1,1-Dichloroethylene	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Iodomethane	≤	0.15	≤	1.28E-03	99,663	≤	4.78E-04	0.00
Carbon Disulfide	≤	9.89	≤	8.70E-02	99,663	≤	3.25E-02	0.00
Methylene Chloride(Dichloromethane)	≤	1.28	≤	1.13E-02	99,663	≤	4.20E-03	0.00
Chloroform	≤	0.10	≤	8.83E-04	99,663	≤	3.30E-04	0.00
1,2-Dichloroethane	≤	0.09	≤	7.47E-04	99,663	≤	2.79E-04	0.00
1,1,1-Trichloroethane	≤	0.13	≤	1.12E-03	99,663	≤	4.17E-04	0.00
Carbon Tetrachloride	≤	0.14	≤	1.22E-03	99,663	≤	4.56E-04	0.00
Benzene	≤	46.10	≤	4.05E-01	99,663	≤	1.51E-01	0.00
1,1,2-Trichloroethane	≤	0.14	≤	1.22E-03	99,663	≤	4.56E-04	0.00
1,2-Dichloropropane	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Trichloroethylene	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Toluene		14.20		1.25E-01	99,663		4.66E-02	0.00
Tetrachloroethylene	≤	0.15	≤	1.33E-03	99,663	≤	4.96E-04	0.00
Chlorobenzene	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Ethylbenzene	≤	0.68	≤	5.99E-03	99,663	≤	2.24E-03	0.00
m / p-Xylene	≤	6.76	≤	5.94E-02	99,663	≤	2.22E-02	0.00
Styrene	≤	2.46	≤	2.16E-02	99,663	≤	8.08E-03	0.00
o-Xylene	≤	1.47	≤	1.29E-02	99,663	≤	4.82E-03	0.00
Bromoform	≤	0.12	≤	1.04E-03	99,663	≤	3.89E-04	0.00
1,1,2,2-Tetrachloroethane	≤	0.09	≤	8.14E-04	99,663	≤	3.04E-04	0.00
Acrylonitrile	≤	0.62	≤	5.47E-03	99,663	≤	2.04E-03	0.00
Total Volatile Organic HAP				**7.59E-01**	99,663		**2.83E-01**	

Sample volume (Vmstd, liters)		113.72
Average % CO_2 by volume, dry		6.40
Average % O_2 by volume, dry		8.20

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Run 3
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes		Sample Catch (ug)		Concentration (mg/dscm)	Flowrate, dscfm		Emissions lb/hr	Blank (ug)
Chloromethane	≤	0.83	≤	7.14E-03	100,279	≤	2.68E-03	0.00
Vinyl Chloride	≤	0.09	≤	7.42E-04	100,279	≤	2.79E-04	0.00
Bromomethane	≤	0.90	≤	7.69E-03	100,279	≤	2.89E-03	0.00
Chloroethane	≤	0.12	≤	1.05E-03	100,279	≤	3.94E-04	0.00
1,1-Dichloroethylene	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Iodomethane	≤	0.12	≤	9.93E-04	100,279	≤	3.73E-04	0.00
Carbon Disulfide	≤	7.09	≤	6.09E-02	100,279	≤	2.29E-02	0.00
Methylene Chloride(Dichloromethane)	≤	1.93	≤	1.66E-02	100,279	≤	6.23E-03	0.00
Chloroform	≤	0.08	≤	6.73E-04	100,279	≤	2.53E-04	0.00
1,2-Dichloroethane	≤	0.07	≤	6.10E-04	100,279	≤	2.29E-04	0.00
1,1,1-Trichloroethane	≤	0.10	≤	8.50E-04	100,279	≤	3.19E-04	0.00
Carbon Tetrachloride	≤	0.11	≤	9.19E-04	100,279	≤	3.45E-04	0.00
Benzene	≤	29.82	≤	2.56E-01	100,279	≤	9.62E-02	0.00
1,1,2-Trichloroethane	≤	0.11	≤	9.19E-04	100,279	≤	3.45E-04	0.00
1,2-Dichloropropane	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Trichloroethylene	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Toluene	≤	9.23	≤	7.93E-02	100,279	≤	2.98E-02	0.00
Tetrachloroethylene	≤	0.13	≤	1.14E-03	100,279	≤	4.29E-04	0.00
Chlorobenzene	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Ethylbenzene	≤	0.43	≤	3.67E-03	100,279	≤	1.38E-03	0.00
m / p-Xylene	≤	4.33	≤	3.71E-02	100,279	≤	1.40E-02	0.00
Styrene	≤	1.46	≤	1.25E-02	100,279	≤	4.71E-03	0.00
o-Xylene	≤	1.00	≤	8.56E-03	100,279	≤	3.22E-03	0.00
Bromoform	≤	0.09	≤	7.76E-04	100,279	≤	2.92E-04	0.00
1,1,2,2-Tetrachloroethane	≤	0.14	≤	1.22E-03	100,279	≤	4.58E-04	0.00
Acrylonitrile	≤	0.62	≤	5.28E-03	100,279	≤	1.98E-03	0.00
Total Volatile Organic HAP				**5.08E-01**			**1.91E-01**	

Sample volume (Vmstd, liters)		116.45
Average % CO_2 by volume, dry		6.10
Average % O_2 by volume, dry		8.80

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Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 316

Source Condition	**Normal**	**Normal**	**Normal**	
Date	**9/7/16**	**9/7/16**	**9/8/16**	
Start Time	**9:07**	**12:30**	**8:30**	
End Time	**11:16**	**14:39**	**10:39**	
	Run 1	**Run 2**	**Run 3**	**Average**
Stack Conditions				
Average Gas Temperature, °F	454.7	455.5	452.6	454.3
Flue Gas Moisture, percent by volume	18.1%	18.5%	18.2%	18.3%
Average Flue Pressure, in. Hg	29.17	29.17	29.08	29.14
Gas Sample Volume, dscf	79.124	76.234	76.308	77.222
Average Gas Velocity, ft/sec	22.044	21.957	22.010	22.004
Gas Volumetric Flow Rate, acfm	218,408	217,541	218,067	218,005
Gas Volumetric Flow Rate, dscfm	100,594	99,696	100,278	100,189
Gas Volumetric Flow Rate, scfm	122,894	122,295	122,603	122,597
Average %CO_2 by volume, dry basis	6.3	6.4	6.1	6.3
Average %O_2 by volume, dry basis	8.4	8.2	8.8	8.5
Isokinetic Variance	104.9	102.0	101.5	102.8
Formaldehyde Emissions (Method 316)				
ug of sample collected	≤ 17.00	≤ 17.00	≤ 18.00	≤ 17.33
ppm	≤ 0.01	≤ 0.01	≤ 0.01	≤ 0.01
mg/dscm	≤ 7.59E-03	≤ 7.88E-03	≤ 8.33E-03	≤ 7.93E-03
lb/hr	≤ 2.86E-03	≤ 2.94E-03	≤ 3.13E-03	≤ 2.98E-03

Arcelor Mittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
HCl, HCN, and HF Summary

Run	Date	Start Time	End Time	HCl (mg/dscm)	HCN (mg/dscm)	HF (mg/dscm)	DSCFM	HCl (lb/hr)	HCN (lb/hr)	HF (lb/hr)
1	9/7/2016	9:07	11:55	6.13E+00	8.27E-01	4.08E-01	100,594	2.31E+00	3.12E-01	1.54E-01
2	9/7/2016	12:30	15:08	6.32E+00	8.27E-01	3.06E-01	99,696	2.36E+00	3.09E-01	1.14E-01
3	9/8/2016	8:30	11:11	3.14E+00	8.21E-01	3.04E-01	100,278	1.18E+00	3.08E-01	1.14E-01
Test average				**5.20E+00**	**8.25E-01**	**3.39E-01**	**100,189**	**1.95E+00**	**3.10E-01**	**1.27E-01**

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Test Set 3

ArcelorMittal Burns Harbor LLC Burns Harbor, Indiana Coke Battery No. 2 Underfire Stack Gaseous Summary					
Test No.	Date	Start Time	End Time	CO_2 % (dry)	O_2 % (dry)
1	09/12/16	11:00	14:35	6.5	8.2
2	09/13/16	08:35	12:10	6.2	8.9
3	09/13/16	12:45	16:13	6.5	8.2
Average				6.4	8.4

Company: ArcelorMittal Burns Harbor, LLC
Plant: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 0010/23

Source Condition	Normal	Normal	Normal	
Date	9/12/16	9/13/16	9/13/16	
Start Time	11:00	8:35	12:45	
End Time	14:26	11:59	16:09	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	447.6	440.0	440.1	442.6
Flue Gas Moisture, percent by volume	17.1%	16.8%	17.6%	17.2%
Average Flue Pressure, in. Hg	29.31	29.23	29.23	29.26
Gas Sample Volume, dscf	156.929	155.438	152.749	155.039
Average Gas Velocity, ft/sec	21.088	20.603	20.472	20.721
Gas Volumetric Flow Rate, acfm	208,932	204,128	202,834	205,298
Gas Volumetric Flow Rate, dscfm	98,710	97,304	95,766	97,260
Gas Volumetric Flow Rate, scfm	119,051	116,982	116,219	117,417
Average %CO_2 by volume, dry basis	6.5	6.2	6.5	6.4
Average %O_2 by volume, dry basis	8.2	8.9	8.2	8.4
Isokinetic Variance	100.3	100.8	100.7	100.6
PCDD/PCDF Emissions				
ug/dscm	≤ 2.85E-04	≤ 2.30E-04	≤ 1.99E-04	≤ 2.38E-04
lb/hr (TEQ Equivalent)	≤ 3.28E-09	≤ 2.01E-09	≤ 1.66E-09	≤ 2.32E-09

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PCDD/PCDF TEST RESULTS SUMMARY
Average Test Results
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 12 and 13, 2016

		Concentration		Emissions	TEQ Factor Results						
Analytes		**(ug/dcsm)**		**(ug/hr)**	**TEQ Factor**		**(ug/dscm)**		**(ug/hr)**		**(lb/hr)**
2378-TCDD	<	6.08E-07	<	0.10	1.0	<	6.08E-07	<	0.10	<	2.21E-10
12378-PeCDD	<	7.42E-07	<	0.12	1.0	<	7.42E-07	<	0.12	<	2.71E-10
123478-HxCDD		9.53E-07		0.16	0.1		9.53E-08		0.02		3.49E-11
123678-HxCDD		1.47E-06		0.24	0.1		1.47E-07		0.02		5.37E-11
123789-HxCDD	<	1.48E-06	<	0.24	0.1	<	1.48E-07	<	0.02	<	5.39E-11
1234678-HpCDD		8.45E-06		1.40	0.01		8.45E-08		0.014		3.09E-11
OCDD		1.54E-05		2.55	0.0003		4.62E-09		0.0008		1.69E-12
2378-TCDF		5.85E-06		0.97	0.1		5.85E-07		0.10		2.13E-10
12378-PeCDF		2.23E-06		0.37	0.03		6.69E-08		0.01		2.44E-11
23478-PeCDF		3.46E-06		0.57	0.3		1.04E-06		0.17		3.79E-10
123478-HxCDF		1.07E-05		1.77	0.1		1.07E-06		0.18		3.90E-10
123678-HxCDF	<	4.74E-06	<	0.79	0.1	<	4.74E-07	<	0.08	<	1.74E-10
234678-HxCDF		8.67E-06		1.44	0.1		8.67E-07		0.14		3.18E-10
123789-HxCDF	<	7.29E-07	<	0.12	0.1	<	7.29E-08	<	0.01	<	2.66E-11
1234678-HpCDF		3.15E-05		5.23	0.01		3.15E-07		0.05		1.15E-10
1234789-HpCDF		3.52E-06		0.59	0.01		3.52E-08		0.006		1.29E-11
OCDF		6.46E-06		1.07	0.0003		1.94E-09		0.0003		7.09E-13
Total TCDD		4.39E-05		7.23							
Total PeCDD		1.62E-05		2.67							
Total HxCDD		1.37E-05		2.27							
Total HpCDD		1.51E-05		2.51							
Total OCDD		1.54E-05		2.55							
Total TCDF		2.37E-05		3.92							
Total PeCDF		2.29E-05		3.79							
Total HxCDF		3.59E-05		5.97							
Total HpCDF		4.46E-05		7.42							
Total OCDF		6.46E-06		1.07							
Total PCDD/PCDF	<	2.38E-04	<	39.41							
TEQ Total						<	6.35E-06	<	1.05	<	2.32E-09

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SPECIATED SEMI-VOLATILE ORGANIC COMPOUNDS TEST RESULTS SUMMARY
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 12 and 13, 2016

Analytes	Concentration (ug/dscm)		Flowrate, dscfm	Emissions lb/hr	
Acenaphthene	≤	1.14E+00	97,260	≤	4.15E-04
Acenaphthylene		4.69E+00	97,260		1.72E-03
Anthracene	≤	1.14E+00	97,260	≤	4.15E-04
Benzo (a) anthracene	≤	1.14E+00	97,260	≤	4.15E-04
Benzo (a) pyrene	≤	1.14E+00	97,260	≤	4.15E-04
Benzo (b) fluoranthene	≤	1.14E+00	97,260	≤	4.15E-04
Benzo (g,h,i) perylene	≤	1.14E+00	97,260	≤	4.15E-04
Benzo (k) fluoranthene	≤	1.14E+00	97,260	≤	4.15E-04
Chrysene	≤	1.14E+00	97,260	≤	4.15E-04
Dibenz (a,h) anthracene	≤	1.14E+00	97,260	≤	4.15E-04
Fluoranthene		2.80E+00	97,260		1.02E-03
Fluorene	≤	1.14E+00	97,260	≤	4.15E-04
Indeno (1,2,3-cd) pyrene	≤	1.14E+00	97,260	≤	4.15E-04
Naphthalene		1.07E+02	97,260		3.92E-02
Phenanthrene		5.83E+00	97,260		2.13E-03
Perylene	≤	1.14E+00	97,260	≤	4.15E-04
Pyrene	≤	2.67E+00	97,260	≤	9.67E-04
Total Semi-Volatile Organic Compounds - Test Average	≤	**1.37E+02**	**97,260**	≤	**5.00E-02**

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Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 315

Source Condition	Normal	Normal	Normal	
Date	9/12/16	9/13/16	9/13/16	
Start Time	11:30	9:05	13:15	
End Time	13:43	11:17	15:28	
	Run 1	Run 2	Run 3	Average
Stack Conditions				
Average Gas Temperature, °F	450.1	447.3	445.1	447.5
Flue Gas Moisture, percent by volume	17.6%	17.1%	18.1%	17.6%
Average Flue Pressure, in. Hg	29.31	29.23	29.23	29.26
Gas Sample Volume, dscf	69.587	72.197	71.608	71.131
Average Gas Velocity, ft/sec	19.998	20.118	20.134	20.083
Gas Volumetric Flow Rate, acfm	198,137	199,323	199,488	198,983
Gas Volumetric Flow Rate, dscfm	92,781	93,964	93,091	93,279
Gas Volumetric Flow Rate, scfm	112,588	113,305	113,670	113,188
Average %CO_2 by volume, dry basis	6.5	6.2	6.5	6.4
Average %O_2 by volume, dry basis	8.2	8.9	8.2	8.4
Isokinetic Variance	99.1	101.6	101.7	100.8
Front Half TSO				
grams collected	≤ 0.0062	≤ 0.0054	≤ 0.0058	≤ 0.0058
mg/dscm	≤ 3.131	≤ 2.629	≤ 2.880	≤ 2.8796
grains/acf	≤ 0.0006	≤ 0.0005	≤ 0.0006	≤ 0.0006
grains/dscf	≤ 0.0014	≤ 0.0011	≤ 0.0013	≤ 0.0013
lb/hr	≤ 1.09E+00	≤ 9.25E-01	≤ 1.00E+00	≤ 1.01E+00
Back Half TSO				
grams collected	≤ 0.0329	≤ 0.0215	≤ 0.0153	≤ 0.0232
mg/dscm	≤ 16.679	≤ 10.529	≤ 7.558	≤ 0.0000
grains/acf	≤ 0.0034	≤ 0.0022	≤ 0.0015	≤ 0.0024
grains/dscf	≤ 0.0073	≤ 0.0046	≤ 0.0033	≤ 0.0051
lb/hr	≤ 5.80E+00	≤ 3.71E+00	≤ 2.64E+00	≤ 4.05E+00
Total TSO*				
grams collected	≤ 0.0390	≤ 0.0269	≤ 0.0212	≤ 0.0290
mg/dscm	≤ 1.98E+01	≤ 1.32E+01	≤ 1.04E+01	≤ 1.45E+01
grains/acf	≤ 0.0040	≤ 0.0027	≤ 0.0021	≤ 0.0029
grains/dscf	≤ 0.0087	≤ 0.0057	≤ 0.0046	≤ 0.0063
lb/hr	≤ 6.88E+00	≤ 4.63E+00	≤ 3.64E+00	≤ 5.05E+00

*These reported Modified Method 315 (TSO) results do not fully account for the magnitude of the documented blank contamination value. Please see Section 2.0 and Maxxam Analytics' Modified Method 315 (TSO) White Paper dated March 10, 2017 provided in Appendix A that states, "The toluene filter extractable blank 90% upper confidence interval of 11.18 mg of residue is 43 times the Method 315 acceptable methylene chloride blank value of 0.26 mg of residue. This suggests the use of toluene extraction solvent to be the cause of the high bias residue results."

"The toluene laboratory processed blank of 8.5 mg of residue is more than 17 times the methylene chloride laboratory processed blank of ≤0.5 mg of residue. This again, would suggest the use of the toluene extraction solvent to be the cause of the high bias residue results." Please see Appendix E for sample calculations in laboratory weight sheet.

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4.0 CERTIFICATION

MOSTARDI PLATT is pleased to have been of service to ArcelorMittal Burns Harbor, LLC. If you have any questions regarding this test report, please do not hesitate to contact us at 630-993-2100.

CERTIFICATION

As project manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results, and the test program was performed in accordance with the methods specified in this test report.

MOSTARDI PLATT

_____ Program Manager

Stuart L. Burton

_____ Quality Assurance

Scott W. Banach

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APPENDICES

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Appendix A – Maxxam Analytics' White Paper of Modified Method 315 (TSO) Toluene Contamination

Maxxam
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March 10, 2017

Scott Banach
Mostardi-Platt

Re: Coke ICR Modified Method 315 Blanks - Methylene Chloride Modified to Toluene

Dear Scott;

The Coke industry received a Clean Air Act Section 114 Information Collection Request (Coke ICR) on April 4, 2016 from US EPA to conduct emissions testing at facilities across the US. The emissions testing required to be conducted by this Coke ICR included a Method 315 (Particulate and Methylene Chloride Extractable Matter (MCEM)), except that USEPA specifically required that the standard method extraction solvent of methylene chloride be substituted with the use of toluene to determine emissions of Toluene Soluble Organics (TSO).

Based on a review of the field and lab results, the Method 315 TSO results added uncertainty due to USEPA's required deviation of switching from methylene chloride to toluene. Information was requested from Maxxam to clearly describe how TSO concentrations were derived including properly labeled references of each number with units used in the calculations, all assumptions and estimations used in the calculations and details on the determination of all blank values. The ultimate objective is to enable a third party to review the results, documentation and calculations to independently verify the results, the blanks and the blank corrected results.

1. Toluene Filter Extractable Blanks

Per our ongoing discussions between during January - March, 2017 Maxxam performed analysis of five (5) filter blanks according to EPA Method 315 section 11.2.1.2, using toluene as the extraction solvent instead of methylene chloride, as required by USEPA's modification of the standard Method 315. An example of an unused probe filter used for this blank determination is shown in Figure 1. In total, 130 ml of toluene was used to extract and rinse each filter during the extraction procedure.

After the toluene was used to extract and rinse each filter, the toluene was passed through an Ahlin filter, glass wool and a fixed porous glass frit as shown in Figure 2, Filtration Apparatus.
These five toluene filter extractable blank results were 5.80, 10.5, 9.10, 13.8 and 7.20 mg of residue. The mean blank result was 9.28 mg of residue. Based on USEPA's SW-846 Chapter 9 statistical analysis, the 90% upper confidence interval of these blanks was determined to be 11.18 mg of residue, as illustrated in the table below. The upper confidence interval would be the conservative value to represent the impact of the background contamination of the unused probe filter, laboratory toluene and filtration apparatus.

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	Method 315 Toluene Filter Extractable Blanks				
Sample	*Blank Result*	*Units*	*Statistic*	*Value*	*Sq Rt*
1	5.8	mg	Population	5.00	2.24
2	10.5	mg	Mean	9.28	
3	9.1	mg	Std Dev	2.77	
4	13.8	mg	Std Error	1.24	
5	7.2	mg	t value	1.53	
	90 % Upper Confidence Interval			**11.18**	mg

EPA Method 315 states that a methylene chloride blank value less than 1.5 ppm, by weight, residue is acceptable. Using the sample volume above, 130 ml sample x 1.33 g/ml methylene chloride density x 1000 mg/g conversion = 172,900 mg, the acceptable residue would be 1.5×10^{-6} x 172,900 mg sample = 0.26 mg of residue.

The toluene filter extractable blank 90% upper confidence interval of 11.18 mg of residue is 43 times the Method 315 acceptable methylene chloride blank value of 0.26 mg of residue. This suggests the use of the toluene extraction solvent to be the cause of the high bias residue results.

2. Laboratory Processed Blanks – Toluene (non-standard) vs Methylene Chloride (standard)

Maxxam also conducted a toluene laboratory processed blank that had a value of 8.5 mg of residue. This blank did not involve an unused probe filter, but did include 100 ml of toluene that was processed using the same filtration apparatus procedure as used for the toluene filter extractable blank and included the Ahlin filter, glass wool and a fixed porous glass frit as shown in Figure 2. The 8.5 mg of residue detected in the toluene laboratory processed blank indicates background contamination from the toluene and filtration Apparatus. The filtration apparatus glassware used to filter the samples was washed and solvent rinsed with methanol prior to the extraction and filtration.

Prior to the USEPA modification of Method 315 for the Coke ICR, methylene chloride was the standard extraction solvent used. Based on historical Method 315 analysis conducted by Maxxam using methylene chloride, all the laboratory processed blanks were reported to be <0.5 mg of residue in 2008, 2010 and 2016.

The toluene laboratory processed blank of 8.5 mg of residue is more than 17 times the methylene chloride laboratory processed blank of <0.5 mg of residue. This again, would suggest the use of the toluene extraction solvent to be the cause of the high bias residue results.

Maxxam
A Bureau Veritas Group Company

3. Technical Laboratory Findings

This laboratory evaluation concludes that the use of toluene instead of methylene chloride as the extraction solvent of the filter and probe rinse has resulted in significantly elevated toluene filter extraction blanks and toluene laboratory processed blank results that cannot be related to the sampled sources and must be considered when attempting to report the actual Method 315 values.

Please feel free to contact me if you have further questions or concerns.

Thank you,

Susan Bigg
Sr. QA Manager
905-817-5700 ext 4049

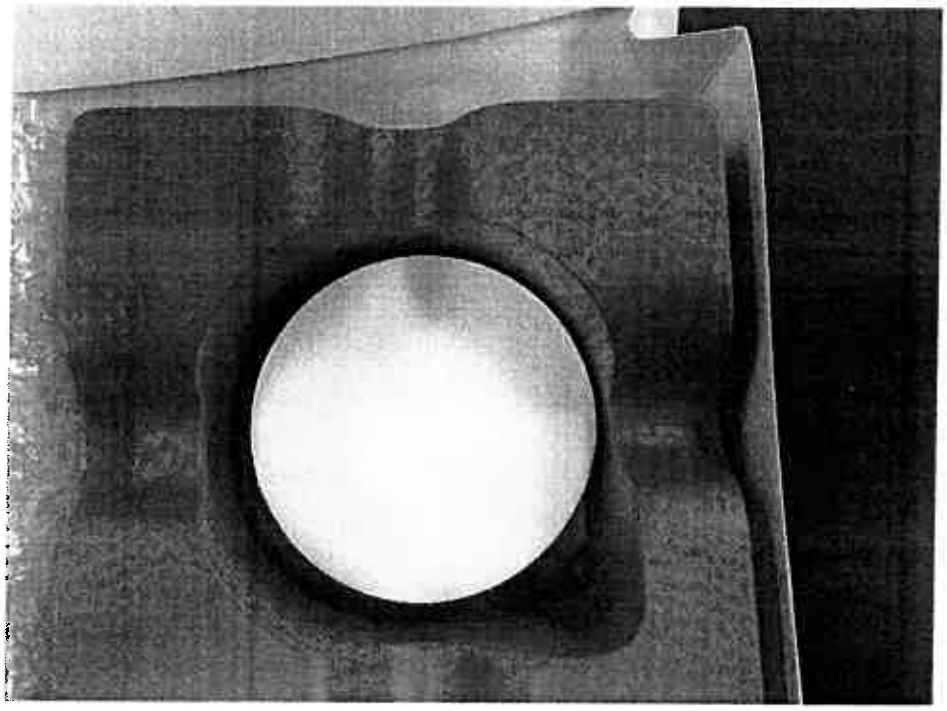

Figure 1 Method 315 Filter

GE Whatman Grade QM-A Quartz Microfiber Air Sampling Filter, 82 mm circle

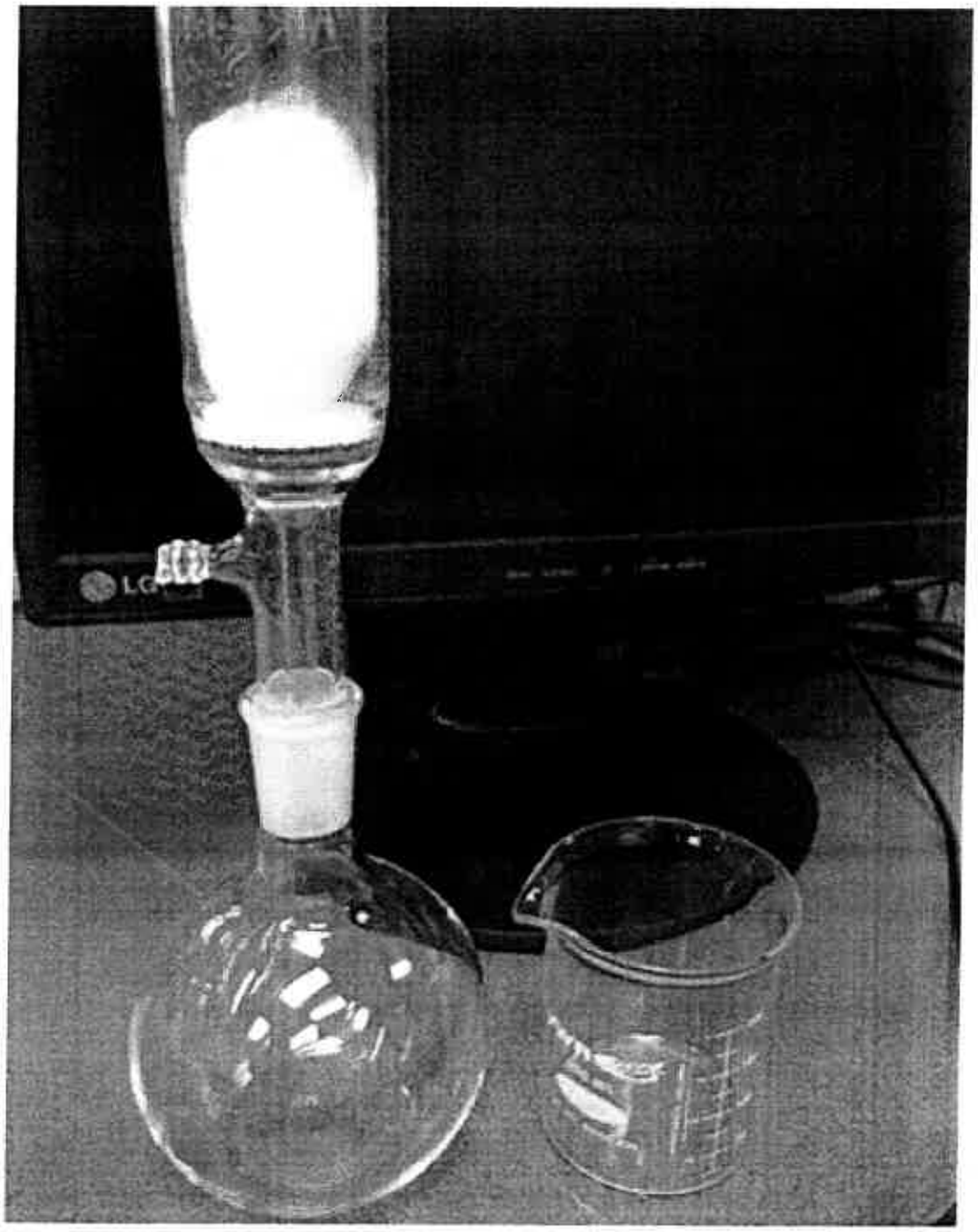

Figure 2 Filtration Apparatus

Filtration Apparatus includes an Ahlin filter, glass wool and a fixed porous glass frit

Appendix B - Test Section Diagram

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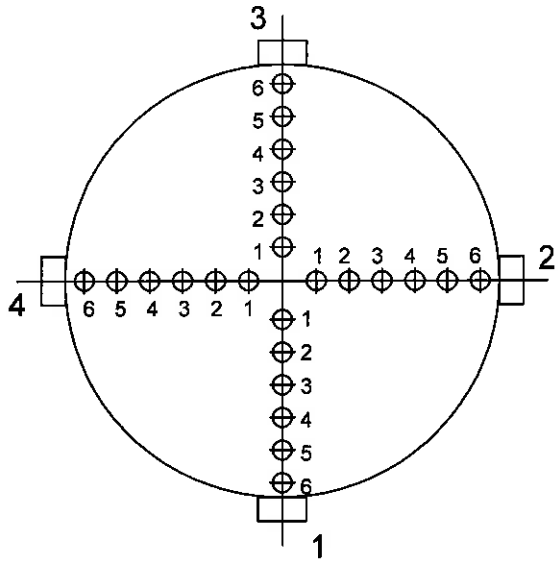
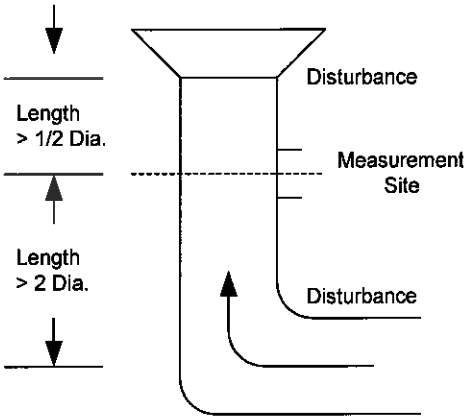
EQUAL AREA TRAVERSE FOR ROUND DUCTS





Job:	Arcelor Mittal Burns Harbor LLC
Date:	September 7 through 15, 2016
Test Location:	#2 Underfire Stack
Duct Diameter:	14.5 Feet
Duct Area:	165.130 Square Feet
No. Points Across Diameter:	12
No. of Ports:	4
Port Length:	50.00 inches

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Appendix C - Sample Train Diagrams

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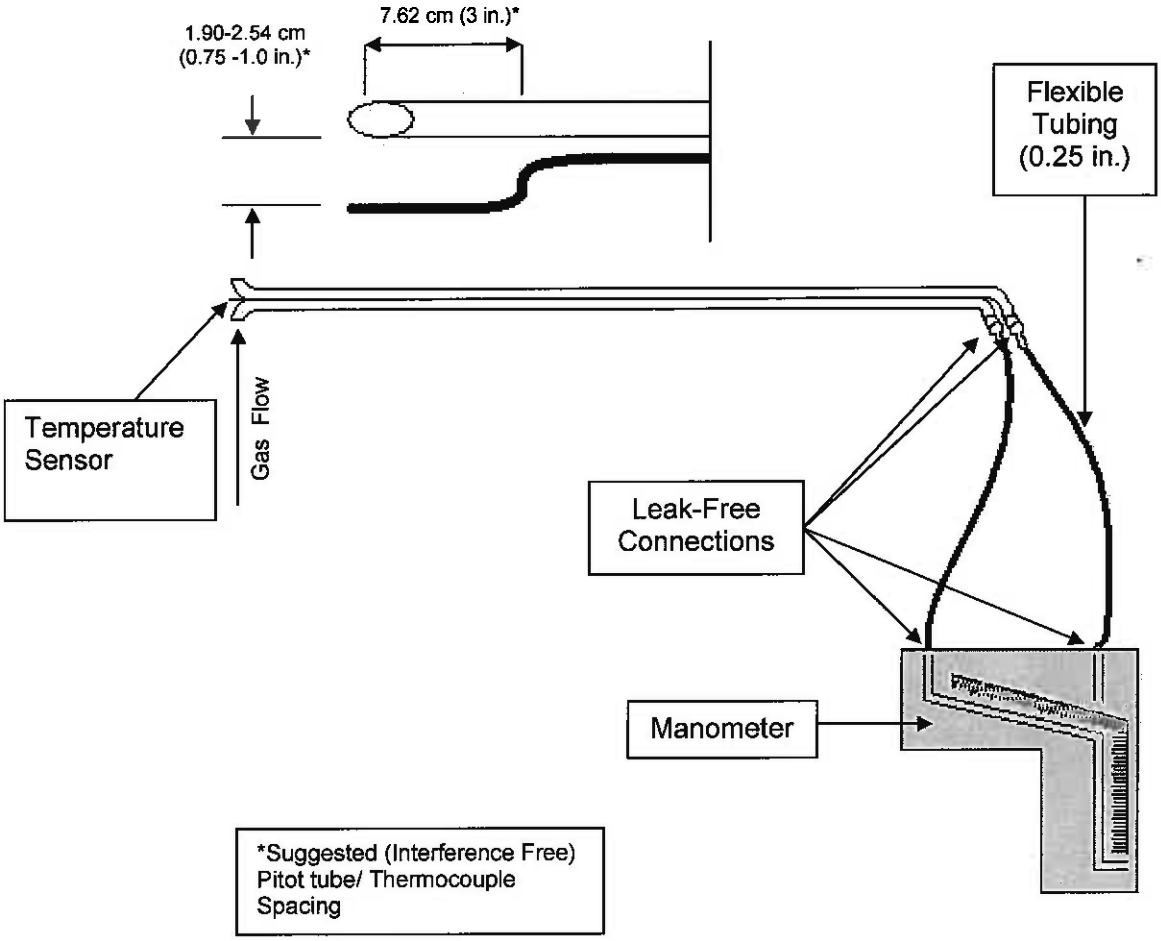
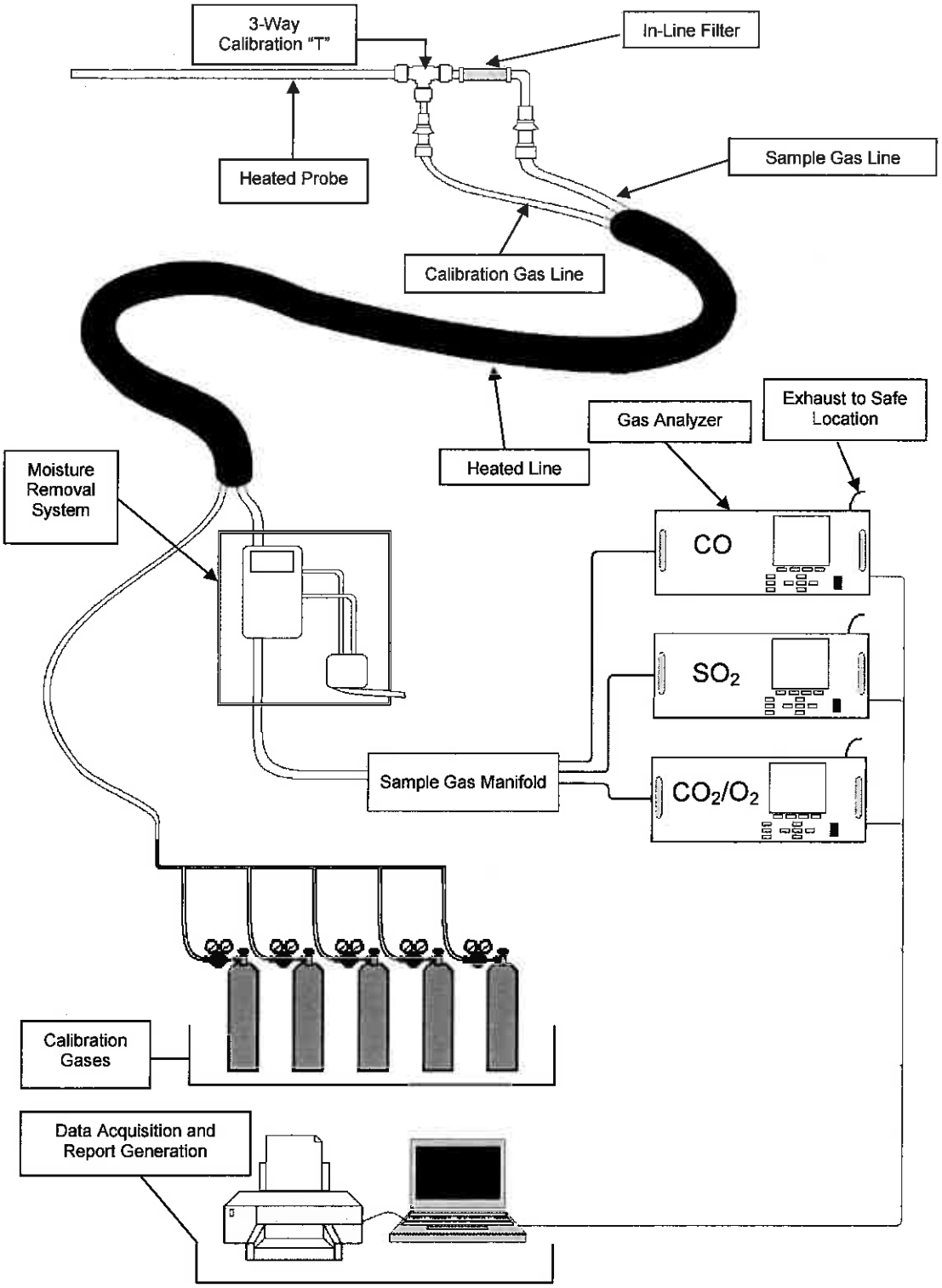
USEPA Method 2- Type S Pitot Tube Manometer Assembly

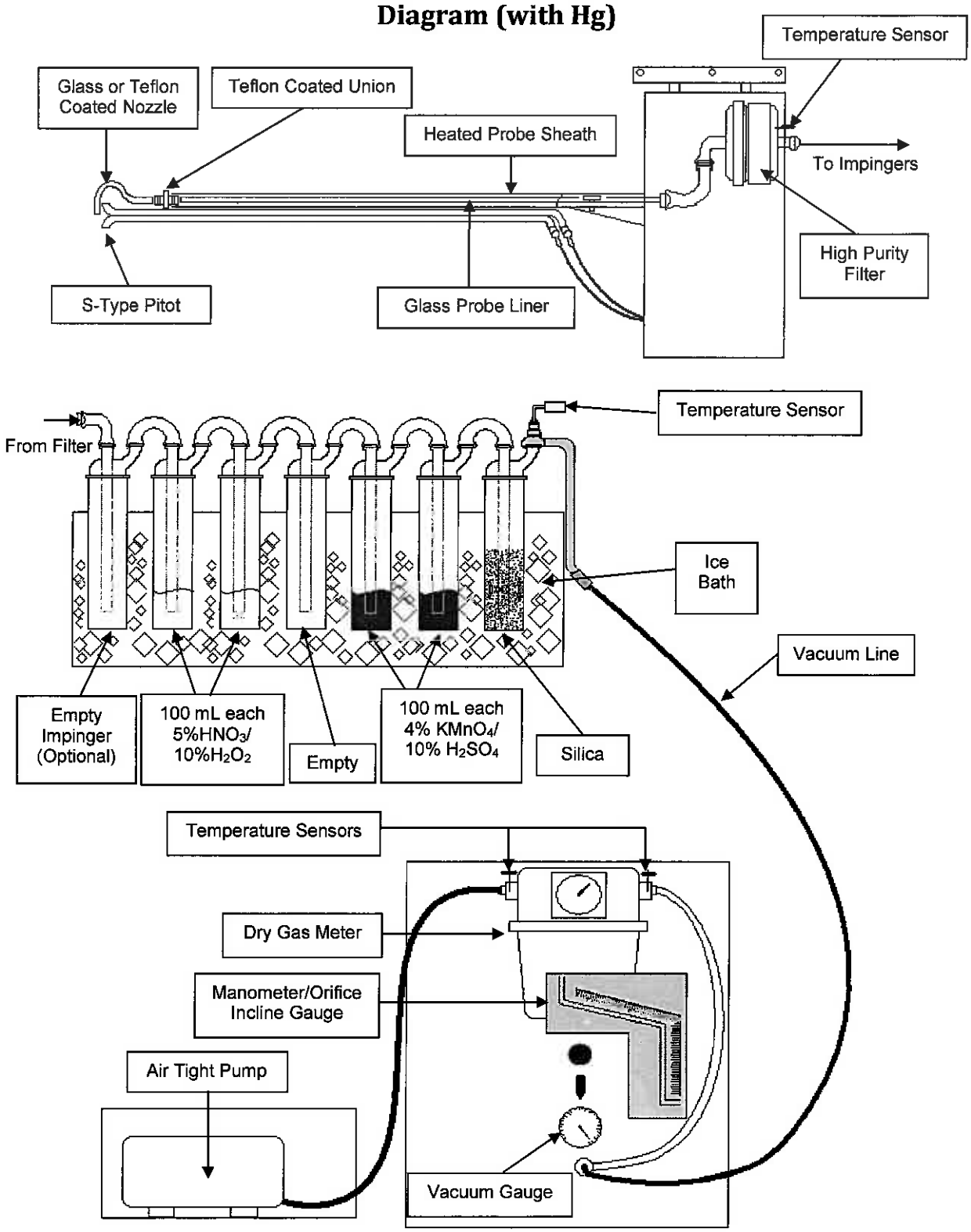


USEPA Methods 3A, 6C, and 10 Extractive Gaseous Sampling Diagram



ATD-007 Extractive3A 6C and 10 Rev. 1.2 3/31/2016

USEPA Method 5/29- Particulate Matter/Metals Sample Train Diagram (with Hg)



ATD-040 USEPA Method 5/29 (with Hg) Rev. 1.1 8/17/2015

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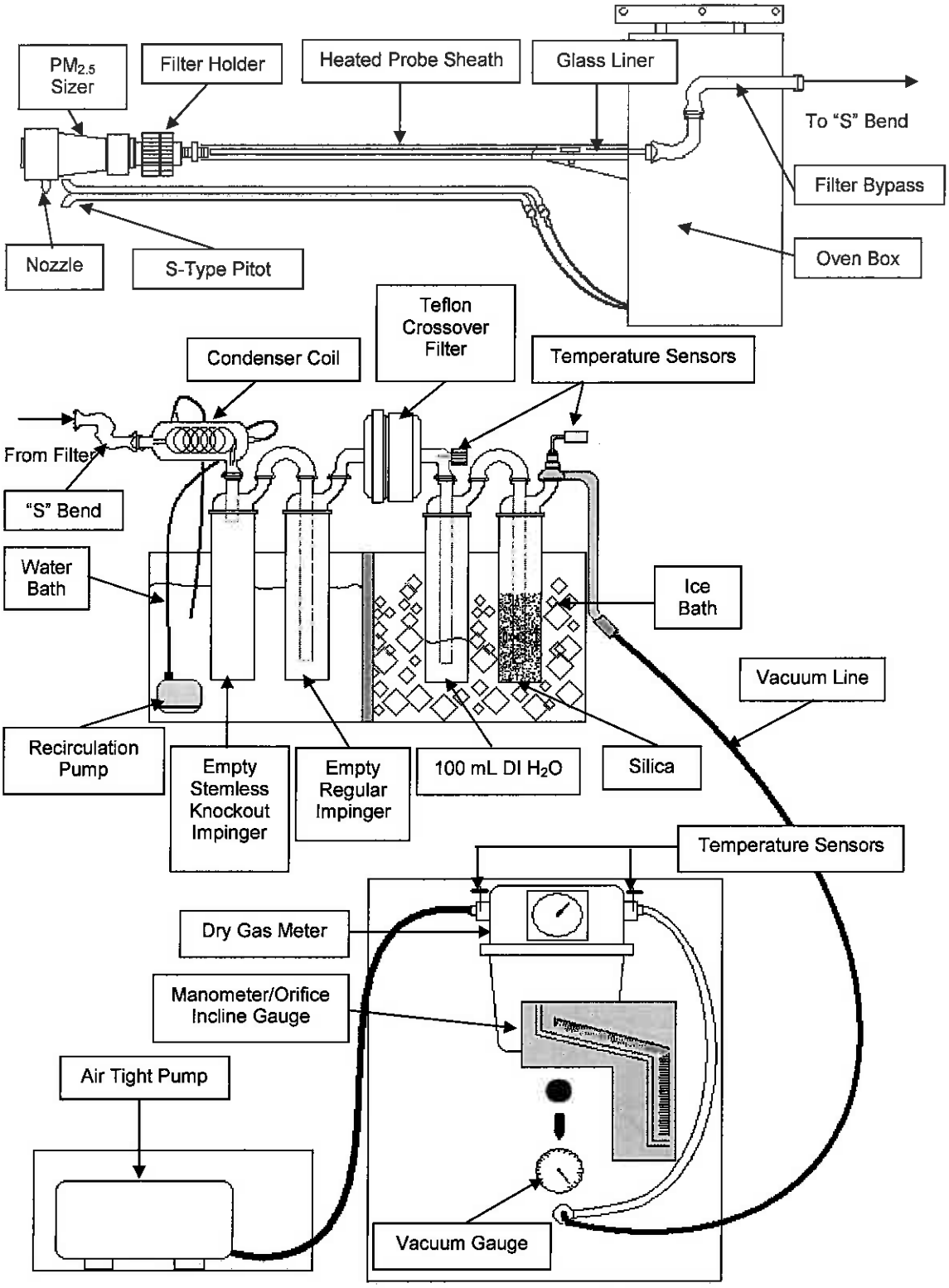
USEPA Method 201a/202- $PM_{2.5}$ and Condensable Particulate Matter



ATD-073 USEPA Method 201A PM2.5/202 Rev. 1.1 8/17/2015

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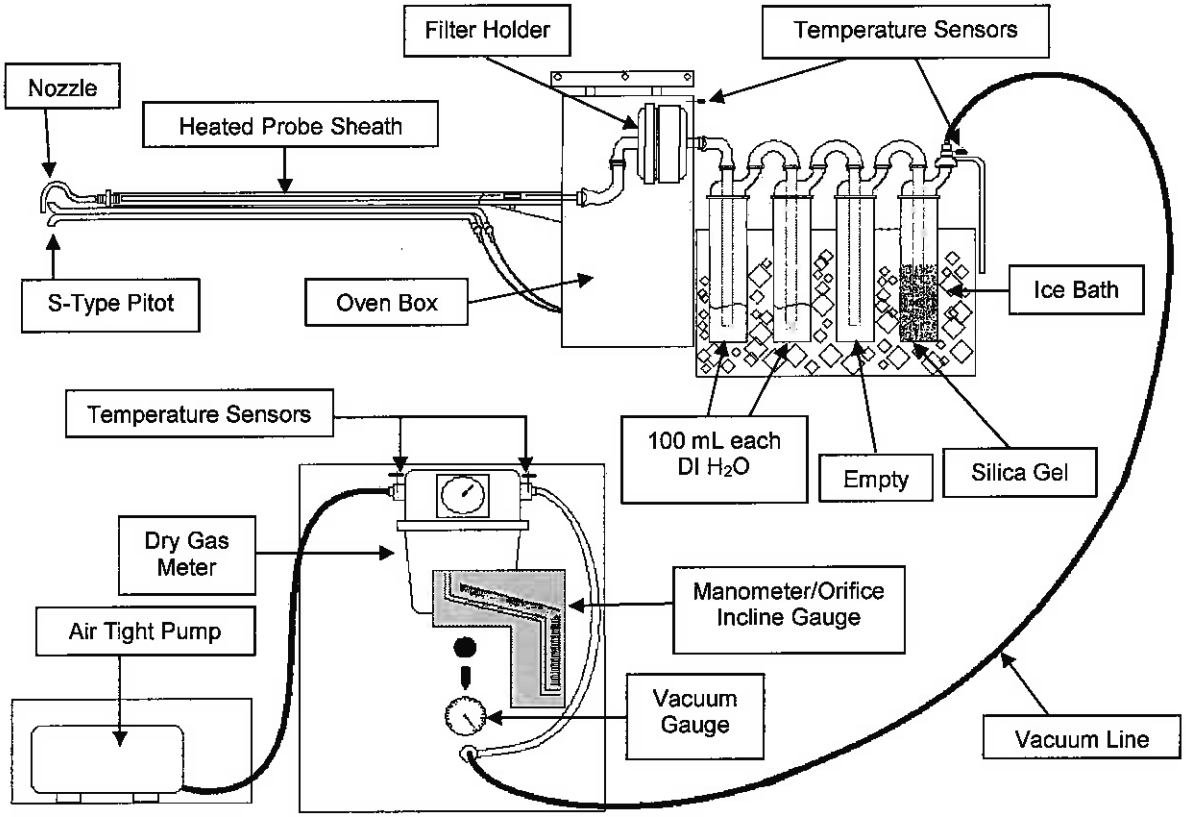
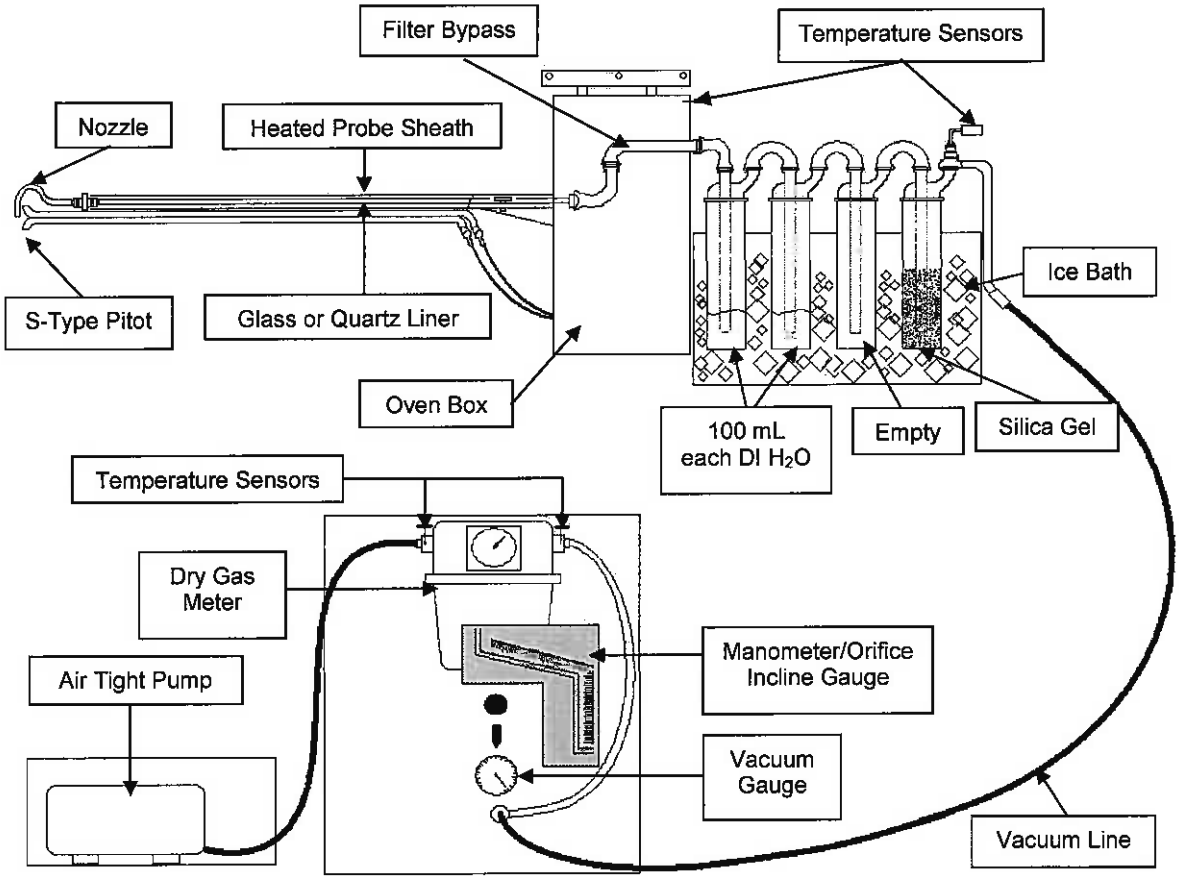
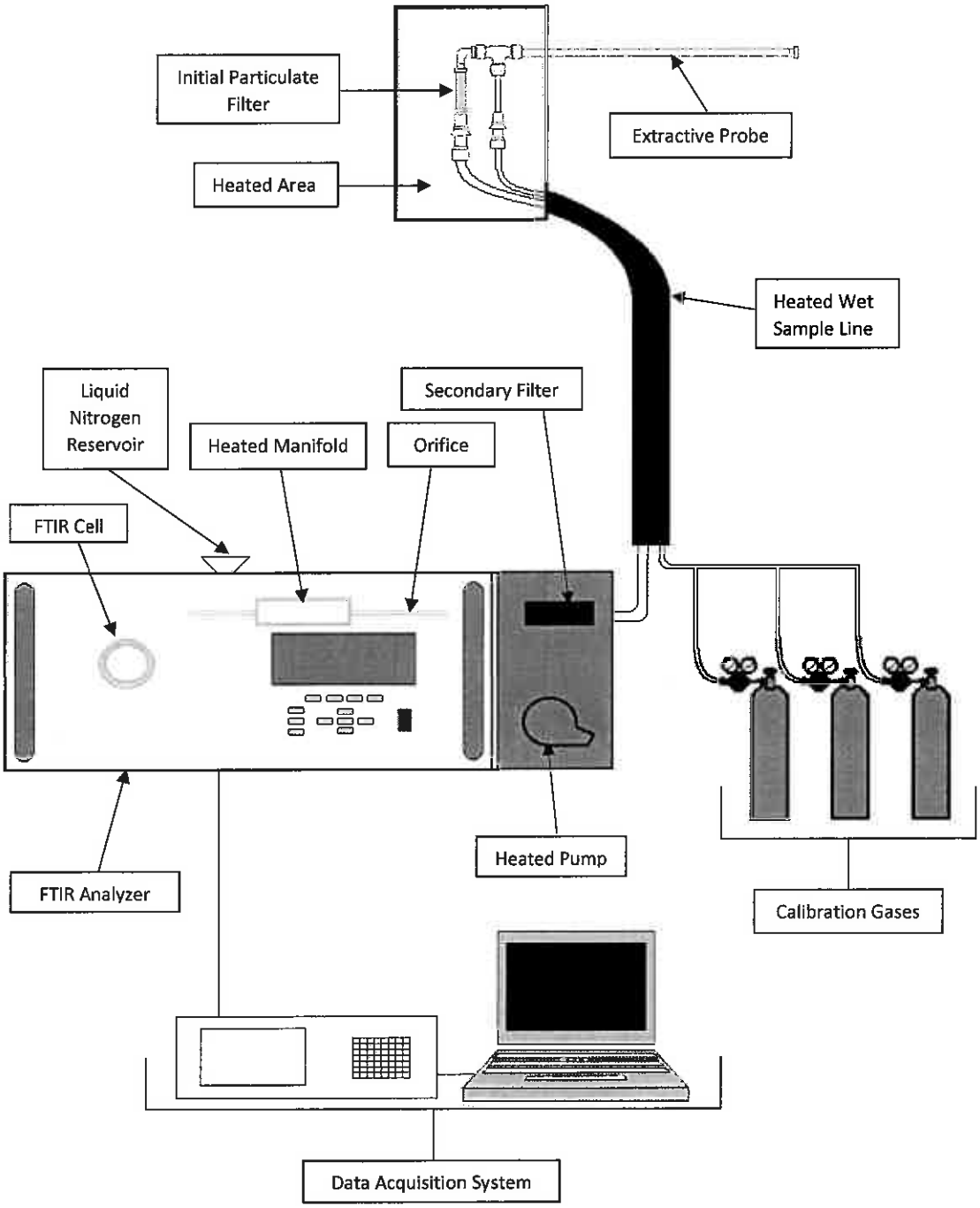
USEPA Method 315- Toluene Extractable Matter Sample Train Diagram



USEPA Method 316- Formaldehyde Sample Train Diagram



USEPA Method 320 – Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy Sample Train Diagram



ATD-081 USEPA Method 320 FTIR Rev. 1.1 8/17/2015

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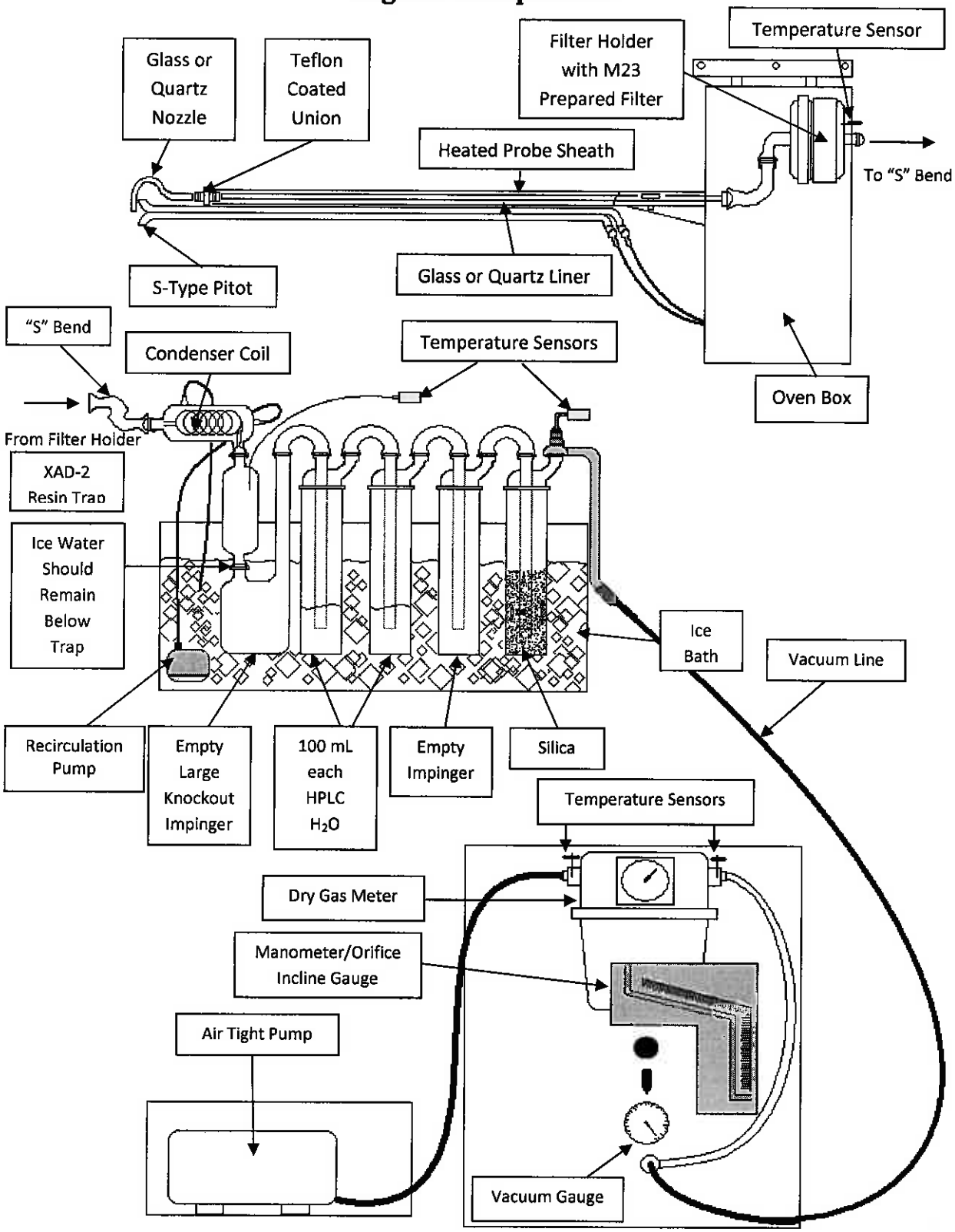
Method 0010/23 - Determination of PCDD/PCDF and Semi-Volatile Organic Compounds



ATD-061 USEPA Method 23 Rev. 1.1 8/17/2015

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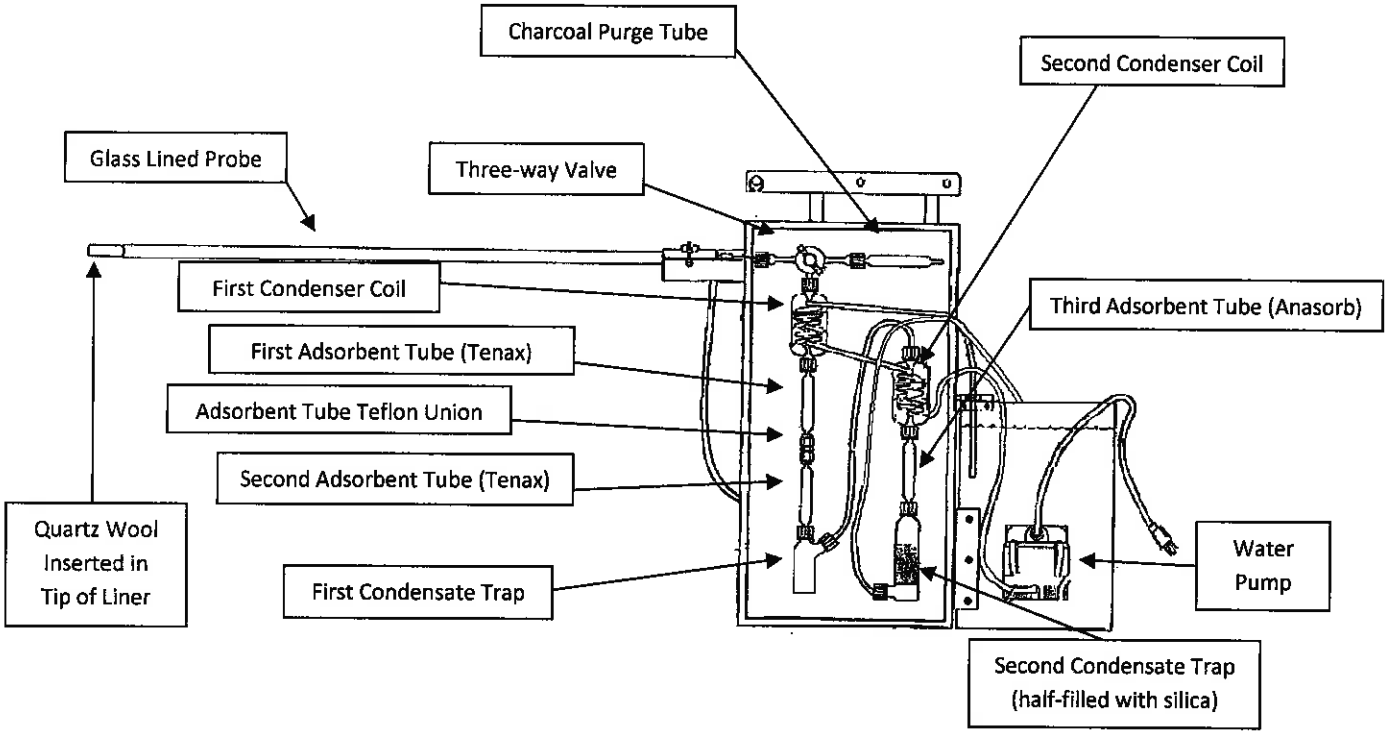
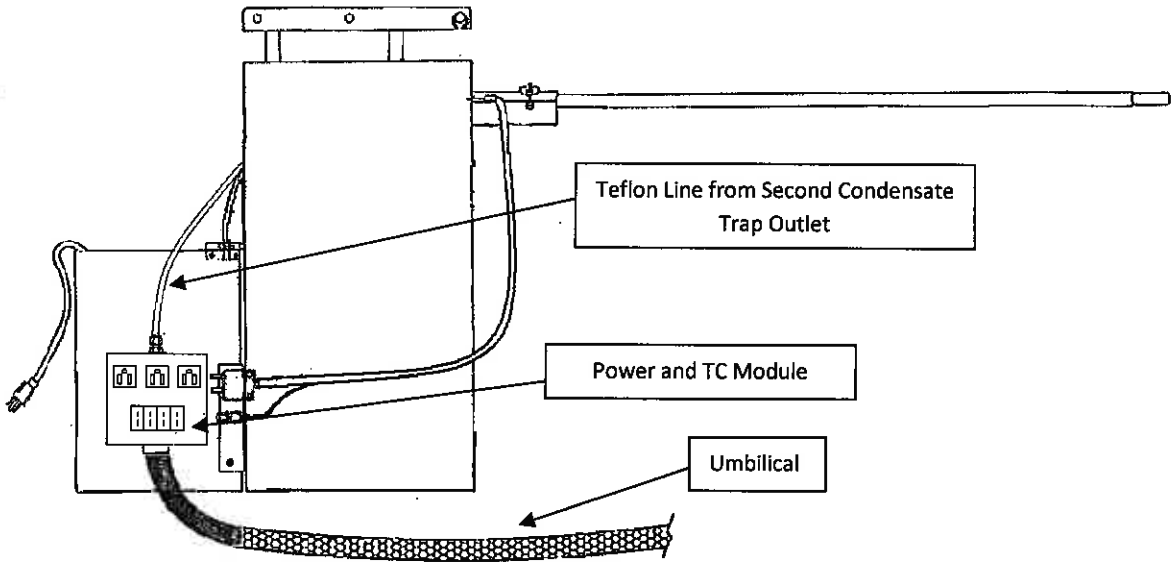
Method 0031 - Determination of Volatile Organic Hazardous Air Pollutants





(Reverse View)

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Appendix D - Calculation Nomenclature and Formulas

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810

Location: Coke Battery No. 2 Underfire Stack
Date: 9/14/16

Sample Calculations

CO ppmvd

$$(48.0 \text{ ppm} - -0.6 \text{ ppm}) \times \frac{49.4 \text{ ppm}}{49.5 \text{ ppm} - -0.6 \text{ ppm}} = 47.9 \text{ ppm}$$

CO2 % (dry)

$$(5.9 \text{ ppm} - 0.0 \text{ ppm}) \times \frac{10.3 \text{ ppm}}{10.0 \text{ ppm} - 0.0 \text{ ppm}} = 6.10\ \%$$

O2 % (dry)

$$(9.0 \text{ ppm} - 0.1 \text{ ppm}) \times \frac{12.2 \text{ ppm}}{12.2 \text{ ppm} - 0.1 \text{ ppm}} = 9.00\ \%$$

$$C_{gas} = (C - C_o) \times \frac{C_{ma}}{C_m - C_o}$$

where:
C_{gas} = Effluent gas concentration, dry basis, ppm
C = Average gas concentration indicated by gas analyzer, dry basis, ppm
C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm
C_m = Average of initital and final system calibration bias check responses for the upscale calibration gas, ppm
C_{ma} = Actual concentration of the upscale calibration gas, ppm

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Client:	**ArcelorMittal Burns Harbor LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/14/2016**
Method:	**5/29**
Source Condition:	**Normal**

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$\%CO_2$ = 6.1 $\%O_2$ = 9.0 $\%N_2$ = 84.9

Md = 29.336

Wet Molecular Weight

$$Ms = Md \times (1-Bws) + (18.0 \times Bws)$$

Md = 29.336 Bws = 0.178

Ms = 27.317

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

Y = 1.001 Vm = 120.990 Pbar = 29.40

DH = 1.65 Tm = 543.1

Vm(std) = 116.169

Volume of Water Vapor Condensed

$$Vw(std) = 0.0471 \times (\text{net } H_2O \text{ gain})$$

Net H_2O = 534.6

Vw(std) = 25.180

Moisture Content

$$Bws = \frac{Vwc(std)}{Vwc(std) + Vm(std)}$$

Vw(std) = 25.180 Vm(std) = 116.169

Bws = 0.178 0.171532509

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Client:	**ArcelorMittal Burns Harbor LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/14/2016**
Method:	**5/29**
Source Condition:	**Normal**

Average Duct Velocity

$$Vs = 85.49 \times Cp \times \text{Sqrt DP (avg)} \times (Ts\ (avg) / (Ps \times Ms))^{1/2}$$

Cp = 0.840 Ts (avg) = 911.3 Sqrt DP (avg): 0.267
Ps = 29.36 Ms = 27.317

Vs = 20.407

Volumetric Flow Rate (Actual Basis)

$$Q = Vs \times A \times 60$$

Vs = 20.407 A = 165.130

Q = 202,185

Volumetric Flow Rate (Standard Basis)

$$Qstd = 17.647 \times Q \times \frac{Ps}{Ts\ (avg)}$$

Q = 202,185 Ps = 29.36 Ts (avg) = 911.3

Qstd = 114,942

Volumetric Flow Rate (Standard Dry Basis)

$$Qstd(dry) = Qstd \times (1-Bws)$$

Qstd = 114,942 Bws = 0.178

Qstd(dry) = 94,466

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times Ts \times Vm(std)}{Vs \times \theta \times An \times Ps \times (1-Bws)}$$

Ts = 911.3 Vm(std) = 116.169 Vs = 20.407
An = 0.0013744 θ = 144 Ps = 29.36
Bws = 0.178

%ISO = 102.7

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Client:	**ArcelorMittal Burns Harbor LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/14/2016**
Method:	**5/29**
Source Condition:	**Normal**

PM Concentration:
This example represents the filterable fraction. For other fractions, use the obtained mn for that particulate fraction.

$$Co = \frac{m_n \times 15.43}{Vm(std)}$$

m_n (g) = 0.1361 Vm(std) = 116.169

Co = 0.0181 gr/dscf

PM Emission Rate:

$$\text{Emission Rate lb/hr} = \frac{Co}{7{,}000} \times Qstd(dry) \times 60$$

Co = 0.0181 Qstd(dry) = 94,466

Emission Rate lb/hr = 14.637 lb/hr

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Client:	**ArcelorMittal Burns Harbor LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/14/2016**
Method:	**5/29**
Source Condition:	**Normal**

Antimony (Sb) Concentration:

$$\mu g/m^3 = \frac{\mu g \text{ of Antimony (Sb)}}{Vm(std) \times 0.02832\ m^3/ft^3}$$

µg= 4.80 **Vm(std) =** 116.169

µg/m³= 1.46E-03

Antimony (Sb) Emission Rate:

$$\text{lb of Antimony (Sb)} = \frac{\mu g \text{ of sample} \times 10^{-6}\ \text{grams}/\mu g}{453.6\ \text{grams/lb}}$$

lb of Antimony (Sb) = 1.06E-08 **dscfm =** 94,466

$$\text{Emission Rate lb/hr} = \frac{\text{lb of Antimony (Sb)}}{Vm(std)} \times \text{dscfm} \times 60\ \text{min/hr}$$

Emission Rate lb/hr = 5.16E-04

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/14/2016**
Method:	**201A/202**
Source Condition:	**Normal**

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$\%CO_2$ = 6.1 $\%O_2$ = 9.0 $\%N_2$ = 84.9

Md = 29.336

Wet Molecular Weight

$$Ms = Md \times (1-Bws) + (18.0 \times Bws)$$

Md = 29.336 Bws = 0.180

Ms = 27.300

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

Y = 1.016 Vm = 79.850 Pbar = 29.40

DH = 0.33 Tm = 536.8

Vm(std) = 78.481

Volume of Water Vapor Condensed

$$Vw(std) = 0.0471 \times (\text{net } H_2O \text{ gain})$$

Net H_2O = 364.8

Vw(std) = 17.182

Moisture Content

$$Bws = \frac{Vwc(std)}{Vwc(std) + Vm(std)}$$

Vw(std) = 17.182 Vm(std) = 78.481

Bws = 0.180 0.171326571

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/14/2016**
Method:	**201A/202**
Source Condition:	**Normal**

Average Duct Velocity

$$Vs = 85.49 \times Cp \times \text{Sqrt DP (avg)} \times (Ts\ (avg)/(Ps \times Ms))^{1/2}$$

Cp = 0.840 Ts (avg) = 909.2 Sqrt DP (avg): 0.277
Ps = 29.36 Ms = 27.300

Vs = 21.159

Volumetric Flow Rate (Actual Basis)

$$Q = Vs \times A \times 60$$

Vs = 21.159 A = 165.130

Q = 209,643

Volumetric Flow Rate (Standard Basis)

$$Qstd = 17.647 \times Q \times \frac{Ps}{Ts\ (avg)}$$

Q = 209,643 Ps = 29.36 Ts (avg) = 909.2

Qstd = 119,455

Volumetric Flow Rate (Standard Dry Basis)

$$Qstd(dry) = Qstd \times (1-Bws)$$

Qstd = 119,455 Bws = 0.180

Qstd(dry) = 97,999

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times Ts \times Vm(std)}{Vs \times \theta \times An \times Ps \times (1-Bws)}$$

Ts = 909.2 Vm(std) = 78.481 Vs = 21.159
An = 0.0004909 θ = 237 Ps = 29.36
Bws = 0.180

%ISO = 101.2

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/14/2016**
Method:	**201A/202**
Source Condition:	**Normal**

PM Concentration:
This example represents the less than PM2.5 filterable fraction. For other fractions, use the obtained mn for that particulate fraction.

$$Co = \frac{m_n \times 15.43}{Vm(std)}$$

m_n (g) = 0.0049 Vm(std) = 78.481

Co = 0.0010 gr/dscf

PM Emission Rate:

$$\text{Emission Rate lb/hr} = \frac{Co}{7{,}000} \times Qstd(dry) \times 60$$

Co = 0.0010 Qstd(dry) = 97,999

Emission Rate lb/hr = 0.807 lb/hr

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810

Location: Coke Battery No. 2 Underfire Stack
Date: 9/7/16

Sample Calculations

SO2 ppmvd

$$(537.1 \text{ ppm} - 4.8 \text{ ppm}) \times \frac{476.3 \text{ ppm}}{476.5 \text{ ppm} - 4.8 \text{ ppm}} = 537.5 \text{ ppm}$$

CO2 % (dry)

$$(6.1\ \% - 0.0\ \%) \times \frac{10.3\ \%}{10.2\ \% - 0.0\ \%} = 6.20\ \%$$

O2 % (dry)

$$(8.3\ \% - 0.0\ \%) \times \frac{12.2\ \%}{12.2\ \% - 0.0\ \%} = 8.30\ \%$$

$$C_{gas} = (C - C_o) \times \frac{C_{ma}}{C_m - C_o}$$

where:
C_{gas} = Effluent gas concentration, dry basis, ppm
C = Average gas concentration indicated by gas analyzer, dry basis, ppm
C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm
C_m = Average of initital and final system calibration bias check responses for the upscale calibration gas, ppm
C_{ma} = Actual concentration of the upscale calibration gas, ppm

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/7/2016**
Method:	**316**
Source Condition:	**Normal**

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$\%CO_2$ = 6.3 $\%O_2$ = 8.4 $\%N_2$ = 85.3

Md = 29.344

Wet Molecular Weight

$$Ms = Md \times (1-Bws) + (18.0 \times Bws)$$

Md = 29.344 Bws = 0.181

Ms = 27.286

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

Y = 1.001 Vm = 83.102 Pbar = 29.21

DH = 1.15 Tm = 543.5

Vm(std) = 79.124

Volume of Water Vapor Condensed

$$Vw(std) = 0.0471 \times (\text{net } H_2O \text{ gain})$$

Net H_2O = 372.4

Vw(std) = 17.540

Moisture Content

$$Bws = \frac{Vwc(std)}{Vwc(std) + Vm(std)}$$

Vw(std) = 17.540 Vm(std) = 79.124

Bws = 0.181 0.184794283

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/7/2016**
Method:	**316**
Source Condition:	**Normal**

Average Duct Velocity

$$Vs = 85.49 \times Cp \times \text{Sqrt DP (avg)} \times (Ts\ (avg) / (Ps \times Ms))^{1/2}$$

Cp = 0.840 Ts (avg) = 914.7 Sqrt DP (avg): 0.286
Ps = 29.17 Ms = 27.286

Vs = 22.044

Volumetric Flow Rate (Actual Basis)

$$Q = Vs \times A \times 60$$

Vs = 22.044 A = 165.130

Q = 218,408

Volumetric Flow Rate (Standard Basis)

$$Qstd = 17.647 \times Q \times \frac{Ps}{Ts\ (avg)}$$

Q = 218,408 Ps = 29.17 Ts (avg) = 914.7

Qstd = 122,894

Volumetric Flow Rate (Standard Dry Basis)

$$Qstd(dry) = Qstd \times (1-Bws)$$

Qstd = 122,894 Bws = 0.181

Qstd(dry) = 100,594

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times Ts \times Vm(std)}{Vs \times \theta \times An \times Ps \times (1-Bws)}$$

Ts = 914.7 Vm(std) = 79.124 Vs = 22.044
An = 0.0010320 θ = 120 Ps = 29.17
Bws = 0.181

%ISO = 104.9

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/7/2016**
Method:	**316**
Source Condition:	**Normal**

Formaldehye Concentration:

$$mg/m^3 = \frac{\text{mg of Formaldehye}}{Vm(std) \times 0.02832\ m^3/ft^3}$$

mg= 0.02 Vm(std) = 79.124

mg/m^3= 1.00E-02

Formaldehye Emission Rate:

$$\text{lb of Formaldehye} = \frac{\mu g \text{ of sample} \times 10^{-6} \text{ grams}/\mu g}{453.6 \text{ grams/lb}}$$

$$\text{Emission Rate lb/hr} = \frac{\text{lb of Formaldehye}}{Vm(std)} \times \text{dscfm} \times 60 \text{ min/hr}$$

lb of Formaldehye = 3.75E-11 dscfm = 100,594

Emission Rate lb/hr = 2.90E-03

© Mostardi Platt

Client:	ArcelorMittal Burns Harbor, LLC
Facility:	Burns Harbor, Indiana
Test Location:	Coke Battery No. 2 Underfire Stack
Run:	1
Date:	9/12/2016
Method:	315
Source Condition:	Normal

Dry Molecular Weight

$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$

$\%CO_2 =$ 6.5 $\%O_2 =$ 8.2 $\%N_2 =$ 85.3

$Md =$ 29.368

Wet Molecular Weight

$Ms = Md \times (1-Bws) + (18.0 \times Bws)$

$Md =$ 29.368 $Bws =$ 0.176

$Ms =$ 27.368

Meter Volume at Standard Conditions

$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$

$Y =$ 1.001 $Vm =$ 72.910

$DH =$ 0.88 $Tm =$ 544.4 $Pbar =$ 29.35

$Vm(std) =$ 69.587

Volume of Water Vapor Condensed

$Vw(std) = 0.0471 \times (\text{net } H_2O \text{ gain})$

$\text{Net } H_2O =$ 315.4

$Vw(std) =$ 14.855

Moisture Content

$Bws = \frac{Vwc(std)}{Vwc(std) + Vm(std)}$

$Vw(std) =$ 14.855 $Vm(std) =$ 69.587

$Bws =$ 0.176 0.170693719

Average Duct Velocity

$Vs = 85.49 \times Cp \times \text{Sqrt DP (avg)} \times (Ts(avg)/(Ps \times Ms))^{1/2}$

$Cp =$ 0.840 $Ts(avg) =$ 910.1 Sqrt DP (avg): 0.261

$Ps =$ 29.31 $Ms =$ 27.368

$Vs =$ 19.998

Volumetric Flow Rate (Actual Basis)

$Q = Vs \times A \times 60$

$Vs =$ 19.998 $A =$ 165.130

$Q =$ 198,137

Volumetric Flow Rate (Standard Basis)

$Qstd = 17.647 \times Q \times \frac{Ps}{Ts(avg)}$

$Q =$ 198,137 $Ps =$ 29.31 $Ts(avg) =$ 910.1

$Qstd =$ 112,588

Volumetric Flow Rate (Standard Dry Basis)

$Qstd(dry) = Qstd \times (1-Bws)$

$Qstd =$ 112,588 $Bws =$ 0.176

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Client:	ArcelorMittal Burns Harbor, LLC
Facility:	Burns Harbor, Indiana
Test Location:	Coke Battery No. 2 Underfire Stack
Run:	1
Date:	9/12/2016
Method:	315
Source Condition:	Normal

Qstd(dry) = 92,781

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times Ts \times Vm(std)}{Vs \times \theta \times An \times Ps \times (1-Bws)}$$

Ts = 910.1 Vm(std) = 69.587 Vs = 19.998
An = 0.0010415 θ = 120 Ps = 29.31
Bws = 0.176

%ISO = 99.1

TSO Concentration:

This example represents the filterable fraction. For other fractions, use the obtained mn for that particulate fraction.

$$Co = \frac{m_n \times 15.43}{Vm(std)}$$

Blanks were subtracted from the front half DCM Extractable Material, and back half DCM Extractive Material

Run 1	Final Weight (grams)		Blank Weight (grams)			Final Weight Minus Blank (grams)
Front Half DCM Extractable Material	0.0040	Front Half DCM Extractable Material COC # 001 Page 3/9	0.0112	Method Blank Front Half DCM Extractable Material Page 8/9	≤	0.0003
DCM Extractable Material	0.0083	Acetone Rinse DCM Extractable Material COC #002 Page 3/9	(72 ml/231 ml x 7.8 mg/1000 mg/g)= 0.0024	Acetone Rinse DCM Extractable Material COC #010-011 Page 3/9	≤	0.0059
Total Front Half Weight					≤	0.0062
DI Water	<0.0005		0.0005 Non detect used in calculation		≤	
DI/Acetone/Toluene Wash	0.0373	Back Half DCM Extractable Material + Back Half DCM Extracable Material in Rinse COC #003 Page 4/9	(200 ml/231 ml x 5.7 mg/1000 mg/g)=0.0068	Acetone Rinse DCM Extractable Material COC #010-011 Page 3/9 and weight of solvent for sample COC #003	≤	0.0005
Total Back Half Weight					≤	0.0324
Total TSO Weight					≤	0.0390

m_n (g) = 0.0380 Vm(std) = 69.587

Co = 0.0087 gr/dscf

TSO Emission Rate:

$$\text{Emission Rate lb/hr} = \frac{Co}{7{,}000} \times Qstd(dry) \times 60$$

Co = 0.0087 Qstd(dry) = 92,781

Emission Rate lb/hr = 6.88E+00 lb/hr

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/12/2016**
Method:	**0010/23**
Source Condition:	**Normal**

Dry Molecular Weight

$$Md = 0.44 \times (\%CO_2) + 0.32 \times (\%O_2) + 0.28 \times \%N_2$$

$\%CO_2$ = 6.5 $\%O_2$ = 8.2 $\%N_2$ = 85.3

Md = 29.368

Wet Molecular Weight

$$Ms = Md \times (1-Bws) + (18.0 \times Bws)$$

Md = 29.368 Bws = 0.171

Ms = 27.426

Meter Volume at Standard Conditions

$$Vm(std) = 17.647 \times Y \times Vm \times \frac{(Pbar + DH/13.6)}{Tm}$$

Y = 1.016 Vm = 160.690 Pbar = 29.35

DH = 1.84 Tm = 541.3

Vm(std) = 156.929

Volume of Water Vapor Condensed

$$Vw(std) = 0.0471 \times (\text{net } H_2O \text{ gain})$$

Net H_2O = 686.6

Vw(std) = 32.339

Moisture Content

$$Bws = \frac{Vwc(std)}{Vwc(std) + Vm(std)}$$

Vw(std) = 32.339 Vm(std) = 156.929

Bws = 0.171 0.168213485

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/12/2016**
Method:	**0010/23**
Source Condition:	**Normal**

Average Duct Velocity

$$Vs = 85.49 \times Cp \times \text{Sqrt DP (avg)} \times (Ts\ (avg) / (Ps \times Ms))^{1/2}$$

Cp = 0.840 Ts (avg) = 907.6 Sqrt DP (avg): 0.276
Ps = 29.31 Ms = 27.426

Vs = 21.088

Volumetric Flow Rate (Actual Basis)

$$Q = Vs \times A \times 60$$

Vs = 21.088 A = 165.130

Q = 208,932

Volumetric Flow Rate (Standard Basis)

$$Qstd = 17.647 \times Q \times \frac{Ps}{Ts\ (avg)}$$

Q = 208,932 Ps = 29.31 Ts (avg) = 907.6

Qstd = 119,051

Volumetric Flow Rate (Standard Dry Basis)

$$Qstd(dry) = Qstd \times (1-Bws)$$

Qstd = 119,051 Bws = 0.171

Qstd(dry) = 98,710

Isokinetic Variation:

$$\%ISO = \frac{0.0945 \times Ts \times Vm(std)}{Vs \times \theta \times An \times Ps \times (1-Bws)}$$

Ts = 907.6 Vm(std) = 156.929 Vs = 21.088
An = 0.0013635 θ = 192 Ps = 29.31
Bws = 0.171

%ISO = 100.3

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Client:	**ArcelorMittal Burns Harbor, LLC**
Facility:	**Burns Harbor, Indiana**
Test Location:	**Coke Battery No. 2 Underfire Stack**
Run:	**1**
Date:	**9/12/2016**
Method:	**0010/23**
Source Condition:	**Normal**

PCDD/PCDF Concentration:

$$ng/m^3 = \frac{\text{ng of PCDD/PCDF}}{Vm(std) \times 0.02832\ m^3/ft^3}$$

ng= 1.27 Vm(std) = 156.929

ng/m^3= 4.88E-08 O_2% = 8.2

PCDD/PCDF Emission Rate:

$$\text{lb of PCDD/PCDF} = \frac{\text{ng of sample} \times 10^{-9}\ \text{grams}/\mu g}{453.6\ \text{grams/lb}}$$

$$\text{Emission Rate lb/hr} = \frac{\text{lb of PCDD/PCDF}}{Vm(std)} \times \text{dscfm} \times 60\ \text{min/hr}$$

lb of PCDD/PCDF = 2.79E-12 dscfm = 98,710

Emission Rate lb/hr = 1.65E-05

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Isokinetic Calculation Formulas

1. $V_{w(std)} = V_{lc}\left(\frac{\rho_w}{M_w}\right)\left(\frac{RT_{std}}{P_{std}}\right) = K_2 V_{lc}$

2. $V_{m(std)} = V_m Y \left(\frac{T_{std}}{T_m}\right)\left(\frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{P_{std}}\right) = K_1\ V_m\ Y \frac{(P_{bar} + (\frac{\Delta H}{13.6}))}{T_m}$

3. $B_{ws} = \frac{V_{w(std)}}{(V_{m(std)} + V_{w(std)})}$

4. $M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2)$

5. $M_s = M_d(1 - B_{ws}) + 18.0(B_{ws})$

6. $C_a = \frac{m_a}{V_a \rho_a}$

7. $W_a = C_a V_{aw} \rho_a$

8. $C_{acf} = 15.43 K_i \left(\frac{m_n P_s}{V_{w(std)} + V_{m(std)}\ T_s}\right)$

9. $C_S = (15.43\ \text{grains/gram})\,(m_n / V_{m(std)})$

10. $v_s = K_p C_p \sqrt{\frac{\Delta P\ T_s}{P_s M_s}}$

11. $Q_{acfm} = v_s A(60_{sec/min})$

12. $Q_{sd} = (3600_{sec/hr})(1 - B_{ws})\, v_s \left(\frac{T_{std} P_s}{T_s P_{std}}\right) A$

13. $E\ (\text{emission rate, lbs/hr}) = Q_{std}(C_s / 7000\ \text{grains/lb})$

14. $IKV = \frac{T_s V_{m(std)} P_{std}}{T_{std} v_s \theta A_n P_s 60(1 - B_{ws})} = K_4 \frac{T_s V_{m(std)}}{P_s v_s A_n \theta (1 - B_{ws})}$

15. $\%EA = \left(\frac{\%O_2 - (0.5\,\%CO)}{0.264\,\%N_2 - (\%O_2 - 0.5\,\%CO)}\right) \times 100$

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Isokinetic Nomenclature

A = Cross-sectional area of stack or duct, square feet
A_n = Cross-sectional area of nozzle, square feet
B_{ws} = Water vapor in gas stream, by volume
C_a = Acetone blank residue concentration, g/g
C_{acf} = Concentration of particulate matter in gas stream at actual conditions, gr/acf
C_p = Pitot tube coefficient
C_s = Concentration of particulate matter in gas stream, dry basis, corrected to standard conditions, gr/dscf
IKV = Isokinetic sampling variance, must be 90.0 % ≤ IKV ≤ 110.0%
M_d = Dry molecular weight of gas, lb/lb-mole
M_s = Molecular weight of gas, wet basis, lb/lb-mole
M_w = Molecular weight of water, 18.0 lb/lb-mole
m_a = Mass of residue of acetone after evaporation, grams
P_{bar} = Barometric pressure at testing site, inches mercury
P_g = Static pressure of gas, inches mercury (inches water/13.6)
P_s = Absolute pressure of gas, inches mercury = $P_{bar} + P_g$
P_{std} = Standard absolute pressure, 29.92 inches mercury
Q_{acfm} = Actual volumetric gas flow rate, acfm
Q_{sd} = Dry volumetric gas flow rate corrected to standard conditions, dscfh
R = Ideal gas constant, 21.85 inches mercury cubic foot/°R-lb-mole
T_m = Dry gas meter temperature, °R
T_s = Gas temperature, °R
T_{std} = Absolute temperature, 528°R
V_a = Volume of acetone blank, ml
V_{aw} = Volume of acetone used in wash, ml
W_a = Weight of residue in acetone wash, grams
m_n = Total amount of particulate matter collected, grams
V_{1c} = Total volume of liquid collected in impingers and silica gel, ml
V_m = Volume of gas sample as measured by dry gas meter, dcf
$V_{m(std)}$ = Volume of gas sample measured by dry gas meter, corrected to standard conditions, dscf
v_s = Gas velocity, ft/sec
$V_{w(std)}$ = Volume of water vapor in gas sample, corrected to standard conditions, scf
Y = Dry gas meter calibration factor
ΔH = Average pressure differential across the orifice meter, inches water
Δp = Velocity head of gas, inches water
ρ_a = Density of acetone, 0.7855 g/ml (average)
ρ_w = Density of water, 0.002201 lb/ml
θ = Total sampling time, minutes
K_1 = 17.647 °R/in. Hg
K_2 = 0.04707 ft^3/ml
K_4 = 0.09450/100 = 0.000945
K_p = Pitot tube constant, $85.49 \frac{ft}{sec}\left[\frac{(lb/lb-mole)(in.\ Hg)}{(°R)(in.\ H_2O)}\right]^{1/2}$
%EA = Percent excess air
$\%CO_2$ = Percent carbon dioxide by volume, dry basis
$\%O_2$ = Percent oxygen by volume, dry basis
%CO = Percent carbon monoxide by volume, dry basis
$\%N_2$ = Percent nitrogen by volume, dry basis
0.264 = Ratio of O_2 to N_2 in air, v/v
28 = Molecular weight of N_2 or CO
32 = Molecular weight of O_2
44 = Molecular weight of CO_2
13.6 = Specific gravity of mercury (Hg)

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Trace Metal (Including Mercury) Sample Calculations

Concentration

$$\frac{\mu g}{m^3} = \frac{\mu g\ of\ trace\ metal}{dscf\ volume\ sampled \times 0.02832 \frac{m^3}{ft^3}}$$

Emission Rate

$$\frac{\mu g\ of\ sample \times \frac{1 \times 10^{-6} grams}{\mu g}}{453.6\ gr/lb} = lbs\ of\ trace\ metal$$

$$\frac{lbs\ of\ trace\ metal}{V_m(std) sample} \times dscfm \times 60 \frac{min}{hr} = lbs\ of\ trace\ metal/hr$$

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Volumetric Air Flow Calculations

$$Vm\ (std) = 17.647 \times Vm \times \left[\frac{\left(P_{bar} + \left[\frac{DH}{13.6}\right]\right)}{(460 + Tm)}\right] \times Y$$

$$Vw\ (std) = 0.0471 \times Vlc$$

$$Bws = \left[\frac{Vw\ (std)}{Vw\ (std) + Vm\ (std)}\right]$$

$$Md = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + [0.28 \times (100 - \%CO_2 - \%O_2)]$$

$$Ms = Md \times (1 - Bws) + (18 \times Bws)$$

$$Vs = \sqrt{\frac{(Ts + 460)}{Ms \times Ps}} \times \sqrt{DP} \times Cp \times 85.49$$

$$Acfm = Vs \times Area\ (of\ stack\ or\ duct) \times 60$$

$$Scfm = Acfm \times 17.647 \times \left[\frac{Ps}{(460 + Ts)}\right]$$

$$Scfh = Scfm \times 60 \frac{min}{hr}$$

$$Dscfm = Scfm \times (1 - Bws)$$

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Volumetric Flow Nomenclature

A = Cross-sectional area of stack or duct, ft2
Bws = Water vapor in gas stream, proportion by volume
Cp = Pitot tube coefficient, dimensionless
Md = Dry molecular weight of gas, lb/lb-mole
Ms = Molecular weight of gas, wet basis, lb/lb-mole
Mw = Molecular weight of water, 18.0 lb/lb-mole
Pbar = Barometric pressure at testing site, in. Hg
Pg = Static pressure of gas, in. Hg (in. H2O/13.6)
DH= Static pressure of gas, in.H2O
Ps = Absolute pressure of gas, in. Hg = Pbar + Pg
Pstd = Standard absolute pressure, 29.92 in. Hg
Acfm = Actual volumetric gas flow rate
Scfm= Volumetric gas flow rate, corrected to standard conditions
Dscfm = Standard volumetric flow rate, corrected to dry conditions
R = Ideal gas constant, 21.85 in. Hg-ft3/°R-lb-mole
Ts = Average stack gas temperature, °F
Tm = Average dry gas meter temperature, oF
Tstd = Standard absolute temperature, 528°R
vs = Gas velocity, ft/sec
Vm(std)= Volume of gas sampled, corrected to standard conditions, scf
Vw(std) = Volume of water vapor in gas sample, corrected to standard conditions, scf
Vlc= Volume of liquid collected
Y = Dry gas meter calibration factor
Δp = Velocity head of gas, in. H2O
K1 = 17.647 °R/in. Hg
%EA = Percent excess air
%CO2 = Percent carbon dioxide by volume, dry basis
%O2 = Percent oxygen by volume, dry basis
%N2 = Percent nitrogen by volume, dry basis
0.264 = Ratio of O2 to N2 in air, v/v
0.28 = Molecular weight of N2 or CO, divided by 100
0.32 = Molecular weight of O2 divided by 100
0.44 = Molecular weight of CO2 divided by 100
13.6 = Specific gravity of mercury (Hg)

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Derivation of Factors Used in Carbon Monoxide and Sulfur Dioxide Calculations

Factors for calculating from lb/dscf to parts per million:

Using 22.414 liters of gas per gram-mole at 0°C and 1 atmosphere pressure,

One pound-mole of gas is contained in 359.04765 ft^3 at 32°F and 29.92 in. Hg, or 385.31943 ft^3 at 68°F and 29.92 in. Hg.

$$ppm = \frac{M\ lb/lb\text{-}mole}{385.31943\ dscf/lb\text{-}mole \times 10^6} = 2.595294\ \times\ 10^{-9}\ M\ lb/dscf$$

Where M = pollutant molecular weight; SO2 = 64.0628 lb/lb-mole; and NO_2 = 46.0055 lb/lb-mole

$$Factor\ for\ ppm\ SO_2 = \frac{1}{64.06 \times 2.59552 \times 10^{-9}} = 6.0151 \times 10^6\ dscf/lb$$

Use 6.0151 x 10^6

$$Factor\ for\ ppm\ NO_x = \frac{1}{46.0055 \times 2.5952494 \times 10^{-9}} = 8.3755 \times 10^6\ dscf/lb$$

Use 8.3755 x 10^6

Factors for calculating concentration as pounds per dry standard cubic feet:

$$Factor\ for\ C_{SO_2} = \frac{64.0628\ grams/gram\text{-}mole}{2\frac{gram-equivalent}{gram\text{-}mole} \times 1000\frac{gram\text{-}milliquivalents}{gram\text{-}equivalent} \times 453.592\frac{grams}{lb}}$$

$$= 7.061721 \times 10^{-5}\ lb/g\text{-}meq$$

Use 7.0617 x 10^{-5}

$$Factor\ for\ C_{NO_2}\ as\ NO_2 = \frac{28316.84\ ml/scf}{4.53592 \times 10^8\ \mu g/lb} = 6.242801 \times 10^{-5}\frac{lb/scf}{\mu g/ml}$$

Use 6.2428 x 10^{-5}

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ppm Conversion Calculations and Factors

ppm to lbs/scf

(ppm X) x (conversion factor X) = X lbs/scf

lbs/scf to lbs/hr

Dry ppm's with dry flow, and wet ppm's with wet flow.

(X lbs/scf) x (airflow scf/min) x (60 min/hr) = X lbs/hr

lbs/scf to lbs/mmBtu

Dry ppm's with dry diluent, and wet ppm's with wet diluent.

CO_2 – (X lbs/scf) x (F_c) x ($100/CO_2$) = X lbs/mmBtu

O_2 – (X lbs/scf) x (F_d) x ($20.9/(20.9-O_2)$) = X lbs/mmBtu

Conversion Factors

NO_x – 1.19396×10^{-7}

SO_2 – 1.6625×10^{-7}

CO – 7.2664×10^{-8}

CH_4 – 4.1637×10^{-8}

C_3H_8 – 1.1419×10^{-7}

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Calculations for Formaldehyde

Concentration

$$\frac{lbs\ HCHO}{dscf} = \frac{mg\ HCHO\ in\ sample}{4.536 \times 10^5 \times dscf}$$

Where:

4.536×10^5 = mg/lb
dscf = volume of gas sampled

Parts Per Million

$$ppm\ HCHO = \frac{lbs\ HCHO}{dscf} \div \frac{30.03}{385 \times 10^6}$$

Where:

385 = Volume of 1 lb mole of gas at 68°F and 29.92 in. Hg
10^6 = Conversion of ppm v/v

Emission Rate

$$lbs\ HCHO/dscf \times dscfm \times 60\,min/hr = lbs/hr\ HCHO$$

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Appendix E - Laboratory Sample Analysis

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Project Number: M162810
Test Location: #2 Underfire Stack

Test Method: 5/29
Filterable Analysis Date: 9/29/2016

Filter Drying Temp °F: 320
Analyst: BWH

Description	Sample Date	ID#	vol. (ml)	Initial Weight (grams)	Final Weight (grams)	Net Weight Gain (grams)
Filterable Particulate						
Test No. 1	9/14/2016					
Source Condition: Normal						
Acetone Wash (Teflon		609	30 ml	20.7556	20.8139	0.0583
M5 Filter		9441		0.4432	0.4531	0.0099
Acetone Wash (Teflon		610	30 ml	20.8320	20.9000	0.0680
Acetone Blank						0.0001
Total Front Half Weight						**0.1361**
Filterable Particulate						
Test No. 2	9/15/2016					
Source Condition: Normal						
Acetone Wash (Teflon		611	25 ml	21.0174	21.1565	0.1391
M5 Filter		10100		0.4574	0.4702	0.0128
Acetone Wash (Teflon		612	25 ml	20.8092	20.9218	0.1126
Acetone Blank						0.0001
Total Front Half Weight						**0.2644**
Filterable Particulate						
Test No. 3	9/15/2016					
Source Condition: Normal						
Acetone Wash (M5 Pans)		613	20 ml	5.2861	5.7850	0.4989
M5 Filter		9984		0.4555	0.4625	0.0070
Acetone Wash (M5 Pans)		614	25 ml	5.2922	5.5456	0.2534
Acetone Blank						0.0001
Total Front Half Weight						**0.7592**
Reagent Blank Summary						
Acetone Wash (Teflon		615	100 ml	20.8972	20.8975	0.0003

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Chain-of-Custody Form

Project Number: M162810	Date Results Required: Standard
Client: ArcelorMittal Burns Harbor	TAT Required: Standard
Plant/Test Location: Burns Harbor Coke Plant	Project Supervisor: Stuart Burton
P.O. # for Lab Work:	

Sample Number	Sample Date	Sample Point Identification	# of Cards	Sub Lab	Analysis Required	Volume (ml)
015	9/14/16	2 Underfire Stack-T1-Filter, Acetone F/W, Nitric Rinse	3	MAX	M5*/29**	
016	9/14/16	2 Underfire Stack-T1-HNO3/H2O2 Imps and Rinse	1	MAX	M29**	
017	9/14/16	2 Underfire Stack-T1-KMnO4 Imps & HCl Rinse, Imp 3 HNO3 Rinse	3	MAX	M29- Hg	
018	9/15/16	2 Underfire Stack-T2-Filter, Acetone F/W, Nitric Rinse	3	MAX	M5*/29**	
019	9/15/16	2 Underfire Stack-T2-HNO3/H2O2 Imps and Rinse	1	MAX	M29*	
020	9/15/16	2 Underfire Stack-T2-KMnO4 Imps & HCl Rinse, Imp 3 HNO3 Rinse	3	MAX	M29- Hg	
021	9/15/16	2 Underfire Stack-T3-Filter, Acetone F/W, Nitric Rinse	3	MAX	M5*/29**	
022	9/15/16	2 Underfire Stack-T3-HNO3/H2O2 Imps and Rinse	1	MAX	M29*	
023	9/15/16	2 Underfire Stack-T3-KMnO4 Imps & HCl Rinse, Imp 3 HNO3 Rinse	3	MAX	M29- Hg	
024	9/14/16	Acetone Reagent Blank	1	MAX	M5*/29**	
025	9/14/16	Filter Reagent Blank	3	MAX	M29*	
026	9/14/16	6 N HNO3 Reagent Blank	1	MAX	M29*	
027	9/14/16	HNO3/H2O2 Reagent Blank	1	MAX	M29*	
028	9/14/16	Acidic KMnO4 and HCl Reagent Blank	2	MAX	M29- Hg	
029	9/14/16	DI Reagent Blank	1	MAX	M29**	
030	9/14/16	M29 Audit sample		MAX		

Delivered to Lab By: Date/Time	Received by: Date/Time	Released by: Date/Time
	[illegible]	

Laboratory Notes: *M5 analysis was performed at the Mostardi Platt laboratory before sending to sub-lab for metals analysis

**Target TSM are: Antimony, Arsenic, Beryllium, Cadmium, Total Chromium, Cobalt, Lead, Manganese, Mercury, Nickel, and Selenium

Please Report Front + Back ½ Separate

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Chain-of-Custody Form	
Project Number: M162810	Date Results Required: Standard*
Client: Arcelor/Mittal Burns Harbor	TAT Required: Standard
Plant/Test Location: Burns Harbor Coke Plant	Project Supervisor: Stuart Burton
P.O. # for Lab Work:	

Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume ml
015	9/14/16	2 Underfire Stack-T1-Filter, Acetone RW, Nitric Rinse	3	MAX	M5*/29**	
016	9/14/16	2 Underfire Stack-T1-HNO3/H2O2 Imps and Rinse	1	MAX	M29**	
017	9/14/16	2 Underfire Stack-T1-KMnO4 Imps & HCl Rinse, Imp & HNO3 Rinse	3	MAX	M29- Hg	
018	9/15/16	2 Underfire Stack-T2-Filter, Acetone RW, Nitric Rinse	3	MAX	M5*/29**	
019	9/15/16	2 Underfire Stack-T2-HNO3/H2O2 Imps and Rinse	1	MAX	M29*	
020	9/15/16	2 Underfire Stack-T2-KMnO4 Imps & HCl Rinse, Imp & HNO3 Rinse	3	MAX	M29- Hg	
021	9/15/16	2 Underfire Stack-T3-Filter, Acetone RW, Nitric Rinse	3	MAX	M5*/29**	
022	9/15/16	2 Underfire Stack-T3-HNO3/H2O2 Imps and Rinse	1	MAX	M29*	
023	9/15/16	2 Underfire Stack-T3-KMnO4 Imps & HCl Rinse, Imp & HNO3 Rinse	3	MAX	M29- Hg	
024	9/14/16	Acetone Reagent Blank	1	MAX	M5*/29**	
025	9/14/16	Filter Reagent Blank	1	MAX	M29*	
026	9/14/16	0.1N HNO3 Reagent Blank	1	MAX	M29*	
027	9/14/16	HNO3/H2O2 Reagent Blank	1	MAX	M29*	
028	9/14/16	Acidic KMnO4 and HCl Reagent Blank	2	MAX	M29- Hg	
029	9/14/16	DI Reagent Blank	1	MAX	M29**	
030	9/14/16	M29 Audit sample		MAX		

Delivered to Lab by: Date/Time	Received by: Date/Time	Processed by: Date/Time
	[illegible]	

Laboratory Notes: *M5 analysis was performed at the Mostardi Platt laboratory before sending to sub-lab for metals analysis

**Target TSM are: Antimony, Arsenic, Beryllium, Cadmium, Total Chromium, Cobalt, Lead, Manganese, Mercury, Nickel, and Selenium

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Your Project #: M162810
Site#: ARCELORMITTAL BURNS HARBOR
Site Location: BURNS HARBOR COKE PLANT

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Your C.O.C. #: 024-029, 015-017, 018-020, 021-023, 030

Report Date: 2016/11/01
Report #: R4230893
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6L4651
Received: 2016/10/05, 14:30

Sample Matrix: Stack Sampling Train
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Mercury 3C in HCl Rinse	4	2016/10/18	2016/10/19	BRL SOP-00104	EPA M29/M0060 m
Mercury 2B in HNO3/H2O2 Imp.	5	2016/10/17	2016/10/18	BRL SOP-00104	EPA M29/M0060 m
Mercury 3B in KMnO4/H2SO4 Imp.	4	2016/10/17	2016/10/18	BRL SOP-00104	EPA M29/M0060 m
Mercury 1B in Filter + Rinse (M29)	4	2016/10/19	2016/10/20	BRL SOP-00104	EPA 29 m
Metals B.H. in H2O2/HNO3 Imp.(6020A)	5	2016/10/17	2016/10/28	BRL SOP-00103 / BRL SOP-00102	EPA M29/CARB 436 m
Metals F.H. in Filter + Rinses (6020A)	5	2016/10/19	2016/10/28	BRL SOP-00103/ BRL SOP-00102	EPA M29/CARB 436 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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Your Project #: M162810
Site#: ARCELORMITTAL BURNS HARBOR
Site Location: BURNS HARBOR COKE PLANT

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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6L4651
Received: 2016/10/05, 14:30

Encryption Key

Clayton Johnson
Project Manager - Air Toxics, Source Evaluation
01 Nov 2016 12:52:44 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B6L4651
Report Date: 2016/11/01

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

EPA M29 METALS (FRONT & BACK SEPARATE)

Maxxam ID		DER762			DER763	DER763	DER859	DER860			
Sampling Date		2016/09/14			2016/09/14	2016/09/14	2016/09/15	2016/09/15			
COC Number		024-029			015-017	015-017	018-020	021-023			
	UNITS	M29 - BLANK	RDL	MDL	M29 - T1	M29 - T1 Lab-Dup	M29 - T2	M29 - T3	RDL	MDL	QC Batch
Front Half Antimony (Sb)	ug	<0.80	0.80	0.080	<0.80	<0.80	0.84	<0.80	0.80	0.080	4707861
Front Half Arsenic (As)	ug	<0.80	0.80	0.080	8.98	8.95	14.8	6.73	0.80	0.080	4707861
Front Half Beryllium (Be)	ug	<0.20	0.20	0.040	<0.20	<0.20	<0.20	<0.20	0.20	0.040	4707861
Front Half Cadmium (Cd)	ug	<0.20	0.20	0.040	<0.20	<0.20	<0.20	<0.20	0.20	0.040	4707861
Front Half Chromium (Cr)	ug	4.63	0.60	0.10	8.21	7.83	44.8	9.08	0.60	0.10	4707861
Front Half Cobalt (Co)	ug	<0.20	0.20	0.020	0.25	0.27	1.09	0.22	0.20	0.020	4707861
Front Half Lead (Pb)	ug	<0.40	0.40	0.040	10.5	10.6	14.6	9.08	0.40	0.040	4707861
Front Half Manganese (Mn)	ug	<1.5	1.5	0.10	5.3	5.2	15.3	3.8	1.5	0.10	4707861
Front Half Nickel (Ni)	ug	<1.0	1.0	0.20	7.7	7.7	35.6	5.2	1.0	0.20	4707861
Front Half Selenium (Se)	ug	<2.0	2.0	0.50	<2.0	<2.0	2.5	<2.0	2.0	0.50	4707861
Back Half Antimony (Sb)	ug	<0.20	0.20	0.040	<4.0	<4.0	<4.0	<4.0	4.0	0.80	4705333
Back Half Arsenic (As)	ug	<0.20	0.20	0.040	<4.0	<4.0	<4.0	<4.0	4.0	0.80	4705333
Back Half Beryllium (Be)	ug	<0.050	0.050	0.050	<1.0	<1.0	<1.0	<1.0	1.0	1.0	4705333
Back Half Cadmium (Cd)	ug	<0.050	0.050	0.030	<1.0	<1.0	<1.0	<1.0	1.0	0.60	4705333
Back Half Chromium (Cr)	ug	0.92	0.15	0.070	386	378	1580	525	3.0	1.4	4705333
Back Half Cobalt (Co)	ug	<0.050	0.050	0.010	1.4	1.5	10.4	3.9	1.0	0.20	4705333
Back Half Lead (Pb)	ug	0.34	0.10	0.040	2.8	2.7	4.9	3.3	2.0	0.80	4705333
Back Half Manganese (Mn)	ug	2.56	0.25	0.060	20.8	22.0	122	59.4	5.0	1.2	4705333
Back Half Nickel (Ni)	ug	0.54	0.25	0.060	142	145	807	304	5.0	1.2	4705333
Back Half Selenium (Se)	ug	<0.50	0.50	0.20	<10	<10	13	11	10	4.0	4705333

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Report Date: 2016/11/01

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Site Location: BURNS HARBOR COKE PLANT

EPA M29 METALS (FRONT & BACK SEPARATE)

Maxxam ID		DES003			DES004			
Sampling Date		2016/09/14			2016/09/14			
COC Number		030			030			
	UNITS	AUDIT- 072816L-1425	RDL	MDL	AUDIT- 072816L-1426	RDL	MDL	QC Batch
Front Half Antimony (Sb)	ug	41.9	0.80	0.080	N/A	0.80	0.080	4707861
Front Half Arsenic (As)	ug	43.0	0.80	0.080	N/A	0.80	0.080	4707861
Front Half Beryllium (Be)	ug	31.2	0.20	0.040	N/A	0.20	0.040	4707861
Front Half Cadmium (Cd)	ug	32.3	0.20	0.040	N/A	0.20	0.040	4707861
Front Half Chromium (Cr)	ug	44.1	0.60	0.10	N/A	0.60	0.10	4707861
Front Half Cobalt (Co)	ug	29.9	0.20	0.020	N/A	0.20	0.020	4707861
Front Half Lead (Pb)	ug	81.6	0.40	0.040	N/A	0.40	0.040	4707861
Front Half Manganese (Mn)	ug	28.9	1.5	0.10	N/A	1.5	0.10	4707861
Front Half Nickel (Ni)	ug	42.1	1.0	0.20	N/A	1.0	0.20	4707861
Front Half Selenium (Se)	ug	55.8	2.0	0.50	N/A	2.0	0.50	4707861
Back Half Antimony (Sb)	ug	N/A	4.0	0.80	1.15	0.0020	0.00040	4705333
Back Half Arsenic (As)	ug	N/A	4.0	0.80	0.652	0.0020	0.00040	4705333
Back Half Beryllium (Be)	ug	N/A	1.0	1.0	0.0615	0.00040	0.00040	4705333
Back Half Cadmium (Cd)	ug	N/A	1.0	0.60	0.896	0.00040	0.00024	4705333
Back Half Chromium (Cr)	ug	N/A	3.0	1.4	0.552	0.0010	0.00047	4705333
Back Half Cobalt (Co)	ug	N/A	1.0	0.20	0.789	0.00040	0.000080	4705333
Back Half Lead (Pb)	ug	N/A	2.0	0.80	0.487	0.0010	0.00040	4705333
Back Half Manganese (Mn)	ug	N/A	5.0	1.2	1.49	0.0020	0.00048	4705333
Back Half Nickel (Ni)	ug	N/A	5.0	1.2	0.607	0.0020	0.00048	4705333
Back Half Selenium (Se)	ug	N/A	10	4.0	0.789	0.0040	0.0016	4705333

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

EPA M29 MERCURY (STACK SAMPLING TRAIN)

Maxxam ID		DER762			DER763	DER763			DER859			
Sampling Date		2016/09/14			2016/09/14	2016/09/14			2016/09/15			
COC Number		024-029			015-017	015-017			018-020			
	UNITS	M29 - BLANK	RDL	MDL	M29 - T1	M29 - T1 Lab-Dup	RDL	MDL	M29 - T2	RDL	MDL	QC Batch
1B Mercury (Hg)	ug	<0.015	0.015	0.015	<0.015	N/A	0.015	0.015	<0.015	0.015	0.015	4707900
2B Mercury (Hg)	ug	<0.075	0.075	0.015	2.94	N/A	0.44	0.088	8.50	0.42	0.084	4704458
3B Mercury (Hg)	ug	<0.02	0.02	0.004	0.190	0.190	0.023	0.0046	1.32	0.023	0.0046	4704174
3C Mercury (Hg)	ug	<0.013	0.013	0.0026	21.3	N/A	0.25	0.05	32.2	0.25	0.05	4706169

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		DER859			DER860	DER860			
Sampling Date		2016/09/15			2016/09/15	2016/09/15			
COC Number		018-020			021-023	021-023			
	UNITS	M29 - T2 Lab-Dup	RDL	MDL	M29 - T3	M29 - T3 Lab-Dup	RDL	MDL	QC Batch
1B Mercury (Hg)	ug	<0.015	0.015	0.015	<0.015	N/A	0.015	0.015	4707900
2B Mercury (Hg)	ug	N/A	0.42	0.084	12.5	12.6	0.41	0.082	4704458
3B Mercury (Hg)	ug	N/A	0.023	0.0046	1.30	N/A	0.023	0.0046	4704174
3C Mercury (Hg)	ug	N/A	0.25	0.05	34.8	34.5	0.25	0.05	4706169

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Maxxam ID		DES006			
Sampling Date		2016/09/14			
COC Number		030			
	UNITS	AUDIT- 072816L-1428	RDL	MDL	QC Batch
2B Mercury (Hg)	ug	15.7 (1)	0.1	0.02	4704458

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Result reported in ug/L

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Report Date: 2016/11/01

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

TEST SUMMARY

Maxxam ID: DER762
Sample ID: M29 - BLANK
Matrix: Stack Sampling Train

Collected: 2016/09/14
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 3C in HCl Rinse	CV/AA	4706169	2016/10/18	2016/10/19	Ron Morrison
Mercury 2B in HNO3/H2O2 Imp.	CV/AA	4704458	2016/10/17	2016/10/18	Ron Morrison
Mercury 3B in KMnO4/H2SO4 Imp.	CV/AA	4704174	2016/10/17	2016/10/18	Ron Morrison
Mercury 1B in Filter + Rinse (M29)	CV/AA	4707900	2016/10/19	2016/10/20	Ron Morrison
Metals B.H. in H2O2/HNO3 Imp.(6020A)	ICP1/MS	4705333	2016/10/17	2016/10/28	Nan Raykha
Metals F.H. in Filter + Rinses (6020A)	ICP1/MS	4707861	2016/10/19	2016/10/28	Nan Raykha

Maxxam ID: DER763
Sample ID: M29 - T1
Matrix: Stack Sampling Train

Collected: 2016/09/14
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 3C in HCl Rinse	CV/AA	4706169	2016/10/18	2016/10/19	Ron Morrison
Mercury 2B in HNO3/H2O2 Imp.	CV/AA	4704458	2016/10/17	2016/10/18	Ron Morrison
Mercury 3B in KMnO4/H2SO4 Imp.	CV/AA	4704174	2016/10/17	2016/10/18	Ron Morrison
Mercury 1B in Filter + Rinse (M29)	CV/AA	4707900	2016/10/19	2016/10/20	Ron Morrison
Metals B.H. in H2O2/HNO3 Imp.(6020A)	ICP1/MS	4705333	2016/10/17	2016/10/28	Nan Raykha
Metals F.H. in Filter + Rinses (6020A)	ICP1/MS	4707861	2016/10/19	2016/10/28	Nan Raykha

Maxxam ID: DER763 Dup
Sample ID: M29 - T1
Matrix: Stack Sampling Train

Collected: 2016/09/14
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 3B in KMnO4/H2SO4 Imp.	CV/AA	4704174	2016/10/17	2016/10/18	Ron Morrison
Metals B.H. in H2O2/HNO3 Imp.(6020A)	ICP1/MS	4705333	2016/10/17	2016/10/28	Nan Raykha
Metals F.H. in Filter + Rinses (6020A)	ICP1/MS	4707861	2016/10/19	2016/10/28	Nan Raykha

Maxxam ID: DER859
Sample ID: M29 - T2
Matrix: Stack Sampling Train

Collected: 2016/09/15
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 3C in HCl Rinse	CV/AA	4706169	2016/10/18	2016/10/19	Ron Morrison
Mercury 2B in HNO3/H2O2 Imp.	CV/AA	4704458	2016/10/17	2016/10/18	Ron Morrison
Mercury 3B in KMnO4/H2SO4 Imp.	CV/AA	4704174	2016/10/17	2016/10/18	Ron Morrison
Mercury 1B in Filter + Rinse (M29)	CV/AA	4707900	2016/10/19	2016/10/20	Ron Morrison
Metals B.H. in H2O2/HNO3 Imp.(6020A)	ICP1/MS	4705333	2016/10/17	2016/10/28	Nan Raykha
Metals F.H. in Filter + Rinses (6020A)	ICP1/MS	4707861	2016/10/19	2016/10/28	Nan Raykha

Maxxam ID: DER859 Dup
Sample ID: M29 - T2
Matrix: Stack Sampling Train

Collected: 2016/09/15
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 1B in Filter + Rinse (M29)	CV/AA	4707900	2016/10/19	2016/10/20	Ron Morrison

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TEST SUMMARY

Maxxam ID: DER860
Sample ID: M29 - T3
Matrix: Stack Sampling Train

Collected: 2016/09/15
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 3C in HCl Rinse	CV/AA	4706169	2016/10/18	2016/10/19	Ron Morrison
Mercury 2B in HNO3/H2O2 Imp.	CV/AA	4704458	2016/10/17	2016/10/18	Ron Morrison
Mercury 3B in KMnO4/H2SO4 Imp.	CV/AA	4704174	2016/10/17	2016/10/18	Ron Morrison
Mercury 1B in Filter + Rinse (M29)	CV/AA	4707900	2016/10/19	2016/10/20	Ron Morrison
Metals B.H. in H2O2/HNO3 Imp.(6020A)	ICP1/MS	4705333	2016/10/17	2016/10/28	Nan Raykha
Metals F.H. in Filter + Rinses (6020A)	ICP1/MS	4707861	2016/10/19	2016/10/28	Nan Raykha

Maxxam ID: DER860 Dup
Sample ID: M29 - T3
Matrix: Stack Sampling Train

Collected: 2016/09/15
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 3C in HCl Rinse	CV/AA	4706169	2016/10/18	2016/10/19	Ron Morrison
Mercury 2B in HNO3/H2O2 Imp.	CV/AA	4704458	2016/10/17	2016/10/18	Ron Morrison

Maxxam ID: DES003
Sample ID: AUDIT- 072816L- 1425
Matrix: Stack Sampling Train

Collected: 2016/09/14
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals F.H. in Filter + Rinses (6020A)	ICP1/MS	4707861	2016/10/19	2016/10/28	Nan Raykha

Maxxam ID: DES004
Sample ID: AUDIT- 072816L- 1426
Matrix: Stack Sampling Train

Collected: 2016/09/14
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals B.H. in H2O2/HNO3 Imp.(6020A)	ICP1/MS	4705333	2016/10/17	2016/10/28	Nan Raykha

Maxxam ID: DES006
Sample ID: AUDIT- 072816L- 1428
Matrix: Stack Sampling Train

Collected: 2016/09/14
Shipped:
Received: 2016/10/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Mercury 2B in HNO3/H2O2 Imp.	CV/AA	4704458	2016/10/17	2016/10/18	Ron Morrison

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Site Location: BURNS HARBOR COKE PLANT

GENERAL COMMENTS

Sample DES004-01 : Data for this sample is reported in ug/mL

EPA M29 METALS (FRONT & BACK SEPARATE)

Metals F.H. in Filter + Rinses (6020A): Post digestion duplicate and spike were done on sample DER763.
Trace level Mn was observed in the Processed Blank.
Metals B.H. in H2O2/HNO3 Imp.(6020A): Extra 20x dilution was required for all samples except DER762 and DES004, due to the matrix (high Sulphur content)
Post digestion duplicate and spike were done on sample DER763 (analyzed on 2016-10-31)

Results relate only to the items tested.

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4704174	RON	Reagent Blank	3B Mercury (Hg)	2016/10/18	<0.013		ug	
4704174	RON	Matrix Spike(DER763)	3B Mercury (Hg)	2016/10/18		100	%	85 - 115
4704174	RON	Matrix Spike DUP(DER763)	3B Mercury (Hg)	2016/10/18		99	%	85 - 115
4704174	RON	MS/MSD RPD	3B Mercury (Hg)	2016/10/18	0.80		%	20
4704174	RON	Spiked Blank	3B Mercury (Hg)	2016/10/18		101	%	90 - 110
4704174	RON	Spiked Blank DUP	3B Mercury (Hg)	2016/10/18		100	%	90 - 110
4704174	RON	RPD	3B Mercury (Hg)	2016/10/18	0.69		%	20
4704174	RON	Method Blank	3B Mercury (Hg)	2016/10/18	<0.013		ug	
4704174	RON	RPD - Sample/Sample Dup	3B Mercury (Hg)	2016/10/18	0.26		%	20
4704458	RON	Matrix Spike(DER860)	2B Mercury (Hg)	2016/10/18		100	%	85 - 115
4704458	RON	Matrix Spike DUP(DER860)	2B Mercury (Hg)	2016/10/18		100	%	85 - 115
4704458	RON	MS/MSD RPD	2B Mercury (Hg)	2016/10/18	0.20		%	20
4704458	RON	Spiked Blank	2B Mercury (Hg)	2016/10/18		101	%	90 - 110
4704458	RON	Spiked Blank DUP	2B Mercury (Hg)	2016/10/18		101	%	90 - 110
4704458	RON	RPD	2B Mercury (Hg)	2016/10/18	0.79		%	20
4704458	RON	Method Blank	2B Mercury (Hg)	2016/10/18	<0.015		ug	
4704458	RON	RPD - Sample/Sample Dup	2B Mercury (Hg)	2016/10/18	0.39		%	20
4705333	N_R	Matrix Spike(DER763)	Back Half Antimony (Sb)	2016/10/28		103	%	70 - 130
			Back Half Arsenic (As)	2016/10/28		100	%	70 - 130
			Back Half Beryllium (Be)	2016/10/28		103	%	70 - 130
			Back Half Cadmium (Cd)	2016/10/28		98	%	70 - 130
			Back Half Chromium (Cr)	2016/10/28		109	%	70 - 130
			Back Half Cobalt (Co)	2016/10/28		104	%	70 - 130
			Back Half Lead (Pb)	2016/10/28		103	%	70 - 130
			Back Half Manganese (Mn)	2016/10/28		106	%	70 - 130
			Back Half Nickel (Ni)	2016/10/28		102	%	70 - 130
			Back Half Selenium (Se)	2016/10/28		103	%	70 - 130
4705333	N_R	Matrix Spike DUP(DER763)	Back Half Antimony (Sb)	2016/10/28		104	%	70 - 130
			Back Half Arsenic (As)	2016/10/28		103	%	70 - 130
			Back Half Beryllium (Be)	2016/10/28		107	%	70 - 130
			Back Half Cadmium (Cd)	2016/10/28		100	%	70 - 130
			Back Half Chromium (Cr)	2016/10/28		103	%	70 - 130
			Back Half Cobalt (Co)	2016/10/28		103	%	70 - 130
			Back Half Lead (Pb)	2016/10/28		107	%	70 - 130
			Back Half Manganese (Mn)	2016/10/28		104	%	70 - 130
			Back Half Nickel (Ni)	2016/10/28		105	%	70 - 130
			Back Half Selenium (Se)	2016/10/28		105	%	70 - 130
4705333	N_R	MS/MSD RPD	Back Half Antimony (Sb)	2016/10/28	0.97		%	20
			Back Half Arsenic (As)	2016/10/28	3.0		%	20
			Back Half Beryllium (Be)	2016/10/28	3.8		%	20
			Back Half Cadmium (Cd)	2016/10/28	2.0		%	20
			Back Half Chromium (Cr)	2016/10/28	5.7		%	20
			Back Half Cobalt (Co)	2016/10/28	0.97		%	20
			Back Half Lead (Pb)	2016/10/28	3.8		%	20
			Back Half Manganese (Mn)	2016/10/28	1.9		%	20
			Back Half Nickel (Ni)	2016/10/28	2.9		%	20
			Back Half Selenium (Se)	2016/10/28	1.9		%	20
4705333	N_R	Spiked Blank	Back Half Antimony (Sb)	2016/10/28		97	%	85 - 115
			Back Half Arsenic (As)	2016/10/28		99	%	85 - 115
			Back Half Beryllium (Be)	2016/10/28		96	%	85 - 115
			Back Half Cadmium (Cd)	2016/10/28		96	%	85 - 115
			Back Half Chromium (Cr)	2016/10/28		103	%	85 - 115
			Back Half Cobalt (Co)	2016/10/28		99	%	85 - 115

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Report Date: 2016/11/01

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Back Half Lead (Pb)	2016/10/28		107	%	85 - 115
			Back Half Manganese (Mn)	2016/10/28		106	%	85 - 115
			Back Half Nickel (Ni)	2016/10/28		100	%	85 - 115
			Back Half Selenium (Se)	2016/10/28		94	%	85 - 115
4705333	N_R	Spiked Blank DUP	Back Half Antimony (Sb)	2016/10/28		98	%	85 - 115
			Back Half Arsenic (As)	2016/10/28		101	%	85 - 115
			Back Half Beryllium (Be)	2016/10/28		100	%	85 - 115
			Back Half Cadmium (Cd)	2016/10/28		98	%	85 - 115
			Back Half Chromium (Cr)	2016/10/28		105	%	85 - 115
			Back Half Cobalt (Co)	2016/10/28		100	%	85 - 115
			Back Half Lead (Pb)	2016/10/28		110	%	85 - 115
			Back Half Manganese (Mn)	2016/10/28		110	%	85 - 115
			Back Half Nickel (Ni)	2016/10/28		103	%	85 - 115
			Back Half Selenium (Se)	2016/10/28		96	%	85 - 115
4705333	N_R	RPD	Back Half Antimony (Sb)	2016/10/28	0.64		%	20
			Back Half Arsenic (As)	2016/10/28	1.8		%	20
			Back Half Beryllium (Be)	2016/10/28	4.6		%	20
			Back Half Cadmium (Cd)	2016/10/28	1.6		%	20
			Back Half Chromium (Cr)	2016/10/28	1.6		%	20
			Back Half Cobalt (Co)	2016/10/28	1.4		%	20
			Back Half Lead (Pb)	2016/10/28	3.2		%	20
			Back Half Manganese (Mn)	2016/10/28	3.7		%	20
			Back Half Nickel (Ni)	2016/10/28	2.4		%	20
			Back Half Selenium (Se)	2016/10/28	1.6		%	20
4705333	N_R	Method Blank	Back Half Antimony (Sb)	2016/10/28	<0.20		ug	
			Back Half Arsenic (As)	2016/10/28	<0.20		ug	
			Back Half Beryllium (Be)	2016/10/28	<0.050		ug	
			Back Half Cadmium (Cd)	2016/10/28	<0.050		ug	
			Back Half Chromium (Cr)	2016/10/28	<0.15		ug	
			Back Half Cobalt (Co)	2016/10/28	<0.050		ug	
			Back Half Lead (Pb)	2016/10/28	<0.10		ug	
			Back Half Manganese (Mn)	2016/10/28	<0.25		ug	
			Back Half Nickel (Ni)	2016/10/28	<0.25		ug	
			Back Half Selenium (Se)	2016/10/28	<0.50		ug	
4705333	N_R	RPD - Sample/Sample Dup	Back Half Antimony (Sb)	2016/10/28	NC		%	20
			Back Half Arsenic (As)	2016/10/28	NC		%	20
			Back Half Beryllium (Be)	2016/10/28	NC		%	20
			Back Half Cadmium (Cd)	2016/10/28	NC		%	20
			Back Half Chromium (Cr)	2016/10/28	2.0		%	20
			Back Half Cobalt (Co)	2016/10/28	NC		%	20
			Back Half Lead (Pb)	2016/10/28	NC		%	20
			Back Half Manganese (Mn)	2016/10/28	NC		%	20
			Back Half Nickel (Ni)	2016/10/28	2.6		%	20
			Back Half Selenium (Se)	2016/10/28	NC		%	20
4706169	RON	Reagent Blank	3C Mercury (Hg)	2016/10/19	<0.013		ug	
4706169	RON	Matrix Spike(DER860)	3C Mercury (Hg)	2016/10/19		100	%	85 - 115
4706169	RON	Matrix Spike DUP(DER860)	3C Mercury (Hg)	2016/10/19		92	%	85 - 115
4706169	RON	MS/MSD RPD	3C Mercury (Hg)	2016/10/19	9.1		%	20
4706169	RON	Spiked Blank	3C Mercury (Hg)	2016/10/19		103	%	90 - 110
4706169	RON	Spiked Blank DUP	3C Mercury (Hg)	2016/10/19		102	%	90 - 110
4706169	RON	RPD	3C Mercury (Hg)	2016/10/19	0.78		%	20
4706169	RON	Method Blank	3C Mercury (Hg)	2016/10/19	<0.013		ug	
4706169	RON	RPD - Sample/Sample Dup	3C Mercury (Hg)	2016/10/19	0.92		%	20

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Site Location: BURNS HARBOR COKE PLANT

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4707861	N_R	Matrix Spike(DER763)	Front Half Antimony (Sb)	2016/10/28		93	%	70 - 130
			Front Half Arsenic (As)	2016/10/28		95	%	70 - 130
			Front Half Beryllium (Be)	2016/10/28		90	%	70 - 130
			Front Half Cadmium (Cd)	2016/10/28		93	%	70 - 130
			Front Half Chromium (Cr)	2016/10/28		104	%	70 - 130
			Front Half Cobalt (Co)	2016/10/28		100	%	70 - 130
			Front Half Lead (Pb)	2016/10/28		104	%	70 - 130
			Front Half Manganese (Mn)	2016/10/28		109	%	70 - 130
			Front Half Nickel (Ni)	2016/10/28		102	%	70 - 130
			Front Half Selenium (Se)	2016/10/28		95	%	70 - 130
4707861	N_R	Matrix Spike DUP(DER763)	Front Half Antimony (Sb)	2016/10/28		94	%	70 - 130
			Front Half Arsenic (As)	2016/10/28		98	%	70 - 130
			Front Half Beryllium (Be)	2016/10/28		94	%	70 - 130
			Front Half Cadmium (Cd)	2016/10/28		94	%	70 - 130
			Front Half Chromium (Cr)	2016/10/28		107	%	70 - 130
			Front Half Cobalt (Co)	2016/10/28		103	%	70 - 130
			Front Half Lead (Pb)	2016/10/28		108	%	70 - 130
			Front Half Manganese (Mn)	2016/10/28		112	%	70 - 130
			Front Half Nickel (Ni)	2016/10/28		103	%	70 - 130
			Front Half Selenium (Se)	2016/10/28		99	%	70 - 130
4707861	N_R	MS/MSD RPD	Front Half Antimony (Sb)	2016/10/28	1.1		%	20
			Front Half Arsenic (As)	2016/10/28	3.1		%	20
			Front Half Beryllium (Be)	2016/10/28	4.3		%	20
			Front Half Cadmium (Cd)	2016/10/28	1.1		%	20
			Front Half Chromium (Cr)	2016/10/28	2.8		%	20
			Front Half Cobalt (Co)	2016/10/28	3.0		%	20
			Front Half Lead (Pb)	2016/10/28	3.8		%	20
			Front Half Manganese (Mn)	2016/10/28	2.7		%	20
			Front Half Nickel (Ni)	2016/10/28	0.98		%	20
			Front Half Selenium (Se)	2016/10/28	4.1		%	20
4707861	N_R	Spiked Blank	Front Half Antimony (Sb)	2016/10/28		100	%	85 - 115
			Front Half Arsenic (As)	2016/10/28		101	%	85 - 115
			Front Half Beryllium (Be)	2016/10/28		97	%	85 - 115
			Front Half Cadmium (Cd)	2016/10/28		101	%	85 - 115
			Front Half Chromium (Cr)	2016/10/28		109	%	85 - 115
			Front Half Cobalt (Co)	2016/10/28		105	%	85 - 115
			Front Half Lead (Pb)	2016/10/28		106	%	85 - 115
			Front Half Manganese (Mn)	2016/10/28		112	%	85 - 115
			Front Half Nickel (Ni)	2016/10/28		105	%	85 - 115
			Front Half Selenium (Se)	2016/10/28		101	%	85 - 115
4707861	N_R	Spiked Blank DUP	Front Half Antimony (Sb)	2016/10/28		96	%	85 - 115
			Front Half Arsenic (As)	2016/10/28		100	%	85 - 115
			Front Half Beryllium (Be)	2016/10/28		97	%	85 - 115
			Front Half Cadmium (Cd)	2016/10/28		97	%	85 - 115
			Front Half Chromium (Cr)	2016/10/28		103	%	85 - 115
			Front Half Cobalt (Co)	2016/10/28		100	%	85 - 115
			Front Half Lead (Pb)	2016/10/28		103	%	85 - 115
			Front Half Manganese (Mn)	2016/10/28		108	%	85 - 115
			Front Half Nickel (Ni)	2016/10/28		103	%	85 - 115
			Front Half Selenium (Se)	2016/10/28		100	%	85 - 115
4707861	N_R	RPD	Front Half Antimony (Sb)	2016/10/28	4.1		%	20
			Front Half Arsenic (As)	2016/10/28	0.50		%	20
			Front Half Beryllium (Be)	2016/10/28	0.68		%	20

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Site Location: BURNS HARBOR COKE PLANT

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Front Half Cadmium (Cd)	2016/10/28	3.6		%	20
			Front Half Chromium (Cr)	2016/10/28	6.1		%	20
			Front Half Cobalt (Co)	2016/10/28	5.1		%	20
			Front Half Lead (Pb)	2016/10/28	2.9		%	20
			Front Half Manganese (Mn)	2016/10/28	3.0		%	20
			Front Half Nickel (Ni)	2016/10/28	2.7		%	20
			Front Half Selenium (Se)	2016/10/28	0.76		%	20
4707861	N_R	Method Blank	Front Half Antimony (Sb)	2016/10/28	<0.80		ug	
			Front Half Arsenic (As)	2016/10/28	<0.80		ug	
			Front Half Beryllium (Be)	2016/10/28	<0.20		ug	
			Front Half Cadmium (Cd)	2016/10/28	<0.20		ug	
			Front Half Chromium (Cr)	2016/10/28	<0.60		ug	
			Front Half Cobalt (Co)	2016/10/28	<0.20		ug	
			Front Half Lead (Pb)	2016/10/28	<0.40		ug	
			Front Half Manganese (Mn)	2016/10/28	1.8, RDL=1.5		ug	
			Front Half Nickel (Ni)	2016/10/28	<1.0		ug	
			Front Half Selenium (Se)	2016/10/28	<2.0		ug	
4707861	N_R	RPD - Sample/Sample Dup	Front Half Antimony (Sb)	2016/10/28	NC		%	20
			Front Half Arsenic (As)	2016/10/28	0.33		%	20
			Front Half Beryllium (Be)	2016/10/28	NC		%	20
			Front Half Cadmium (Cd)	2016/10/28	NC		%	20
			Front Half Chromium (Cr)	2016/10/28	4.8		%	20
			Front Half Cobalt (Co)	2016/10/28	NC		%	20
			Front Half Lead (Pb)	2016/10/28	0.40		%	20
			Front Half Manganese (Mn)	2016/10/28	NC		%	20
			Front Half Nickel (Ni)	2016/10/28	0.39		%	20
			Front Half Selenium (Se)	2016/10/28	NC		%	20
4707900	RON	Reagent Blank	1B Mercury (Hg)	2016/10/20	<0.015		ug	
4707900	RON	Matrix Spike(DER859)	1B Mercury (Hg)	2016/10/20		101	%	85 - 115
4707900	RON	Matrix Spike DUP(DER859)	1B Mercury (Hg)	2016/10/20		101	%	85 - 115
4707900	RON	MS/MSD RPD	1B Mercury (Hg)	2016/10/20	0.099		%	20
4707900	RON	Spiked Blank	1B Mercury (Hg)	2016/10/20		99	%	90 - 110
4707900	RON	Spiked Blank DUP	1B Mercury (Hg)	2016/10/20		101	%	90 - 110
4707900	RON	RPD	1B Mercury (Hg)	2016/10/20	1.3		%	20
4707900	RON	Method Blank	1B Mercury (Hg)	2016/10/20	<0.015		ug	
4707900	RON	RPD - Sample/Sample Dup	1B Mercury (Hg)	2016/10/20	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Reagent Blank: A blank matrix containing all reagents used in the analytical procedure. Used to determine any analytical contamination.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Site Location: BURNS HARBOR COKE PLANT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Frank Mo, B.Sc., Inorganic Lab. Manager

Ralph Siebert, Operations Manager - Inorganic Analyses

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Client:	**ArcelorMittal Burns Harbor, LLC**		
Facility:	**Burns Harbor, Indiana**		
Project Number:	**M162810**		
Test Location:	**Coke Battery No. 2 Underfire Stack**		
Test Method:	**201A/202**	**Filter Drying Temp:**	**Ambient**
Filterable Analysis Date:	**9/21/2016**	**Analyst:**	**BWH**
Condensable Analysis Date:	**9/26/2016**	**Analyst:**	**BWH**

Description	Sample Date	ID#	vol. (ml)	Initial Weight (grams)	Final Weight (grams)	Net Weight Gain (grams)
Filterable Particulate						
Test No. 1	9/14/2016					
Source Condition: Normal						
<PM2.5 Filter		1711		3.0607	3.0643	0.0036
Acetone Wash		7926	45 mls	5.1189	5.1205	0.0016
Acetone Blank						0.0003
Total Front Half <PM2.5 Weight						**0.0049**
>PM2.5 Acetone Wash		7927	40 mls	5.1141	5.1243	0.0102
Acetone Blank						0.0003
Total Front Half >PM2.5 Weight						**0.0099**
Condensable Particulate						
Acetone/Hexane Wash		8237	240 mls	2.5966	2.5995	0.0029
DI Wash		8057	102 mls	5.1537	5.4799	0.3262
NH_4OH Correction			62 mls			0.1001
Field Blank						0.0018
Total Back Half Weight						**0.2272**
Total <PM2.5 Weight						**0.2321**
Filterable Particulate						
Test No. 2	9/15/2016					
Source Condition: Normal						
<PM2.5 Filter		1712		2.8836	2.8871	0.0035
Acetone Wash		7754	35 mls	5.1081	5.1367	0.0286
Acetone Blank						0.0002
Total Front Half <PM2.5 Weight						**0.0319**
>PM2.5 Acetone Wash		7755	30 mls	5.0906	5.0949	0.0043
Acetone Blank						0.0002
Total Front Half >PM2.5 Weight						**0.0041**
Condensable Particulate						
Acetone/Hexane Wash		8238	265 mls	2.6062	2.6975	0.0913
DI Wash		8058	227 mls	5.1886	5.3902	0.2016
NH_4OH Correction			31 mls			0.0505
Field Blank						0.0018
Total Back Half Weight						**0.2406**
Total <PM2.5 Weight						**0.2725**
Filterable Particulate						
Test No. 3	9/15/2016					
Source Condition: Normal						
<PM2.5 Filter		1617		5.1631	5.1659	0.0028
Acetone Wash		8304	35 mls	5.1559	5.2030	0.0471
Acetone Blank						0.0002
Total Front Half <PM2.5 Weight						**0.0497**
>PM2.5 Acetone Wash		8305	40 mls	5.1318	5.1337	0.0019
Acetone Blank						0.0003
Total Front Half >PM2.5 Weight						**0.0016**
Condensable Particulate						
Acetone/Hexane Wash		8239	265 mls	2.5909	2.6173	0.0264
DI Wash		8059	201 mls	5.2044	5.3564	0.1520
NH_4OH Correction			29 mls			0.0478
Field Blank						0.0018
Total Back Half Weight						**0.1288**
Total <PM2.5 Weight						**0.1785**
Field Train Blank Summary						
Acetone/Hexane Wash		8236	190 mls	2.5955	2.5965	0.0010
DI Wash		8056	249 mls	5.1452	5.1460	0.0008
NH_4OH Correction			0 mls			0.0000
Total Field Train Blank						0.0018
Field Proof Blank Summary						
Acetone/Hexane Wash		8307	80 mls	5.1676	5.1676	0.0000
DI Wash		8306	45 mls	5.1695	5.1699	0.0004
Normality of NH_4OH						0.0954
Reagent Blank Summary						
DI Wash		8031	100 mls	5.1534	5.1537	0.0003
Hexane Wash		8030	100 mls	5.1395	5.1395	0.0000
Acetone Wash (filterable)		8029	100 mls	5.1468	5.1478	0.0007

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Chain-of-Custody Form

Project Number M162810	Date Results Required: Standard
Client: Arcelor/Mittal Burns Harbor	TAT Required: Standard
Plant/Test Location: Burns Harbor Underfire Stack	Project Supervisor: [illegible]

Sample Number	Sample Date	Sample Point Identification	# of Sample	Sub Lot	Analysis Required	Volume mls
001	9/7/16	Underfire Stack-T1-DI Impg and Rinses	2	Max	M316	[illegible]
002	9/7/16	Underfire Stack-T2-DI Impg and Rinses	2	Max	M316	[illegible]
003	9/8/16	Underfire Stack-T3-DI Impg and Rinses	2	Max	M316	[illegible]
004	9/8/16	DI Blank	1	Max	M316	[illegible]
005	9/7/16	Underfire Stack-T1A-Moisture Tubes	3	Max	0031	—
006	9/7/16	Underfire Stack-T1B-Sorbent Tubes	3	Max	0031	—
007	9/7/16	Underfire Stack-T1C-Sorbent Tubes	3	Max	0031	—
008	9/7/16	Underfire Stack-T1D-Sorbent Tubes	3	Max	0031	—
009	9/7/16	Underfire Stack-T1E-Sorbent Tubes	3	Max	0031	—
010	9/7/16	Underfire Stack-T1F-Sorbent Tubes	3	Max	0031	—
011	9/7/16	Underfire Stack-T1-Condensate Impg	1	Max	0031	[illegible]
012	9/7/16	Underfire Stack-T2A-Sorbent Tubes	3	Max	0031	—
013	9/7/16	Underfire Stack-T2B-Sorbent Tubes	3	Max	0031	—
014	9/7/16	Underfire Stack-T2C-Sorbent Tubes	3	Max	0031	—
015	9/7/16	Underfire Stack-T2D-Sorbent Tubes	3	Max	0031	—
016	9/7/16	Underfire Stack-T2E-Sorbent Tubes	3	Max	0031	—
017	9/7/16	Underfire Stack-T2F-Sorbent Tubes	3	Max	0031	—
018	9/7/16	Underfire Stack-T2-Condensate Impg	1	Max	0031	[illegible]
019	9/8/16	Underfire Stack-T3A-Sorbent Tubes	3	Max	0031	—
020	9/8/16	Underfire Stack-T3B-Sorbent Tubes	3	Max	0031	—

Delivered to Lab by: Date/Time	Received by: Date/Time	Processed by: Date/Time
	[illegible] 09/09/16 [illegible]	

Laboratory Notes Only 2lb in the Cooler. - BWH

[illegible]

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Chain-of-Custody Form

Project Number:M162810	Date Results Required: Standard
Client: ArcelorMittal Burns Harbor	TAT Required: Standard
Plant/Test Location: Burns Harbor/Underfire Stack	Project Supervisor:CST

Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume, mls
001	9/7/16	Underfire Stack-T1-DI Imps and Rinses	2	Max	M316	
002	9/7/16	Underfire Stack-T2-DI Imps and Rinses	2	Max	M316	
003	9/8/16	Underfire Stack-T3-DI Imps and Rinses	2	Max	M316	
004	9/8/16	DI Blank	1	Max	M316	
005	9/7/16	Underfire Stack-T1A-Sorbent Tubes	3	Max	0031	
006	9/7/16	Underfire Stack-T1B-Sorbent Tubes	3	Max	0031	
007	9/7/16	Underfire Stack-T1C-Sorbent Tubes	3	Max	0031	
008	9/7/16	Underfire Stack-T1D-Sorbent Tubes	3	Max	0031	
009	9/7/16	Underfire Stack-T1E-Sorbent Tubes	3	Max	0031	
010	9/7/16	Underfire Stack-T1F-Sorbent Tubes	3	Max	0031	
011	9/7/16	Underfire Stack-T1-Condensate rinse	1	Max	0031	
012	9/7/16	Underfire Stack-T2A-Sorbent Tubes	3	Max	0031	
013	9/7/16	Underfire Stack-T2B-Sorbent Tubes	3	Max	0031	
014	9/7/16	Underfire Stack-T2C-Sorbent Tubes	3	Max	0031	
015	9/7/16	Underfire Stack-T2D-Sorbent Tubes	3	Max	0031	
016	9/7/16	Underfire Stack-T2E-Sorbent Tubes	3	Max	0031	
017	9/7/16	Underfire Stack-T2F-Sorbent Tubes	3	Max	0031	
018	9/7/16	Underfire Stack-T2-Condensate rinse	1	Max	0031	
019	9/8/16	Underfire Stack-T3A-Sorbent Tubes	3	Max	0031	
020	9/8/16	Underfire Stack-T3B-Sorbent Tubes	3	Max	0031	

Delivered to Lab by: Date/Time:	Received by: Date/Time:	Processed by: Date/Time:

Laboratory Notes:

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Chain-of-Custody Form

Project Number: M162810	Date Results Required:Standard
Client: ArcelorMittal Burns Harbor	TAT Required:Standard
Plant/Test Location: Burns Harbor/Underfire Stack	Project Supervisor:CST

Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume, mls
021	9/8/16	Underfire Stack-T3C-Sorbent Tubes	3	Max	0031	
022	9/8/16	Underfire Stack-T3D-Sorbent Tubes	3	Max	0031	
023	9/8/16	Underfire Stack-T3E-Sorbent Tubes	3	Max	0031	
024	9/8/16	Underfire Stack-T3F-Sorbent Tubes	3	Max	0031	
025	9/8/16	Underfire Stack-T3-Condensate rinse	3	Max	0031	
026						
027						
028						
029						
030						

Delivered to Lab by: Date/Time:	Received by: Date/Time:	Processed by: Date/Time:

Laboratory Notes:

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Your Project #: M162810
Site#: BURNS HARBOR UNDERFIRE STACK
Site Location: ARCELORMITTAL BURNS HARBOR

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Your C.O.C. #: 005, 006, 007, 008, 009, 010, 012, 013, 014, 015, 016, 017, 019, 020, 021, 022, 023, 024, 011, 018, 025

Report Date: 2016/10/03
Report #: R4188537
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6K1223
Received: 2016/09/17, 18:30

Sample Matrix: Stack Sampling Train
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
VOST Condensate (8260Cmod)	3	N/A	2016/09/22	CAM SOP-00226	EPA 8260C m
VOST EPA5041A, 8260C for 0030, 0031	9	N/A	2016/09/23	BRL SOP-00302	EPA5041A, 8260C
VOST EPA5041A, 8260C for 0030, 0031	9	N/A	2016/09/24	BRL SOP-00302	EPA5041A, 8260C

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Clayton Johnson
Project Manager - Air Toxics, Source Evaluation
03 Oct 2016 17:00:00 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF862			DCF863			
Sampling Date		2016/09/07			2016/09/07			
COC Number		005			006			
	UNITS	VOST- T1A-18A/B/C	RDL	MDL	VOST- T1B-10A/B/C	RDL	MDL	QC Batch
Chloromethane	ug	<0.26	0.26	0.26	<0.080	0.080	0.080	4673402
Vinyl Chloride	ug	<0.013	0.013	0.013	<0.013	0.013	0.013	4673402
Bromomethane	ug	0.112	0.015	0.015	0.068	0.015	0.015	4673402
Chloroethane	ug	<0.0090	0.0090	0.0090	<0.0090	0.0090	0.0090	4673402
1,1-Dichloroethylene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4673402
Iodomethane	ug	0.016	0.015	0.015	<0.015	0.015	0.015	4673402
Carbon Disulfide	ug	1.41	0.026	0.026	1.64	0.026	0.026	4673402
Methylene Chloride(Dichloromethane)	ug	<0.019	0.019	0.020	<0.019	0.019	0.020	4673402
Chloroform	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4673402
1,2-Dichloroethane	ug	<0.0070	0.0070	0.0070	<0.0070	0.0070	0.0070	4673402
1,1,1-Trichloroethane	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4673402
Carbon Tetrachloride	ug	<0.016	0.016	0.016	<0.016	0.016	0.016	4673402
Benzene	ug	6.80	0.0090	0.0090	7.40	0.0090	0.0090	4673402
1,1,2-Trichloroethane	ug	<0.016	0.016	0.016	<0.016	0.016	0.016	4673402
1,2-Dichloropropane	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4673402
Trichloroethylene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4673402
Toluene	ug	2.14	0.014	0.014	2.31	0.014	0.014	4673402
Tetrachloroethylene	ug	0.023	0.018	0.018	<0.018	0.018	0.018	4673402
Chlorobenzene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4673402
Ethylbenzene	ug	0.096	0.014	0.014	0.111	0.014	0.014	4673402
m / p-Xylene	ug	0.983	0.015	0.015	1.08	0.015	0.015	4673402
Styrene	ug	0.331	0.012	0.012	0.343	0.012	0.012	4673402
o-Xylene	ug	0.208	0.015	0.015	0.236	0.015	0.015	4673402
Bromoform	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4673402
1,1,2,2-Tetrachloroethane	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4673402
Acrylonitrile	ug	0.028	0.025	0.025	0.042	0.025	0.025	4673402
Surrogate Recovery (%)								
Bromofluorobenzene	%	97	N/A	N/A	98	N/A	N/A	4673402
D10-Ethylbenzene (FS)	%	131	N/A	N/A	125	N/A	N/A	4673402
D4-1,2-Dichloroethane	%	122	N/A	N/A	125	N/A	N/A	4673402
D8-Toluene	%	92	N/A	N/A	98	N/A	N/A	4673402

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF864	DCF865	DCF866			
Sampling Date		2016/09/07	2016/09/07	2016/09/07			
COC Number		007	008	009			
	UNITS	VOST- T1C-9A/B/C	VOST- T1D-2A/B/C	VOST- T1E-3A/B/C	RDL	MDL	QC Batch
Chloromethane	ug	0.024	0.098	0.033	0.015	0.015	4673402
Vinyl Chloride	ug	<0.013	<0.013	<0.013	0.013	0.013	4673402
Bromomethane	ug	0.023	0.071	0.053	0.015	0.015	4673402
Chloroethane	ug	<0.0090	<0.0090	<0.0090	0.0090	0.0090	4673402
1,1-Dichloroethylene	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Iodomethane	ug	<0.015	<0.015	<0.015	0.015	0.015	4673402
Carbon Disulfide	ug	2.00	1.82	1.48	0.026	0.026	4673402
Methylene Chloride(Dichloromethane)	ug	<0.019	0.029	<0.019	0.019	0.020	4673402
Chloroform	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
1,2-Dichloroethane	ug	<0.0070	<0.0070	<0.0070	0.0070	0.0070	4673402
1,1,1-Trichloroethane	ug	<0.014	<0.014	<0.014	0.014	0.014	4673402
Carbon Tetrachloride	ug	<0.016	<0.016	<0.016	0.016	0.016	4673402
Benzene	ug	9.48	8.30	6.91	0.0090	0.0090	4673402
1,1,2-Trichloroethane	ug	<0.016	<0.016	<0.016	0.016	0.016	4673402
1,2-Dichloropropane	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Trichloroethylene	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Toluene	ug	2.85	2.45	2.19	0.014	0.014	4673402
Tetrachloroethylene	ug	<0.018	<0.018	<0.018	0.018	0.018	4673402
Chlorobenzene	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Ethylbenzene	ug	0.108	0.120	0.101	0.014	0.014	4673402
m / p-Xylene	ug	1.25	1.24	1.04	0.015	0.015	4673402
Styrene	ug	0.409	0.491	0.353	0.012	0.012	4673402
o-Xylene	ug	0.249	0.265	0.227	0.015	0.015	4673402
Bromoform	ug	<0.014	<0.014	<0.014	0.014	0.014	4673402
1,1,2,2-Tetrachloroethane	ug	<0.014	<0.014	<0.014	0.014	0.014	4673402
Acrylonitrile	ug	<0.025	0.035	0.036	0.025	0.025	4673402
Surrogate Recovery (%)							
Bromofluorobenzene	%	91	100	99	N/A	N/A	4673402
D10-Ethylbenzene (FS)	%	152	121	117	N/A	N/A	4673402
D4-1,2-Dichloroethane	%	113	118	119	N/A	N/A	4673402
D8-Toluene	%	100	100	100	N/A	N/A	4673402

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF867	DCF868	DCF869			
Sampling Date		2016/09/07	2016/09/07	2016/09/07			
COC Number		010	012	013			
	UNITS	VOST- T1F-1A/B/C	VOST- T2A-18A/B/C	VOST- T2B-17A/B/C	RDL	MDL	QC Batch
Chloromethane	ug	0.109	0.016	0.016	0.015	0.015	4673402
Vinyl Chloride	ug	<0.013	<0.013	<0.013	0.013	0.013	4673402
Bromomethane	ug	0.121	0.024	<0.015	0.015	0.015	4673402
Chloroethane	ug	<0.0090	<0.0090	<0.0090	0.0090	0.0090	4673402
1,1-Dichloroethylene	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Iodomethane	ug	<0.015	<0.015	<0.015	0.015	0.015	4673402
Carbon Disulfide	ug	1.21	1.81	1.54	0.026	0.026	4673402
Methylene Chloride(Dichloromethane)	ug	<0.019	0.019	<0.019	0.019	0.020	4673402
Chloroform	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
1,2-Dichloroethane	ug	<0.0070	<0.0070	<0.0070	0.0070	0.0070	4673402
1,1,1-Trichloroethane	ug	<0.014	<0.014	<0.014	0.014	0.014	4673402
Carbon Tetrachloride	ug	<0.016	<0.016	<0.016	0.016	0.016	4673402
Benzene	ug	7.02	8.73	7.34	0.0090	0.0090	4673402
1,1,2-Trichloroethane	ug	<0.016	<0.016	<0.016	0.016	0.016	4673402
1,2-Dichloropropane	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Trichloroethylene	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Toluene	ug	2.22	2.64	2.32	0.014	0.014	4673402
Tetrachloroethylene	ug	<0.018	<0.018	<0.018	0.018	0.018	4673402
Chlorobenzene	ug	<0.011	<0.011	<0.011	0.011	0.011	4673402
Ethylbenzene	ug	0.109	0.112	0.100	0.014	0.014	4673402
m / p-Xylene	ug	1.04	1.24	1.08	0.015	0.015	4673402
Styrene	ug	0.260	0.462	0.342	0.012	0.012	4673402
o-Xylene	ug	0.235	0.252	0.234	0.015	0.015	4673402
Bromoform	ug	<0.014	<0.014	<0.014	0.014	0.014	4673402
1,1,2,2-Tetrachloroethane	ug	<0.014	<0.014	<0.014	0.014	0.014	4673402
Acrylonitrile	ug	<0.025	0.025	0.025	0.025	0.025	4673402
Surrogate Recovery (%)							
Bromofluorobenzene	%	98	96	99	N/A	N/A	4673402
D10-Ethylbenzene (FS)	%	116	137	116	N/A	N/A	4673402
D4-1,2-Dichloroethane	%	115	111	115	N/A	N/A	4673402
D8-Toluene	%	97	98	100	N/A	N/A	4673402

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF870		DCF871	DCF872			
Sampling Date		2016/09/07		2016/09/07	2016/09/07			
COC Number		014		015	016			
	UNITS	VOST- T2C-16A/B/C	QC Batch	VOST- T2D-15A/B/C	VOST- T2E-14A/B/C	RDL	MDL	QC Batch
Chloromethane	ug	0.027	4673402	0.057	0.052	0.015	0.015	4675198
Vinyl Chloride	ug	<0.013	4673402	<0.013	<0.013	0.013	0.013	4675198
Bromomethane	ug	0.036	4673402	0.129	0.045	0.015	0.015	4675198
Chloroethane	ug	<0.0090	4673402	<0.0090	<0.0090	0.0090	0.0090	4675198
1,1-Dichloroethylene	ug	<0.011	4673402	<0.011	<0.011	0.011	0.011	4675198
Iodomethane	ug	<0.015	4673402	0.017	<0.015	0.015	0.015	4675198
Carbon Disulfide	ug	1.64	4673402	2.07	1.47	0.026	0.026	4675198
Methylene Chloride(Dichloromethane)	ug	0.130	4673402	<0.019	<0.019	0.019	0.020	4675198
Chloroform	ug	<0.011	4673402	<0.011	<0.011	0.011	0.011	4675198
1,2-Dichloroethane	ug	<0.0070	4673402	<0.0070	<0.0070	0.0070	0.0070	4675198
1,1,1-Trichloroethane	ug	<0.014	4673402	<0.014	<0.014	0.014	0.014	4675198
Carbon Tetrachloride	ug	<0.016	4673402	<0.016	<0.016	0.016	0.016	4675198
Benzene	ug	6.81	4673402	8.58	7.84	0.0090	0.0090	4675198
1,1,2-Trichloroethane	ug	<0.016	4673402	<0.016	<0.016	0.016	0.016	4675198
1,2-Dichloropropane	ug	<0.011	4673402	<0.011	<0.011	0.011	0.011	4675198
Trichloroethylene	ug	<0.011	4673402	<0.011	<0.011	0.011	0.011	4675198
Toluene	ug	2.04	4673402	2.55	2.42	0.014	0.014	4675198
Tetrachloroethylene	ug	<0.018	4673402	<0.018	<0.018	0.018	0.018	4675198
Chlorobenzene	ug	<0.011	4673402	<0.011	<0.011	0.011	0.011	4675198
Ethylbenzene	ug	0.097	4673402	0.132	0.103	0.014	0.014	4675198
m / p-Xylene	ug	0.995	4673402	1.29	1.13	0.015	0.015	4675198
Styrene	ug	0.385	4673402	0.497	0.380	0.012	0.012	4675198
o-Xylene	ug	0.202	4673402	0.290	0.246	0.015	0.015	4675198
Bromoform	ug	<0.014	4673402	<0.014	<0.014	0.014	0.014	4675198
1,1,2,2-Tetrachloroethane	ug	<0.014	4673402	<0.014	<0.014	0.014	0.014	4675198
Acrylonitrile	ug	<0.025	4673402	0.051	0.037	0.025	0.025	4675198
Surrogate Recovery (%)								
Bromofluorobenzene	%	103	4673402	101	97	N/A	N/A	4675198
D10-Ethylbenzene (FS)	%	117	4673402	139	139	N/A	N/A	4675198
D4-1,2-Dichloroethane	%	114	4673402	126	119	N/A	N/A	4675198
D8-Toluene	%	100	4673402	101	101	N/A	N/A	4675198

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF873			DCF948			
Sampling Date		2016/09/07			2016/09/08			
COC Number		017			019			
	UNITS	VOST- T2F-13A/B/C	RDL	MDL	VOST- T3A-5A/B/C	RDL	MDL	QC Batch
Chloromethane	ug	0.095	0.015	0.015	<0.17	0.17	0.17	4675198
Vinyl Chloride	ug	<0.013	0.013	0.013	<0.013	0.013	0.013	4675198
Bromomethane	ug	0.163	0.015	0.015	0.052	0.015	0.015	4675198
Chloroethane	ug	<0.0090	0.0090	0.0090	<0.0090	0.0090	0.0090	4675198
1,1-Dichloroethylene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Iodomethane	ug	0.017	0.015	0.015	<0.015	0.015	0.015	4675198
Carbon Disulfide	ug	1.32	0.026	0.026	1.49	0.026	0.026	4675198
Methylene Chloride(Dichloromethane)	ug	0.171	0.019	0.020	0.027	0.019	0.020	4675198
Chloroform	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
1,2-Dichloroethane	ug	<0.0070	0.0070	0.0070	<0.0070	0.0070	0.0070	4675198
1,1,1-Trichloroethane	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4675198
Carbon Tetrachloride	ug	<0.016	0.016	0.016	<0.016	0.016	0.016	4675198
Benzene	ug	6.76	0.0090	0.0090	6.16	0.0090	0.0090	4675198
1,1,2-Trichloroethane	ug	<0.016	0.016	0.016	<0.016	0.016	0.016	4675198
1,2-Dichloropropane	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Trichloroethylene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Toluene	ug	2.15	0.014	0.014	1.85	0.014	0.014	4675198
Tetrachloroethylene	ug	<0.018	0.018	0.018	0.023	0.018	0.018	4675198
Chlorobenzene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Ethylbenzene	ug	0.094	0.014	0.014	0.086	0.014	0.014	4675198
m / p-Xylene	ug	0.977	0.015	0.015	0.903	0.015	0.015	4675198
Styrene	ug	0.353	0.012	0.012	0.301	0.012	0.012	4675198
o-Xylene	ug	0.201	0.015	0.015	0.207	0.015	0.015	4675198
Bromoform	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4675198
1,1,2,2-Tetrachloroethane	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4675198
Acrylonitrile	ug	0.029	0.025	0.025	0.034	0.025	0.025	4675198
Surrogate Recovery (%)								
Bromofluorobenzene	%	100	N/A	N/A	106	N/A	N/A	4675198
D10-Ethylbenzene (FS)	%	116	N/A	N/A	92	N/A	N/A	4675198
D4-1,2-Dichloroethane	%	120	N/A	N/A	123	N/A	N/A	4675198
D8-Toluene	%	98	N/A	N/A	100	N/A	N/A	4675198

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF949			DCF950			
Sampling Date		2016/09/08			2016/09/08			
COC Number		020			021			
	UNITS	VOST- T3B-4A/B/C	RDL	MDL	VOST- T3C-12A/B/C	RDL	MDL	QC Batch
Chloromethane	ug	<0.19	0.19	0.19	<0.22	0.22	0.22	4675198
Vinyl Chloride	ug	<0.013	0.013	0.013	<0.013	0.013	0.013	4675198
Bromomethane	ug	0.185	0.015	0.015	0.270	0.015	0.015	4675198
Chloroethane	ug	<0.0090	0.0090	0.0090	<0.0090	0.0090	0.0090	4675198
1,1-Dichloroethylene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Iodomethane	ug	0.016	0.015	0.015	0.018	0.015	0.015	4675198
Carbon Disulfide	ug	1.57	0.026	0.026	1.99	0.026	0.026	4675198
Methylene Chloride(Dichloromethane)	ug	<0.019	0.019	0.020	<0.019	0.019	0.020	4675198
Chloroform	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
1,2-Dichloroethane	ug	<0.0070	0.0070	0.0070	<0.0070	0.0070	0.0070	4675198
1,1,1-Trichloroethane	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4675198
Carbon Tetrachloride	ug	<0.016	0.016	0.016	<0.016	0.016	0.016	4675198
Benzene	ug	7.42	0.0090	0.0090	8.08	0.0090	0.0090	4675198
1,1,2-Trichloroethane	ug	<0.016	0.016	0.016	<0.016	0.016	0.016	4675198
1,2-Dichloropropane	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Trichloroethylene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Toluene	ug	2.37	0.014	0.014	2.50	0.014	0.014	4675198
Tetrachloroethylene	ug	0.018	0.018	0.018	0.021	0.018	0.018	4675198
Chlorobenzene	ug	<0.011	0.011	0.011	<0.011	0.011	0.011	4675198
Ethylbenzene	ug	0.094	0.014	0.014	0.103	0.014	0.014	4675198
m / p-Xylene	ug	1.04	0.015	0.015	1.17	0.015	0.015	4675198
Styrene	ug	0.290	0.012	0.012	0.380	0.012	0.012	4675198
o-Xylene	ug	0.231	0.015	0.015	0.260	0.015	0.015	4675198
Bromoform	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4675198
1,1,2,2-Tetrachloroethane	ug	<0.014	0.014	0.014	<0.014	0.014	0.014	4675198
Acrylonitrile	ug	0.054	0.025	0.025	0.045	0.025	0.025	4675198
Surrogate Recovery (%)								
Bromofluorobenzene	%	103	N/A	N/A	103	N/A	N/A	4675198
D10-Ethylbenzene (FS)	%	135	N/A	N/A	129	N/A	N/A	4675198
D4-1,2-Dichloroethane	%	119	N/A	N/A	119	N/A	N/A	4675198
D8-Toluene	%	103	N/A	N/A	103	N/A	N/A	4675198

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF951	DCF952	DCF953			
Sampling Date		2016/09/08	2016/09/08	2016/09/08			
COC Number		022	023	024			
	UNITS	VOST- T3D-11A/B/C	VOST- T3E-10A/B/C	VOST- T3F-9A/B/C	RDL	MDL	QC Batch
Chloromethane	ug	0.080	0.029	0.174	0.015	0.015	4675198
Vinyl Chloride	ug	<0.013	<0.013	<0.013	0.013	0.013	4675198
Bromomethane	ug	0.131	0.058	0.250	0.015	0.015	4675198
Chloroethane	ug	<0.0090	<0.0090	<0.0090	0.0090	0.0090	4675198
1,1-Dichloroethylene	ug	<0.011	<0.011	<0.011	0.011	0.011	4675198
Iodomethane	ug	<0.015	<0.015	<0.015	0.015	0.015	4675198
Carbon Disulfide	ug	2.00	1.55	1.50	0.026	0.026	4675198
Methylene Chloride(Dichloromethane)	ug	<0.019	0.045	<0.019	0.019	0.020	4675198
Chloroform	ug	<0.011	<0.011	<0.011	0.011	0.011	4675198
1,2-Dichloroethane	ug	<0.0070	<0.0070	<0.0070	0.0070	0.0070	4675198
1,1,1-Trichloroethane	ug	<0.014	<0.014	<0.014	0.014	0.014	4675198
Carbon Tetrachloride	ug	<0.016	<0.016	<0.016	0.016	0.016	4675198
Benzene	ug	8.12	7.08	7.21	0.0090	0.0090	4675198
1,1,2-Trichloroethane	ug	<0.016	<0.016	<0.016	0.016	0.016	4675198
1,2-Dichloropropane	ug	<0.011	<0.011	<0.011	0.011	0.011	4675198
Trichloroethylene	ug	<0.011	<0.011	<0.011	0.011	0.011	4675198
Toluene	ug	2.47	2.27	2.32	0.014	0.014	4675198
Tetrachloroethylene	ug	0.028	0.032	<0.018	0.018	0.018	4675198
Chlorobenzene	ug	<0.011	<0.011	<0.011	0.011	0.011	4675198
Ethylbenzene	ug	0.101	0.086	0.082	0.014	0.014	4675198
m / p-Xylene	ug	1.17	0.975	0.982	0.015	0.015	4675198
Styrene	ug	0.446	0.281	0.310	0.012	0.012	4675198
o-Xylene	ug	0.256	0.210	0.204	0.015	0.015	4675198
Bromoform	ug	<0.014	<0.014	<0.014	0.014	0.014	4675198
1,1,2,2-Tetrachloroethane	ug	<0.014	<0.014	<0.014	0.014	0.014	4675198
Acrylonitrile	ug	0.052	0.045	<0.025	0.025	0.025	4675198
Surrogate Recovery (%)							
Bromofluorobenzene	%	106	104	100	N/A	N/A	4675198
D10-Ethylbenzene (FS)	%	137	114	126	N/A	N/A	4675198
D4-1,2-Dichloroethane	%	121	119	116	N/A	N/A	4675198
D8-Toluene	%	104	103	100	N/A	N/A	4675198

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Report Date: 2016/10/03

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF966			DCF967	DCF968			
Sampling Date		2016/09/07			2016/09/07	2016/09/08			
COC Number		011			018	025			
	UNITS	COND- T1	RDL	MDL	COND- T2	COND- T3	RDL	MDL	QC Batch
Chloromethane	ug/L	<100	100	100	<4.0	<4.0	4.0	4.0	4671593
Vinyl Chloride	ug/L	<20	20	20	<0.80	<0.80	0.80	0.80	4671593
Bromomethane	ug/L	<150	150	150	<6.0	<6.0	6.0	6.0	4671593
Chloroethane	ug/L	<50	50	50	<2.0	<2.0	2.0	2.0	4671593
1,1-Dichloroethylene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Iodomethane	ug/L	<30	30	30	<1.2	<1.2	1.2	1.2	4671593
Carbon Disulfide	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Methylene Chloride(Dichloromethane)	ug/L	1300	50	50	21	43	2.0	2.0	4671593
Chloroform	ug/L	<20	20	20	<0.80	<0.80	0.80	0.80	4671593
1,2-Dichloroethane	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
1,1,1-Trichloroethane	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Carbon Tetrachloride	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Benzene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
1,1,2-Trichloroethane	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
1,2-Dichloropropane	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Trichloroethylene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Toluene	ug/L	<25	25	25	1.8	<1.0	1.0	1.0	4671593
Tetrachloroethylene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Chlorobenzene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Ethylbenzene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
p+m-Xylene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Styrene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
o-Xylene	ug/L	<25	25	25	<1.0	<1.0	1.0	1.0	4671593
Bromoform	ug/L	<20	20	20	<0.80	<0.80	0.80	0.80	4671593
1,1,2,2-Tetrachloroethane	ug/L	<50	50	50	<2.0	<2.0	2.0	2.0	4671593
Surrogate Recovery (%)									
4-Bromofluorobenzene	%	95	N/A	N/A	99	101	N/A	N/A	4671593
D4-1,2-Dichloroethane	%	108	N/A	N/A	108	107	N/A	N/A	4671593
D8-Toluene	%	102	N/A	N/A	100	104	N/A	N/A	4671593

RDL = Reportable Detection Limit
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N/A = Not Applicable

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Site Location: ARCELORMITTAL BURNS HARBOR

TEST SUMMARY

Maxxam ID: DCF862
Sample ID: VOST- T1A- 18A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF863
Sample ID: VOST- T1B- 10A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF864
Sample ID: VOST- T1C- 9A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF865
Sample ID: VOST- T1D- 2A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF866
Sample ID: VOST- T1E- 3A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF867
Sample ID: VOST- T1F- 1A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF868
Sample ID: VOST- T2A- 18A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

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Report Date: 2016/10/03

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

TEST SUMMARY

Maxxam ID: DCF869
Sample ID: VOST- T2B- 17A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF870
Sample ID: VOST- T2C- 16A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4673402	N/A	2016/09/23	Angel Guerrero

Maxxam ID: DCF871
Sample ID: VOST- T2D- 15A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF872
Sample ID: VOST- T2E- 14A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF873
Sample ID: VOST- T2F- 13A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF948
Sample ID: VOST- T3A- 5A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF949
Sample ID: VOST- T3B- 4A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

TEST SUMMARY

Maxxam ID: DCF950
Sample ID: VOST- T3C- 12A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF951
Sample ID: VOST- T3D- 11A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF952
Sample ID: VOST- T3E- 10A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF953
Sample ID: VOST- T3F- 9A/B/C
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST EPA5041A, 8260C for 0030, 0031	GC/MS	4675198	N/A	2016/09/24	Angel Guerrero

Maxxam ID: DCF966
Sample ID: COND- T1
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	4671593	N/A	2016/09/22	Adriana Zurita

Maxxam ID: DCF967
Sample ID: COND- T2
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	4671593	N/A	2016/09/22	Adriana Zurita

Maxxam ID: DCF968
Sample ID: COND- T3
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	4671593	N/A	2016/09/22	Adriana Zurita

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GENERAL COMMENTS

VOST analysis:
Carbon Disulfide, Benzene, and Toluene are over the calibration range. Data should be considered an estimate only.

Sample DCF862-01 : Increased DL for Chloromethane due to matrix interference.

Sample DCF863-01 : Increased DL for Chloromethane due to matrix interference.

Sample DCF948-01 : Increased DL for Chloromethane due to matrix interference.

Sample DCF949-01 : Increased DL for Chloromethane due to matrix interference.

Sample DCF950-01 : Increased DL for Chloromethane, due to matrix interference.

Sample DCF966-01 : The sample vial was received containing 41mL of sample.
Sample was ananlyzed at 50x dilution. Detection limits were adjusted accordingly.
Acrylonitrile < 250ug/L

Sample DCF967-01 : The sample vial was received containing 43mL of sample.
Sample was ananlyzed at 2x dilution. Detection limits were adjusted accordingly.
Acrylonitrile < 10ug/L

Sample DCF968-01 : The sample vial was received containing 40.5mL of sample.
Sample was ananlyzed at 2x dilution. Detection limits were adjusted accordingly.
Acrylonitrile < 10ug/L

Results relate only to the items tested.

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4671593	AZ	Spiked Blank	4-Bromofluorobenzene	2016/09/22		99	%	70 - 130
			D4-1,2-Dichloroethane	2016/09/22		104	%	70 - 130
			D8-Toluene	2016/09/22		100	%	70 - 130
			Chloromethane	2016/09/22		96	%	60 - 140
			Vinyl Chloride	2016/09/22		111	%	70 - 130
			Bromomethane	2016/09/22		79	%	60 - 140
			Chloroethane	2016/09/22		105	%	70 - 130
			1,1-Dichloroethylene	2016/09/22		120	%	70 - 130
			Iodomethane	2016/09/22		93	%	N/A
			Carbon Disulfide	2016/09/22		126	%	N/A
			Methylene Chloride(Dichloromethane)	2016/09/22		105	%	70 - 130
			Chloroform	2016/09/22		109	%	70 - 130
			1,2-Dichloroethane	2016/09/22		108	%	70 - 130
			1,1,1-Trichloroethane	2016/09/22		114	%	70 - 130
			Carbon Tetrachloride	2016/09/22		126	%	70 - 130
			Benzene	2016/09/22		106	%	70 - 130
			1,1,2-Trichloroethane	2016/09/22		102	%	70 - 130
			1,2-Dichloropropane	2016/09/22		101	%	70 - 130
			Trichloroethylene	2016/09/22		102	%	70 - 130
			Toluene	2016/09/22		101	%	70 - 130
			Tetrachloroethylene	2016/09/22		103	%	70 - 130
			Chlorobenzene	2016/09/22		100	%	70 - 130
			Ethylbenzene	2016/09/22		105	%	70 - 130
			p+m-Xylene	2016/09/22		104	%	70 - 130
			Styrene	2016/09/22		102	%	70 - 130
			o-Xylene	2016/09/22		104	%	70 - 130
			Bromoform	2016/09/22		93	%	70 - 130
			1,1,2,2-Tetrachloroethane	2016/09/22		100	%	70 - 130
4671593	AZ	Method Blank	4-Bromofluorobenzene	2016/09/22		91	%	70 - 130
			D4-1,2-Dichloroethane	2016/09/22		99	%	70 - 130
			D8-Toluene	2016/09/22		107	%	70 - 130
			Chloromethane	2016/09/22	<2.0		ug/L	
			Vinyl Chloride	2016/09/22	<0.40		ug/L	
			Bromomethane	2016/09/22	<3.0		ug/L	
			Chloroethane	2016/09/22	<1.0		ug/L	
			1,1-Dichloroethylene	2016/09/22	<0.50		ug/L	
			Iodomethane	2016/09/22	<0.60		ug/L	
			Carbon Disulfide	2016/09/22	<0.50		ug/L	
			Methylene Chloride(Dichloromethane)	2016/09/22	<1.0		ug/L	
			Chloroform	2016/09/22	<0.40		ug/L	
			1,2-Dichloroethane	2016/09/22	<0.50		ug/L	
			1,1,1-Trichloroethane	2016/09/22	<0.50		ug/L	
			Carbon Tetrachloride	2016/09/22	<0.50		ug/L	
			Benzene	2016/09/22	<0.50		ug/L	
			1,1,2-Trichloroethane	2016/09/22	<0.50		ug/L	
			1,2-Dichloropropane	2016/09/22	<0.50		ug/L	
			Trichloroethylene	2016/09/22	<0.50		ug/L	
			Toluene	2016/09/22	<0.50		ug/L	
			Tetrachloroethylene	2016/09/22	<0.50		ug/L	
			Chlorobenzene	2016/09/22	<0.50		ug/L	
			Ethylbenzene	2016/09/22	<0.50		ug/L	
			p+m-Xylene	2016/09/22	<0.50		ug/L	
			Styrene	2016/09/22	<0.50		ug/L	

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			o-Xylene	2016/09/22	<0.50		ug/L	
			Bromoform	2016/09/22	<0.40		ug/L	
			1,1,2,2-Tetrachloroethane	2016/09/22	<1.0		ug/L	
4673402	AGU	Spiked Blank	Bromofluorobenzene	2016/09/23		99	%	43 - 131
			D10-Ethylbenzene (FS)	2016/09/23		98	%	47 - 157
			D4-1,2-Dichloroethane	2016/09/23		101	%	64 - 133
			D8-Toluene	2016/09/23		99	%	68 - 121
			Chloromethane	2016/09/23		127	%	50 - 150
			Vinyl Chloride	2016/09/23		114	%	50 - 150
			Bromomethane	2016/09/23		107	%	50 - 150
			Chloroethane	2016/09/23		109	%	50 - 150
			1,1-Dichloroethylene	2016/09/23		113	%	50 - 150
			Iodomethane	2016/09/23		95	%	N/A
			Carbon Disulfide	2016/09/23		105	%	50 - 150
			Methylene Chloride(Dichloromethane)	2016/09/23		110	%	50 - 150
			Chloroform	2016/09/23		109	%	50 - 150
			1,2-Dichloroethane	2016/09/23		110	%	50 - 150
			1,1,1-Trichloroethane	2016/09/23		109	%	50 - 150
			Carbon Tetrachloride	2016/09/23		110	%	50 - 150
			Benzene	2016/09/23		109	%	50 - 150
			1,1,2-Trichloroethane	2016/09/23		111	%	50 - 150
			1,2-Dichloropropane	2016/09/23		108	%	50 - 150
			Trichloroethylene	2016/09/23		112	%	50 - 150
			Toluene	2016/09/23		110	%	50 - 150
			Tetrachloroethylene	2016/09/23		112	%	50 - 150
			Chlorobenzene	2016/09/23		111	%	50 - 150
			Ethylbenzene	2016/09/23		110	%	50 - 150
			m / p-Xylene	2016/09/23		110	%	50 - 150
			Styrene	2016/09/23		110	%	50 - 150
			o-Xylene	2016/09/23		110	%	50 - 150
			Bromoform	2016/09/23		114	%	50 - 150
			1,1,2,2-Tetrachloroethane	2016/09/23		108	%	50 - 150
			Acrylonitrile	2016/09/23		100	%	N/A
4673402	AGU	Method Blank	Bromofluorobenzene	2016/09/23		98	%	43 - 131
			D10-Ethylbenzene (FS)	2016/09/23		92	%	47 - 157
			D4-1,2-Dichloroethane	2016/09/23		110	%	64 - 133
			D8-Toluene	2016/09/23		100	%	68 - 121
			Chloromethane	2016/09/23	<0.015		ug	
			Vinyl Chloride	2016/09/23	<0.013		ug	
			Bromomethane	2016/09/23	<0.015		ug	
			Chloroethane	2016/09/23	<0.0090		ug	
			1,1-Dichloroethylene	2016/09/23	<0.011		ug	
			Iodomethane	2016/09/23	<0.015		ug	
			Carbon Disulfide	2016/09/23	<0.026		ug	
			Methylene Chloride(Dichloromethane)	2016/09/23	<0.019		ug	
			Chloroform	2016/09/23	<0.011		ug	
			1,2-Dichloroethane	2016/09/23	<0.0070		ug	
			1,1,1-Trichloroethane	2016/09/23	<0.014		ug	
			Carbon Tetrachloride	2016/09/23	<0.016		ug	
			Benzene	2016/09/23	<0.0090		ug	
			1,1,2-Trichloroethane	2016/09/23	<0.016		ug	
			1,2-Dichloropropane	2016/09/23	<0.011		ug	
			Trichloroethylene	2016/09/23	<0.011		ug	

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Toluene	2016/09/23	<0.014		ug	
			Tetrachloroethylene	2016/09/23	<0.018		ug	
			Chlorobenzene	2016/09/23	<0.011		ug	
			Ethylbenzene	2016/09/23	<0.014		ug	
			m / p-Xylene	2016/09/23	<0.015		ug	
			Styrene	2016/09/23	<0.012		ug	
			o-Xylene	2016/09/23	<0.015		ug	
			Bromoform	2016/09/23	<0.014		ug	
			1,1,2,2-Tetrachloroethane	2016/09/23	<0.014		ug	
			Acrylonitrile	2016/09/23	<0.025		ug	
4675198	AGU	Spiked Blank	Bromofluorobenzene	2016/09/24		101	%	43 - 131
			D10-Ethylbenzene (FS)	2016/09/24		107	%	47 - 157
			D4-1,2-Dichloroethane	2016/09/24		95	%	64 - 133
			D8-Toluene	2016/09/24		99	%	68 - 121
			Chloromethane	2016/09/24		104	%	50 - 150
			Vinyl Chloride	2016/09/24		103	%	50 - 150
			Bromomethane	2016/09/24		106	%	50 - 150
			Chloroethane	2016/09/24		106	%	50 - 150
			1,1-Dichloroethylene	2016/09/24		107	%	50 - 150
			Iodomethane	2016/09/24		83	%	N/A
			Carbon Disulfide	2016/09/24		95	%	50 - 150
			Methylene Chloride(Dichloromethane)	2016/09/24		95	%	50 - 150
			Chloroform	2016/09/24		101	%	50 - 150
			1,2-Dichloroethane	2016/09/24		100	%	50 - 150
			1,1,1-Trichloroethane	2016/09/24		101	%	50 - 150
			Carbon Tetrachloride	2016/09/24		102	%	50 - 150
			Benzene	2016/09/24		101	%	50 - 150
			1,1,2-Trichloroethane	2016/09/24		107	%	50 - 150
			1,2-Dichloropropane	2016/09/24		97	%	50 - 150
			Trichloroethylene	2016/09/24		107	%	50 - 150
			Toluene	2016/09/24		103	%	50 - 150
			Tetrachloroethylene	2016/09/24		111	%	50 - 150
			Chlorobenzene	2016/09/24		105	%	50 - 150
			Ethylbenzene	2016/09/24		103	%	50 - 150
			m / p-Xylene	2016/09/24		104	%	50 - 150
			Styrene	2016/09/24		104	%	50 - 150
			o-Xylene	2016/09/24		104	%	50 - 150
			Bromoform	2016/09/24		116	%	50 - 150
			1,1,2,2-Tetrachloroethane	2016/09/24		109	%	50 - 150
			Acrylonitrile	2016/09/24		103	%	N/A
4675198	AGU	Method Blank	Bromofluorobenzene	2016/09/24		102	%	43 - 131
			D10-Ethylbenzene (FS)	2016/09/24		98	%	47 - 157
			D4-1,2-Dichloroethane	2016/09/24		103	%	64 - 133
			D8-Toluene	2016/09/24		99	%	68 - 121
			Chloromethane	2016/09/24	<0.015		ug	
			Vinyl Chloride	2016/09/24	<0.013		ug	
			Bromomethane	2016/09/24	<0.015		ug	
			Chloroethane	2016/09/24	<0.0090		ug	
			1,1-Dichloroethylene	2016/09/24	<0.011		ug	
			Iodomethane	2016/09/24	<0.015		ug	
			Carbon Disulfide	2016/09/24	<0.026		ug	
			Methylene Chloride(Dichloromethane)	2016/09/24	<0.019		ug	
			Chloroform	2016/09/24	<0.011		ug	

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2-Dichloroethane	2016/09/24	<0.0070		ug	
			1,1,1-Trichloroethane	2016/09/24	<0.014		ug	
			Carbon Tetrachloride	2016/09/24	<0.016		ug	
			Benzene	2016/09/24	<0.0090		ug	
			1,1,2-Trichloroethane	2016/09/24	<0.016		ug	
			1,2-Dichloropropane	2016/09/24	<0.011		ug	
			Trichloroethylene	2016/09/24	<0.011		ug	
			Toluene	2016/09/24	<0.014		ug	
			Tetrachloroethylene	2016/09/24	<0.018		ug	
			Chlorobenzene	2016/09/24	<0.011		ug	
			Ethylbenzene	2016/09/24	<0.014		ug	
			m / p-Xylene	2016/09/24	<0.015		ug	
			Styrene	2016/09/24	<0.012		ug	
			o-Xylene	2016/09/24	<0.015		ug	
			Bromoform	2016/09/24	<0.014		ug	
			1,1,2,2-Tetrachloroethane	2016/09/24	<0.014		ug	
			Acrylonitrile	2016/09/24	<0.025		ug	

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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Maxxam Job #: B6K1223
Report Date: 2016/10/03

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Maureen Smith

Maureen Smith, Supervisor, Volatiles

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Your Project #: M162810
Site#: BURNS HARBOR/ UNDERFIRE
Site Location: ARCELORMITTAL
Your C.O.C. #: 001

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Report Date: 2016/10/06
Report #: R4192284
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6K6631
Received: 2016/09/23, 14:20

Sample Matrix: Stack Sampling Train
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
VOST Condensate (8260Cmod)	1	N/A	2016/10/05	CAM SOP-00226	EPA 8260C m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Clayton Johnson
Project Manager - Air Toxics, Source Evaluation
06 Oct 2016 10:57:39 -03:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

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Maxxam Job #: B6K6631
Report Date: 2016/10/06

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL

VOLATILE ORGANICS BY GC/MS (STACK SAMPLING TRAIN)

Maxxam ID		DDF245			
Sampling Date		2016/09/22			
COC Number		001			
	UNITS	M0031- DI BLANK	RDL	MDL	QC Batch
Chloromethane	ug/L	<2.0	2.0	2.0	4689098
Vinyl Chloride	ug/L	<0.40	0.40	0.40	4689098
Bromomethane	ug/L	<3.0	3.0	3.0	4689098
Chloroethane	ug/L	<1.0	1.0	1.0	4689098
1,1-Dichloroethylene	ug/L	<0.50	0.50	0.50	4689098
Iodomethane	ug/L	<0.60	0.60	0.60	4689098
Carbon Disulfide	ug/L	<0.50	0.50	0.50	4689098
Methylene Chloride(Dichloromethane)	ug/L	3.1	1.0	1.0	4689098
Chloroform	ug/L	<0.40	0.40	0.40	4689098
1,2-Dichloroethane	ug/L	<0.50	0.50	0.50	4689098
1,1,1-Trichloroethane	ug/L	<0.50	0.50	0.50	4689098
Carbon Tetrachloride	ug/L	<0.50	0.50	0.50	4689098
Benzene	ug/L	<0.50	0.50	0.50	4689098
1,1,2-Trichloroethane	ug/L	<0.50	0.50	0.50	4689098
1,2-Dichloropropane	ug/L	<0.50	0.50	0.50	4689098
Trichloroethylene	ug/L	<0.50	0.50	0.50	4689098
Toluene	ug/L	<0.50	0.50	0.50	4689098
Chlorobenzene	ug/L	<0.50	0.50	0.50	4689098
Ethylbenzene	ug/L	<0.50	0.50	0.50	4689098
p+m-Xylene	ug/L	<0.50	0.50	0.50	4689098
Styrene	ug/L	<0.50	0.50	0.50	4689098
o-Xylene	ug/L	<0.50	0.50	0.50	4689098
Bromoform	ug/L	<0.40	0.40	0.40	4689098
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	94	N/A	N/A	4689098
D4-1,2-Dichloroethane	%	97	N/A	N/A	4689098
D8-Toluene	%	104	N/A	N/A	4689098

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B6K6631
Report Date: 2016/10/06

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Client Project #: M162810
Site Location: ARCELORMITTAL

TEST SUMMARY

Maxxam ID: DDF245
Sample ID: M0031- DI BLANK
Matrix: Stack Sampling Train

Collected: 2016/09/22
Shipped:
Received: 2016/09/23

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	4689098	N/A	2016/10/05	Yujie Yan

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Maxxam Job #: B6K6631
Report Date: 2016/10/06

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL

GENERAL COMMENTS

Sample DDF245-01 : The sample vial was received containing 43mL of sample.

Results relate only to the items tested.

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Maxxam Job #: B6K6631
Report Date: 2016/10/06

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4689098	YYA	Spiked Blank	4-Bromofluorobenzene	2016/10/05		95	%	70 - 130
			D4-1,2-Dichloroethane	2016/10/05		98	%	70 - 130
			D8-Toluene	2016/10/05		102	%	70 - 130
			Chloromethane	2016/10/05		92	%	60 - 140
			Vinyl Chloride	2016/10/05		107	%	70 - 130
			Bromomethane	2016/10/05		65	%	60 - 140
			Chloroethane	2016/10/05		100	%	70 - 130
			1,1-Dichloroethylene	2016/10/05		112	%	70 - 130
			Iodomethane	2016/10/05		88	%	N/A
			Carbon Disulfide	2016/10/05		115	%	N/A
			Methylene Chloride(Dichloromethane)	2016/10/05		91	%	70 - 130
			Chloroform	2016/10/05		96	%	70 - 130
			1,2-Dichloroethane	2016/10/05		94	%	70 - 130
			1,1,1-Trichloroethane	2016/10/05		105	%	70 - 130
			Carbon Tetrachloride	2016/10/05		116	%	70 - 130
			Benzene	2016/10/05		95	%	70 - 130
			1,1,2-Trichloroethane	2016/10/05		90	%	70 - 130
			1,2-Dichloropropane	2016/10/05		90	%	70 - 130
			Trichloroethylene	2016/10/05		94	%	70 - 130
			Toluene	2016/10/05		98	%	70 - 130
			Chlorobenzene	2016/10/05		93	%	70 - 130
			Ethylbenzene	2016/10/05		101	%	70 - 130
			p+m-Xylene	2016/10/05		99	%	70 - 130
			Styrene	2016/10/05		94	%	70 - 130
			o-Xylene	2016/10/05		94	%	70 - 130
			Bromoform	2016/10/05		83	%	70 - 130
4689098	YYA	Method Blank	4-Bromofluorobenzene	2016/10/05		92	%	70 - 130
			D4-1,2-Dichloroethane	2016/10/05		103	%	70 - 130
			D8-Toluene	2016/10/05		107	%	70 - 130
			Chloromethane	2016/10/05	<2.0		ug/L	
			Vinyl Chloride	2016/10/05	<0.40		ug/L	
			Bromomethane	2016/10/05	<3.0		ug/L	
			Chloroethane	2016/10/05	<1.0		ug/L	
			1,1-Dichloroethylene	2016/10/05	<0.50		ug/L	
			Iodomethane	2016/10/05	<0.60		ug/L	
			Carbon Disulfide	2016/10/05	<0.50		ug/L	
			Methylene Chloride(Dichloromethane)	2016/10/05	<1.0		ug/L	
			Chloroform	2016/10/05	<0.40		ug/L	
			1,2-Dichloroethane	2016/10/05	<0.50		ug/L	
			1,1,1-Trichloroethane	2016/10/05	<0.50		ug/L	
			Carbon Tetrachloride	2016/10/05	<0.50		ug/L	
			Benzene	2016/10/05	<0.50		ug/L	
			1,1,2-Trichloroethane	2016/10/05	<0.50		ug/L	
			1,2-Dichloropropane	2016/10/05	<0.50		ug/L	
			Trichloroethylene	2016/10/05	<0.50		ug/L	
			Toluene	2016/10/05	<0.50		ug/L	
			Chlorobenzene	2016/10/05	<0.50		ug/L	
			Ethylbenzene	2016/10/05	<0.50		ug/L	
			p+m-Xylene	2016/10/05	<0.50		ug/L	
			Styrene	2016/10/05	<0.50		ug/L	
			o-Xylene	2016/10/05	<0.50		ug/L	

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Maxxam Job #: B6K6631
Report Date: 2016/10/06

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Client Project #: M162810
Site Location: ARCELORMITTAL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Bromoform	2016/10/05	<0.40		ug/L	

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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Maxxam Job #: B6K6631
Report Date: 2016/10/06

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Maureen Smith

Maureen Smith, Supervisor, Volatiles

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Total Average Run 1-3
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes	Sample Catch (ug)	Concentration (mg/dscm)	Flowrate, dscfm	Emissions lb/hr
Chloromethane	≤ 1.99	≤ 1.73E-02	100,197	≤ 6.41E-03
Vinyl Chloride	≤ 0.37	≤ 3.18E-03	100,197	≤ 1.18E-03
Bromomethane	≤ 2.72	≤ 2.37E-02	100,197	≤ 8.77E-03
Chloroethane	≤ 0.79	≤ 6.86E-03	100,197	≤ 2.54E-03
1,1-Dichloroethylene	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Iodomethane	≤ 0.53	≤ 4.59E-03	100,197	≤ 1.70E-03
Carbon Disulfide	≤ 9.19	≤ 8.00E-02	100,197	≤ 2.96E-02
Methylene Chloride(Dichloromethane)	≤ 18.88	≤ 1.64E-01	100,197	≤ 6.08E-02
Chloroform	≤ 0.35	≤ 3.09E-03	100,197	≤ 1.14E-03
1,2-Dichloroethane	≤ 0.41	≤ 3.55E-03	100,197	≤ 1.31E-03
1,1,1-Trichloroethane	≤ 0.45	≤ 3.87E-03	100,197	≤ 1.43E-03
Carbon Tetrachloride	≤ 0.46	≤ 3.96E-03	100,197	≤ 1.47E-03
Benzene	≤ 40.95	≤ 3.57E-01	100,197	≤ 1.32E-01
1,1,2-Trichloroethane	≤ 0.46	≤ 3.96E-03	100,197	≤ 1.47E-03
1,2-Dichloropropane	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Trichloroethylene	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Toluene	≤ 12.87	≤ 1.12E-01	100,197	≤ 4.15E-02
Tetrachloroethylene	≤ 0.47	≤ 4.12E-03	100,197	≤ 1.53E-03
Chlorobenzene	≤ 0.43	≤ 3.73E-03	100,197	≤ 1.38E-03
Ethylbenzene	≤ 0.93	≤ 8.06E-03	100,197	≤ 2.98E-03
m / p-Xylene	≤ 6.25	≤ 5.44E-02	100,197	≤ 2.01E-02
Styrene	≤ 2.38	≤ 2.07E-02	100,197	≤ 7.66E-03
o-Xylene	≤ 1.64	≤ 1.42E-02	100,197	≤ 5.27E-03
Bromoform	≤ 0.37	≤ 3.23E-03	100,197	≤ 1.20E-03
1,1,2,2-Tetrachloroethane	≤ 0.79	≤ 6.86E-03	100,197	≤ 2.54E-03
Acrylonitrile	≤ 3.89	≤ 3.39E-02	100,197	≤ 1.25E-02
Total Volatile Organic HAP	**≤ 108.84**	**≤ 9.47E-01**	**100,197**	**≤ 3.51E-01**

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Run 1
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes	Sample Catch (ug)		Concentration (mg/dscm)		Flowrate, dscfm	Emissions lb/hr		Blank (ug)
Chloromethane	≤	4.70	≤	4.09E-02	100,649	≤	1.54E-02	0.00
Vinyl Chloride	≤	0.90	≤	7.81E-03	100,649	≤	2.94E-03	0.00
Bromomethane	≤	6.60	≤	5.74E-02	100,649	≤	2.16E-02	0.00
Chloroethane	≤	2.10	≤	1.83E-02	100,649	≤	6.90E-03	0.00
1,1-Dichloroethylene	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Iodomethane	≤	1.32	≤	1.15E-02	100,649	≤	4.33E-03	0.00
Carbon Disulfide	≤	10.59	≤	9.21E-02	100,649	≤	3.47E-02	0.00
Methylene Chloride(Dichloromethane)	≤	53.42	≤	4.65E-01	100,649	≤	1.75E-01	0.00
Chloroform	≤	0.89	≤	7.71E-03	100,649	≤	2.90E-03	0.00
1,2-Dichloroethane	≤	1.07	≤	9.28E-03	100,649	≤	3.50E-03	0.00
1,1,1-Trichloroethane	≤	1.11	≤	9.64E-03	100,649	≤	3.64E-03	0.00
Carbon Tetrachloride	≤	1.12	≤	9.75E-03	100,649	≤	3.68E-03	0.00
Benzene	≤	46.94	≤	4.08E-01	100,649	≤	1.54E-01	0.00
1,1,2-Trichloroethane	≤	1.12	≤	9.75E-03	100,649	≤	3.68E-03	0.00
1,2-Dichloropropane	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Trichloroethylene	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Toluene	≤	15.19	≤	1.32E-01	100,649	≤	4.98E-02	0.00
Tetrachloroethylene	≤	1.14	≤	9.90E-03	100,649	≤	3.73E-03	0.00
Chlorobenzene	≤	1.09	≤	9.49E-03	100,649	≤	3.58E-03	0.00
Ethylbenzene	≤	1.67	≤	1.45E-02	100,649	≤	5.48E-03	0.00
m / p-Xylene	≤	7.66	≤	6.66E-02	100,649	≤	2.51E-02	0.00
Styrene	≤	3.21	≤	2.79E-02	100,649	≤	1.05E-02	0.00
o-Xylene	≤	2.45	≤	2.13E-02	100,649	≤	8.02E-03	0.00
Bromoform	≤	0.90	≤	7.86E-03	100,649	≤	2.96E-03	0.00
1,1,2,2-Tetrachloroethane	≤	2.13	≤	1.86E-02	100,649	≤	7.00E-03	0.00
Acrylonitrile	≤	10.44	≤	9.08E-02	100,649	≤	3.42E-02	0.00
Total Volatile Organic HAP				**1.57E+00**			**5.93E-01**	

Sample volume (Vmstd, liters)		114.99
Average % CO_2 by volume, dry		6.30
Average % O_2 by volume, dry		8.40

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Run 2
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes	Sample Catch (ug)		Concentration (mg/dscm)		Flowrate, dscfm	Emissions lb/hr		Blank (ug)
Chloromethane	≤	0.44	≤	3.83E-03	99,663	≤	1.43E-03	0.00
Vinyl Chloride	≤	0.11	≤	9.88E-04	99,663	≤	3.69E-04	0.00
Bromomethane	≤	0.67	≤	5.89E-03	99,663	≤	2.20E-03	0.00
Chloroethane	≤	0.14	≤	1.23E-03	99,663	≤	4.60E-04	0.00
1,1-Dichloroethylene	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Iodomethane	≤	0.15	≤	1.28E-03	99,663	≤	4.78E-04	0.00
Carbon Disulfide	≤	9.89	≤	8.70E-02	99,663	≤	3.25E-02	0.00
Methylene Chloride(Dichloromethane)	≤	1.28	≤	1.13E-02	99,663	≤	4.20E-03	0.00
Chloroform	≤	0.10	≤	8.83E-04	99,663	≤	3.30E-04	0.00
1,2-Dichloroethane	≤	0.09	≤	7.47E-04	99,663	≤	2.79E-04	0.00
1,1,1-Trichloroethane	≤	0.13	≤	1.12E-03	99,663	≤	4.17E-04	0.00
Carbon Tetrachloride	≤	0.14	≤	1.22E-03	99,663	≤	4.56E-04	0.00
Benzene	≤	46.10	≤	4.05E-01	99,663	≤	1.51E-01	0.00
1,1,2-Trichloroethane	≤	0.14	≤	1.22E-03	99,663	≤	4.56E-04	0.00
1,2-Dichloropropane	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Trichloroethylene	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Toluene		14.20		1.25E-01	99,663		4.66E-02	0.00
Tetrachloroethylene	≤	0.15	≤	1.33E-03	99,663	≤	4.96E-04	0.00
Chlorobenzene	≤	0.11	≤	9.58E-04	99,663	≤	3.58E-04	0.00
Ethylbenzene	≤	0.68	≤	5.99E-03	99,663	≤	2.24E-03	0.00
m / p-Xylene	≤	6.76	≤	5.94E-02	99,663	≤	2.22E-02	0.00
Styrene	≤	2.46	≤	2.16E-02	99,663	≤	8.08E-03	0.00
o-Xylene	≤	1.47	≤	1.29E-02	99,663	≤	4.82E-03	0.00
Bromoform	≤	0.12	≤	1.04E-03	99,663	≤	3.89E-04	0.00
1,1,2,2-Tetrachloroethane	≤	0.09	≤	8.14E-04	99,663	≤	3.04E-04	0.00
Acrylonitrile	≤	0.62	≤	5.47E-03	99,663	≤	2.04E-03	0.00
Total Volatile Organic HAP				**7.59E-01**	99,663		**2.83E-01**	

Sample volume (Vmstd, liters)		113.72
Average % CO_2 by volume, dry		6.40
Average % O_2 by volume, dry		8.20

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SPECIATED VOLATILE ORGANIC HAP TEST RESULTS SUMMARY
Run 3
Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 7, 2016

Analytes	Sample Catch (ug)		Concentration (mg/dscm)		Flowrate, dscfm	Emissions lb/hr		Blank (ug)
Chloromethane	≤	0.83	≤	7.14E-03	100,279	≤	2.68E-03	0.00
Vinyl Chloride	≤	0.09	≤	7.42E-04	100,279	≤	2.79E-04	0.00
Bromomethane	≤	0.90	≤	7.69E-03	100,279	≤	2.89E-03	0.00
Chloroethane	≤	0.12	≤	1.05E-03	100,279	≤	3.94E-04	0.00
1,1-Dichloroethylene	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Iodomethane	≤	0.12	≤	9.93E-04	100,279	≤	3.73E-04	0.00
Carbon Disulfide	≤	7.09	≤	6.09E-02	100,279	≤	2.29E-02	0.00
Methylene Chloride(Dichloromethane)	≤	1.93	≤	1.66E-02	100,279	≤	6.23E-03	0.00
Chloroform	≤	0.08	≤	6.73E-04	100,279	≤	2.53E-04	0.00
1,2-Dichloroethane	≤	0.07	≤	6.10E-04	100,279	≤	2.29E-04	0.00
1,1,1-Trichloroethane	≤	0.10	≤	8.50E-04	100,279	≤	3.19E-04	0.00
Carbon Tetrachloride	≤	0.11	≤	9.19E-04	100,279	≤	3.45E-04	0.00
Benzene	≤	29.82	≤	2.56E-01	100,279	≤	9.62E-02	0.00
1,1,2-Trichloroethane	≤	0.11	≤	9.19E-04	100,279	≤	3.45E-04	0.00
1,2-Dichloropropane	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Trichloroethylene	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Toluene	≤	9.23	≤	7.93E-02	100,279	≤	2.98E-02	0.00
Tetrachloroethylene	≤	0.13	≤	1.14E-03	100,279	≤	4.29E-04	0.00
Chlorobenzene	≤	0.09	≤	7.47E-04	100,279	≤	2.81E-04	0.00
Ethylbenzene	≤	0.43	≤	3.67E-03	100,279	≤	1.38E-03	0.00
m / p-Xylene	≤	4.33	≤	3.71E-02	100,279	≤	1.40E-02	0.00
Styrene	≤	1.46	≤	1.25E-02	100,279	≤	4.71E-03	0.00
o-Xylene	≤	1.00	≤	8.56E-03	100,279	≤	3.22E-03	0.00
Bromoform	≤	0.09	≤	7.76E-04	100,279	≤	2.92E-04	0.00
1,1,2,2-Tetrachloroethane	≤	0.14	≤	1.22E-03	100,279	≤	4.58E-04	0.00
Acrylonitrile	≤	0.62	≤	5.28E-03	100,279	≤	1.98E-03	0.00
Total Volatile Organic HAP				**5.08E-01**			**1.91E-01**	

Sample volume (Vmstd, liters)		116.45
Average % CO_2 by volume, dry		6.10
Average % O_2 by volume, dry		8.80

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Your Project #: M162810
Site#: BURNS HARBOR UNDERFIRE STACK
Site Location: ARCELORMITTAL BURNS HARBOR
Your C.O.C. #: 004, 001, 002, 003

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Report Date: 2016/09/26
Report #: R4180302
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6K1277
Received: 2016/09/17, 18:30

Sample Matrix: Stack Sampling Train
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Formaldehyde (M316)	4	2016/09/21	2016/09/21	BRL SOP-00113	EPA 316 m
Final Volume of Impinger	4	N/A	2016/09/21		

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Clayton Johnson
Project Manager - Air Toxics, Source Evaluation
26 Sep 2016 16:42:50 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

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Maxxam Job #: B6K1277
Report Date: 2016/09/26

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		DCG249		DCG250	DCG250	DCG251		DCG252			
Sampling Date		2016/09/08		2016/09/07	2016/09/07	2016/09/07		2016/09/08			
COC Number		004		001	001	002		003			
	UNITS	M316- DI BLANK	RDL	M316- R1	M316- R1 Lab-Dup	M316- R2	RDL	M316- R3	RDL	QC Batch	MDL
Formaldehyde	ug	<4.5	4.5	<17	<17	<17	17	<18	18	4670106	3
Impinger Volume	ml	180	1	678	N/A	661	1	710	1	4670113	1

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B6K1277
Report Date: 2016/09/26

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

TEST SUMMARY

Maxxam ID: DCG249
Sample ID: M316- DI BLANK
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Formaldehyde (M316)	/SPEC	4670106	2016/09/21	2016/09/21	Manoj Gera
Final Volume of Impinger		4670113	N/A	2016/09/21	Frank Mo

Maxxam ID: DCG250
Sample ID: M316- R1
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Formaldehyde (M316)	/SPEC	4670106	2016/09/21	2016/09/21	Manoj Gera
Final Volume of Impinger		4670113	N/A	2016/09/21	Frank Mo

Maxxam ID: DCG250 Dup
Sample ID: M316- R1
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Formaldehyde (M316)	/SPEC	4670106	2016/09/21	2016/09/21	Manoj Gera

Maxxam ID: DCG251
Sample ID: M316- R2
Matrix: Stack Sampling Train

Collected: 2016/09/07
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Formaldehyde (M316)	/SPEC	4670106	2016/09/21	2016/09/21	Manoj Gera
Final Volume of Impinger		4670113	N/A	2016/09/21	Frank Mo

Maxxam ID: DCG252
Sample ID: M316- R3
Matrix: Stack Sampling Train

Collected: 2016/09/08
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Formaldehyde (M316)	/SPEC	4670106	2016/09/21	2016/09/21	Manoj Gera
Final Volume of Impinger		4670113	N/A	2016/09/21	Frank Mo

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GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam Job #: B6K1277
Report Date: 2016/09/26

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4670106	MGE	Matrix Spike(DCG250)	Formaldehyde	2016/09/21		49 (1)	%	80 - 120
4670106	MGE	Spiked Blank	Formaldehyde	2016/09/21		105	%	91 - 107
4670106	MGE	Method Blank	Formaldehyde	2016/09/21	<4.5		ug	
4670106	MGE	RPD - Sample/Sample Dup	Formaldehyde	2016/09/21	NC		%	20

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Matrix spike failed due to interference

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Maxxam Job #: B6K1277
Report Date: 2016/09/26

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Frank Mo, B.Sc., Inorganic Lab. Manager

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Chain-of-Custody Form	
Project Number:M162810	Date Results Required: Standard
Client: ArcelorMittal Burns Harbor	TAT Required: Standard
Plant/Test Location: Burns Harbor Coke Plant	Project Supervisor: Stuart Burton
P.O. # for Lab Work:	

Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume, mls
012	9/12/16	2 Underfire Stack-T1- Filter and adsorbent module	2	MAX	0010 and 23	
013	9/12/16	2 Underfire Stack- T1- Acetone washes	1	MAX	0010 and 23	
014	9/12/16	2 Underfire Stack-T1- Methylene Chloride rinses	1	MAX	0010 and 23	
015	9/12/16	2 Underfire Stack-T1- Toluene rinses	1	MAX	0010 and 23	
016	9/12/16	2 Underfire Stack-T1- Impinger contents	2	MAX	Hold	
017	9/13/16	2 Underfire Stack-T2- Filter and adsorbent module	2	MAX	0010 and 23	
018	9/13/16	2 Underfire Stack- T2- Acetone washes	1	MAX	0010 and 23	
019	9/13/16	2 Underfire Stack-T2- Methylene Chloride rinses	1	MAX	0010 and 23	
020	9/13/16	2 Underfire Stack-T2- Toluene rinses	1	MAX	0010 and 23	
021	9/13/16	2 Underfire Stack-T2- Impinger contents	2	MAX	Hold	
022	9/13/16	2 Underfire Stack-T3- Filter and adsorbent module	2	MAX	0010 and 23	
023	9/13/16	2 Underfire Stack- T3- Acetone washes	1	MAX	0010 and 23	
024	9/13/16	2 Underfire Stack-T3- Methylene Chloride rinses	1	MAX	0010 and 23	
025	9/13/16	2 Underfire Stack-T3- Toluene rinses	1	MAX	0010 and 23	
026	9/13/16	2 Underfire Stack-T3- Impinger contents	2	MAX	Hold	
027	9/12/16	Acetone blank	1	MAX	0010 and 23	
028	9/12/16	Toluene blank	1	MAX	0010 and 23	
029	9/12/16	Methylene Chloride blank	1	MAX	0010 and 23	

Delivered to Lab by: Date/Time:	Received by: Date/Time:	Processed by: Date/Time:

Laboratory Notes: Target SVOC are: Acenaphthene, Acenaphthylene, Anthracene, Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, Naphthalene, Phenanthrene, Perylene, and Pyrene.

D/F results will also report individual congeners and individual toxic equivalents (TEQ). Analysis will be performed by SW 846 8270D for SVOC and by SW 846 8290A using a high resolution GC/MS.

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Your Project #: M162810
Site#: BURNS HARBOR COKE PLANT
Site Location: ARCELORMITTAL BURNS HARBOR

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Your C.O.C. #: 012-015, 017-020, 022-025, 027-029

Report Date: 2016/10/21
Report #: R4218982
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6K1111
Received: 2016/09/17, 18:30

Sample Matrix: Stack Sampling Train
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
SVOCs in MM5 SamplingTrain (EPA0010)	4	2016/09/26	2016/10/19	BRL SOP-00200	EPA 8270D/M0010 m
2,3,7,8-TCDF Confirmation (M23)	1	N/A	2016/10/11	BRL SOP-00404	EPA M23/23A m
Dioxins/Furans in Air (Method 23)	4	2016/09/26	2016/10/08	BRL SOP-00404	EPA M23/23A m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Clayton Johnson
Project Manager - Air Toxics, Source Evaluation
21 Oct 2016 17:06:35 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

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Maxxam Job #: B6K1111
Report Date: 2016/10/21

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF276							
Sampling Date		2016/09/12							
COC Number		012-015				TOXIC EQUIVALENCY		# of	
	UNITS	M23- R1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg	<3.0	3.0	30	6.0	1.00	3.00	N/A	4693776
1,2,3,7,8-Penta CDD *	pg	4.7	2.3	30	6.0	1.00	4.70	N/A	4693776
1,2,3,4,7,8-Hexa CDD *	pg	6.1	2.3	30	6.0	0.100	0.610	N/A	4693776
1,2,3,6,7,8-Hexa CDD *	pg	8.5	2.3	30	6.0	0.100	0.850	N/A	4693776
1,2,3,7,8,9-Hexa CDD *	pg	6.1	2.1	30	6.0	0.100	0.610	N/A	4693776
1,2,3,4,6,7,8-Hepta CDD *	pg	56.7	2.3	30	9.0	0.0100	0.567	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDD *	pg	94.2	4.7	300	9.0	0.000300	0.0283	N/A	4693776
Total Tetra CDD *	pg	102	3.0	30	N/A	N/A	N/A	3	4693776
Total Penta CDD *	pg	39.9	2.3	30	N/A	N/A	N/A	4	4693776
Total Hexa CDD *	pg	63.7	2.3	30	N/A	N/A	N/A	7	4693776
Total Hepta CDD *	pg	102	2.3	30	N/A	N/A	N/A	2	4693776
2,3,7,8-Tetra CDF **	pg	24.2	2.7	30	6.0	0.100	2.42	N/A	4693776
1,2,3,7,8-Penta CDF **	pg	11.0	2.7	30	6.0	0.0300	0.330	N/A	4693776
2,3,4,7,8-Penta CDF **	pg	22.9	2.7	30	6.0	0.300	6.87	N/A	4693776
1,2,3,4,7,8-Hexa CDF **	pg	70.0 (1)	2.4	30	6.0	0.100	7.00	N/A	4693776
1,2,3,6,7,8-Hexa CDF **	pg	31.1	2.3	30	6.0	0.100	3.11	N/A	4693776
2,3,4,6,7,8-Hexa CDF **	pg	63.9	2.5	30	6.0	0.100	6.39	N/A	4693776
1,2,3,7,8,9-Hexa CDF **	pg	3.5	2.6	30	6.0	0.100	0.350	N/A	4693776
1,2,3,4,6,7,8-Hepta CDF **	pg	235	2.0	30	9.0	0.0100	2.35	N/A	4693776
1,2,3,4,7,8,9-Hepta CDF **	pg	27.0	2.3	30	6.0	0.0100	0.270	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDF **	pg	49.3	3.2	300	15	0.000300	0.0148	N/A	4693776
Total Tetra CDF **	pg	93.3	2.7	30	N/A	N/A	N/A	11	4693776
Total Penta CDF **	pg	126	2.7	30	N/A	N/A	N/A	9	4693776
Total Hexa CDF **	pg	256	2.4	30	N/A	N/A	N/A	10	4693776
Total Hepta CDF **	pg	341	2.1	30	N/A	N/A	N/A	4	4693776
TOTAL TOXIC EQUIVALENCY	pg	N/A	N/A	N/A	N/A	N/A	39.5	N/A	N/A
Surrogate Recovery (%)									
C13-1234678 HeptaCDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	4693776

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / Merged Peak

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Maxxam Job #: B6K1111
Report Date: 2016/10/21

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF276							
Sampling Date		2016/09/12							
COC Number		012-015				TOXIC EQUIVALENCY		# of	
	UNITS	M23- R1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-1234678 HeptaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123478 HexaCDD *	%	121	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123478 HexaCDF **	%	96	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-1234789 HeptaCDF **	%	94	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDD *	%	99	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDF **	%	83	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDD *	%	99	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123789 HexaCDF **	%	74	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-23478 PentaCDF **	%	100	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDF **	%	87	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-Octachlorodibenzo-p-Dioxin	%	75	N/A	N/A	N/A	N/A	N/A	N/A	4693776
Cl37-2378 TetraCDD *	%	100	N/A	N/A	N/A	N/A	N/A	N/A	4693776

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
** CDF = Chloro Dibenzo-p-Furan
N/A = Not Applicable
* CDD = Chloro Dibenzo-p-Dioxin

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Maxxam Job #: B6K1111
Report Date: 2016/10/21

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF277							
Sampling Date		2016/09/13							
COC Number		017-020				TOXIC EQUIVALENCY		# of	
	UNITS	M23- R2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg	<2.1	2.1	30	6.0	1.00	2.10	N/A	4693776
1,2,3,7,8-Penta CDD *	pg	<2.7	2.7	30	6.0	1.00	2.70	N/A	4693776
1,2,3,4,7,8-Hexa CDD *	pg	3.9	2.9	30	6.0	0.100	0.390	N/A	4693776
1,2,3,6,7,8-Hexa CDD *	pg	5.8	2.9	30	6.0	0.100	0.580	N/A	4693776
1,2,3,7,8,9-Hexa CDD *	pg	5.8	2.6	30	6.0	0.100	0.580	N/A	4693776
1,2,3,4,6,7,8-Hepta CDD *	pg	34.8	3.0	30	9.0	0.0100	0.348	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDD *	pg	56.8	3.1	300	9.0	0.000300	0.0170	N/A	4693776
Total Tetra CDD *	pg	251	2.1	30	N/A	N/A	N/A	7	4693776
Total Penta CDD *	pg	93.7	2.7	30	N/A	N/A	N/A	4	4693776
Total Hexa CDD *	pg	35.3	2.8	30	N/A	N/A	N/A	5	4693776
Total Hepta CDD *	pg	60.9	3.0	30	N/A	N/A	N/A	2	4693776
2,3,7,8-Tetra CDF **	pg	27.4	2.5	30	6.0	0.100	2.74	N/A	4693776
1,2,3,7,8-Penta CDF **	pg	9.2	3.1	30	6.0	0.0300	0.276	N/A	4693776
2,3,4,7,8-Penta CDF **	pg	12.6	3.2	30	6.0	0.300	3.78	N/A	4693776
1,2,3,4,7,8-Hexa CDF **	pg	41.9 (1)	2.4	30	6.0	0.100	4.19	N/A	4693776
1,2,3,6,7,8-Hexa CDF **	pg	<19 (2)	19	30	6.0	0.100	1.90	N/A	4693776
2,3,4,6,7,8-Hexa CDF **	pg	32.2	2.6	30	6.0	0.100	3.22	N/A	4693776
1,2,3,7,8,9-Hexa CDF **	pg	<2.7	2.7	30	6.0	0.100	0.270	N/A	4693776
1,2,3,4,6,7,8-Hepta CDF **	pg	112	2.4	30	9.0	0.0100	1.12	N/A	4693776
1,2,3,4,7,8,9-Hepta CDF **	pg	10.7	2.8	30	6.0	0.0100	0.107	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDF **	pg	17.8	3.2	300	15	0.000300	0.00534	N/A	4693776
Total Tetra CDF **	pg	125	2.5	30	N/A	N/A	N/A	15	4693776
Total Penta CDF **	pg	97.8	3.2	30	N/A	N/A	N/A	8	4693776
Total Hexa CDF **	pg	123	2.5	30	N/A	N/A	N/A	6	4693776
Total Hepta CDF **	pg	151	2.5	30	N/A	N/A	N/A	4	4693776
Confirmation 2,3,7,8-Tetra CDF **	pg	10.5	3.4	30	N/A	0.100	1.05	N/A	4697374

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / Merged Peak

(2) EMPC / DPE - Diphenylether interference present caused dibenzofuran detected to become a "non-detect" with an elevated detection limit.

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Maxxam Job #: B6K1111
Report Date: 2016/10/21

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF277							
Sampling Date		2016/09/13							
COC Number		017-020				TOXIC EQUIVALENCY		# of	
	UNITS	M23- R2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
TOTAL TOXIC EQUIVALENCY	pg	N/A	N/A	N/A	N/A	N/A	22.6	N/A	N/A
Surrogate Recovery (%)									
Confirmation C13-2378 TetraCDF **	%	93	N/A	N/A	N/A	N/A	N/A	N/A	4697374
C13-1234678 HeptaCDD *	%	97	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-1234678 HeptaCDF **	%	69	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123478 HexaCDD *	%	123	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123478 HexaCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-1234789 HeptaCDF **	%	88	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDD *	%	92	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123789 HexaCDF **	%	70	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-23478 PentaCDF **	%	92	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDD *	%	97	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDF **	%	89	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-Octachlorodibenzo-p-Dioxin	%	74	N/A	N/A	N/A	N/A	N/A	N/A	4693776
Cl37-2378 TetraCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	4693776

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan
* CDD = Chloro Dibenzo-p-Dioxin

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Report Date: 2016/10/21

Mostardi Platt
Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF278							
Sampling Date		2016/09/13							
COC Number		022-025				TOXIC EQUIVALENCY		# of	
	UNITS	M23- R3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg	<2.9	2.9	30	6.0	1.00	2.90	N/A	4693776
1,2,3,7,8-Penta CDD *	pg	<2.4	2.4	30	6.0	1.00	2.40	N/A	4693776
1,2,3,4,7,8-Hexa CDD *	pg	2.6 (1)	2.2	30	6.0	0.100	0.260	N/A	4693776
1,2,3,6,7,8-Hexa CDD *	pg	5.1 (1)	2.3	30	6.0	0.100	0.510	N/A	4693776
1,2,3,7,8,9-Hexa CDD *	pg	<7.6 (2)	7.6	30	6.0	0.100	0.760	N/A	4693776
1,2,3,4,6,7,8-Hepta CDD *	pg	20.2	2.0	30	9.0	0.0100	0.202	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDD *	pg	52.2	5.0	300	9.0	0.000300	0.0157	N/A	4693776
Total Tetra CDD *	pg	224	2.9	30	N/A	N/A	N/A	5	4693776
Total Penta CDD *	pg	79.6	2.4	30	N/A	N/A	N/A	3	4693776
Total Hexa CDD *	pg	81.6	2.2	30	N/A	N/A	N/A	3	4693776
Total Hepta CDD *	pg	37.3	2.0	30	N/A	N/A	N/A	2	4693776
2,3,7,8-Tetra CDF **	pg	25.4	4.4	30	6.0	0.100	2.54	N/A	4693776
1,2,3,7,8-Penta CDF **	pg	9.2	2.9	30	6.0	0.0300	0.276	N/A	4693776
2,3,4,7,8-Penta CDF **	pg	10.2	2.9	30	6.0	0.300	3.06	N/A	4693776
1,2,3,4,7,8-Hexa CDF **	pg	29.0 (3)	3.0	30	6.0	0.100	2.90	N/A	4693776
1,2,3,6,7,8-Hexa CDF **	pg	12.6	2.9	30	6.0	0.100	1.26	N/A	4693776
2,3,4,6,7,8-Hexa CDF **	pg	18.6	3.2	30	6.0	0.100	1.86	N/A	4693776
1,2,3,7,8,9-Hexa CDF **	pg	3.4	3.3	30	6.0	0.100	0.340	N/A	4693776
1,2,3,4,6,7,8-Hepta CDF **	pg	69.6	2.3	30	9.0	0.0100	0.696	N/A	4693776
1,2,3,4,7,8,9-Hepta CDF **	pg	8.9	2.8	30	6.0	0.0100	0.0890	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDF **	pg	18.3	3.2	300	15	0.000300	0.00549	N/A	4693776
Total Tetra CDF **	pg	93.9	4.4	30	N/A	N/A	N/A	9	4693776
Total Penta CDF **	pg	78.4	2.9	30	N/A	N/A	N/A	8	4693776
Total Hexa CDF **	pg	96.4	3.1	30	N/A	N/A	N/A	7	4693776
Total Hepta CDF **	pg	98.6	2.5	30	N/A	N/A	N/A	4	4693776
TOTAL TOXIC EQUIVALENCY	pg	N/A	N/A	N/A	N/A	N/A	20.1	N/A	N/A

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan
(1) EMPC / Ratio - Isotopic ratio adjusted to meet theoretical
(2) RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds
(3) EMPC / Merged Peak

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF278							
Sampling Date		2016/09/13							
COC Number		022-025				TOXIC EQUIVALENCY		# of	
	UNITS	M23- R3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
C13-1234678 HeptaCDD *	%	104	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-1234678 HeptaCDF **	%	74	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123478 HexaCDD *	%	118	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123478 HexaCDF **	%	110	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-1234789 HeptaCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDD *	%	101	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDF **	%	77	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDD *	%	100	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDF **	%	90	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123789 HexaCDF **	%	77	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-23478 PentaCDF **	%	97	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDF **	%	86	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-Octachlorodibenzo-p-Dioxin	%	80	N/A	N/A	N/A	N/A	N/A	N/A	4693776
Cl37-2378 TetraCDD *	%	100	N/A	N/A	N/A	N/A	N/A	N/A	4693776

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

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Site Location: ARCELORMITTAL BURNS HARBOR

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF279							
Sampling Date		2016/09/12							
COC Number		027-029				TOXIC EQUIVALENCY		# of	
	UNITS	M23- BLANK	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg	<3.3	3.3	30	6.0	1.00	3.30	N/A	4693776
1,2,3,7,8-Penta CDD *	pg	<2.6	2.6	30	6.0	1.00	2.60	N/A	4693776
1,2,3,4,7,8-Hexa CDD *	pg	<2.6	2.6	30	6.0	0.100	0.260	N/A	4693776
1,2,3,6,7,8-Hexa CDD *	pg	<2.6	2.6	30	6.0	0.100	0.260	N/A	4693776
1,2,3,7,8,9-Hexa CDD *	pg	<2.4	2.4	30	6.0	0.100	0.240	N/A	4693776
1,2,3,4,6,7,8-Hepta CDD *	pg	<2.6	2.6	30	9.0	0.0100	0.0260	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDD *	pg	8.2 (1)	3.7	300	9.0	0.000300	0.00246	N/A	4693776
Total Tetra CDD *	pg	<3.3	3.3	30	N/A	N/A	N/A	0	4693776
Total Penta CDD *	pg	<2.6	2.6	30	N/A	N/A	N/A	0	4693776
Total Hexa CDD *	pg	<5.6 (2)	5.6	30	N/A	N/A	N/A	0	4693776
Total Hepta CDD *	pg	<2.6	2.6	30	N/A	N/A	N/A	0	4693776
2,3,7,8-Tetra CDF **	pg	<2.1	2.1	30	6.0	0.100	0.210	N/A	4693776
1,2,3,7,8-Penta CDF **	pg	<2.8	2.8	30	6.0	0.0300	0.0840	N/A	4693776
2,3,4,7,8-Penta CDF **	pg	<2.8	2.8	30	6.0	0.300	0.840	N/A	4693776
1,2,3,4,7,8-Hexa CDF **	pg	<2.5	2.5	30	6.0	0.100	0.250	N/A	4693776
1,2,3,6,7,8-Hexa CDF **	pg	<2.4	2.4	30	6.0	0.100	0.240	N/A	4693776
2,3,4,6,7,8-Hexa CDF **	pg	<2.6	2.6	30	6.0	0.100	0.260	N/A	4693776
1,2,3,7,8,9-Hexa CDF **	pg	<2.7	2.7	30	6.0	0.100	0.270	N/A	4693776
1,2,3,4,6,7,8-Hepta CDF **	pg	<2.3	2.3	30	9.0	0.0100	0.0230	N/A	4693776
1,2,3,4,7,8,9-Hepta CDF **	pg	<2.8	2.8	30	6.0	0.0100	0.0280	N/A	4693776
1,2,3,4,6,7,8,9-Octa CDF **	pg	<3.0	3.0	300	15	0.000300	0.000900	N/A	4693776
Total Tetra CDF **	pg	<2.1	2.1	30	N/A	N/A	N/A	0	4693776
Total Penta CDF **	pg	<2.8	2.8	30	N/A	N/A	N/A	0	4693776
Total Hexa CDF **	pg	<2.5	2.5	30	N/A	N/A	N/A	0	4693776
Total Hepta CDF **	pg	<2.5	2.5	30	N/A	N/A	N/A	0	4693776
TOTAL TOXIC EQUIVALENCY	pg	N/A	N/A	N/A	N/A	N/A	8.89	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / Ratio - Isotopic ratio adjusted to meet theoretical

(2) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		DCF279							
Sampling Date		2016/09/12							
COC Number		027-029				TOXIC EQUIVALENCY		# of	
	UNITS	M23- BLANK	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
C13-1234678 HeptaCDD *	%	91	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-1234678 HeptaCDF **	%	63	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDD *	%	90	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123678 HexaCDF **	%	71	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDD *	%	91	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-12378 PentaCDF **	%	83	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-123789 HexaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDD *	%	85	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-2378 TetraCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	4693776
C13-Octachlorodibenzo-p-Dioxin	%	63	N/A	N/A	N/A	N/A	N/A	N/A	4693776

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.
WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds
QC Batch = Quality Control Batch
* CDD = Chloro Dibenzo-p-Dioxin
N/A = Not Applicable
** CDF = Chloro Dibenzo-p-Furan

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SEMI-VOLATILE ORGANICS BY GC-MS (STACK SAMPLING TRAIN)

Maxxam ID		DCF276	DCF277	DCF278			DCF279			
Sampling Date		2016/09/12	2016/09/13	2016/09/13			2016/09/12			
COC Number		012-015	017-020	022-025			027-029			
	UNITS	M23- R1	M23- R2	M23- R3	RDL	MDL	M23- BLANK	RDL	MDL	QC Batch
Acenaphthene	ug	<5	<5	<5	5	0.7	<5	5	0.7	4676217
Acenaphthylene	ug	32	13	17	5	1	<5	5	1	4676217
Anthracene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Benzo(a)anthracene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Benzo(a)pyrene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Benzo(b)fluoranthene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Benzo(g,h,i)perylene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Benzo(k)fluoranthene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Chrysene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Dibenz(a,h)anthracene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Fluoranthene	ug	22	<5	10	5	1	<5	5	1	4676217
Fluorene	ug	<5	<5	<5	5	1	<5	5	1	4676217
Indeno(1,2,3-cd)pyrene	ug	<5	<5	<5	5	0.8	<5	5	0.8	4676217
Naphthalene	ug	644	420	351	100	20	<5	5	0.8	4676217
Phenanthrene	ug	41	17	19	5	1	<5	5	1	4676217
Pyrene	ug	<5	13	17	5	1	<5	5	1	4676217
Surrogate Recovery (%)										
2,4,6-Tribromophenol	%	142 (1)	117	117	N/A	N/A	115	N/A	N/A	4676217
2,6-Dibromo-4-fluorophenol (FS)	%	94	84	89	N/A	N/A	N/A	N/A	N/A	4676217
2-Fluorobiphenyl	%	103	104	100	N/A	N/A	78	N/A	N/A	4676217
2-Fluorophenol	%	114	109	101	N/A	N/A	2.5 (1)	N/A	N/A	4676217
D10-Pyrene (FS)	%	107	107	108	N/A	N/A	N/A	N/A	N/A	4676217
D14-Terphenyl	%	110	106	106	N/A	N/A	98	N/A	N/A	4676217
D5-Nitrobenzene	%	100	99	96	N/A	N/A	50	N/A	N/A	4676217
D5-Phenol	%	113	115 (1)	109	N/A	N/A	28	N/A	N/A	4676217

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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TEST SUMMARY

Maxxam ID: DCF276
Sample ID: M23- R1
Matrix: Stack Sampling Train

Collected: 2016/09/12
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	4676217	2016/09/26	2016/10/19	Lidija Tomic
Dioxins/Furans in Air (Method 23)	HRMS/MS	4693776	2016/09/26	2016/10/08	Owen Cosby

Maxxam ID: DCF277
Sample ID: M23- R2
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	4676217	2016/09/26	2016/10/19	Lidija Tomic
2,3,7,8-TCDF Confirmation (M23)	HRMS/MS	4697374	N/A	2016/10/11	Vica Cioranic
Dioxins/Furans in Air (Method 23)	HRMS/MS	4693776	2016/09/26	2016/10/08	Owen Cosby

Maxxam ID: DCF278
Sample ID: M23- R3
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	4676217	2016/09/26	2016/10/19	Lidija Tomic
Dioxins/Furans in Air (Method 23)	HRMS/MS	4693776	2016/09/26	2016/10/08	Owen Cosby

Maxxam ID: DCF279
Sample ID: M23- BLANK
Matrix: Stack Sampling Train

Collected: 2016/09/12
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	4676217	2016/09/26	2016/10/19	Lidija Tomic
Dioxins/Furans in Air (Method 23)	HRMS/MS	4693776	2016/09/26	2016/10/08	Owen Cosby

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GENERAL COMMENTS

Compound Perylene has not been subjected to Maxxam's standard validation procedure for this matrix. The analysis was performed with the client consent, however results should be viewed with discretion. Recovery of perylene is based on the method spike.
Recovery in Spike =106.05 %
Recovery in Spike Dup = 107.445%
No Perylene was found in the samples. An estimated mdl is 5 ug

Sample DCF276-01 : Sample was rerun at a 20x dilution for Naphthalene due to exceedence of linear range.
Mdl raised accordingly.

Sample DCF277-01 : Sample was rerun at a 20x dilution for Naphthalene due to exceedence of linear range.
Mdl raised accordingly.

Sample DCF278-01 : Sample was rerun at a 20x dilution for Naphthalene due to exceedence of linear range.
Mdl raised accordingly.

Results relate only to the items tested.

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Maxxam Job #: B6K1111
Report Date: 2016/10/21

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4676217	LTO	Spiked Blank	2,4,6-Tribromophenol	2016/10/18		102	%	24 - 121
			2-Fluorobiphenyl	2016/10/18		104	%	30 - 115
			2-Fluorophenol	2016/10/18		85	%	30 - 130
			Acenaphthene	2016/10/18		106	%	40 - 125
			Acenaphthylene	2016/10/18		103	%	40 - 125
			Anthracene	2016/10/18		98	%	40 - 125
			Benzo(a)pyrene	2016/10/18		100	%	40 - 125
			Benzo(b)fluoranthene	2016/10/18		111	%	40 - 125
			Benzo(k)fluoranthene	2016/10/18		106	%	40 - 125
			Chrysene	2016/10/18		113	%	40 - 125
			D14-Terphenyl	2016/10/18		101	%	18 - 137
			D5-Nitrobenzene	2016/10/18		106	%	23 - 120
			D5-Phenol	2016/10/18		91	%	24 - 113
			Dibenz(a,h)anthracene	2016/10/18		102	%	40 - 125
			Fluoranthene	2016/10/18		103	%	40 - 125
			Fluorene	2016/10/18		103	%	40 - 125
			Indeno(1,2,3-cd)pyrene	2016/10/18		104	%	40 - 125
			Naphthalene	2016/10/18		99	%	40 - 125
			Phenanthrene	2016/10/18		102	%	40 - 125
			Pyrene	2016/10/18		99	%	40 - 125
4676217	LTO	Spiked Blank DUP	2,4,6-Tribromophenol	2016/10/18		117	%	24 - 121
			2-Fluorobiphenyl	2016/10/18		105	%	30 - 115
			2-Fluorophenol	2016/10/18		84	%	30 - 130
			Acenaphthene	2016/10/18		104	%	40 - 125
			Acenaphthylene	2016/10/18		107	%	40 - 125
			Anthracene	2016/10/18		107	%	40 - 125
			Benzo(a)pyrene	2016/10/18		104	%	40 - 125
			Benzo(b)fluoranthene	2016/10/18		117	%	40 - 125
			Benzo(k)fluoranthene	2016/10/18		112	%	40 - 125
			Chrysene	2016/10/18		119	%	40 - 125
			D14-Terphenyl	2016/10/18		102	%	18 - 137
			D5-Nitrobenzene	2016/10/18		105	%	23 - 120
			D5-Phenol	2016/10/18		96	%	24 - 113
			Dibenz(a,h)anthracene	2016/10/18		109	%	40 - 125
			Fluoranthene	2016/10/18		111	%	40 - 125
			Fluorene	2016/10/18		105	%	40 - 125
			Indeno(1,2,3-cd)pyrene	2016/10/18		110	%	40 - 125
			Naphthalene	2016/10/18		103	%	40 - 125
			Phenanthrene	2016/10/18		106	%	40 - 125
			Pyrene	2016/10/18		102	%	40 - 125
4676217	LTO	Spiked Blank DUP 2	2,4,6-Tribromophenol	2016/10/18		60	%	24 - 121
			2-Fluorobiphenyl	2016/10/18		102	%	30 - 115
			2-Fluorophenol	2016/10/18		49	%	30 - 130
			D14-Terphenyl	2016/10/18		107	%	18 - 137
			D5-Nitrobenzene	2016/10/18		91	%	23 - 120
			D5-Phenol	2016/10/18		69	%	24 - 113
4676217	LTO	Spiked Blank DUP 3	2,4,6-Tribromophenol	2016/10/18		61	%	24 - 121
			2-Fluorobiphenyl	2016/10/18		102	%	30 - 115
			2-Fluorophenol	2016/10/18		56	%	30 - 130
			D14-Terphenyl	2016/10/18		103	%	18 - 137
			D5-Nitrobenzene	2016/10/18		98	%	23 - 120
			D5-Phenol	2016/10/18		73	%	24 - 113
4676217	LTO	RPD	Acenaphthene	2016/10/18	1.3		%	50

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Client Project #: M162810
Site Location: ARCELORMITTAL BURNS HARBOR

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Acenaphthylene	2016/10/18	4.2		%	50
			Anthracene	2016/10/18	8.7		%	50
			Benzo(a)pyrene	2016/10/18	3.9		%	50
			Benzo(b)fluoranthene	2016/10/18	5.6		%	50
			Benzo(k)fluoranthene	2016/10/18	5.5		%	50
			Chrysene	2016/10/18	5.0		%	50
			Dibenz(a,h)anthracene	2016/10/18	6.6		%	50
			Fluoranthene	2016/10/18	7.3		%	50
			Fluorene	2016/10/18	2.0		%	50
			Indeno(1,2,3-cd)pyrene	2016/10/18	5.4		%	50
			Naphthalene	2016/10/18	3.2		%	50
			Phenanthrene	2016/10/18	4.2		%	50
			Pyrene	2016/10/18	2.6		%	50
4676217	LTO	Method Blank	2,4,6-Tribromophenol	2016/10/19		85	%	24 - 121
			2-Fluorobiphenyl	2016/10/19		97	%	30 - 115
			2-Fluorophenol	2016/10/19		72	%	30 - 130
			Acenaphthene	2016/10/19	<5		ug	
			Acenaphthylene	2016/10/19	<5		ug	
			Anthracene	2016/10/19	<5		ug	
			Benzo(a)anthracene	2016/10/19	<5		ug	
			Benzo(a)pyrene	2016/10/19	<5		ug	
			Benzo(b)fluoranthene	2016/10/19	<5		ug	
			Benzo(g,h,i)perylene	2016/10/19	<5		ug	
			Benzo(k)fluoranthene	2016/10/19	<5		ug	
			Chrysene	2016/10/19	<5		ug	
			D14-Terphenyl	2016/10/19		99	%	18 - 137
			D5-Nitrobenzene	2016/10/19		95	%	23 - 120
			D5-Phenol	2016/10/19		88	%	24 - 113
			Dibenz(a,h)anthracene	2016/10/19	<5		ug	
			Fluoranthene	2016/10/19	<5		ug	
			Fluorene	2016/10/19	<5		ug	
			Indeno(1,2,3-cd)pyrene	2016/10/19	<5		ug	
			Naphthalene	2016/10/19	<5		ug	
			Phenanthrene	2016/10/19	<5		ug	
			Pyrene	2016/10/19	<5		ug	
4693776	OBC	Spiked Blank	C13-1234678 HeptaCDD	2016/10/08		107	%	25 - 130
			C13-1234678 HeptaCDF	2016/10/08		78	%	25 - 130
			C13-123678 HexaCDD	2016/10/08		104	%	40 - 130
			C13-123678 HexaCDF	2016/10/08		86	%	40 - 130
			C13-12378 PentaCDD	2016/10/08		104	%	40 - 130
			C13-12378 PentaCDF	2016/10/08		93	%	40 - 130
			C13-123789 HexaCDF	2016/10/08		81	%	40 - 130
			C13-2378 TetraCDD	2016/10/08		92	%	40 - 130
			C13-2378 TetraCDF	2016/10/08		84	%	40 - 130
			C13-Octachlorodibenzo-p-Dioxin	2016/10/08		83	%	25 - 130
			2,3,7,8-Tetra CDD	2016/10/08		98	%	80 - 140
			1,2,3,7,8-Penta CDD	2016/10/08		88	%	80 - 140
			1,2,3,4,7,8-Hexa CDD	2016/10/08		91	%	80 - 140
			1,2,3,6,7,8-Hexa CDD	2016/10/08		85	%	80 - 140
			1,2,3,7,8,9-Hexa CDD	2016/10/08		104	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDD	2016/10/08		82	%	80 - 140
			1,2,3,4,6,7,8,9-Octa CDD	2016/10/08		95	%	80 - 140
			2,3,7,8-Tetra CDF	2016/10/08		97	%	80 - 140

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,7,8-Penta CDF	2016/10/08		98	%	80 - 140
			2,3,4,7,8-Penta CDF	2016/10/08		109	%	80 - 140
			1,2,3,4,7,8-Hexa CDF	2016/10/08		94	%	80 - 140
			1,2,3,6,7,8-Hexa CDF	2016/10/08		94	%	80 - 140
			2,3,4,6,7,8-Hexa CDF	2016/10/08		109	%	80 - 140
			1,2,3,7,8,9-Hexa CDF	2016/10/08		105	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDF	2016/10/08		92	%	80 - 140
			1,2,3,4,7,8,9-Hepta CDF	2016/10/08		89	%	80 - 140
			1,2,3,4,6,7,8,9-Octa CDF	2016/10/08		88	%	80 - 140
4693776	OBC	Spiked Blank DUP	C13-1234678 HeptaCDD	2016/10/08		90	%	25 - 130
			C13-1234678 HeptaCDF	2016/10/08		75	%	25 - 130
			C13-123678 HexaCDD	2016/10/08		94	%	40 - 130
			C13-123678 HexaCDF	2016/10/08		73	%	40 - 130
			C13-12378 PentaCDD	2016/10/08		95	%	40 - 130
			C13-12378 PentaCDF	2016/10/08		84	%	40 - 130
			C13-123789 HexaCDF	2016/10/08		72	%	40 - 130
			C13-2378 TetraCDD	2016/10/08		87	%	40 - 130
			C13-2378 TetraCDF	2016/10/08		79	%	40 - 130
			C13-Octachlorodibenzo-p-Dioxin	2016/10/08		71	%	25 - 130
			2,3,7,8-Tetra CDD	2016/10/08		97	%	80 - 140
			1,2,3,7,8-Penta CDD	2016/10/08		87	%	80 - 140
			1,2,3,4,7,8-Hexa CDD	2016/10/08		86	%	80 - 140
			1,2,3,6,7,8-Hexa CDD	2016/10/08		89	%	80 - 140
			1,2,3,7,8,9-Hexa CDD	2016/10/08		96	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDD	2016/10/08		81	%	80 - 140
			1,2,3,4,6,7,8,9-Octa CDD	2016/10/08		96	%	80 - 140
			2,3,7,8-Tetra CDF	2016/10/08		99	%	80 - 140
			1,2,3,7,8-Penta CDF	2016/10/08		98	%	80 - 140
			2,3,4,7,8-Penta CDF	2016/10/08		106	%	80 - 140
			1,2,3,4,7,8-Hexa CDF	2016/10/08		97	%	80 - 140
			1,2,3,6,7,8-Hexa CDF	2016/10/08		96	%	80 - 140
			2,3,4,6,7,8-Hexa CDF	2016/10/08		105	%	80 - 140
			1,2,3,7,8,9-Hexa CDF	2016/10/08		107	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDF	2016/10/08		82	%	80 - 140
			1,2,3,4,7,8,9-Hepta CDF	2016/10/08		80	%	80 - 140
			1,2,3,4,6,7,8,9-Octa CDF	2016/10/08		88	%	80 - 140
4693776	OBC	RPD	2,3,7,8-Tetra CDD	2016/10/08	NC		%	20
			1,2,3,7,8-Penta CDD	2016/10/08	NC		%	20
			1,2,3,4,7,8-Hexa CDD	2016/10/08	NC		%	20
			1,2,3,6,7,8-Hexa CDD	2016/10/08	NC		%	20
			1,2,3,7,8,9-Hexa CDD	2016/10/08	NC		%	20
			1,2,3,4,6,7,8-Hepta CDD	2016/10/08	NC		%	20
			1,2,3,4,6,7,8,9-Octa CDD	2016/10/08	NC		%	20
			2,3,7,8-Tetra CDF	2016/10/08	NC		%	20
			1,2,3,7,8-Penta CDF	2016/10/08	NC		%	20
			2,3,4,7,8-Penta CDF	2016/10/08	NC		%	20
			1,2,3,4,7,8-Hexa CDF	2016/10/08	NC		%	20
			1,2,3,6,7,8-Hexa CDF	2016/10/08	NC		%	20
			2,3,4,6,7,8-Hexa CDF	2016/10/08	NC		%	20
			1,2,3,7,8,9-Hexa CDF	2016/10/08	NC		%	20
			1,2,3,4,6,7,8-Hepta CDF	2016/10/08	NC		%	20
			1,2,3,4,7,8,9-Hepta CDF	2016/10/08	NC		%	20
			1,2,3,4,6,7,8,9-Octa CDF	2016/10/08	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4693776	OBC	Method Blank	C13-1234678 HeptaCDD	2016/10/08		96	%	25 - 130
			C13-1234678 HeptaCDF	2016/10/08		68	%	25 - 130
			C13-123678 HexaCDD	2016/10/08		92	%	40 - 130
			C13-123678 HexaCDF	2016/10/08		72	%	40 - 130
			C13-12378 PentaCDD	2016/10/08		97	%	40 - 130
			C13-12378 PentaCDF	2016/10/08		86	%	40 - 130
			C13-123789 HexaCDF	2016/10/08		71	%	40 - 130
			C13-2378 TetraCDD	2016/10/08		89	%	40 - 130
			C13-2378 TetraCDF	2016/10/08		81	%	40 - 130
			C13-Octachlorodibenzo-p-Dioxin	2016/10/08		74	%	25 - 130
			2,3,7,8-Tetra CDD	2016/10/08	<3.1, EDL=3.1		pg	
			1,2,3,7,8-Penta CDD	2016/10/08	<2.3, EDL=2.3		pg	
			1,2,3,4,7,8-Hexa CDD	2016/10/08	<2.3, EDL=2.3		pg	
			1,2,3,6,7,8-Hexa CDD	2016/10/08	<2.3, EDL=2.3		pg	
			1,2,3,7,8,9-Hexa CDD	2016/10/08	<2.1, EDL=2.1		pg	
			1,2,3,4,6,7,8-Hepta CDD	2016/10/08	2.9, EDL=2.6		pg	
			1,2,3,4,6,7,8,9-Octa CDD	2016/10/08	16.3, EDL=3.1		pg	
			Total Tetra CDD	2016/10/08	3.5, EDL=3.1		pg	
			Total Penta CDD	2016/10/08	3.2, EDL=2.3		pg	
			Total Hexa CDD	2016/10/08	3.9, EDL=2.2		pg	
			Total Hepta CDD	2016/10/08	2.9, EDL=2.6		pg	
			2,3,7,8-Tetra CDF	2016/10/08	4.3, EDL=2.2 (1)		pg	
			1,2,3,7,8-Penta CDF	2016/10/08	<3.4, EDL=3.4		pg	
			2,3,4,7,8-Penta CDF	2016/10/08	<3.4, EDL=3.4		pg	
			1,2,3,4,7,8-Hexa CDF	2016/10/08	<3.3, EDL=3.3		pg	
			1,2,3,6,7,8-Hexa CDF	2016/10/08	<3.1, EDL=3.1		pg	
			2,3,4,6,7,8-Hexa CDF	2016/10/08	<3.5, EDL=3.5		pg	
			1,2,3,7,8,9-Hexa CDF	2016/10/08	<3.6, EDL=3.6		pg	
			1,2,3,4,6,7,8-Hepta CDF	2016/10/08	2.9, EDL=2.2 (2)		pg	
			1,2,3,4,7,8,9-Hepta CDF	2016/10/08	<2.6, EDL=2.6		pg	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			1,2,3,4,6,7,8,9-Octa CDF	2016/10/08	3.8, EDL=3.1		pg	
			Total Tetra CDF	2016/10/08	7.2, EDL=2.2		pg	
			Total Penta CDF	2016/10/08	<3.4, EDL=3.4		pg	
			Total Hexa CDF	2016/10/08	<3.4, EDL=3.4		pg	
			Total Hepta CDF	2016/10/08	2.9, EDL=2.4 (1)		pg	

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) EMPC / Ratio - Isotopic ratio adjusted to meet theoretical

(2) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Karen Nicol

Karen Nicol, Supervisor, Semi-Volatiles

Owen Cosby, BSc.C.Chem, Supervisor, HRMS Services

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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SPECIATED SEMI-VOLATILE ORGANIC COMPOUNDS TEST RESULTS SUMMARY
Run 1
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 12, 2016

Analytes		Sample Catch (ug)		Sample Catch (ug-Blank)		Concentration (ug/dcsm)	Flowrate, dscfm		Emissions lb/hr
Acenaphthene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Acenaphthylene		32.00		32.00		7.20E+00	98,710		2.66E-03
Anthracene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Benzo (a) anthracene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Benzo (a) pyrene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Benzo (b) fluoranthene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Benzo (g,h,i) perylene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Benzo (k) fluoranthene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Chrysene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Dibenz (a,h) anthracene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Fluoranthene		22.00		22.00		4.95E+00	98,710		1.83E-03
Fluorene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Indeno (1,2,3-cd) pyrene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Naphthalene		644.00		644.00		1.45E+02	98,710		5.36E-02
Phenanthrene		41.00		41.00		9.23E+00	98,710		3.41E-03
Perylene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Pyrene	<	5.00	<	5.00	<	1.13E+00	98,710	<	4.16E-04
Total Semi-Volatile Organic Compounds			<	**804.00**	<	**1.81E+02**		<	**6.69E-02**

Sample volume (Vmstd, liters)	4443.76
Average % CO_2 by volume, dry	6.50
Average % O_2 by volume, dry	8.20

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SPECIATED SEMI-VOLATILE ORGANIC COMPOUNDS TEST RESULTS SUMMARY
Run 2
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 13, 2016

Analytes		Sample Catch (ug)		(ug-Blank)		Concentration (ug/dcsm)	Flowrate, dscfm		Emissions lb/hr
Acenaphthene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Acenaphthylene		13.00		13.00		2.95E+00	97,304		1.08E-03
Anthracene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Benzo (a) anthracene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Benzo (a) pyrene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Benzo (b) fluoranthene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Benzo (g,h,i) perylene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Benzo (k) fluoranthene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Chrysene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Dibenz (a,h) anthracene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Fluoranthene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Fluorene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Indeno (1,2,3-cd) pyrene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Naphthalene		420.00		420.00		9.54E+01	97,304		3.48E-02
Phenanthrene		17.00		17.00		3.86E+00	97,304		1.41E-03
Perylene	<	5.00	<	5.00	<	1.14E+00	97,304	<	4.14E-04
Pyrene		13.00		13.00		2.95E+00	97,304		1.08E-03
Total Semi-Volatile Organic Compounds			<	**528.00**	<	**1.20E+02**		<	**4.37E-02**

Sample volume (Vmstd, liters)		4401.57
Average % CO_2 by volume, dry		6.20
Average % O_2 by volume, dry		8.90

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SPECIATED SEMI-VOLATILE ORGANIC COMPOUNDS TEST RESULTS SUMMARY
Run 3
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 13, 2016

Analytes		Sample Catch (ug)		(ug-Blank)		Concentration (ug/dcsm)	Flowrate, dscfm		Emissions lb/hr
Acenaphthene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Acenaphthylene		17.00		17.00		3.93E+00	95,766		1.41E-03
Anthracene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Benzo (a) anthracene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Benzo (a) pyrene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Benzo (b) fluoranthene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Benzo (g,h,i) perylene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Benzo (k) fluoranthene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Chrysene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Dibenz (a,h) anthracene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Fluoranthene		10.00		10.00		2.31E+00	95,766		8.29E-04
Fluorene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Indeno (1,2,3-cd) pyrene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Naphthalene		351.00		351.00		8.11E+01	95,766		2.91E-02
Phenanthrene		19.00		19.00		4.39E+00	95,766		1.58E-03
Perylene	<	5.00	<	5.00	<	1.16E+00	95,766	<	4.15E-04
Pyrene		17.00		17.00		3.93E+00	95,766		1.41E-03
Total Semi-Volatile Organic Compounds			<	**474.00**	<	**1.10E+02**		<	**3.93E-02**

Sample volume (Vmstd, liters)		4325.40
Average % CO_2 by volume, dry		6.50
Average % O_2 by volume, dry		8.20

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PCDD/PCDF TEST RESULTS SUMMARY
Run 1
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 12, 2016

Analytes		Sample Catch (pg)		(pg-Blank)		(ug)		Concentration (ug/dscm)		Emissions (ug/hr)	TEQ Factor Results: TEQ Factor		(ug/dscm)		(ug/hr)		(lb/hr)
2378-TCDD	<	3.00	<	3.00	<	3.00E-06	<	6.75E-07	<	0.11	1.0	<	6.75E-07	<	0.11	<	2.50E-10
12378-PeCDD		4.70		4.70		4.70E-06		1.06E-06		0.18	1.0		1.06E-06		0.18		3.91E-10
123478-HxCDD		6.10		6.10		6.10E-06		1.37E-06		0.23	0.1		1.37E-07		0.02		5.08E-11
123678-HxCDD		8.50		8.50		8.50E-06		1.91E-06		0.32	0.1		1.91E-07		0.03		7.07E-11
123789-HxCDD		6.10		6.10		6.10E-06		1.37E-06		0.23	0.1		1.37E-07		0.02		5.08E-11
1234678-HpCDD		56.70		56.70		5.67E-05		1.28E-05		2.14	0.01		1.28E-07		0.021		4.72E-11
OCDD		94.20		94.20		9.42E-05		2.12E-05		3.56	0.0003		6.36E-09		0.0011		2.35E-12
2378-TCDF		24.20		24.20		2.42E-05		5.45E-06		0.91	0.1		5.45E-07		0.09		2.01E-10
12378-PeCDF		11.00		11.00		1.10E-05		2.48E-06		0.42	0.03		7.43E-08		0.01		2.75E-11
23478-PeCDF		22.90		22.90		2.29E-05		5.15E-06		0.86	0.3		1.55E-06		0.26		5.72E-10
123478-HxCDF		70.00		70.00		7.00E-05		1.58E-05		2.64	0.1		1.58E-06		0.26		5.82E-10
123678-HxCDF		31.10		31.10		3.11E-05		7.00E-06		1.17	0.1		7.00E-07		0.12		2.59E-10
234678-HxCDF		63.90		63.90		6.39E-05		1.44E-05		2.41	0.1		1.44E-06		0.24		5.32E-10
123789-HxCDF		3.50		3.50		3.50E-06		7.88E-07		0.13	0.1		7.88E-08		0.01		2.91E-11
1234678-HpCDF		235.00		235.00		2.35E-04		5.29E-05		8.87	0.01		5.29E-07		0.09		1.96E-10
1234789-HpCDF		27.00		27.00		2.70E-05		6.08E-06		1.02	0.01		6.08E-08		0.010		2.25E-11
OCDF		49.30		49.30		4.93E-05		1.11E-05		1.86	0.0003		3.33E-09		0.0006		1.23E-12
Total TCDD		102.00		102.00		1.02E-04		2.30E-05		3.85							
Total PeCDD		39.90		39.90		3.99E-05		8.98E-06		1.51							
Total HxCDD		63.70		63.70		6.37E-05		1.43E-05		2.40							
Total HpCDD		102.00		102.00		1.02E-04		2.30E-05		3.85							
Total OCDD		94.20		94.20		9.42E-05		2.12E-05		3.56							
Total TCDF		93.30		93.30		9.33E-05		2.10E-05		3.52							
Total PeCDF		126.00		126.00		1.26E-04		2.84E-05		4.76							
Total HxCDF		256.00		256.00		2.56E-04		5.76E-05		9.66							
Total HpCDF		341.00		341.00		3.41E-04		7.67E-05		12.87							
Total OCDF		49.30		49.30		4.93E-05		1.11E-05		1.86							
Total PCDD/PCDF			<	1,267.40	<	1.27E-03	<	2.85E-04	<	47.83							
TEQ Total												<	8.88E-06	<	1.49	<	3.28E-09

Sample volume (Vmstd, dscf)		156.93
Volumetric Air Flow (DSCFM)		98,709.81
Fd-Factor dscf/MMBtu		0.0
Average % CO_2 by volume, dry		6.50
Average % O_2 by volume, dry		8.20

PCDD/PCDF TEST RESULTS SUMMARY
Run 2
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 13, 2016

Analytes		Sample Catch (pg)		(pg-Blank)		(ug)		Concentration (ug/dscm)		Emissions (ug/hr)	TEQ Factor Results TEQ Factor		(ug/dscm)		(ug/hr)		(lb/hr)
2378-TCDD	<	2.10	<	2.10	<	2.10E-06	<	4.77E-07	<	0.08	1.0	<	4.77E-07	<	0.08	<	1.74E-10
12378-PeCDD	<	2.70	<	2.70	<	2.70E-06	<	6.13E-07	<	0.10	1.0	<	6.13E-07	<	0.10	<	2.24E-10
123478-HxCDD		3.90		3.90		3.90E-06		8.86E-07		0.15	0.1		8.86E-08		0.01		3.23E-11
123678-HxCDD		5.80		5.80		5.80E-06		1.32E-06		0.22	0.1		1.32E-07		0.02		4.80E-11
123789-HxCDD		5.80		5.80		5.80E-06		1.32E-06		0.22	0.1		1.32E-07		0.02		4.80E-11
1234678-HpCDD		34.80		34.80		3.48E-05		7.91E-06		1.31	0.01		7.91E-08		0.013		2.88E-11
OCDD		56.80		56.80		5.68E-05		1.29E-05		2.13	0.0003		3.87E-09		0.0006		1.41E-12
2378-TCDF		27.40		27.40		2.74E-05		6.23E-06		1.03	0.1		6.23E-07		0.10		2.27E-10
12378-PeCDF		9.20		9.20		9.20E-06		2.09E-06		0.35	0.03		6.27E-08		0.01		2.29E-11
23478-PeCDF		12.60		12.60		1.26E-05		2.86E-06		0.47	0.3		8.59E-07		0.14		3.13E-10
123478-HxCDF		41.90		41.90		4.19E-05		9.52E-06		1.57	0.1		9.52E-07		0.16		3.47E-10
123678-HxCDF	<	19.00	<	19.00	<	1.90E-05	<	4.32E-06	<	0.71	0.1	<	4.32E-07	<	0.07	<	1.57E-10
234678-HxCDF		32.20		32.20		3.22E-05		7.32E-06		1.21	0.1		7.32E-07		0.12		2.67E-10
123789-HxCDF	<	2.70	<	2.70	<	2.70E-06	<	6.13E-07	<	0.10	0.1	<	6.13E-08	<	0.01	<	2.24E-11
1234678-HpCDF		112.00		112.00		1.12E-04		2.54E-05		4.21	0.01		2.54E-07		0.04		9.27E-11
1234789-HpCDF		10.70		10.70		1.07E-05		2.43E-06		0.40	0.01		2.43E-08		0.004		8.86E-12
OCDF		17.80		17.80		1.78E-05		4.04E-06		0.67	0.0003		1.21E-09		0.0002		4.42E-13
Total TCDD		251.00		251.00		2.51E-04		5.70E-05		9.43							
Total PeCDD		93.70		93.70		9.37E-05		2.13E-05		3.52							
Total HxCDD		35.30		35.30		3.53E-05		8.02E-06		1.33							
Total HpCDD		60.90		60.90		6.09E-05		1.38E-05		2.29							
Total OCDD		56.80		56.80		5.68E-05		1.29E-05		2.13							
Total TCDF		125.00		125.00		1.25E-04		2.84E-05		4.69							
Total PeCDF		97.80		97.80		9.78E-05		2.22E-05		3.67							
Total HxCDF		123.00		123.00		1.23E-04		2.79E-05		4.62							
Total HpCDF		151.00		151.00		1.51E-04		3.43E-05		5.67							
Total OCDF		17.80		17.80		1.78E-05		4.04E-06		0.67							
Total PCDD/PCDF			<	1,012.30	<	1.01E-03	<	2.30E-04	<	38.02							
TEQ Total												<	5.53E-06	<	0.91	<	2.01E-09

Sample volume (Vmstd, dscf)	155.44
Volumetric Air Flow (DSCFM)	97,304.05
Fd-Factor dscf/MMBtu	0.0
Average % CO_2 by volume, dry	6.20
Average % O_2 by volume, dry	8.90

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PCDD/PCDF TEST RESULTS SUMMARY
Run 3
ArcelorMittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
September 13, 2016

Analytes		Sample Catch (pg)		(pg-Blank)		(ug)		Concentration (ug/dcsm)		Emissions (ug/hr)	TEQ Factor Results TEQ Factor		(ug/dscm)		(ug/hr)		(lb/hr)
2378-TCDD	<	2.90	<	2.90	<	2.90E-06	<	6.70E-07	<	0.11	1.0	<	6.70E-07	<	0.11	<	2.40E-10
12378-PeCDD	<	2.40	<	2.40	<	2.40E-06	<	5.55E-07	<	0.09	1.0	<	5.55E-07	<	0.09	<	1.99E-10
123478-HxCDD		2.60		2.60		2.60E-06		6.01E-07		0.10	0.1		6.01E-08		0.01		2.16E-11
123678-HxCDD		5.10		5.10		5.10E-06		1.18E-06		0.19	0.1		1.18E-07		0.02		4.23E-11
123789-HxCDD	<	7.60	<	7.60	<	7.60E-06	<	1.76E-06	<	0.29	0.1	<	1.76E-07	<	0.03	<	6.30E-11
1234678-HpCDD		20.20		20.20		2.02E-05		4.67E-06		0.76	0.01		4.67E-08		0.008		1.68E-11
OCDD		52.20		52.20		5.22E-05		1.21E-05		1.96	0.0003		3.62E-09		0.0006		1.30E-12
2378 -TCDF		25.40		25.40		2.54E-05		5.87E-06		0.96	0.1		5.87E-07		0.10		2.11E-10
12378-PeCDF		9.20		9.20		9.20E-06		2.13E-06		0.35	0.03		6.38E-08		0.01		2.29E-11
23478-PeCDF		10.20		10.20		1.02E-05		2.36E-06		0.38	0.3		7.07E-07		0.12		2.54E-10
123478-HxCDF		29.00		29.00		2.90E-05		6.70E-06		1.09	0.1		6.70E-07		0.11		2.40E-10
123678-HxCDF		12.60		12.60		1.26E-05		2.91E-06		0.47	0.1		2.91E-07		0.05		1.04E-10
234678-HxCDF		18.60		18.60		1.86E-05		4.30E-06		0.70	0.1		4.30E-07		0.07		1.54E-10
123789-HxCDF		3.40		3.40		3.40E-06		7.86E-07		0.13	0.1		7.86E-08		0.01		2.82E-11
1234678-HpCDF		69.60		69.60		6.96E-05		1.61E-05		2.62	0.01		1.61E-07		0.03		5.77E-11
1234789-HpCDF		8.90		8.90		8.90E-06		2.06E-06		0.33	0.01		2.06E-08		0.003		7.38E-12
OCDF		18.30		18.30		1.83E-05		4.23E-06		0.69	0.0003		1.27E-09		0.0002		4.55E-13
Total TCDD		224.00		224.00		2.24E-04		5.18E-05		8.43							
Total PeCDD		79.60		79.60		7.96E-05		1.84E-05		2.99							
Total HxCDD		81.60		81.60		8.16E-05		1.89E-05		3.07							
Total HpCDD		37.30		37.30		3.73E-05		8.62E-06		1.40							
Total OCDD		52.20		52.20		5.22E-05		1.21E-05		1.96							
Total TCDF		93.90		93.90		9.39E-05		2.17E-05		3.53							
Total PeCDF		78.40		78.40		7.84E-05		1.81E-05		2.95							
Total HxCDF		96.40		96.40		9.64E-05		2.23E-05		3.63							
Total HpCDF		98.60		98.60		9.86E-05		2.28E-05		3.71							
Total OCDF		18.30		18.30		1.83E-05		4.23E-06		0.69							
Total PCDD/PCDF			<	860.30	<	8.60E-04	<	1.99E-04	<	32.36							
TEQ Total												<	4.64E-06	<	0.76	<	1.66E-09

Sample volume (Vmstd, dscf)	152.75
Volumetric Air Flow (DSCFM)	95,766.37
Fd-Factor dscf/MMBtu	0.0
Average % CO_2 by volume, dry	6.50
Average % O_2 by volume, dry	8.20

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Project Number: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Test Method: 315

Project No. M162810B
Coke Battery #2 Underfire Stack

Description	Sample Date	ID#	vol. (ml)	Final Weight (grams)	Sample ID		Blank Weight (grams)	Blank ID	Final Weights used in calculations (grams)	Reference Final Weights Minus Blank, not used in calculations, but show the magnitude of the blank contamination (grams)	Toluene extractable material blank mls	weight of toluene grams
Filterable Particulate												
Test No. 1	9/12/2016											
Source Condition: Normal												
Filter Toluene Extractable		DCF6		0.0040	M315 Container 1	COC 001 DCF631	0.01118	QA/QC Batch 467820 Toluene Method	0.0003	-0.0072		
Toluene Extractable Material		DCF6	ml	0.0083	M315 Container	COC 001 DCF635	0.0024	COC 010-011 DCF634	0.0059	0.0059	7.8	
Total Front Half Weight	Sample Calculation						(72 ml/231 ml) x 7.8/1000=0.0024		0.0062	-0.0013		
Condensable Particulate												
DI/Acetone/Toluene Wash		DCF638	ml	0.0000	M315 Container	COC 002-003	0.0000	COC 010-011 DCF634	0.0005	0.0000		
Back Half TSO Weight		DCF638		0.0373	M315 Container	COC 002-003	0.0049	COC 010-011 DCF634	0.0324	0.0324	5.7	170
Total Back Half TSO Weight	Sample Calculation						(170 g/.85g/ml)/231 mls x (5.7 mg/1000 mg/g)=0.0068		0.0329	0.0324		
Total TSO Weight									0.0390	0.0311		
Filterable Particulate												
Test No. 2	9/13/2016											
Source Condition: Normal												
Filter Toluene Extractable		DCF6		0.0047	M315 Container 1	COC 004 DCF632	0.01118	QA/QC Batch 467820 Toluene Method	0.0003	-0.0065		
Toluene Extractable Material		DCF6	ml	0.0071	M315 Container	COC 004 DCF636	0.0020	COC 010-011 DCF634	0.0051	0.0051	7.8	
Total Front Half Weight	Sample Calculation						(60 ml/225 ml) x 7.8/1000=0.0020		0.0054	-0.0014		
Condensable Particulate												
DI/Acetone/Toluene Wash		DCF639		0.0000	M315 Container	COC 005-006	0.0000	COC 010-011 DCF634	0.0005	0.0000		
DI Wash		DCF639	ml	0.0248	M315 Container	COC 005-006	0.0038	COC 010-011 DCF634	0.0210	0.0210	5.7	130
Total Back Half TSO Weight	Sample Calculation						(130 g/.85g/ml)/231 mls x (5.7 mg/1000 mg/g)=0.0052		0.0215	0.0210		
Total TSO Weight									0.0269	0.0196		
Filterable Particulate												
Test No. 3	9/13/2016											
Source Condition: Normal												
Filter Toluene Extractable		DCF6		0.0062	M315 Container 1	COC 007 DCF633	0.01118	QA/QC Batch 467820 Toluene Method	0.0003	-0.0050		
Toluene Extractable Material		DCF6	ml	0.0077	M315 Container	COC 007 DCF637	0.0022	COC 010-011 DCF634	0.0055	0.0055	7.8	
Total Front Half Weight	Sample Calculation						(65 ml/225 ml) x 7.8/1000=0.0022		0.0058	0.0006		
Condensable Particulate												
DI/Acetone/Toluene Wash		DCF640		0.0000	M315 Container	COC 008-009	0.0000	COC 010-011 DCF634	0.0005	0.0000		
DI Wash		DCF640	ml	0.0186	M315 Container	COC 008-009	0.0038	COC 010-011 DCF634	0.0148	0.0148	5.7	130
Total Back Half TSO Weight	Sample Calculation						(130 g/.85g/ml)/231mls x (5.7 mg/1000 mg/g)=0.0052		0.0153	0.0148		
Total TSO Weight									0.0212	0.0154		
Reagent Blank Summary												
Acetone/Toluene Wash		DCF6	180 gram	0.0078						0.0078		

* Blanks were subtracted from the front half Toluene Extractable Material, and back half Toluene Extractive Material

*Lab mls of Toluene from Acetone Extration: 25mls
*Toluene Blank Volume in mls: 206mls
*Toluene Volume added by Lab: 25mls
*Density of 3 parts Toluene and 1 part Acetone: 0.85

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Your Project #: M162810
Site#: ARCELORMITTAL BURNS HARBOR
Site Location: BURNS HARBOR COKE PLANT

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Your C.O.C. #: 001, 004, 007, 010-011, 002-003, 005-006, 008-009

Report Date: 2017/01/18
Report #: R4329232
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6K1182
Received: 2016/09/17, 18:30

Sample Matrix: Stack Sampling Train
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Particulates/Acetone Rinse (M5/315/M201)	4	2016/09/26	2016/09/26	BRL SOP-00109	EPA 5/315 m
Particulates B. H. Water Imp. (M315)	3	2016/09/27	2016/09/27	BRL SOP-00109	EPA 315
Particulates/Filter (M5/315/NJATM1/M201)	3	N/A	2016/09/27	BRL SOP-00109	EPA 5/315/NJATM1 m
Final Volume of Acetone Probe Rinse	4	N/A	2016/09/28	BRL SOP-00109	
Final Volume of Impinger	3	N/A	2016/09/29		
Weight of Solvent from Impingers	3	N/A	2016/09/29		
Weight of Solvent from Impingers	4	N/A	2016/09/30		

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods. Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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Your Project #: M162810
Site#: ARCELORMITTAL BURNS HARBOR
Site Location: BURNS HARBOR COKE PLANT

Attention:Data Reporting

Mostardi Platt
888 Industrial Rd
Elmhurst, IL
USA 60126-1121

Your C.O.C. #: 001, 004, 007, 010-011, 002-003, 005-006, 008-009

Report Date: 2017/01/18
Report #: R4329232
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B6K1182
Received: 2016/09/17, 18:30

Encryption Key

Clayton Johnson
Project Manager - Air Toxics, Source Evaluation
18 Jan 2017 18:14:23

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B6K1182
Report Date: 2017/01/18

Mostardi Platt
Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		DCF631	DCF632	DCF633			
Sampling Date		2016/09/12	2016/09/13	2016/09/13			
COC Number		001	004	007			
	UNITS	M315 - FILT R1	M315 - FILT R2	M315 - FILT R3	RDL	MDL	QC Batch
Front Half DCM Extractable Material	mg	4.00	4.70	6.20	0.50	N/A	4678620
Front Half Particulate Weight on Filter	mg	226	118	125	0.30	0.060	4678620

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam ID		DCF634	DCF635			
Sampling Date		2016/09/12	2016/09/12			
COC Number		010-011	001			
	UNITS	M315- BLANK ACE/TOL	M315- R1 ACE/TOLUENE	RDL	MDL	QC Batch
Acetone Rinse DCM Extractable Material	mg	7.8	8.3	0.5	N/A	4676851
Acetone Rinse Particulate Weight in Acetone Rinse	mg	2.6	101	0.5	0.1	4676851
Acetone Rinse Volume	ml	160 (1)	29 (1)	1	1	4679446
Weight of Solvent	g	180	41	0.1	N/A	4684240

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Results reported are in grams

Maxxam ID		DCF636	DCF637			
Sampling Date		2016/09/13	2016/09/13			
COC Number		004	007			
	UNITS	M315- R2 ACE/TOLUENE	M315- R3 ACE/TOLUENE	RDL	MDL	QC Batch
Acetone Rinse DCM Extractable Material	mg	7.1	7.7	0.5	N/A	4676851
Acetone Rinse Particulate Weight in Acetone Rinse	mg	63.3	54.8	0.5	0.1	4676851
Acetone Rinse Volume	ml	50 (1)	33 (1)	1	1	4679446
Weight of Solvent	g	31	34	0.1	N/A	4684240

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
(1) Results reported are in grams

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Maxxam Job #: B6K1182
Report Date: 2017/01/18

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		DCF638	DCF639	DCF640			
Sampling Date		2016/09/12	2016/09/13	2016/09/13			
COC Number		002-003	005-006	008-009			
	UNITS	M315- R1 BH IMP	M315- R2 BH IMP	M315- R3 BH IMP	RDL	MDL	QC Batch
Back Half DCM Extractable Material	mg	<0.5	<0.5	<0.5	0.5	N/A	4678632
Back Half DCM Extractable Material in Rinse	mg	37.3	24.8	18.6	0.5	N/A	4678632
Impinger Volume	ml	564	540	586	1	1	4682260
Weight of Solvent	g	170	130	130	0.1	N/A	4682379

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

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Maxxam Job #: B6K1182
Report Date: 2017/01/18

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

TEST SUMMARY

Maxxam ID: DCF631
Sample ID: M315 - FILT R1
Matrix: Stack Sampling Train

Collected: 2016/09/12
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Filter (M5/315/NJATM1/M201)	BAL	4678620	N/A	2016/09/27	Brenda Moore

Maxxam ID: DCF632
Sample ID: M315 - FILT R2
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Filter (M5/315/NJATM1/M201)	BAL	4678620	N/A	2016/09/27	Brenda Moore

Maxxam ID: DCF633
Sample ID: M315 - FILT R3
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Filter (M5/315/NJATM1/M201)	BAL	4678620	N/A	2016/09/27	Brenda Moore

Maxxam ID: DCF634
Sample ID: M315- BLANK ACE/TOL
Matrix: Stack Sampling Train

Collected: 2016/09/12
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4676851	2016/09/26	2016/09/26	Brenda Moore
Final Volume of Acetone Probe Rinse		4679446	N/A	2016/09/28	Brenda Moore
Weight of Solvent from Impingers		4684240	N/A	2016/09/30	Brenda Moore

Maxxam ID: DCF635
Sample ID: M315- R1 ACE/TOLUENE
Matrix: Stack Sampling Train

Collected: 2016/09/12
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4676851	2016/09/26	2016/09/26	Brenda Moore
Final Volume of Acetone Probe Rinse		4679446	N/A	2016/09/28	Brenda Moore
Weight of Solvent from Impingers		4684240	N/A	2016/09/30	Brenda Moore

Maxxam ID: DCF636
Sample ID: M315- R2 ACE/TOLUENE
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4676851	2016/09/26	2016/09/26	Brenda Moore
Final Volume of Acetone Probe Rinse		4679446	N/A	2016/09/28	Brenda Moore
Weight of Solvent from Impingers		4684240	N/A	2016/09/30	Brenda Moore

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TEST SUMMARY

Maxxam ID: DCF637
Sample ID: M315- R3 ACE/TOLUENE
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates/Acetone Rinse (M5/315/M201)	BAL	4676851	2016/09/26	2016/09/26	Brenda Moore
Final Volume of Acetone Probe Rinse		4679446	N/A	2016/09/28	Brenda Moore
Weight of Solvent from Impingers		4684240	N/A	2016/09/30	Brenda Moore

Maxxam ID: DCF638
Sample ID: M315- R1 BH IMP
Matrix: Stack Sampling Train

Collected: 2016/09/12
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates B. H. Water Imp. (M315)	BAL	4678632	2016/09/27	2016/09/27	Brenda Moore
Final Volume of Impinger		4682260	N/A	2016/09/29	Brenda Moore
Weight of Solvent from Impingers		4682379	N/A	2016/09/29	Brenda Moore

Maxxam ID: DCF639
Sample ID: M315- R2 BH IMP
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates B. H. Water Imp. (M315)	BAL	4678632	2016/09/27	2016/09/27	Brenda Moore
Final Volume of Impinger		4682260	N/A	2016/09/29	Brenda Moore
Weight of Solvent from Impingers		4682379	N/A	2016/09/29	Brenda Moore

Maxxam ID: DCF640
Sample ID: M315- R3 BH IMP
Matrix: Stack Sampling Train

Collected: 2016/09/13
Shipped:
Received: 2016/09/17

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Particulates B. H. Water Imp. (M315)	BAL	4678632	2016/09/27	2016/09/27	Brenda Moore
Final Volume of Impinger		4682260	N/A	2016/09/29	Brenda Moore
Weight of Solvent from Impingers		4682379	N/A	2016/09/29	Brenda Moore

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Maxxam Job #: B6K1182
Report Date: 2017/01/18

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

GENERAL COMMENTS

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Particulates/Filter (M5/315/NJATM1/M201): Extraction was performed using Toluene as per client request.
Particulates/Acetone Rinse (M5/315/M201): Extraction was performed using Toluene as per client request.
Particulates B. H. Water Imp. (M315): Extraction was performed using Toluene as per client request.

Results relate only to the items tested.

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Report Date: 2017/01/18

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Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
4676851	BLM	Method Blank	Acetone Rinse DCM Extractable Material	2016/09/26	3.7, RDL=0.5		mg	
			Acetone Rinse Particulate Weight in Acetone	2016/09/26	<0.5		mg	
4678620	BLM	Method Blank	Front Half DCM Extractable Material	2016/09/27	2.60, RDL=0.50		mg	
4678632	BLM	Method Blank	Back Half DCM Extractable Material	2016/09/27	<0.5		mg	
			Back Half DCM Extractable Material in Rinse	2016/09/27	<0.5		mg	

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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Maxxam Job #: B6K1182
Report Date: 2017/01/18

Mostardi Platt
Client Project #: M162810
Site Location: BURNS HARBOR COKE PLANT

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Frank Mo, B.Sc., Inorganic Lab. Manager

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B6K1182

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Chain-of-Custody Form

Project Number: M162810	Date Results Required: Standard
Client: ArcelorMittal Burns Harbor	TAT Required: Standard
Plant/Test Location: Burns Harbor Coke Plant	Project Supervisor: Stuart Burton
P.O. # for Lab Work:	

Sample Number	Sample Date	Sample Point Identification	# of Conts	Sub Lab	Analysis Required	Volume, mL
001	9/12/16	2 Underfire Stack-T1- Filter and probe rinses	3	MAX	*M315	
002	9/12/16	2 Underfire Stack- T1- Dilimps and rinse	1	MAX	*M315	544
003	9/12/16	2 Underfire Stack-T1- Imps acetone and toluene rinses	2	MAX	*M315	
004	9/13/16	2 Underfire Stack-T2- Filter and probe rinses	3	MAX	*M315	
005	9/13/16	2 Underfire Stack- T2- Dilimps and rinse	1	MAX	*M315	500
006	9/13/16	2 Underfire Stack-T2- Imps acetone and toluene rinses	2	MAX	*M315	
007	9/13/16	2 Underfire Stack-T3- Filter and probe rinses	3	MAX	*M315	
008	9/13/16	2 Underfire Stack- T3- Dilimps and rinse	1	MAX	*M315	500
009	9/13/16	2 Underfire Stack-T3- Imps acetone and toluene rinses	2	MAX	*M315	
010	9/12/16	Acetone blank	1	MAX	*M315	
011	9/12/16	Toluene blank	1	MAX	*M315	

Delivered to Lab by: Date/Time:	Received by: Date/Time: 9:40 JAYDEN PEREIRA 2016 09 17	Processed by: Date/Time:

Laboratory Notes: Please get volumes on all other samples

*Toluene is used instead of Methylene Chloride as solvent for extraction

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ERA
A Waters Company

November 9, 2016

Ben Hendricks
Mostardi Platt
888 Industrial Drive
Elmhurst, IL 60123

Enclosed is your final report for ERA's Stationary Source Audit Sample (SSAS) Program. Your final report includes an evaluation of all results submitted by your laboratory to ERA.

Data Evaluation Protocols: All analytes in ERA's SSAS Program have been evaluated comparing the reported result to the acceptance limits generated using the criteria contained in the TNI SSAS Table.

For any "Not Acceptable" results, please contact your state regulator for any corrective action requirements.

Thank you for your participation in ERA's SSAS Program. If you have any questions, please contact our Proficiency Testing Department at 1-800-372-0122.

Sincerely,

Pat Larson

Patrick Larson
Quality Officer

cc: Project File Number 072816L

ERA
A Waters Company

Recipient Type	Report Recipient	Contact	Project ID
Agency	IN-DEM (SSAS) 100 North Senate Avenue MC 61-53 Indiana Govenment Center North Indianapolis, IN 46204 USA	David Cline dcline@idem.in.gov Phone: (317) 232-8443	
Facility	ArcelorMittal Burns Harbor 250 W US Hwy 12 Burns Harbor, IN 46304 USA	Jeffery May jeffrey.may@arcelormittal.com Phone: 219-787-4964	
Lab	Maxxam Analytics Inc 6740 Campobello Rd Mississauga, ON L5N 2L8 Canada	Tarif Rahman Project Manager TRahman@Maxxam.ca Phone: (905) 817-5700-5712 Fax: (905) 817-5775	
Tester	Mostardi Platt 888 Industrial Drive Elmhurst, IL 60123 USA	Ben Hendricks mplaboratory@mp-mail.com Phone: 630-993-2694	Burns Harbor Underfire 2 Stack

ISO/IEC 17043:2010
ACCREDITED

Project # : 072816L

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ERA
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072816L Laboratory Exception Report

Tarif Rahman
Project Manager
Maxxam Analytics Inc
6740 Campobello Rd
Mississauga, ON L5N 2L8
(905) 817-5700-5712

EPA ID: **Not Reported**
ERA Customer Number: **M748564**

Evaluation Checks

There are no values reported with < where the assigned value was greater than 0.

Not Acceptable Evaluations

There were no Not Acceptable evaluations for this study.

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Final Report Results For Laboratory
Maxxam Analytics Inc

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SSAP Evaluation Report

Project Number: **072816L**

ERA Customer Number: **M748564**

Laboratory Name: **Maxxam Analytics Inc**

Inorganic Results

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072816L Evaluation Final Complete Report

ERA
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Tarif Rahman
Project Manager
Maxxam Analytics Inc
6740 Campobello Rd
Mississauga, ON L5N 2L8
(905) 817-5700-5712

EPA ID: Not Reported
ERA Customer Number: M748564

Project No. M162810B
Coke Battery #2 Underfire Stack

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Analyst Name
SSAP Metals on Filter Paper (cat# 1425, lot# 072816L) Study Dates: 07/28/16 - 11/09/16									
1005	Antimony	µg/Filter	41.9	44.3	33.2 - 55.4	Acceptable	EPA Method 29 2000	10/28/2016	
1010	Arsenic	µg/Filter	43.0	43.7	32.8 - 54.6	Acceptable	EPA Method 29 2000	10/28/2016	
1015	Barium	µg/Filter		49.4	37.0 - 61.8	Not Reported			
1020	Beryllium	µg/Filter	31.2	31.9	23.9 - 39.9	Acceptable	EPA Method 29 2000	10/28/2016	
1030	Cadmium	µg/Filter	32.3	34.2	27.4 - 41.0	Acceptable	EPA Method 29 2000	10/28/2016	
1040	Chromium	µg/Filter	44.1	40.5	32.4 - 48.6	Acceptable	EPA Method 29 2000	10/28/2016	
1050	Cobalt	µg/Filter	29.9	27.1	20.3 - 33.9	Acceptable	EPA Method 29 2000	10/28/2016	
1055	Copper	µg/Filter		24.8	18.6 - 31.0	Not Reported			
1075	Lead	µg/Filter	81.6	75.6	60.5 - 90.7	Acceptable	EPA Method 29 2000	10/28/2016	
1090	Manganese	µg/Filter	28.9	24.8	19.8 - 29.8	Acceptable	EPA Method 29 2000	10/28/2016	
1105	Nickel	µg/Filter	42.1	40.6	32.5 - 48.7	Acceptable	EPA Method 29 2000	10/28/2016	
1140	Selenium	µg/Filter	55.8	56.0	42.0 - 70.0	Acceptable	EPA Method 29 2000	10/28/2016	
1150	Silver	µg/Filter		88.1	61.7 - 115	Not Reported			
1165	Thallium	µg/Filter		78.0	58.5 - 97.5	Not Reported			
1190	Zinc	µg/Filter		64.5	48.4 - 80.6	Not Reported			

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072816L Evaluation Final Complete Report

ERA
A Waters Company

Tarif Rahman
Project Manager
Maxxam Analytics Inc
6740 Campobello Rd
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(905) 817-5700-5712

EPA ID: Not Reported
ERA Customer Number: M748564

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Analyst Name
SSAP Metals in Impinger Solution (cat# 1426, lot# 072816L) Study Dates: 07/28/16 - 11/09/16									
1005	Antimony	µg/mL	1.15	1.23	0.922 - 1.54	Acceptable	EPA Method 29 2000	10/28/2016	
1010	Arsenic	µg/mL	0.652	0.673	0.505 - 0.841	Acceptable	EPA Method 29 2000	10/28/2016	
1015	Barium	µg/mL		2.34	1.76 - 2.92	Not Reported			
1020	Beryllium	µg/mL	0.0615	0.0675	0.0472 - 0.0878	Acceptable	EPA Method 29 2000	10/28/2016	
1030	Cadmium	µg/mL	0.896	0.969	0.775 - 1.16	Acceptable	EPA Method 29 2000	10/28/2016	
1040	Chromium	µg/mL	0.552	0.567	0.454 - 0.680	Acceptable	EPA Method 29 2000	10/28/2016	
1050	Cobalt	µg/mL	0.789	0.794	0.596 - 0.992	Acceptable	EPA Method 29 2000	10/28/2016	
1055	Copper	µg/mL		0.939	0.704 - 1.17	Not Reported			
1075	Lead	µg/mL	0.487	0.467	0.350 - 0.584	Acceptable	EPA Method 29 2000	10/28/2016	
1090	Manganese	µg/mL	1.49	1.45	1.09 - 1.81	Acceptable	EPA Method 29 2000	10/28/2016	
1105	Nickel	µg/mL	0.607	0.646	0.517 - 0.775	Acceptable	EPA Method 29 2000	10/28/2016	
1140	Selenium	µg/mL	0.789	0.831	0.623 - 1.04	Acceptable	EPA Method 29 2000	10/28/2016	
1150	Silver	µg/mL		0.501	0.376 - 0.626	Not Reported			
1165	Thallium	µg/mL		0.155	0.116 - 0.194	Not Reported			
1190	Zinc	µg/mL		1.70	1.28 - 2.12	Not Reported			
SSAP Mercury in Impinger Solution (cat# 1428, lot# 072816L) Study Dates: 07/28/16 - 11/09/16									
1095	Mercury	ng/mL	15.7	16.2	12.2 - 20.2	Acceptable	EPA Method 29 2000	10/18/2016	

Project No. M16281QB
Coke Battery #2 Underfire Stack
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Appendix F - Reference Method Test Data (Computerized Sheets)

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Client:	ArcelorMittal Burns Harbor LLC		
Facility:	Burns Harbor, Indiana		
Test Location:	Coke Battery No. 2 Underfire Stack		
Project #:	M162810		
Test Method:	5/29		
Test Engineer:	BVG		
Test Technician:	BRM		
Type of Fuel Firing:	Other		
	R1	**R2**	**R3**
Temp ID:	CM23	CM23	CM23
Meter ID:	CM23	CM23	CM23
Pitot ID:	235	235	235
Nozzle Diameter (Inches):	0.502	0.502	0.502
Meter Calibration Date:	8/4/2016	8/4/2016	8/4/2016
Meter Calibration Factor (Y):	1.001	1.001	1.001
Meter Orifice Setting (Delta H):	1.405	1.405	1.405
Nozzle Kit ID Number and Material:	glass	glass	glass
Pitot Tube Coefficient:	0.840		
Probe Length (Feet):	12.0		
Probe Liner Material:	Glass		
Sample Plane:	Horizontal		
Port Length (Inches):	50.00		
Port Size (Diameter, Inches):	6.00		
Port Type:	Flange		
Duct Shape:	Circular		
Diameter (Feet):	14.5		
Duct Area (Square Feet):	165.130		
Upstream Diameters:	> 2.0		
Downstream Diameters:	> 3.0		
Number of Ports Sampled:	4		
Number of Points per Port:	6		
Minutes per Point:	6.0		
Minutes per Reading:	6.0		
Total Number of Traverse Points:	24		
Test Length (Minutes):	144		
Train Type:	Anderson Box		
Source Condition:	Normal		
Servomex Serial Number:	01440D1/3791		
Moisture Balance ID:	S10-35		
# of Runs	3		

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Run 1-Method 5/29

Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/14/16
Start Time: 10:05
End Time: 12:41

DRY GAS METER CONDITIONS

ΔH:	1.65	in. H_2O
Meter Temperature, Tm:	83.1	°F
Sqrt ΔP:	0.267	in. H_2O
Stack Temperature, Ts:	451.3	°F
Meter Volume, Vm:	120.990	ft^3
Meter Volume, Vmstd:	116.169	dscf
Meter Volume, Vwstd:	25.180	wscf
Isokinetic Variance:	102.7	%I
Test Length:	144.00	in mins.
Nozzle Diameter:	0.502	in inches
Barometric Pressure:	29.40	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	29.36	in. Hg. abs.
Carbon Dioxide:	6.10	%
Oxygen:	9.00	%
Nitrogen:	84.90	%
Gas Weight dry, Md:	29.336	lb/lb mole
Gas Weight wet, Ms:	27.317	lb/lb mole
Excess Air:	67.096	%
Gas Velocity, Vs:	20.407	fps
Volumetric Flow:	202,185	acfm
Volumetric Flow:	94,466	dscfm
Volumetric Flow:	114,942	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	4137.0	ml	Silica Initial Wt.	815.0	grams
Final Impinger Content:	4655.6	ml	Silica Final Wt.	831.0	grams
Impinger Difference:	518.6	ml	Silica Difference:	16.0	grams

Total Water Gain: 534.6 Moisture, Bws: 0.178

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	10:05:00	0.06	1.40	56.010	452	75	75	253	253	65
2	10:11:00	0.07	1.60	60.750	468	76	75	253	252	60
3	10:17:00	0.08	1.90	65.750	428	79	75	250	252	61
4	10:23:00	0.08	1.80	71.100	455	83	76	253	252	61
5	10:29:00	0.07	1.60	76.350	465	84	77	253	252	63
6	10:35:00	0.07	1.60	81.250	440	85	78	253	252	63
	10:41:00			86.130						
2-1	10:45:00	0.07	1.60	86.130	453	84	78	253	252	65
2	10:51:00	0.08	1.80	91.100	465	85	79	253	253	61
3	10:57:00	0.07	1.70	96.450	432	87	80	253	252	61
4	11:03:00	0.08	1.90	101.600	447	87	80	253	252	61
5	11:09:00	0.06	1.40	106.950	459	88	81	253	252	62
6	11:15:00	0.06	1.40	111.650	472	88	81	253	252	62
	11:21:00			116.288						
3-1	11:25:00	0.07	1.60	116.288	448	85	81	252	252	63
2	11:31:00	0.08	1.80	121.350	465	86	82	253	252	62
3	11:37:00	0.08	1.90	126.700	445	88	82	253	252	62
4	11:43:00	0.07	1.60	132.100	448	89	83	252	252	63
5	11:49:00	0.07	1.60	137.150	463	89	82	253	252	63
6	11:55:00	0.06	1.40	142.100	411	89	83	253	252	65
	12:01:00			146.930						
4-1	12:05:00	0.06	1.40	146.930	448	87	83	253	252	65
2	12:11:00	0.08	1.90	151.650	465	88	83	251	251	57
3	12:17:00	0.08	1.90	156.950	424	89	83	252	252	57
4	12:23:00	0.07	1.60	162.500	450	90	83	252	252	57
5	12:29:00	0.07	1.60	167.550	462	90	83	253	252	58
6	12:35:00	0.07	1.60	172.550	465	90	84	252	251	59
	12:41:00			177.000						
Total	2:24:00			120.990		86.0	80.3			
Average			1.65		451.3	83.1				
Min			1.40		411.0	75.0				
Max			1.90		472.0	90.0				

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Run 2-Method 5/29

Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/15/16
Start Time: 8:50
End Time: 11:29

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	1.70	In. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	81.9	°F	Flue Pressure (Ps):	29.52	in. Hg. abs.
Sqrt ΔP:	0.269	In. H_2O	Carbon Dioxide:	6.20	%
Stack Temperature, Ts:	450.1	°F	Oxygen:	8.80	%
Meter Volume, Vm:	125.639	ft^3	Nitrogen:	85.0	%
Meter Volume, Vmstd:	121.567	dscf	Gas Weight dry, Md:	29.344	lb/lb mole
Meter Volume, Vwstd:	25.170	wscf	Gas Weight wet, Ms:	27.398	lb/lb mole
Isokinetic Variance:	105.5	%I	Excess Air:	64.516	%
			Gas Velocity, Vs:	20.486	fps
Test Length:	144.00	in mins.	Volumetric Flow:	202,974	acfm
Nozzle Diameter:	0.502	in inches	Volumetric Flow:	96,241	dscfm
Barometric Pressure:	29.56	in Hg	Volumetric Flow:	116,168	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	4037.0	ml	Silica Initial Wt.	826.0	grams
Final Impinger Content:	4555.3	ml	Silica Final Wt.	842.1	grams
Impinger Difference:	518.3	ml	Silica Difference:	16.1	grams
Total Water Gain:	534.4		Moisture, Bws:	0.172	

Port-Point No.	Clock Time	Velocity Head Δp In. H2O	Orifice ΔH In. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	8:50:00	0.07	1.59	78.538	461	71	70	251	252	57
2	8:56:00	0.07	1.59	83.420	440	73	70	251	252	57
3	9:02:00	0.07	1.63	88.246	440	73	70	250	251	58
4	9:08:00	0.08	1.63	93.180	446	74	71	250	251	59
5	9:14:00	0.08	1.86	98.410	448	74	71	251	251	59
6	9:20:00	0.08	1.86	103.630	461	76	71	251	251	59
	9:26:00			108.860						
2-1	9:31:00	0.07	1.60	108.860	468	80	74	251	250	61
2	9:37:00	0.07	1.60	113.830	472	82	75	251	250	62
3	9:43:00	0.06	1.44	118.640	428	84	76	252	251	63
4	9:49:00	0.06	1.44	123.270	433	85	76	252	252	64
5	9:55:00	0.08	1.89	127.960	449	87	77	252	252	64
6	10:01:00	0.08	1.87	133.179	457	87	77	252	251	62
	10:07:00			138.490						
3-1	10:12:00	0.07	1.64	138.490	458	89	78	251	252	59
2	10:18:00	0.07	1.64	143.520	464	90	79	251	252	59
3	10:24:00	0.08	1.96	148.440	421	92	82	251	251	60
4	10:30:00	0.08	1.95	153.890	429	92	82	252	251	61
5	10:36:00	0.08	1.94	159.310	436	93	83	252	251	61
6	10:42:00	0.07	1.67	164.680	449	93	83	251	251	62
	10:48:00			169.711						
4-1	10:53:00	0.06	1.41	169.711	462	92	84	251	251	62
2	10:59:00	0.06	1.41	174.370	467	93	85	251	252	62
3	11:05:00	0.07	1.68	178.960	449	93	85	251	252	63
4	11:11:00	0.07	1.69	183.980	444	94	86	252	252	63
5	11:17:00	0.08	1.89	189.030	462	94	86	252	252	64
6	11:23:00	0.08	1.90	196.640	458	95	86	251	251	64
	11:29:00			204.177						
Total	2:24:00			125.639		85.7	78.2			
Average			1.70		450.1	81.9				
Min			1.41		421.0	70.0				
Max			1.96		472.0	95.0				

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Run 3-Method 5/29

Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/15/16
Start Time: 13:45
End Time: 16:19

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	1.75	In. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	89.2	°F	Flue Pressure (Ps):	29.52	in. Hg. abs.
Sqrt ΔP:	0.269	In. H_2O	Carbon Dioxide:	6.10	%
Stack Temperature, Ts:	440.9	°F	Oxygen:	8.80	%
Meter Volume, Vm:	123.380	ft^3	Nitrogen:	85.1	%
Meter Volume, Vmstd:	117.816	dscf	Gas Weight dry, Md:	29.328	lb/lb mole
Meter Volume, Vwstd:	24.045	wscf	Gas Weight wet, Ms:	27.408	lb/lb mole
Isokinetic Variance:	101.4	%I	Excess Air:	64.392	%
			Gas Velocity, Vs:	20.383	fps
Test Length:	144.00	in mins.	Volumetric Flow:	201,951	acfm
Nozzle Diameter:	0.502	in inches	Volumetric Flow:	96,973	dscfm
Barometric Pressure:	29.56	in Hg	Volumetric Flow:	116,764	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	4162.2	ml	Silica Initial Wt.	794.2	grams
Final Impinger Content:	4655.0	ml	Silica Final Wt.	811.9	grams
Impinger Difference:	492.8	ml	Silica Difference:	17.7	grams

Total Water Gain: 510.5 Moisture, Bws: 0.169

Port-Point No.	Clock Time	Velocity Head Δp In. H2O	Orifice ΔH In. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	13:45:00	0.07	1.66	4.730	445	83	83	251	251	62
2	13:51:00	0.07	1.65	9.760	451	83	83	251	251	62
3	13:57:00	0.07	1.65	14.710	454	84	83	252	251	62
4	14:03:00	0.07	1.68	19.670	436	85	83	251	251	62
5	14:09:00	0.08	1.98	24.740	450	87	83	250	251	63
6	14:15:00	0.08	1.92	29.990	438	87	83	250	251	64
	14:21:00			35.398						
2-1	14:24:00	0.07	1.71	35.398	421	88	83	250	250	63
2	14:30:00	0.07	1.68	40.490	440	89	84	250	250	62
3	14:36:00	0.06	1.45	45.530	436	91	84	250	250	62
4	14:42:00	0.06	1.45	50.190	440	92	85	251	251	61
5	14:48:00	0.08	1.96	54.920	423	92	85	251	251	60
6	14:54:00	0.08	1.92	60.310	445	93	86	251	251	59
	15:00:00			65.695						
3-1	15:04:00	0.07	1.67	65.695	450	94	87	251	250	59
2	15:10:00	0.07	1.69	70.760	443	95	88	251	250	60
3	15:16:00	0.07	1.72	75.830	428	95	89	251	250	60
4	15:22:00	0.08	1.94	80.940	439	95	89	252	250	61
5	15:28:00	0.08	1.91	86.370	456	94	90	252	250	61
6	15:34:00	0.08	1.93	91.760	447	94	90	252	250	61
	15:40:00			97.188						
4-1	15:43:00	0.07	1.70	97.188	440	95	90	251	250	60
2	15:49:00	0.07	1.67	102.290	456	96	90	251	250	60
3	15:55:00	0.06	1.45	107.360	443	96	90	251	250	60
4	16:01:00	0.07	1.74	112.140	424	97	91	251	251	60
5	16:07:00	0.08	1.97	117.180	436	98	91	250	251	61
6	16:13:00	0.08	1.95	122.730	440	98	91	250	251	61
	16:19:00			128.110						
Total	2:24:00			123.380		91.7	86.7			
Average			1.75		440.9	89.2				
Min			1.45		421.0	83.0				
Max			1.98		456.0	98.0				

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Client:	ArcelorMittal Burns Harbor, LLC		
Facility:	Burns Harbor, Indiana		
Test Location:	Coke Battery No. 2 Underfire Stack		
Project #:	M162810		
Test Method:	201A/202		
Test Engineer:	CSE		
Test Technician:	BM		
Type of Fuel Firing:	Other		
	R1	**R2**	**R3**
Temp ID:	CM3	CM3	CM3
Meter ID:	CM3	CM3	CM3
Pitot ID:	123	123	123
Nozzle Diameter (Inches):	0.300	0.318	0.318
Meter Calibration Date:	8/1/2016	8/1/2016	8/1/2016
Meter Calibration Factor (Y):	1.016	1.016	1.016
Meter Orifice Setting (Delta H):	1.525	1.525	1.525
Pitot Tube Coefficient:	0.840		
Probe Length (Feet):	12.0		
Probe Liner Material:	Glass		
Sample Plane:	Horizontal		
Port Length (Inches):	50.00		
Port Size (Diameter, Inches):	6.00		
Port Type:	Flange		
Duct Shape:	Circular		
Diameter (Feet):	14.5		
Duct Area (Square Feet):	165.130		
Upstream Diameters:	> 0.5		
Downstream Diameters:	> 2.0		
Number of Ports Sampled:	4		
Number of Points per Port:	12		
Minutes per Point:	8.0		
Minutes per Reading:	4.0		
Total Number of Traverse Points:	48		
Test Length (Minutes):	384		
Train Type:	Hot Box		
Source Condition:	Normal		
Servomex Serial Number:	01440D1/3791		
Moisture Balance ID:	S10-35		
# of Runs	3		

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Run 1-Method 201A/202

Client:	ArcelorMittal Burns Harbor, LLC	Date:	9/14/16
Facility:	Burns Harbor, Indiana	Start Time:	10:00
Test Location:	Coke Battery No. 2 Underfire Stack	End Time:	14:09
Source Condition:	Normal		

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	0.33	in. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	76.8	°F	Flue Pressure (Ps):	29.36	in. Hg. abs.
Sqrt ΔP:	0.277	in. H_2O	Carbon Dioxide:	6.10	%
Stack Temperature, Ts:	449.2	°F	Oxygen:	9.00	%
Meter Volume, Vm:	79.850	ft^3	Nitrogen:	84.90	%
Meter Volume, Vmstd:	78.481	dscf	Gas Weight dry, Md:	29.336	lb/lb mole
Meter Volume, Vwstd:	17.182	wscf	Gas Weight wet, Ms:	27.300	lb/lb mole
Isokinetic Variance:	101.2	%I	Excess Air:	67.096	%
			Gas Velocity, Vs:	21.159	fps
Test Length:	237.00	in mins.	Volumetric Flow:	209,643	acfm
Nozzle Diameter:	0.318	in inches	Volumetric Flow:	97,999	dscfm
Barometric Pressure:	29.40	in Hg	Volumetric Flow:	119,455	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1889.2	ml	Silica Initial Wt.	807.8	grams
Final Impinger Content:	2237.9	ml	Silica Final Wt.	823.9	grams
Impinger Difference:	348.7	ml	Silica Difference:	16.1	grams

Total Water Gain: 364.8 Moisture, Bws: 0.180

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	2.0697 Inlet °F	Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	10:00:00	0.08	0.33	50.880	438	74	74	250	249	65
1	10:05:00	0.08	0.33	52.720	458	74	74	250	249	63
2	10:10:00	0.08	0.33	54.440	472	75	74	250	249	62
2	10:15:00	0.08	0.33	56.190	421	75	74	250	249	62
3	10:20:00	0.08	0.33	57.900	446	76	75	250	250	63
3	10:25:00	0.08	0.33	59.660	450	76	75	250	250	62
4	10:30:00	0.08	0.33	61.440	465	76	75	249	250	62
4	10:35:00	0.08	0.33	63.150	470	76	75	251	250	62
5	10:40:00	0.08	0.33	64.890	434	76	75	249	250	63
5	10:45:00	0.08	0.33	66.610	451	76	75	250	251	63
6	10:50:00	0.06	0.33	68.330	455	76	75	250	250	64
6	10:54:45	0.06	0.33	69.690	481	76	75	250	250	64
	10:59:30			71.010						
2-1	11:04:00	0.08	0.33	71.010	458	76	75	250	250	64
1	11:09:00	0.08	0.33	72.810	470	76	75	250	250	64
2	11:14:00	0.08	0.33	74.570	463	76	76	250	250	61
2	11:19:00	0.08	0.33	76.330	451	76	76	250	250	61
3	11:24:00	0.08	0.33	79.020	440	76	76	250	250	60
3	11:29:00	0.08	0.33	79.790	449	77	76	250	250	66
4	11:34:00	0.08	0.33	81.510	464	77	76	250	250	66
4	11:39:00	0.08	0.33	83.280	427	77	76	248	250	66
5	11:44:00	0.07	0.33	84.980	440	77	76	250	250	65
5	11:48:45	0.07	0.33	86.440	456	77	76	250	250	64
6	11:53:30	0.06	0.33	87.900	440	77	76	250	250	64
6	11:58:15	0.06	0.33	89.220	439	77	76	250	249	64
	12:03:00			90.590						
3-1	12:07:00	0.08	0.33	90.590	457	77	77	250	250	61
1	12:12:00	0.08	0.33	92.390	457	77	77	250	250	61
2	12:17:00	0.08	0.33	94.150	417	78	77	250	250	61
2	12:22:00	0.08	0.33	95.890	417	78	77	250	250	61
3	12:27:00	0.08	0.33	97.660	452	78	78	250	250	61
3	12:32:00	0.08	0.33	99.350	452	78	78	250	250	61
4	12:37:00	0.08	0.33	101.150	438	78	78	250	250	61
4	12:42:00	0.08	0.33	102.860	436	78	78	250	250	61
5	12:47:00	0.08	0.33	104.590	446	78	78	250	250	60
5	12:52:00	0.08	0.33	106.330	448	78	78	250	250	60
6	12:57:00	0.07	0.33	108.050	458	78	78	250	250	60
6	13:01:45	0.07	0.33	109.580	458	78	78	250	250	60
	13:06:30		0.33	110.970						
4-1	13:10:00	0.08	0.33	110.970	459	78	78	249	249	64
1	13:15:00	0.08	0.33	112.770	459	78	78	249	249	64
2	13:20:00	0.08	0.33	114.530	442	78	78	250	250	60
2	13:25:00	0.08	0.33	116.220	442	78	78	250	250	60
3	13:30:00	0.08	0.33	118.010	453	78	78	250	250	59
3	13:35:00	0.08	0.33	119.740	453	78	78	250	250	59
4	13:40:00	0.08	0.33	121.570	430	78	78	250	250	60
4	13:45:00	0.08	0.33	123.190	430	78	78	250	250	60
5	13:50:00	0.07	0.33	124.970	451	78	78	250	250	59
5	13:54:45	0.07	0.33	126.440	451	78	78	250	250	59
6	13:59:30	0.07	0.33	127.880	468	78	78	250	250	61
6	14:04:15	0.07	0.33	129.300	468	78	78	250	250	61
	14:09:00			130.740						
Total	3:57:00			79.850		77.0	76.5			
Average			0.33		449.2	76.8				
Min			0.33		417.0	74.0				
Max			0.33		472.0	78.0				

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Run 2-Method 201A/202

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/15/16
Start Time: 8:20
End Time: 12:31

DRY GAS METER CONDITIONS

ΔH:	0.32	in. H_2O
Meter Temperature, Tm:	77.8	°F
Sqrt ΔP:	0.272	in. H_2O
Stack Temperature, Ts:	449.6	°F
Meter Volume, Vm:	80.610	ft^3
Meter Volume, Vmstd:	79.074	dscf
Meter Volume, Vwstd:	16.348	wscf
Isokinetic Variance:	102.9	%I
Test Length:	237.00	in mins.
Nozzle Diameter:	0.318	in inches
Barometric Pressure:	29.40	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	29.36	in. Hg. abs.
Carbon Dioxide:	6.20	%
Oxygen:	8.80	%
Nitrogen:	85.0	%
Gas Weight dry, Md:	29.344	lb/lb mole
Gas Weight wet, Ms:	27.400	lb/lb mole
Excess Air:	64.516	%
Gas Velocity, Vs:	20.768	fps
Volumetric Flow:	205,767	acfm
Volumetric Flow:	97,112	dscfm
Volumetric Flow:	117,190	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1904.8	ml	Silica Initial Wt.	854.6	grams
Final Impinger Content:	2232.4	ml	Silica Final Wt.	874.1	grams
Impinger Difference:	327.6	ml	Silica Difference:	19.5	grams

Total Water Gain: 347.1 Moisture, Bws: 0.171

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	8:20:00	0.07	0.32	31.700	444	68	68	252	251	60
1	8:24:45	0.07	0.32	33.380	452	68	68	250	253	60
2	8:29:30	0.07	0.32	34.500	449	69	69	251	253	59
2	8:34:25	0.07	0.32	36.430	438	70	69	253	252	59
3	8:39:00	0.08	0.32	37.920	434	70	69	250	249	59
3	8:43:30	0.08	0.32	39.380	445	71	70	251	251	59
4	8:48:00	0.08	0.32	40.440	448	71	70	252	251	59
4	8:53:15	0.08	0.32	42.460	446	72	70	249	252	59
5	8:58:30	0.08	0.32	44.380	444	72	71	249	253	61
5	9:03:45	0.08	0.32	45.870	441	73	72	248	253	61
6	9:09:00	0.08	0.32	47.760	439	74	72	248	251	62
6	9:15:00	0.08	0.32	49.720	428	74	72	248	251	62
	9:19:30			51.500						
2-1	9:23:00	0.07	0.32	51.500	441	74	73	251	246	63
1	9:27:45	0.07	0.32	53.200	461	75	73	252	249	62
2	9:32:15	0.07	0.32	54.600	457	75	74	252	251	61
2	9:37:00	0.07	0.32	55.950	472	76	74	253	251	61
3	9:41:45	0.08	0.32	57.420	461	76	75	254	252	61
3	9:47:00	0.08	0.32	59.800	444	77	75	254	253	61
4	9:52:15	0.08	0.32	61.400	462	77	76	256	253	59
4	9:57:30	0.08	0.32	63.600	468	77	76	256	254	60
5	10:02:45	0.08	0.32	65.200	460	78	77	252	254	61
5	10:08:00	0.08	0.32	66.800	456	79	77	252	251	61
6	10:13:15	0.08	0.32	68.200	463	79	78	253	252	61
6	10:18:30	0.08	0.32	70.660	428	79	78	251	252	61
	10:23:45			72.570						
3-1	10:27:00	0.06	0.32	72.570	457	79	79	252	249	61
1	10:31:30	0.06	0.32	73.420	452	80	79	251	253	61
2	10:36:00	0.07	0.32	75.300	436	81	79	248	253	62
2	10:40:45	0.07	0.32	76.550	440	81	80	249	254	62
3	10:45:30	0.08	0.32	77.900	442	81	80	252	254	63
3	10:50:45	0.08	0.32	79.900	450	82	80	249	253	62
4	10:56:00	0.08	0.32	81.720	445	82	81	249	255	62
4	11:01:15	0.08	0.32	83.280	436	83	81	251	252	62
5	11:06:30	0.08	0.32	85.920	456	84	82	253	253	63
5	11:11:45	0.08	0.32	87.600	462	84	83	253	253	62
6	11:17:00	0.08	0.32	89.330	455	84	83	252	252	62
6	11:22:15	0.08	0.32	90.870	443	84	83	251	251	62
	11:27:30			92.880						
4-1	11:32:00	0.06	0.32	92.880	460	84	83	251	250	63
1	11:36:30	0.06	0.32	94.270	466	84	83	251	250	63
2	11:41:00	0.06	0.32	95.610	440	82	83	251	250	62
2	11:45:30	0.06	0.32	96.970	444	83	83	250	251	62
3	11:50:00	0.08	0.32	98.320	451	83	83	251	252	63
3	11:55:15	0.08	0.32	100.160	454	83	83	251	252	63
4	12:00:30	0.08	0.32	101.870	460	83	83	250	251	63
4	12:05:45	0.08	0.32	103.790	444	83	83	251	251	63
5	12:11:00	0.08	0.32	105.610	452	83	83	251	250	63
5	12:16:25	0.08	0.32	107.420	459	83	83	252	251	64
6	12:21:30	0.07	0.32	109.280	464	83	83	252	251	64
6	12:26:15	0.07	0.32	110.810	434	83	83	251	251	64
	12:31:00			112.310						
Total	3:59:45			80.610		78.3	77.3			
Average			0.32		449.6	77.8				
Min			0.32		428.0	68.0				
Max			0.32		472.0	84.0				

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Run 3-Method 201A/202

Client:	ArcelorMittal Burns Harbor, LLC	Date:	9/15/16
Facility:	Burns Harbor, Indiana	Start Time:	13:14
Test Location:	Coke Battery No. 2 Underfire Stack	End Time:	17:24
Source Condition:	Normal		

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	0.32	in. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	84.6	°F	Flue Pressure (Ps):	29.36	in. Hg. abs.
Sqrt ΔP:	0.274	in. H_2O	Carbon Dioxide:	6.10	%
Stack Temperature, Ts:	445.2	°F	Oxygen:	8.80	%
Meter Volume, Vm:	62.597	ft^3	Nitrogen:	85.1	%
Meter Volume, Vmstd:	60.005	dscf	Gas Weight dry, Md:	29.326	lb/lb mole
Meter Volume, Vwstd:	16.527	wscf	Gas Weight wet, Ms:	27.389	lb/lb mole
Isokinetic Variance:	102.9	%I	Excess Air:	64.392	%
			Gas Velocity, Vs:	20.905	fps
Test Length:	237.00	in mins.	Volumetric Flow:	207,119	acfm
Nozzle Diameter:	0.318	in inches	Volumetric Flow:	98,243	dscfm
Barometric Pressure:	29.40	in Hg	Volumetric Flow:	118,538	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1932.0	ml	Silica Initial Wt.	813.2	grams
Final Impinger Content:	2266.9	ml	Silica Final Wt.	829.2	grams
Impinger Difference:	334.9	ml	Silica Difference:	16.0	grams

Total Water Gain: 350.9 Moisture, Bws: 0.171

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	13:14:00	0.07	0.32	12.863	442	80	80	253	251	61
1	13:18:45	0.07	0.32	14.520	430	81	82	254	251	62
2	13:23:30	0.07	0.32	16.090	448	82	82	251	251	62
2	13:28:15	0.07	0.32	17.440	462	82	82	249	249	62
3	13:33:00	0.08	0.32	19.120	464	82	82	250	250	62
3	13:38:15	0.08	0.32	20.920	461	82	82	251	251	62
4	13:43:30	0.08	0.32	22.740	441	82	82	251	250	63
4	13:48:45	0.08	0.32	24.610	453	82	82	251	250	63
5	13:54:00	0.08	0.32	26.390	454	83	82	250	251	63
5	13:59:15	0.08	0.32	28.220	421	83	82	251	250	64
6	14:04:30	0.08	0.32	30.040	436	83	82	250	250	64
6	14:08:45	0.08	0.32	31.860	450	83	82	251	251	62
	14:15:00			33.670						
2-1	14:18:00	0.06	0.32	33.670	429	83	82	250	249	62
1	14:22:30	0.06	0.32	34.920	443	84	84	251	250	63
2	14:27:00	0.07	0.32	36.430	453	84	84	251	250	64
2	14:31:45	0.07	0.32	37.960	440	85	84	251	251	64
3	14:35:30	0.08	0.32	39.520	448	85	84	251	251	64
3	14:40:45	0.08	0.32	41.320	438	85	84	251	250	64
4	14:46:00	0.08	0.32	43.160	441	85	84	251	250	65
4	14:51:15	0.08	0.32	44.970	420	85	84	250	250	65
5	14:56:30	0.08	0.32	46.810	443	85	84	250	250	65
5	15:01:45	0.08	0.32	48.620	430	85	84	250	250	65
6	15:07:00	0.08	0.32	50.430	450	85	85	250	251	66
6	15:12:15	0.06	0.32	52.260	446	85	85	250	251	65
	15:17:30			54.250						
3-1	15:21:00	0.08	0.32	54.280	443	85	85	252	253	62
1	15:26:15	0.08	0.32	56.220	455	86	86	253	251	63
2	15:31:30	0.08	0.32	57.600	460	86	86	253	251	63
2	15:36:45	0.08	0.32	59.720	467	86	86	251	250	63
3	15:42:00	0.08	0.32	61.200	463	87	86	249	251	62
3	15:47:15	0.08	0.32	63.550	456	87	86	250	249	62
4	15:52:30	0.08	0.32	65.670	443	87	86	251	249	63
4	15:57:45	0.08	0.32	67.110	420	87	86	249	250	63
5	16:03:00	0.07	0.32	68.920	431	86	86	248	251	62
5	16:07:45	0.07	0.32	70.450	439	86	86	248	250	61
6	16:12:30	0.07	0.32	71.720	442	87	86	249	252	61
6	16:17:15	0.07	0.32	73.380	419	87	86	249	245	62
	16:22:00			75.390						
4-1	16:25:00	0.08	0.32	75.390	446	86	86	249	240	63
1	16:30:15	0.08	0.32	77.340	451	86	86	250	249	63
2	16:35:30	0.08	0.32	78.860	442	86	86	250	250	63
2	16:40:45	0.08	0.32	80.490	435	87	86	248	251	64
3	16:46:00	0.07	0.32	82.340	451	87	86	248	252	64
3	16:50:45	0.07	0.32	84.000	456	87	86	249	252	62
4	16:55:30	0.07	0.32	85.420	466	87	86	249	253	62
4	17:00:15	0.07	0.32	87.560	438	87	86	250	253	63
5	17:05:00	0.08	0.32	88.900	451	86	86	251	253	63
5	17:10:15	0.08	0.32	90.720	466	86	85	251	252	61
6	17:15:30	0.06	0.32	92.640	458	86	85	251	252	62
6	17:20:00	0.06	0.32	93.950	439	86	85	251	252	62
	17:24:30			95.460						
Total	4:01:00			62.597		84.9	84.4			
Average			0.32		445.2	84.6				
Min			0.32		419.0	80.0				
Max			0.32		467.0	87.0				

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Calibration Corrected Data

Run #	Run Date	Start Time	End Time	CO2 % (dry)	O2 % (dry)	CO ppmvd
1	9/14/16	10:00	11:00	6.1	9.0	47.9
2	9/14/16	11:13	12:13	6.2	8.5	50.2
3	9/14/16	12:41	13:41	6.1	8.5	49.0
Average Test 1				**6.1**	**8.7**	**49.0**

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Calibration Corrected Data

Run #	Run Date	Start Time	End Time	CO2 % (dry)	O2 % (dry)	CO ppmvd
1	9/15/16	8:20	9:20	6.2	8.9	41.5
2	9/15/16	9:39	10:26	6.2	8.7	41.1
3	9/15/16	11:00	12:00	6.1	8.7	40.9
Average Test 2				**6.2**	**8.8**	**41.2**
4	9/15/16	13:14	14:14	6.2	8.7	42.2
5	9/15/16	14:29	15:28	6.1	8.8	41.9
6	9/15/16	15:57	16:55	6.1	8.8	43.0
Average Test 3				**6.1**	**8.8**	**42.4**

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/14/16
Run 1-1

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
10:00	41.40	5.99	8.77
10:01	44.60	6.21	8.33
10:02	47.70	6.14	8.46
10:03	49.30	6.21	8.32
10:04	50.80	6.11	8.52
10:05	51.00	6.07	8.62
10:06	51.90	5.85	9.33
10:07	51.20	6.14	8.57
10:08	53.70	6.16	8.43
10:09	55.50	6.09	8.54
10:10	56.40	6.23	8.26
10:11	57.20	6.30	8.10
10:12	60.80	6.44	7.81
10:13	62.60	6.15	8.40
10:14	60.10	6.18	8.34
10:15	55.50	2.62	15.84
10:16	21.00	5.48	9.99
10:17	45.10	6.39	8.10
10:18	45.50	6.41	8.01
10:19	55.50	6.36	8.08
10:20	49.40	6.24	8.30
10:21	44.60	6.20	8.37
10:22	44.50	6.22	8.32
10:23	43.70	5.98	8.80
10:24	41.30	6.16	8.43
10:25	44.30	6.26	8.26
10:26	45.80	6.08	8.70
10:27	44.10	6.26	8.29
10:28	47.10	6.30	8.15
10:29	49.10	6.24	8.27
10:30	48.70	6.14	8.46
10:31	47.60	6.21	8.32
10:32	48.60	6.02	8.70
10:33	44.90	5.78	9.19
10:34	41.60	5.78	9.20
10:35	37.30	2.50	16.13
10:36	13.90	5.08	10.84
10:37	26.20	6.37	8.18
10:38	45.90	6.30	8.26
10:39	52.70	6.19	8.45
10:40	52.00	6.16	8.50
10:41	50.60	6.12	8.54
10:42	51.00	6.06	8.63
10:43	49.20	5.82	9.12
10:44	47.90	5.95	8.87
10:45	48.70	5.87	9.00
10:46	48.60	5.50	10.21
10:47	47.30	5.87	9.17
10:48	50.90	5.97	8.79
10:49	53.10	6.00	8.71
10:50	55.00	6.18	8.37
10:51	56.90	6.13	8.44
10:52	57.70	6.19	8.32
10:53	57.60	5.91	8.86
10:54	55.00	5.75	9.21
10:55	42.10	2.35	16.35
10:56	12.60	4.86	11.21
10:57	35.50	6.28	8.29
10:58	63.50	6.44	7.92
10:59	58.30	6.42	7.92
11:00	55.80	6.40	7.94
Average	**48.00**	**5.90**	**9.00**
Min	12.60	2.35	7.81
Max	63.50	6.44	16.35

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/14/16
Run 1-2

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
11:13	48.30	6.41	7.69
11:14	53.90	6.33	7.84
11:15	39.80	2.56	15.79
11:16	12.10	5.02	10.75
11:17	28.90	6.23	8.24
11:18	40.70	6.48	7.69
11:19	46.10	6.38	7.84
11:20	49.80	6.47	7.64
11:21	51.30	6.21	8.15
11:22	49.00	6.16	8.26
11:23	50.30	6.20	8.18
11:24	51.10	6.17	8.23
11:25	52.20	6.31	7.95
11:26	54.30	6.19	8.19
11:27	54.60	6.30	7.97
11:28	56.20	6.35	7.86
11:29	59.30	6.40	7.74
11:30	59.40	6.38	7.77
11:31	61.40	6.40	7.70
11:32	61.30	6.25	8.02
11:33	58.00	6.12	8.28
11:34	58.00	6.19	8.18
11:35	46.30	2.50	15.92
11:36	14.70	4.99	10.81
11:37	31.30	6.30	8.12
11:38	40.00	6.31	8.05
11:39	43.20	6.34	7.94
11:40	45.00	6.33	7.93
11:41	47.20	6.44	7.68
11:42	47.70	6.28	8.00
11:43	46.10	6.26	8.05
11:44	45.10	6.25	8.07
11:45	45.90	6.29	8.00
11:46	46.70	6.25	8.07
11:47	46.50	6.32	7.95
11:48	46.90	6.23	8.13
11:49	48.10	6.40	7.78
11:50	49.80	6.41	7.73
11:51	54.10	6.55	7.44
11:52	55.80	6.38	7.78
11:53	50.70	6.28	7.99
11:54	50.20	6.32	7.93
11:55	41.10	2.61	15.71
11:56	10.90	4.95	10.91
11:57	30.90	6.40	7.91
11:58	79.50	6.22	8.23
11:59	59.00	6.30	8.04
12:00	52.20	6.35	7.92
12:01	77.50	6.46	7.66
12:02	78.40	6.26	8.05
12:03	67.50	6.31	7.96
12:04	56.20	6.15	8.25
12:05	52.30	6.27	8.02
12:06	54.60	6.15	8.27
12:07	56.20	6.39	7.77
12:08	62.90	6.26	8.03
12:09	56.10	6.26	8.04
12:10	57.40	6.30	7.94
12:11	57.90	6.37	7.78
12:12	61.70	6.39	7.74
12:13	59.80	6.21	8.10
Average	**50.30**	**6.06**	**8.49**
Min	10.90	2.50	7.44
Max	79.50	6.55	15.92

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/14/16
Run 1-3

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
12:41	48.50	6.35	7.90
12:42	50.30	6.20	8.17
12:43	50.80	6.37	7.82
12:44	54.30	6.40	7.74
12:45	55.70	6.34	7.86
12:46	55.30	6.27	7.99
12:47	58.30	6.46	7.61
12:48	58.90	6.20	8.14
12:49	56.10	6.24	8.11
12:50	57.20	6.27	8.02
12:51	58.80	6.29	7.98
12:52	58.90	6.33	7.88
12:53	61.20	6.36	7.81
12:54	60.70	6.15	8.23
12:55	50.60	2.66	15.57
12:56	15.20	4.92	10.94
12:57	33.70	6.49	7.68
12:58	53.00	6.52	7.57
12:59	57.70	6.35	7.89
13:00	47.30	6.30	7.99
13:01	46.10	6.25	8.09
13:02	45.50	6.31	7.97
13:03	47.20	6.37	7.82
13:04	49.10	6.34	7.86
13:05	47.40	6.16	8.22
13:06	44.80	5.99	8.77
13:07	42.10	6.29	8.06
13:08	48.00	6.28	8.00
13:09	47.30	6.12	8.33
13:10	46.10	6.27	8.03
13:11	48.30	6.18	8.18
13:12	46.50	6.05	8.43
13:13	45.20	6.09	8.36
13:14	46.50	6.22	8.11
13:15	41.40	2.63	15.63
13:16	11.10	4.80	11.20
13:17	26.90	6.31	8.09
13:18	40.40	6.42	7.84
13:19	45.00	6.29	8.05
13:20	47.60	6.38	7.85
13:21	49.50	6.33	7.94
13:22	51.30	6.30	7.98
13:23	52.30	6.39	7.80
13:24	54.90	6.31	7.95
13:25	53.40	6.18	8.20
13:26	53.60	6.16	8.25
13:27	54.10	6.25	8.10
13:28	55.70	6.27	8.07
13:29	57.10	6.27	8.06
13:30	57.50	6.23	8.15
13:31	57.60	6.27	8.06
13:32	58.40	6.24	8.11
13:33	59.20	6.38	7.82
13:34	63.80	6.58	7.40
13:35	59.90	2.77	15.33
13:36	17.20	4.92	10.94
13:37	35.90	6.46	7.80
13:38	45.80	6.51	7.66
13:39	50.20	6.56	7.50
13:40	52.00	6.45	7.70
13:41	52.40	6.45	7.68
Average	**49.10**	**6.06**	**8.50**
Min	11.10	2.63	7.40
Max	63.80	6.58	15.63

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16
Run 2-1

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
8:20	46.80	6.41	8.18
8:21	49.40	6.42	8.16
8:22	45.20	6.32	8.35
8:23	43.30	6.28	8.44
8:24	41.90	6.33	8.36
8:25	43.50	6.38	8.23
8:26	45.20	6.22	8.71
8:27	39.80	6.32	8.39
8:28	43.00	6.30	8.40
8:29	43.50	6.30	8.37
8:30	48.10	6.53	7.92
8:31	49.80	6.32	8.33
8:32	43.80	6.35	8.26
8:33	47.80	6.42	8.16
8:34	46.40	6.40	8.21
8:35	34.20	2.51	16.28
8:36	11.40	5.43	10.20
8:37	26.70	6.46	8.21
8:38	35.20	6.35	8.39
8:39	38.00	6.28	8.48
8:40	40.50	6.47	8.10
8:41	43.30	6.31	8.38
8:42	43.70	6.29	8.44
8:43	49.60	6.24	8.53
8:44	51.70	6.28	8.47
8:45	53.20	6.34	8.36
8:46	51.30	5.93	9.53
8:47	48.40	6.27	8.60
8:48	53.20	6.24	8.54
8:49	51.60	6.29	8.43
8:50	55.30	6.45	8.10
8:51	56.50	6.35	8.28
8:52	54.00	6.31	8.37
8:53	51.30	6.07	8.86
8:54	49.50	6.16	8.70
8:55	36.70	2.42	16.45
8:56	13.90	5.20	10.69
8:57	29.00	6.38	8.38
8:58	39.10	6.44	8.21
8:59	40.70	6.40	8.25
9:00	40.00	6.34	8.34
9:01	40.80	6.39	8.23
9:02	42.30	6.40	8.19
9:03	41.70	6.31	8.36
9:04	40.40	6.29	8.38
9:05	40.60	6.27	8.41
9:06	39.80	6.14	8.66
9:07	38.20	6.29	8.40
9:08	40.80	6.27	8.43
9:09	42.60	6.45	8.06
9:10	45.00	6.41	8.14
9:11	45.50	6.37	8.23
9:12	43.10	6.40	8.14
9:13	45.80	6.39	8.16
9:14	46.40	6.56	7.82
9:15	37.30	2.57	16.10
9:16	11.10	5.29	10.44
9:17	25.90	6.27	8.53
9:18	34.30	6.36	8.32
9:19	38.70	6.34	8.35
9:20	40.20	6.35	8.33
Average	**41.90**	**6.09**	**8.85**
Min	11.10	2.42	7.82
Max	56.50	6.56	16.45

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16
Run 2-2

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
9:39	41.00	6.35	8.20
9:40	39.80	6.27	8.33
9:41	39.30	6.16	8.57
9:42	34.70	5.92	9.05
9:43	34.20	6.17	8.58
9:44	37.20	6.16	8.55
9:45	38.40	6.30	8.27
9:46	39.20	5.86	9.52
9:47	34.10	6.15	8.73
9:48	38.90	6.37	8.16
9:49	42.80	6.36	8.14
9:50	44.10	6.42	8.03
9:51	43.10	6.19	8.47
9:52	42.10	6.40	8.06
9:53	44.50	6.23	8.40
9:54	41.70	6.22	8.42
9:55	31.10	2.49	16.16
9:56	10.90	5.15	10.63
9:57	25.30	6.33	8.36
9:58	34.50	6.46	8.07
9:59	39.00	6.40	8.12
10:00	41.30	6.38	8.15
10:01	42.80	6.32	8.23
10:02	44.40	6.35	8.15
10:03	45.70	6.35	8.12
10:04	47.40	6.31	8.20
10:05	48.00	6.33	8.15
10:06	47.80	6.12	8.55
10:07	48.00	6.39	8.04
10:08	51.30	6.51	7.78
10:09	52.20	6.45	7.89
10:10	54.40	6.51	7.78
10:11	52.90	6.28	8.23
10:12	51.20	6.19	8.41
10:13	51.20	6.30	8.19
10:14	52.80	6.38	8.05
10:15	41.40	2.63	15.81
10:16	14.60	4.84	11.21
10:17	32.70	6.37	8.19
10:18	39.00	6.45	7.98
10:19	41.00	6.42	8.01
10:20	43.00	6.42	7.98
10:21	43.60	6.48	7.85
10:22	45.20	6.42	7.96
10:23	43.60	6.38	8.03
10:24	42.50	6.32	8.12
10:25	43.20	6.40	7.96
10:26	42.60	6.21	8.32
Average	**41.20**	**6.10**	**8.67**
Min	10.90	2.49	7.78
Max	54.40	6.51	16.16

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16
Run 2-3

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
11:00	42.10	6.39	7.99
11:01	43.70	6.47	7.82
11:02	44.00	6.41	7.92
11:03	42.90	6.27	8.18
11:04	42.00	6.38	7.96
11:05	43.10	6.40	7.90
11:06	43.40	6.19	8.60
11:07	38.20	6.20	8.41
11:08	41.50	6.34	8.07
11:09	43.10	6.27	8.18
11:10	44.60	6.44	7.83
11:11	46.60	6.45	7.81
11:12	48.30	6.49	7.75
11:13	47.90	6.53	7.64
11:14	52.60	6.56	7.58
11:15	40.20	2.76	15.51
11:16	9.60	4.57	11.59
11:17	24.40	6.40	8.05
11:18	35.00	6.46	7.88
11:19	39.10	6.43	7.91
11:20	41.20	6.29	8.17
11:21	42.90	6.41	7.90
11:22	45.00	6.26	8.19
11:23	45.10	6.25	8.21
11:24	45.70	6.16	8.41
11:25	46.30	6.23	8.27
11:26	47.50	5.98	8.97
11:27	46.60	6.25	8.28
11:28	48.90	6.17	8.37
11:29	49.60	6.18	8.36
11:30	49.20	6.13	8.42
11:31	50.30	6.30	8.09
11:32	51.70	6.22	8.24
11:33	51.10	6.10	8.45
11:34	51.10	6.32	8.01
11:35	43.70	2.88	15.45
11:36	13.20	4.33	11.89
11:37	30.60	6.15	8.51
11:38	36.10	6.31	8.19
11:39	39.00	6.25	8.29
11:40	39.60	6.32	8.10
11:41	42.10	6.30	8.14
11:42	42.00	6.30	8.13
11:43	40.70	6.18	8.34
11:44	39.50	6.24	8.22
11:45	41.10	6.30	8.08
11:46	42.70	6.19	8.33
11:47	41.80	6.30	8.10
11:48	42.10	6.21	8.26
11:49	42.70	6.20	8.33
11:50	41.00	6.14	8.42
11:51	41.00	6.08	8.59
11:52	39.10	6.03	8.65
11:53	40.30	6.18	8.36
11:54	42.20	6.24	8.18
11:55	36.80	3.08	15.38
11:56	8.90	4.15	12.03
11:57	22.70	6.16	8.45
11:58	33.40	6.50	7.80
11:59	38.20	6.25	8.26
12:00	39.40	6.15	8.43
Average	**40.70**	**6.02**	**8.72**
Min	8.90	2.76	7.58
Max	52.60	6.56	15.51

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16
Run 3-1

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
13:14	49.30	6.48	7.73
13:15	39.80	4.58	15.57
13:16	9.60	3.10	11.37
13:17	24.00	6.21	8.14
13:18	33.80	6.43	7.93
13:19	38.00	6.39	7.90
13:20	42.10	6.53	7.85
13:21	43.10	6.33	8.07
13:22	43.70	6.33	8.27
13:23	43.80	6.18	8.25
13:24	45.50	6.30	7.85
13:25	49.70	6.49	7.81
13:26	48.30	6.28	9.06
13:27	46.70	6.11	8.31
13:28	49.30	6.36	8.07
13:29	49.80	6.25	8.28
13:30	50.10	6.27	8.14
13:31	50.90	6.27	8.15
13:32	51.10	6.28	8.16
13:33	52.20	6.35	7.74
13:34	53.80	6.48	7.82
13:35	44.50	5.64	15.39
13:36	13.00	2.40	11.81
13:37	28.90	5.70	8.36
13:38	35.60	6.37	7.99
13:39	39.30	6.40	8.08
13:40	40.00	6.37	8.08
13:41	39.10	6.32	8.23
13:42	38.80	6.29	8.15
13:43	40.90	6.38	7.68
13:44	43.60	6.51	7.91
13:45	42.90	6.44	7.68
13:46	43.60	6.48	8.96
13:47	36.00	6.05	8.44
13:48	41.00	6.28	7.97
13:49	43.90	6.38	7.69
13:50	45.80	6.50	8.27
13:51	39.90	6.22	8.49
13:52	39.50	6.13	8.02
13:53	44.80	6.37	7.97
13:54	44.70	6.38	7.92
13:55	38.00	6.36	15.22
13:56	9.00	2.87	11.99
13:57	21.80	4.70	8.46
13:58	31.70	6.12	8.06
13:59	37.20	6.37	8.17
14:00	39.80	6.33	8.04
14:01	41.80	6.36	8.22
14:02	43.00	6.28	8.18
14:03	44.30	6.28	8.08
14:04	48.40	6.31	7.80
14:05	48.30	6.45	8.08
14:06	47.80	6.36	9.27
14:07	45.50	6.03	8.42
14:08	48.90	6.13	8.18
14:09	50.30	6.28	8.27
14:10	49.70	6.27	8.47
14:11	50.50	6.15	8.20
14:12	52.30	6.19	8.10
14:13	52.90	6.31	7.95
14:14	53.70	6.33	8.31
Average	**41.90**	**6.07**	**8.67**
Min	9.00	2.40	7.68
Max	53.80	6.53	15.57

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16
Run 3-2

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
14:28	43.50	6.35	7.99
14:29	44.10	6.54	7.62
14:30	50.00	6.44	7.81
14:31	47.20	6.49	7.71
14:32	48.20	6.45	7.77
14:33	49.40	6.49	7.68
14:34	48.40	6.48	7.70
14:35	42.40	2.84	15.25
14:36	9.30	4.35	12.03
14:37	22.30	6.15	8.51
14:38	32.30	6.29	8.22
14:39	37.10	6.18	8.38
14:40	39.30	6.27	8.20
14:41	48.70	6.18	8.36
14:42	45.10	6.21	8.30
14:43	47.00	6.35	8.00
14:44	48.00	6.24	8.19
14:45	48.30	6.39	7.90
14:46	48.60	5.98	9.00
14:47	46.50	6.05	8.70
14:48	48.10	6.18	8.29
14:49	49.80	6.24	8.15
14:50	50.40	6.11	8.38
14:51	50.50	6.34	7.91
14:52	53.10	6.37	7.84
14:53	52.40	6.29	8.02
14:54	52.90	6.25	8.12
14:55	40.60	2.37	16.15
14:56	12.60	4.76	11.09
14:57	29.20	6.41	7.95
14:58	39.40	6.55	7.64
14:59	43.90	6.55	7.62
15:00	44.30	6.55	7.61
15:01	44.60	6.41	7.86
15:02	40.10	6.24	8.17
15:03	37.60	6.13	8.39
15:04	35.70	6.13	8.38
15:05	37.00	6.24	8.19
15:06	37.40	5.88	9.19
15:07	34.30	6.31	8.14
15:08	40.20	6.43	7.82
15:09	42.70	6.28	8.11
15:10	41.70	6.30	8.05
15:11	57.70	6.43	7.82
15:12	59.50	6.46	7.75
15:13	55.90	6.31	8.04
15:14	43.80	6.37	7.92
15:15	35.50	2.60	15.77
15:16	8.90	4.59	11.47
15:17	22.90	6.31	8.17
15:18	33.00	6.28	8.22
15:19	36.70	6.15	8.43
15:20	38.00	5.94	8.80
15:21	38.20	5.96	8.76
15:22	39.50	6.05	8.56
15:23	41.20	6.16	8.34
15:24	44.00	6.20	8.29
15:25	46.10	6.25	8.18
15:26	46.60	6.04	8.90
15:27	45.90	6.25	8.34
15:28	47.50	6.02	8.66
Average	**41.70**	**6.01**	**8.70**
Min	8.90	2.37	7.61
Max	59.50	6.55	16.15

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16
Run 3-3

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)
15:55	36.40	2.79	15.30
15:56	10.10	4.78	11.19
15:57	24.00	6.26	8.34
15:58	33.80	6.47	7.90
15:59	38.90	6.50	7.78
16:00	43.10	6.48	7.80
16:01	44.10	6.37	7.99
16:02	45.30	6.19	8.34
16:03	44.70	6.20	8.30
16:04	46.10	6.16	8.40
16:05	47.60	6.33	8.09
16:06	48.80	6.04	8.88
16:07	48.70	6.35	8.13
16:08	51.00	6.34	8.05
16:09	51.70	6.34	8.02
16:10	52.20	6.26	8.17
16:11	52.40	6.37	7.95
16:12	53.80	6.43	7.83
16:13	54.60	6.48	7.70
16:14	57.60	6.53	7.62
16:15	45.50	2.67	15.54
16:16	13.70	4.56	11.61
16:17	30.10	6.29	8.26
16:18	36.20	6.31	8.19
16:19	38.00	6.34	8.11
16:20	40.90	6.40	7.96
16:21	41.60	6.37	7.98
16:22	43.00	6.40	7.92
16:23	41.80	6.30	8.09
16:24	41.30	6.37	7.94
16:25	43.00	6.40	7.87
16:26	42.50	6.09	8.72
16:27	38.30	6.36	8.06
16:28	43.80	6.42	7.82
16:29	45.40	6.38	7.89
16:30	45.10	6.29	8.07
16:31	43.40	6.25	8.13
16:32	43.90	6.42	7.82
16:33	47.50	6.44	7.76
16:34	46.90	6.35	7.93
16:35	39.10	2.93	14.96
16:36	9.30	4.37	11.96
16:37	23.20	6.27	8.23
16:38	34.00	6.40	7.93
16:39	39.30	6.48	7.71
16:40	44.70	6.45	7.74
16:41	46.30	6.52	7.60
16:42	47.20	6.25	8.10
16:43	47.10	6.38	7.84
16:44	49.10	6.30	8.00
16:45	49.60	6.36	7.88
16:46	50.00	5.86	9.16
16:47	47.80	6.14	8.50
16:48	50.10	6.20	8.20
16:49	51.40	6.25	8.06
16:50	52.00	6.13	8.30
16:51	51.30	6.12	8.31
16:52	51.70	6.16	8.21
16:53	53.00	6.27	7.99
16:54	53.60	6.11	8.31
16:55	46.50	2.96	14.83
Average	**43.20**	**6.00**	**8.71**
Min	9.30	2.67	7.60
Max	57.60	6.53	15.54

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Company:	Arcelor Mittal Burns Harbor LLC	
Total Average Run 1-3	Burns Harbor, Indiana	
Test Location:	Coke Battery No. 2 Underfire Stack	
Test Method:	0031	
Test Engineer:	BVG	
Test Technician:	N/A	
Temp ID:	MM4A	
Meter ID:	MM4A	
Probe Length:	12.0	**ft**
Probe Liner Material:	Glass	
Meter Calibration Factor (Y):	1.000	
Sample Plane:	Horizontal	
Port Length:	50.00	**in.**
Port Size (diameter):	6.00	**in.**
Port Type:	Nipple	
Duct Shape:	Circular	
Diameter	14.5	**ft**
Duct Area:	165.130	**Sq. Ft.**
Test Length:	120	**min.**
Train Type:	Other	
Source Condition:	Normal	
# of Runs	3	

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Run 1-Method 0031

Total Average

Company: Arcelor Mittal Burns Harbor LLC
Plant: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal
Date: 9/7/16
Start Time: 9:07
End Time: 11:55

Meter Temperature, Tm:	85.3	°F
Stack Temperature, Ts:	454.7	°F
Test Length	120.00	in mins.
Barometric Pressure	29.21	in Hg
Set 1 Meter Volume, Vm:	20.209	cc
Set 1 Meter Volume, Vmstd:	19.104	dscc
Set 2 Meter Volume, Vm:	20.314	cc
Set 2 Meter Volume, Vmstd:	19.204	dscc
Set 3 Meter Volume, Vm:	20.176	cc
Set 3 Meter Volume, Vmstd:	19.073	dscc
Set 4 Meter Volume, Vm:	20.305	cc
Set 4 Meter Volume, Vmstd:	19.195	dscc
Set 5 Meter Volume, Vm:	20.413	cc
Set 5 Meter Volume, Vmstd:	19.297	dscc
Set 6 Meter Volume, Vm:	20.220	cc
Set 6 Meter Volume, Vmstd:	19.115	dscc
Total Meter Volume, Vmstd:	114.989	dscc
Carbon Dioxide:	6.30	%
Oxygen:	8.40	%
Nitrogen:	85.30	%
Gas Weight dry, Md:	29.344	lb/lb mole

Port-Reading No.	Clock Time	Actual Meter Vol. liters	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F
Set 1-1	9:07:00	0.000	454.7	80	79
Set 1-2	9:12:00	4.950		82	80
Set 1-3	9:17:00	10.400		82	82
Set 1-4	9:22:00	15.250		82	82
	9:27:00	20.209			
Set 1 Data		20.209	454.7	81.1	
Set 2-1	9:34:00	0.000	454.7	82	83
Set 2-2	9:39:00	4.900		82	83
Set 2-3	9:44:00	10.300		83	83
Set 2-4	9:49:00	15.250		83	83
	9:54:00	20.314			
Set 2 Data		20.314	454.7	82.8	
Set 3-1	10:05:00	0.000	454.7	84	84
Set 3-2	10:10:00	4.850		84	84
Set 3-3	10:15:00	10.150		85	85
Set 3-4	10:20:00	15.311		86	86
	10:25:00	20.176			
Set 3 Data		20.176	454.7	84.8	
Set 4-1	10:34:00	0.000	454.7	85	85
Set 4-2	10:39:00	4.900		86	86
Set 4-3	10:44:00	10.000		86	87
Set 4-4	10:49:00	15.200		87	87
	10:54:00	20.305			
Set 4 Data		20.305	454.7	86.1	
Set 5-1	11:02:00	0.000	454.7	87	87
Set 5-2	11:07:00	5.000		87	88
Set 5-3	11:12:00	10.750		87	88
Set 5-4	11:17:00	15.100		88	88
	11:22:00	20.413			
Set 5 Data		20.413	454.7	87.5	
Set 6-1	11:35:00	0.000	454.7	89	89
Set 6-2	11:40:00	4.950		89	89
Set 6-3	11:45:00	10.000		90	89
Set 6-4	11:50:00	15.100		90	90
	11:55:00	20.220			
Set 6 Data		20.220	454.7	89.4	

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Run 2-Method 0031

Total Average

Company: Arcelor Mittal Burns Harbor LLC
Plant: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal
Date: 9/7/16
Start Time: 12:30
End Time: 15:08

Meter Temperature, Tm:	91.3	°F
Stack Temperature, Ts:	455.5	°F
Test Length	120.00	in mins.
Barometric Pressure	29.21	in Hg
Set 1 Meter Volume, Vm:	20.129	cc
Set 1 Meter Volume, Vmstd:	18.822	dscc
Set 2 Meter Volume, Vm:	20.210	cc
Set 2 Meter Volume, Vmstd:	18.898	dscc
Set 3 Meter Volume, Vm:	20.306	cc
Set 3 Meter Volume, Vmstd:	18.988	dscc
Set 4 Meter Volume, Vm:	20.409	cc
Set 4 Meter Volume, Vmstd:	19.084	dscc
Set 5 Meter Volume, Vm:	20.336	cc
Set 5 Meter Volume, Vmstd:	19.016	dscc
Set 6 Meter Volume, Vm:	20.228	cc
Set 6 Meter Volume, Vmstd:	18.915	dscc
Total Meter Volume, Vmstd:	113.724	dscc
Carbon Dioxide:	6.40	%
Oxygen:	8.20	%
Nitrogen:	85.40	%
Gas Weight dry, Md:	29.352	lb/lb mole

Port-Reading No.	Clock Time	Actual Meter Vol. liters	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F
Set 1-1	12:30:00	0.000	455.5	89	88
Set 1-2	12:35:00	4.950		89	89
Set 1-3	12:40:00	10.100		90	90
Set 1-4	12:45:00	15.200		90	91
	12:50:00	20.129			
Set 1 Data		20.129	455.5	89.5	
Set 2-1	12:57:00	0.000	455.5	90	90
Set 2-2	13:02:00	5.100		90	90
Set 2-3	13:07:00	10.000		91	90
Set 2-4	13:12:00	15.200		91	91
	13:17:00	20.210			
Set 2 Data		20.210	455.5	90.4	
Set 3-1	13:24:00	0.000	455.5	90	91
Set 3-2	13:29:00	5.000		91	91
Set 3-3	13:34:00	10.100		91	91
Set 3-4	13:39:00	15.200		91	92
	13:44:00	20.306			
Set 3 Data		20.306	455.5	91.0	
Set 4-1	13:52:00	0.000	455.5	91	91
Set 4-2	13:57:00	5.000		91	91
Set 4-3	14:02:00	9.950		92	92
Set 4-4	14:07:00	15.150		93	92
	14:12:00	20.409			
Set 4 Data		20.409	455.5	91.6	
Set 5-1	14:20:00	0.000	455.5	93	92
Set 5-2	14:25:00	4.900		93	92
Set 5-3	14:30:00	10.000		93	92
Set 5-4	14:35:00	15.150		93	92
	14:40:00	20.336			
Set 5 Data		20.336	455.5	92.5	
Set 6-1	14:48:00	0.000	455.5	93	92
Set 6-2	14:53:00	5.100		93	92
Set 6-3	14:58:00	10.150		93	92
Set 6-4	15:03:00	15.000		93	92
	15:08:00	20.228			
Set 6 Data		20.228	455.5	92.5	

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Run 3-Method 0031

Total Average**Company:** **Arcelor Mittal Burns Harbor LLC**
Plant: **Burns Harbor, Indiana**
Test Location: **Coke Battery No. 2 Underfire Stack**
Source Condition: **Normal**
Date: **9/8/16**
Start Time: **8:30**
End Time: **11:10**

Meter Temperature, Tm:	74.5	°F
Stack Temperature, Ts:	452.6	°F
Test Length	120.00	in mins.
Barometric Pressure	29.12	in Hg
Set 1 Meter Volume, Vm:	20.215	cc
Set 1 Meter Volume, Vmstd:	19.434	dscc
Set 2 Meter Volume, Vm:	20.167	cc
Set 2 Meter Volume, Vmstd:	19.388	dscc
Set 3 Meter Volume, Vm:	20.125	cc
Set 3 Meter Volume, Vmstd:	19.348	dscc
Set 4 Meter Volume, Vm:	20.255	cc
Set 4 Meter Volume, Vmstd:	19.473	dscc
Set 5 Meter Volume, Vm:	20.118	cc
Set 5 Meter Volume, Vmstd:	19.341	dscc
Set 6 Meter Volume, Vm:	20.246	cc
Set 6 Meter Volume, Vmstd:	19.464	dscc
Total Meter Volume, Vmstd:	116.449	dscc
Carbon Dioxide:	6.10	%
Oxygen:	8.80	%
Nitrogen:	85.10	%
Gas Weight dry, Md:	29.328	lb/lb mole

Port-Reading No.	Clock Time	Actual Meter Vol. liters	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F
Set 1-1	8:30:00	0.000	452.6	71	72
Set 1-2	8:35:00	5.000		72	72
Set 1-3	8:40:00	10.150		73	73
Set 1-4	8:45:00	15.150		73	73
	8:50:00	20.215			
Set 1 Data		20.215	452.6	72.4	
Set 2-1	8:58:00	0.000	452.6	74	74
Set 2-2	9:03:00	4.950		74	74
Set 2-3	9:08:00	10.100		74	74
Set 2-4	9:13:00	15.000		75	75
	9:18:00	20.167			
Set 2 Data		20.167	452.6	74.3	
Set 3-1	9:25:00	0.000	452.6	75	75
Set 3-2	9:30:00	5.000		75	75
Set 3-3	9:35:00	10.150		75	75
Set 3-4	9:40:00	15.000		75	75
	9:45:00	20.125			
Set 3 Data		20.125	452.6	75.0	
Set 4-1	9:53:00	0.000	452.6	74	74
Set 4-2	9:58:00	5.000		74	74
Set 4-3	10:03:00	10.150		75	75
Set 4-4	10:08:00	15.000		75	75
	10:13:00	20.255			
Set 4 Data		20.255	452.6	74.5	
Set 5-1	10:20:00	0.000	452.6	75	75
Set 5-2	10:25:00	4.950		75	75
Set 5-3	10:30:00	10.000		76	76
Set 5-4	10:35:00	15.000		76	76
	10:40:00	20.118			
Set 5 Data		20.118	452.6	75.5	
Set 6-1	10:50:00	0.000	452.6	75	75
Set 6-2	10:55:00	5.000		75	75
Set 6-3	11:00:00	10.000		76	76
Set 6-4	11:05:00	15.150		76	76
	11:10:00	20.246			
Set 6 Data		20.246	452.6	75.5	

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Calibration Corrected Data

Run #	Run Date	Start Time	End Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
1	9/7/16	9:07	10:07	537.5	6.2	8.3
2	9/7/16	10:30	11:30	569.6	6.3	8.4
Test 1 Average				**553.6**	**6.3**	**8.4**
3	9/7/16	12:30	13:30	572.1	6.4	8.2
4	9/7/16	13:50	14:50	555.9	6.4	8.2
Test 2 Average				**564.0**	**6.4**	**8.2**

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Calibration Corrected Data

Run #	Run Date	Start Time	End Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
1	9/8/16	8:30	9:30	540.9	6.0	8.9
2	9/8/16	9:51	10:51	540.1	6.1	8.7
Test 3 Average				**540.5**	**6.1**	**8.8**

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/7/16
Run 1-1

Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
9:07	523.30	6.46	7.64
9:08	552.50	6.41	7.65
9:09	542.00	6.27	7.92
9:10	541.20	6.09	8.30
9:11	531.80	6.05	8.38
9:12	536.90	5.97	8.53
9:13	534.10	6.30	7.86
9:14	552.70	4.81	11.01
9:15	275.80	2.88	15.19
9:16	465.50	6.18	8.26
9:17	568.20	6.57	7.40
9:18	577.60	6.63	7.23
9:19	575.10	6.55	7.35
9:20	565.00	6.54	7.35
9:21	561.70	6.47	7.48
9:22	563.20	6.46	7.50
9:23	559.90	6.49	7.44
9:24	561.40	6.47	7.46
9:25	561.30	6.63	7.12
9:26	555.00	6.14	8.38
9:27	508.60	6.36	7.82
9:28	553.20	6.49	7.44
9:29	556.70	6.42	7.57
9:30	550.90	6.39	7.61
9:31	556.10	6.51	7.36
9:32	561.80	6.50	7.38
9:33	558.90	6.41	7.55
9:34	548.40	4.87	10.90
9:35	281.40	2.83	15.16
9:36	463.80	6.09	8.36
9:37	562.10	6.51	7.47
9:38	568.20	6.41	7.62
9:39	563.90	6.52	7.38
9:40	569.40	6.62	7.14
9:41	571.40	6.60	7.16
9:42	569.70	6.44	7.50
9:43	557.90	6.50	7.38
9:44	566.20	6.49	7.39
9:45	561.30	6.49	7.37
9:46	553.10	6.22	8.38
9:47	506.60	6.44	7.67
9:48	555.60	6.37	7.63
9:49	553.70	6.07	8.26
9:50	536.90	5.87	8.68
9:51	539.90	6.24	7.92
9:52	553.70	6.19	7.99
9:53	548.50	6.27	7.82
9:54	556.90	4.95	10.76
9:55	286.00	2.69	15.47
9:56	465.50	5.88	8.80
9:57	567.70	6.35	7.83
9:58	575.40	6.25	7.99
9:59	565.50	6.33	7.80
10:00	568.60	6.22	8.01
10:01	560.10	6.18	8.08
10:02	556.40	6.30	7.80
10:03	561.00	6.25	7.91
10:04	555.70	6.10	8.23
10:05	557.80	6.28	7.86
10:06	562.90	6.15	8.28
10:07	541.50	6.39	7.69
Average	**537.10**	**6.10**	**8.29**
Min	275.80	2.69	7.12
Max	577.60	6.63	15.47

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/7/16
Run 1-2

Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
10:30	582.70	6.45	8.07
10:31	594.40	6.57	7.87
10:32	592.00	6.54	7.91
10:33	592.90	6.67	7.65
10:34	589.30	4.93	11.20
10:35	287.70	2.94	15.21
10:36	507.60	6.20	8.69
10:37	598.10	6.63	7.84
10:38	606.20	6.75	7.56
10:39	587.00	6.72	7.59
10:40	588.50	6.65	7.70
10:41	577.80	6.51	7.97
10:42	572.40	6.55	7.90
10:43	580.80	6.63	7.74
10:44	583.30	6.61	7.79
10:45	581.90	6.66	7.67
10:46	569.80	6.29	8.87
10:47	522.50	6.67	7.88
10:48	580.20	6.69	7.60
10:49	586.00	6.56	7.85
10:50	579.40	6.56	7.84
10:51	587.20	6.67	7.61
10:52	590.80	6.71	7.52
10:53	585.40	6.60	7.75
10:54	578.40	4.92	11.18
10:55	281.10	2.97	15.14
10:56	503.10	6.40	8.33
10:57	605.30	6.81	7.48
10:58	609.50	6.75	7.54
10:59	599.20	6.73	7.54
11:00	600.10	6.76	7.46
11:01	589.70	6.55	7.88
11:02	585.40	6.57	7.84
11:03	578.50	6.60	7.76
11:04	594.30	6.69	7.56
11:05	580.80	6.47	8.01
11:06	573.30	6.28	8.69
11:07	546.70	6.61	7.92
11:08	584.10	6.59	7.82
11:09	585.60	6.68	7.62
11:10	600.70	6.76	7.43
11:11	597.20	6.75	7.44
11:12	596.40	6.70	7.53
11:13	597.40	6.55	7.82
11:14	576.80	4.94	11.11
11:15	286.10	2.88	15.30
11:16	513.70	6.35	8.36
11:17	609.30	6.77	7.50
11:18	613.80	6.64	7.72
11:19	609.20	6.66	7.70
11:20	602.80	6.63	7.74
11:21	605.10	6.68	7.63
11:22	605.40	6.68	7.62
11:23	597.50	6.59	7.79
11:24	592.80	6.63	7.70
11:25	590.40	6.59	7.77
11:26	582.00	6.32	8.55
11:27	552.10	6.54	7.99
11:28	589.60	6.58	7.80
11:29	585.90	6.44	8.09
11:30	586.60	6.55	7.89
Average	**569.00**	**6.33**	**8.35**
Min	281.10	2.88	7.43
Max	613.80	6.81	15.30

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/7/16
Run 2-1

Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
12:30	584.10	6.62	7.57
12:31	578.90	6.60	7.61
12:32	578.70	6.55	7.72
12:33	577.50	6.67	7.49
12:34	573.30	4.57	11.44
12:35	270.70	3.29	14.71
12:36	505.40	6.48	8.07
12:37	597.50	6.72	7.49
12:38	599.40	6.80	7.33
12:39	593.60	6.70	7.50
12:40	591.10	6.84	7.20
12:41	591.30	6.61	7.64
12:42	574.20	6.56	7.74
12:43	581.10	6.67	7.52
12:44	585.50	6.68	7.51
12:45	584.90	6.66	7.53
12:46	570.20	6.31	8.65
12:47	520.10	6.47	8.12
12:48	574.70	6.55	7.76
12:49	574.00	6.67	7.53
12:50	587.40	6.76	7.33
12:51	593.10	6.61	7.59
12:52	580.80	6.59	7.66
12:53	592.30	6.59	7.64
12:54	582.70	4.67	11.21
12:55	283.00	3.29	14.73
12:56	499.00	6.27	8.48
12:57	585.60	6.75	7.46
12:58	595.00	6.67	7.58
12:59	583.40	6.51	7.88
13:00	573.40	6.52	7.85
13:01	578.00	6.66	7.59
13:02	586.30	6.70	7.48
13:03	593.30	6.81	7.24
13:04	590.20	6.62	7.61
13:05	589.30	6.72	7.43
13:06	588.50	6.42	8.16
13:07	571.00	6.69	7.58
13:08	602.30	6.70	7.45
13:09	597.80	6.65	7.53
13:10	598.20	6.40	7.99
13:11	571.60	6.24	8.37
13:12	574.30	6.43	7.99
13:13	584.80	6.47	7.90
13:14	588.50	4.58	11.34
13:15	282.60	3.13	15.12
13:16	518.00	6.32	8.43
13:17	627.50	6.77	7.47
13:18	639.30	6.87	7.21
13:19	626.50	6.72	7.45
13:20	615.30	6.73	7.44
13:21	613.30	6.65	7.60
13:22	614.50	6.73	7.42
13:23	610.10	6.84	7.18
13:24	618.30	6.91	7.04
13:25	614.10	6.72	7.40
13:26	593.30	6.32	8.68
13:27	556.10	6.68	7.76
13:28	610.90	6.66	7.60
13:29	606.70	6.76	7.37
13:30	615.20	6.86	7.16
Average	**571.10**	**6.36**	**8.19**
Min	270.70	3.13	7.04
Max	639.30	6.91	15.12

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/7/16
Run 2-2

Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
13:50	597.70	6.57	7.68
13:51	594.10	6.59	7.65
13:52	597.70	6.70	7.43
13:53	598.90	6.67	7.50
13:54	590.70	4.90	10.90
13:55	294.70	3.18	14.77
13:56	521.30	6.49	8.04
13:57	619.40	6.83	7.29
13:58	613.90	6.78	7.35
13:59	606.60	6.71	7.45
14:00	596.60	6.77	7.33
14:01	586.00	6.51	7.84
14:02	577.30	6.62	7.62
14:03	589.80	6.70	7.46
14:04	585.50	6.64	7.57
14:05	583.20	6.70	7.43
14:06	570.90	6.27	8.69
14:07	515.60	6.56	7.95
14:08	572.80	6.64	7.56
14:09	576.20	6.61	7.59
14:10	573.10	6.54	7.71
14:11	574.10	6.51	7.77
14:12	561.50	6.37	8.04
14:13	567.00	6.59	7.61
14:14	563.70	4.77	11.08
14:15	281.30	3.05	15.05
14:16	490.30	6.40	8.18
14:17	583.70	6.79	7.36
14:18	595.10	6.79	7.34
14:19	580.60	6.81	7.28
14:20	587.00	6.80	7.27
14:21	575.20	6.72	7.42
14:22	575.50	6.75	7.35
14:23	571.30	6.69	7.46
14:24	569.10	6.71	7.40
14:25	565.30	6.75	7.33
14:26	561.80	6.50	8.17
14:27	521.40	6.68	7.63
14:28	567.30	6.70	7.45
14:29	568.80	6.73	7.37
14:30	573.50	6.71	7.42
14:31	572.80	6.70	7.45
14:32	570.80	6.72	7.41
14:33	565.90	6.43	8.11
14:34	471.60	4.45	12.54
14:35	248.70	3.00	15.29
14:36	427.30	6.06	9.37
14:37	547.20	6.76	7.52
14:38	582.10	6.79	7.38
14:39	572.60	6.64	7.64
14:40	582.60	6.95	7.01
14:41	588.10	6.82	7.23
14:42	582.10	6.87	7.12
14:43	577.10	6.71	7.42
14:44	574.40	6.76	7.33
14:45	576.00	6.79	7.26
14:46	563.60	6.43	8.26
14:47	528.20	6.68	7.62
14:48	569.80	6.78	7.33
14:49	576.20	6.76	7.34
14:50	571.30	6.79	7.27
Average	**554.80**	**6.39**	**8.14**
Min	248.70	3.00	7.01
Max	619.40	6.95	15.29

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/8/16
Run 3-1

Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
8:30	563.50	6.41	8.06
8:31	559.00	6.42	8.03
8:32	563.90	6.47	7.93
8:33	566.30	6.46	7.95
8:34	550.10	4.43	11.95
8:35	271.60	3.33	14.67
8:36	495.40	6.16	8.72
8:37	570.60	6.42	8.15
8:38	573.40	6.37	8.21
8:39	563.60	6.28	8.38
8:40	563.00	6.39	8.15
8:41	565.00	6.35	8.20
8:42	556.80	6.38	8.15
8:43	561.30	6.25	8.39
8:44	546.40	6.12	8.65
8:45	550.40	6.13	8.62
8:46	533.50	5.86	9.55
8:47	501.20	6.27	8.57
8:48	548.30	6.24	8.45
8:49	548.20	6.27	8.39
8:50	560.10	6.35	8.23
8:51	558.30	6.23	8.45
8:52	560.30	6.38	8.15
8:53	566.00	6.31	8.28
8:54	548.80	4.26	12.30
8:55	272.20	3.35	14.67
8:56	498.40	6.16	8.77
8:57	577.00	6.51	8.00
8:58	578.50	6.50	7.96
8:59	573.30	6.35	8.25
9:00	561.80	6.27	8.41
9:01	566.80	6.37	8.20
9:02	568.30	6.28	8.40
9:03	565.50	6.33	8.30
9:04	570.40	6.29	8.36
9:05	568.00	6.29	8.36
9:06	542.90	5.83	9.88
9:07	489.30	6.21	8.82
9:08	553.00	6.33	8.33
9:09	564.70	6.43	8.09
9:10	573.30	6.52	7.87
9:11	568.20	6.52	7.87
9:12	571.90	6.50	7.90
9:13	574.20	6.44	8.04
9:14	560.90	4.48	11.83
9:15	282.10	3.39	14.65
9:16	503.10	6.20	8.69
9:17	575.10	6.19	8.62
9:18	563.10	5.97	9.05
9:19	555.30	6.17	8.66
9:20	566.40	6.23	8.52
9:21	559.60	6.28	8.40
9:22	562.70	6.30	8.35
9:23	561.50	6.30	8.35
9:24	555.70	6.32	8.31
9:25	562.00	6.20	8.53
9:26	535.10	5.81	9.71
9:27	493.90	6.21	8.74
9:28	548.50	6.28	8.41
9:29	547.80	6.20	8.53
9:30	546.80	6.30	8.34
Average	**540.40**	**6.05**	**8.90**
Min	271.60	3.33	7.87
Max	578.50	6.52	14.67

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/8/16
Run 3-2

Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
9:51	567.70	6.40	8.05
9:52	563.50	6.34	8.17
9:53	557.90	6.36	8.16
9:54	558.40	4.51	11.79
9:55	276.00	3.34	14.61
9:56	500.90	6.23	8.57
9:57	573.80	6.44	8.11
9:58	575.00	6.55	7.86
9:59	567.00	6.34	8.23
10:00	558.00	6.34	8.22
10:01	554.60	6.29	8.31
10:02	546.50	6.20	8.47
10:03	552.20	6.31	8.27
10:04	557.70	6.37	8.14
10:05	557.10	6.30	8.30
10:06	551.10	6.23	8.52
10:07	544.70	6.45	8.04
10:08	565.50	6.38	8.11
10:09	554.90	6.28	8.30
10:10	555.00	6.34	8.20
10:11	560.00	6.33	8.19
10:12	555.20	6.48	7.90
10:13	568.10	6.46	7.93
10:14	550.30	4.43	11.88
10:15	265.70	3.30	14.71
10:16	489.00	6.13	8.82
10:17	568.60	6.47	8.11
10:18	568.80	6.40	8.18
10:19	567.00	6.53	7.90
10:20	564.90	6.45	8.04
10:21	563.20	6.44	8.03
10:22	555.80	6.28	8.32
10:23	552.00	6.41	8.07
10:24	560.30	6.47	7.95
10:25	562.70	6.41	8.04
10:26	533.00	5.97	9.38
10:27	496.20	6.36	8.38
10:28	547.20	6.26	8.38
10:29	552.50	6.41	8.08
10:30	556.20	6.36	8.15
10:31	558.50	6.48	7.94
10:32	563.80	6.48	7.91
10:33	553.80	6.47	7.92
10:34	559.20	4.58	11.51
10:35	278.40	3.23	14.87
10:36	487.70	6.13	8.77
10:37	569.10	6.53	7.93
10:38	574.90	6.46	8.00
10:39	565.00	6.48	7.95
10:40	563.70	6.38	8.14
10:41	559.80	6.40	8.10
10:42	559.40	6.42	8.04
10:43	558.30	6.51	7.86
10:44	564.40	6.39	8.07
10:45	556.40	6.44	7.99
10:46	545.60	6.04	9.09
10:47	508.40	6.28	8.47
10:48	550.30	6.35	8.18
10:49	554.10	6.20	8.43
10:50	554.40	6.35	8.15
10:51	555.80	6.38	8.08
Average	**539.60**	**6.12**	**8.69**
Min	265.70	3.23	7.86
Max	575.00	6.55	14.87

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Client:	ArcelorMittal Burns Harbor, LLC		
Facility:	Burns Harbor, Indiana		
Test Location:	Coke Battery No. 2 Underfire Stack		
Project #:	M162810		
Test Method:	316		
Test Engineer:	CST		
Test Technician:	BVG		
Type of Fuel Firing:	Other		
	R1	**R2**	**R3**
Temp ID:	CM23	CM23	CM23
Meter ID:	CM23	CM23	CM23
Nozzle Diameter (Inches):	0.435	0.435	0.435
Meter Calibration Date:	8/4/2016	8/4/2016	8/4/2016
Meter Calibration Factor (Y):	1.001	1.001	1.001
Meter Orifice Setting (Delta H):	1.405	1.405	1.405
Pitot Tube Coefficient:	0.840		
Probe Length (Feet):	12.0		
Probe Liner Material:	Glass		
Sample Plane:	Horizontal		
Port Length (Inches):	50.00		
Port Size (Diameter, Inches):	6.00		
Port Type:	Flange		
Duct Shape:	Circular		
Diameter (Feet):	14.5		
Duct Area (Square Feet):	165.130		
Upstream Diameters:	> 0.5		
Downstream Diameters:	> 2.0		
Number of Ports Sampled:	4		
Number of Points per Port:	6		
Minutes per Point:	5.0		
Minutes per Reading:	5.0		
Total Number of Traverse Points:	24		
Test Length (Minutes):	120		
Train Type:	Hot Box		
Source Condition:	Normal		
Servomex Serial Number:	01440D1/3791		
Moisture Balance ID:	S10-35		
# of Runs	3		

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Run 1-Method 316

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/7/16
Start Time: 9:07
End Time: 11:16

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	1.15	in. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	83.5	°F	Flue Pressure (Ps):	29.17	in. Hg. abs.
Sqrt ΔP:	0.286	in. H_2O	Carbon Dioxide:	6.30	%
Stack Temperature, Ts:	454.7	°F	Oxygen:	8.40	%
Meter Volume, Vm:	83.102	ft^3	Nitrogen:	85.30	%
Meter Volume, Vmstd:	79.124	dscf	Gas Weight dry, Md:	29.344	lb/lb mole
Meter Volume, Vwstd:	17.540	wscf	Gas Weight wet, Ms:	27.286	lb/lb mole
Isokinetic Variance:	104.9	%I	Excess Air:	59.493	%
			Gas Velocity, Vs:	22.044	fps
Test Length:	120.00	in mins.	Volumetric Flow:	218,408	acfm
Nozzle Diameter:	0.435	in inches	Volumetric Flow:	100,594	dscfm
Barometric Pressure:	29.21	in Hg	Volumetric Flow:	122,894	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1913.7	ml	Silica Initial Wt.	863.9	grams
Final Impinger Content:	2268.7	ml	Silica Final Wt.	881.3	grams
Impinger Difference:	355.0	ml	Silica Difference:	17.4	grams

Total Water Gain: 372.4 Moisture, Bws: 0.181

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	9:07:00	0.08	1.15	74.039	462	81	80	250	250	62
-2	9:12:00	0.08	1.15	77.500	478	81	80	250	249	62
-3	9:17:00	0.09	1.29	80.960	429	82	80	250	252	62
-4	9:22:00	0.09	1.26	84.640	445	82	81	250	249	62
-5	9:27:00	0.08	1.11	88.270	458	83	81	250	250	62
-6	9:32:00	0.08	1.11	91.660	463	83	81	250	250	62
	9:37:00			95.050						
2-1	9:40:00	0.09	1.26	95.050	450	83	81	250	250	62
-2	9:45:00	0.09	1.26	98.680	451	83	81	250	250	62
-3	9:50:00	0.08	1.10	102.310	468	84	81	250	251	62
-4	9:55:00	0.08	1.10	105.690	474	84	82	250	252	62
-5	10:00:00	0.08	1.15	109.070	436	85	82	250	250	62
-6	10:05:00	0.07	0.98	112.530	449	85	82	250	251	62
	10:10:00			115.730						
3-1	10:13:00	0.08	1.10	115.730	473	85	82	250	250	62
-2	10:18:00	0.09	1.29	119.110	433	85	82	250	251	62
-3	10:23:00	0.09	1.26	122.790	450	86	82	250	250	62
-4	10:28:00	0.08	1.11	126.420	460	86	83	250	250	62
-5	10:33:00	0.08	1.10	129.810	477	87	83	250	249	62
-6	10:38:00	0.08	1.15	133.190	430	87	83	250	250	62
	10:43:00			136.650						
4-1	10:46:00	0.08	1.12	136.650	453	87	83	250	250	62
-2	10:51:00	0.08	1.10	140.070	476	87	83	250	250	62
-3	10:56:00	0.08	1.12	143.450	451	88	83	250	250	62
-4	11:01:00	0.09	1.29	146.870	439	88	84	250	250	62
-5	11:06:00	0.08	1.12	150.550	450	89	84	250	250	62
-6	11:11:00	0.07	0.97	153.970	458	89	84	250	250	62
	11:16:00			157.141						
Total	2:00:00			83.102		85.0	82.0			
Average			1.15		454.7	83.5				
Min			0.97		429.0	80.0				
Max			1.29		478.0	89.0				

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Run 2-Method 316

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/7/16
Start Time: 12:30
End Time: 14:39

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	1.08	In. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	92.0	°F	Flue Pressure (Ps):	29.17	in. Hg. abs.
Sqrt ΔP:	0.285	In. H_2O	Carbon Dioxide:	6.40	%
Stack Temperature, Ts:	455.5	°F	Oxygen:	8.20	%
Meter Volume, Vm:	81.334	ft^3	Nitrogen:	85.4	%
Meter Volume, Vmstd:	76.234	dscf	Gas Weight dry, Md:	29.352	lb/lb mole
Meter Volume, Vwstd:	17.281	wscf	Gas Weight wet, Ms:	27.254	lb/lb mole
Isokinetic Variance:	102.0	%I	Excess Air:	57.160	%
			Gas Velocity, Vs:	21.957	fps
Test Length:	120.00	in mins.	Volumetric Flow:	217,541	acfm
Nozzle Diameter:	0.435	in inches	Volumetric Flow:	99,696	dscfm
Barometric Pressure:	29.21	in Hg	Volumetric Flow:	122,295	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2002.5	ml	Silica Initial Wt.	806.2	grams
Final Impinger Content:	2347.8	ml	Silica Final Wt.	827.8	grams
Impinger Difference:	345.3	ml	Silica Difference:	21.6	grams

Total Water Gain: 366.9 Moisture, Bws: 0.185

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	12:30:00	0.08	1.04	58.128	475	89	89	250	253	62
-2	12:35:00	0.08	1.09	61.470	426	89	89	250	250	62
-3	12:40:00	0.08	1.08	64.880	438	90	89	250	248	62
-4	12:45:00	0.09	1.20	68.270	450	90	90	250	252	62
-5	12:50:00	0.09	1.19	71.840	461	91	90	250	249	62
-6	12:55:00	0.07	0.91	75.400	468	91	90	250	249	62
	13:00:00			78.520						
2-1	13:03:00	0.08	1.08	78.520	441	91	90	250	249	62
-2	13:08:00	0.08	1.06	81.910	463	91	90	250	249	62
-3	13:13:00	0.08	1.04	85.260	470	92	90	250	249	62
-4	13:18:00	0.08	1.04	88.600	481	92	91	250	249	62
-5	13:23:00	0.08	1.08	91.940	437	93	91	250	251	62
-6	13:28:00	0.08	1.07	95.330	450	93	91	250	250	62
	13:33:00			98.700						
3-1	13:36:00	0.08	1.04	98.700	474	93	91	250	250	62
-2	13:41:00	0.09	1.23	102.040	421	93	91	250	248	62
-3	13:46:00	0.08	1.07	105.660	446	94	91	251	250	62
-4	13:51:00	0.08	1.06	109.030	462	94	92	250	249	62
-5	13:56:00	0.09	1.17	112.380	476	95	92	250	251	62
-6	14:01:00	0.09	1.22	115.920	433	95	92	250	250	62
	14:06:00			119.540						
4-1	14:09:00	0.08	1.06	119.540	458	95	92	250	249	62
-2	14:14:00	0.08	1.06	122.890	464	95	92	249	248	62
-3	14:19:00	0.08	1.04	126.240	478	96	92	250	251	62
-4	14:24:00	0.08	1.08	129.580	440	96	93	250	251	62
-5	14:29:00	0.08	1.07	132.970	453	97	93	250	248	62
-6	14:34:00	0.07	0.91	136.340	468	97	93	250	250	62
	14:39:00			139.462						
Total	2:00:00			81.334		93.0	91.0			
Average			1.08		455.5	92.0				
Min			0.91		421.0	89.0				
Max			1.23		481.0	97.0				

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Run 3-Method 316

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/8/16
Start Time: 8:30
End Time: 10:39

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	1.05	In. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	73.5	°F	Flue Pressure (Ps):	29.08	in. Hg. abs.
Sqrt ΔP:	0.286	In. H_2O	Carbon Dioxide:	6.10	%
Stack Temperature, Ts:	452.6	°F	Oxygen:	8.80	%
Meter Volume, Vm:	78.933	ft^3	Nitrogen:	85.1	%
Meter Volume, Vmstd:	76.308	dscf	Gas Weight dry, Md:	29.328	lb/lb mole
Meter Volume, Vwstd:	16.989	wscf	Gas Weight wet, Ms:	27.265	lb/lb mole
Isokinetic Variance:	101.5	%I	Excess Air:	64.392	%
			Gas Velocity, Vs:	22.010	fps
Test Length:	120.00	in mins.	Volumetric Flow:	218,067	acfm
Nozzle Diameter:	0.435	in inches	Volumetric Flow:	100,278	dscfm
Barometric Pressure:	29.12	in Hg	Volumetric Flow:	122,603	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1921.8	ml	Silica Initial Wt.	853.4	grams
Final Impinger Content:	2265.6	ml	Silica Final Wt.	870.3	grams
Impinger Difference:	343.8	ml	Silica Difference:	16.9	grams

Total Water Gain: 360.7 Moisture, Bws: 0.182

Port-Point No.	Clock Time	Velocity Head Δp In. H2O	Orifice ΔH In. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	8:30:00	0.08	1.01	39.900	470	69	69	250	252	61
-2	8:35:00	0.08	1.06	43.120	427	69	69	250	251	61
-3	8:40:00	0.09	1.17	46.420	436	70	69	250	251	61
-4	8:45:00	0.09	1.16	49.900	449	70	70	250	251	61
-5	8:50:00	0.08	1.02	53.370	458	71	70	250	249	61
-6	8:55:00	0.08	1.01	56.610	473	71	70	250	250	61
	9:00:00			59.830						
2-1	9:03:00	0.08	1.04	59.830	436	72	71	250	250	61
-2	9:08:00	0.08	1.02	63.110	457	72	71	250	250	61
-3	9:13:00	0.09	1.14	66.350	470	73	71	250	251	61
-4	9:18:00	0.09	1.17	69.770	440	73	72	250	253	61
-5	9:23:00	0.09	1.17	73.250	442	74	72	250	250	61
-6	9:28:00	0.08	1.02	76.730	462	74	72	250	250	61
	9:33:00			79.970						
3-1	9:36:00	0.08	1.01	79.970	469	75	73	250	253	61
-2	9:41:00	0.08	1.06	83.190	430	75	73	250	248	61
-3	9:46:00	0.08	1.03	86.490	446	76	73	250	250	61
-4	9:51:00	0.08	1.02	89.760	461	76	74	250	251	61
-5	9:56:00	0.08	1.06	93.000	428	77	74	250	250	61
-6	10:01:00	0.07	0.91	96.300	440	77	74	250	251	61
	10:06:00			99.370						
4-1	10:09:00	0.08	1.03	99.370	453	78	75	250	250	61
-2	10:14:00	0.08	1.01	102.640	474	78	75	250	250	61
-3	10:19:00	0.08	1.02	105.860	461	79	75	250	250	61
-4	10:24:00	0.08	1.02	109.100	463	79	76	250	250	61
-5	10:29:00	0.08	1.01	112.340	468	80	76	250	250	61
-6	10:34:00	0.08	1.03	115.560	450	80	76	250	250	61
	10:39:00			118.833						
Total	2:00:00			78.933		74.5	72.5			
Average			1.05		452.6	73.5				
Min			0.91		427.0	69.0				
Max			1.17		474.0	80.0				

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Arcelor Mittal Burns Harbor LLC
Burns Harbor, Indiana
#2 Coke Battery Underfire Stack
Hydrogen Sulfide Summary

Run	Date	Start Time	End Time	H_2S (ppm)	DSCFM	H_2S (lb/hr)
1	9/7/2016	9:07	11:52	< 5.00E-01	100,649	< 2.67E-01
2	9/7/2016	12:30	15:00	1.25E+00	99,663	6.60E-01
3	9/8/2016	8:30	11:10	< 5.00E-01	100,278	< 2.66E-01
Test average				**< 7.50E-01**	**100,197**	**< 3.97E-01**

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H2S Investigation of the Underfire Stack

H2S Detection Limit

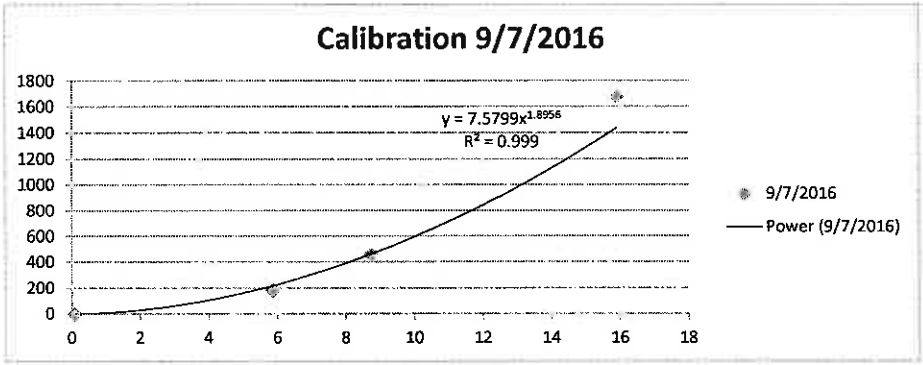
Run	Concentration
1	8.6899
2	8.5553
3	8.6788
4	8.5453
5	8.5927
6	8.3439
7	8.3693
Average	8.5393
St Dev.	0.1368

Detection Limit = 3.14 x St. Dev. = 0.4297 ppm

Date: 9/7/2016

Calibration:

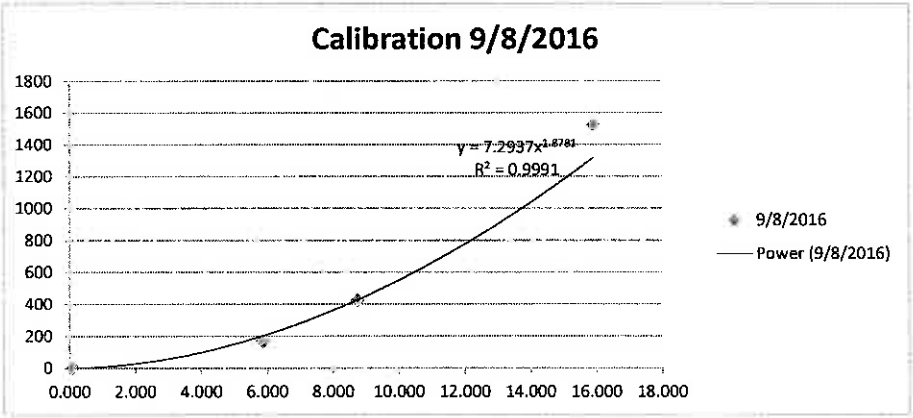
Certified Concentration	Area Counts Run #1	Run #2	Run #3	Average
5.858	181.8903	179.345	181.7726	181.003
8.738	457.2397	455.8462	451.8625	454.983
15.900	1672.185	1672.918	1687.7839	1677.629



Date: 9/8/2016

Calibration:

Certified Concentration	Area Counts Run #1	Run #2	Run #3	Average
5.858	168.4027	173.024	170.2604	170.562
8.738	422.3046	420.5179	420.4788	421.100
15.900	1542.552	1514.5692	1522.8742	1526.665



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Date: 9/7/2016
Run #: 1

Pre-Cal Check

Certified Concentration	Area Counts	Calculated Concentration
8.738	415.6522	8.7494

Injection #	Time	Area Counts	H2S Concentration
1	9:07	0	BDL
3	9:17	0	BDL
4	9:27	0	BDL
7	9:37	0	BDL
9	9:47	0	BDL
12	9:57	0	BDL
15	10:07	0	BDL
18	10:17	0	BDL
21	10:27	0	BDL
24	10:37	0	BDL
25	10:47	0	BDL
26	10:57	0	BDL
29	11:17	0	BDL
31	11:27	0	BDL
32	11:37	0	BDL
34	11:52	0	BDL

Post-Cal Check

Certified Concentration	Area Counts	Calculated Concentration
8.738	403.4829	8.3496

Date: 9/7/2016
Run #: 2

Pre-Cal Check

Certified Concentration	Area Counts	Calculated Concentration
8.738	412.3768	8.4295

Injection #	Time	Area Counts	H2S Concentration
1	12:30	0	BDL
3	12:40	0	BDL
4	12:50	0	BDL
7	13:05	0	BDL
9	13:10	0	BDL
12	13:20	0	BDL
15	13:30	0	BDL
18	13:40	0	BDL
21	13:50	0	BDL*
24	14:00	0	BDL*
25	14:10	0	BDL*
26	14:20	0	BDL*
29	14:30	0	BDL*
31	14:40	0	BDL*
32	14:50	111.7072	4.68**
32	15:00	321.8678	7.54**

Post-Cal Check

Certified Concentration	Area Counts	Calculated Concentration
8.738	426.8488	8.5596

*Citrate Buffer became saturated with SO2

**Peak occurred where H2S would have been detected, but may not be H2S because of citrate buffer saturation.

Date: 9/8/2016
Run #: 3

Pre-Cal Check

Certified Concentration	Area Counts	Calculated Concentration
8.738	405.07	8.6419

Injection #	Time	Area Counts	H2S Concentration
1	8:30	0	BDL
3	8:40	0	BDL
4	8:50	0	BDL
7	9:00	0	BDL
9	9:10	0	BDL
12	9:25	0	BDL
15	9:40	0	BDL
18	9:50	0	BDL
21	10:10	0	BDL
24	10:10	0	BDL
25	10:20	0	BDL
26	10:30	0	BDL
29	10:40	0	BDL
31	10:50	0	BDL
32	11:00	0	BDL
32	11:10	0	BDL

Post-Cal Check

Certified Concentration	Area Counts	Calculated Concentration
8.738	380.2472	8.3979

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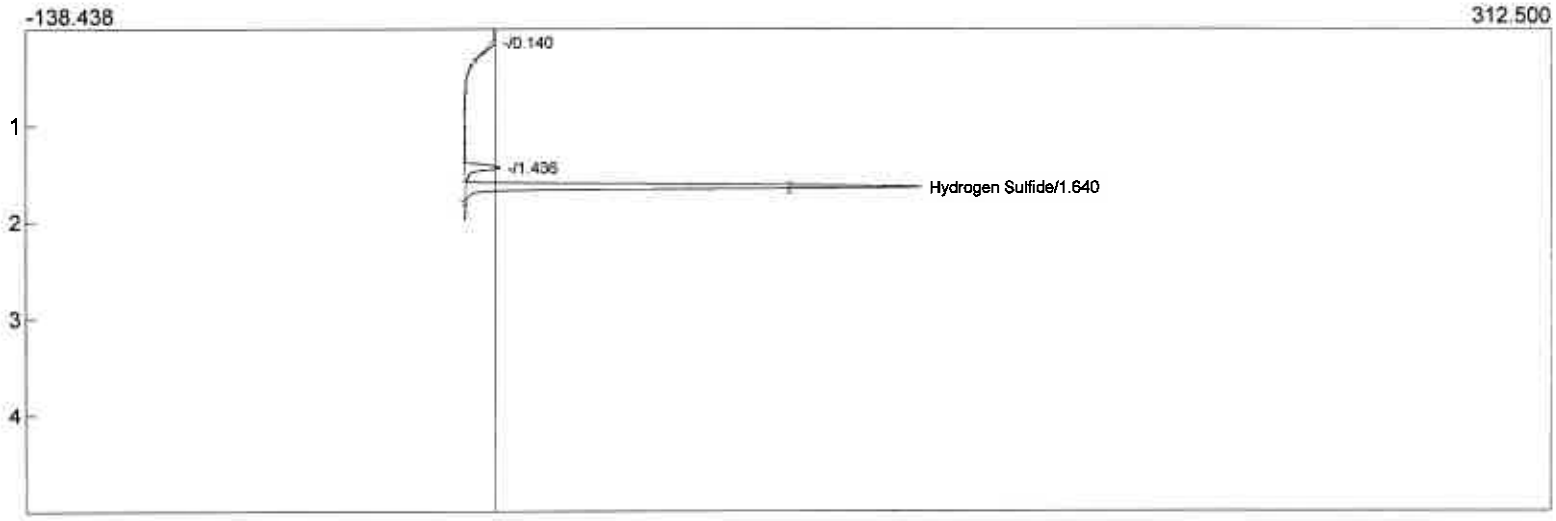
Lab name: Mostardi Platt
Client: ArcelorMittal Burns Harbor
Analysis date: 09/07/2016 08:37:10
Method: Air Injection
Description: FPD-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_517.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.140	11.5386	1.331	0.0000	
-	1.436	44.6980	10.531	0.0000	
Hydrogen Sulfide	1.640	415.6522	135.264	8.4589	
		471.8888		8.4589	

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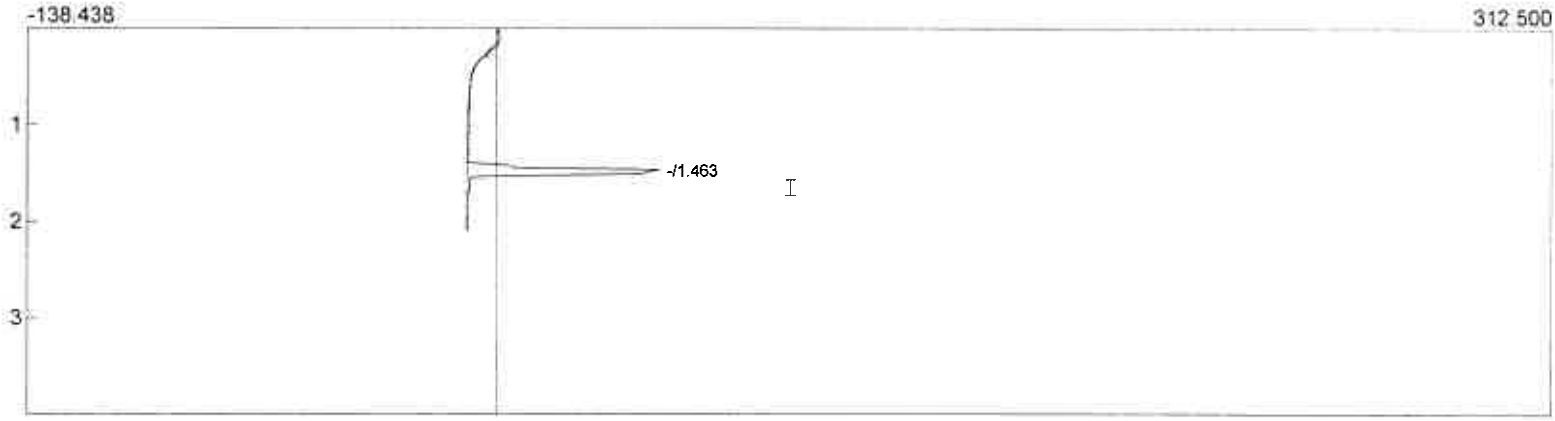
Lab name: SRI Instruments
Client: ArcelorMittal Burns Harbor
Client ID: N2024
Analysis date: 09/07/2016 09:04:29
Method: Air Sample
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_527.CHR ()
Sample: Underfire Stack
Comments: Underfire Stack Gas Analysis

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	258.3402	57.036	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		258.3402		0.0000	

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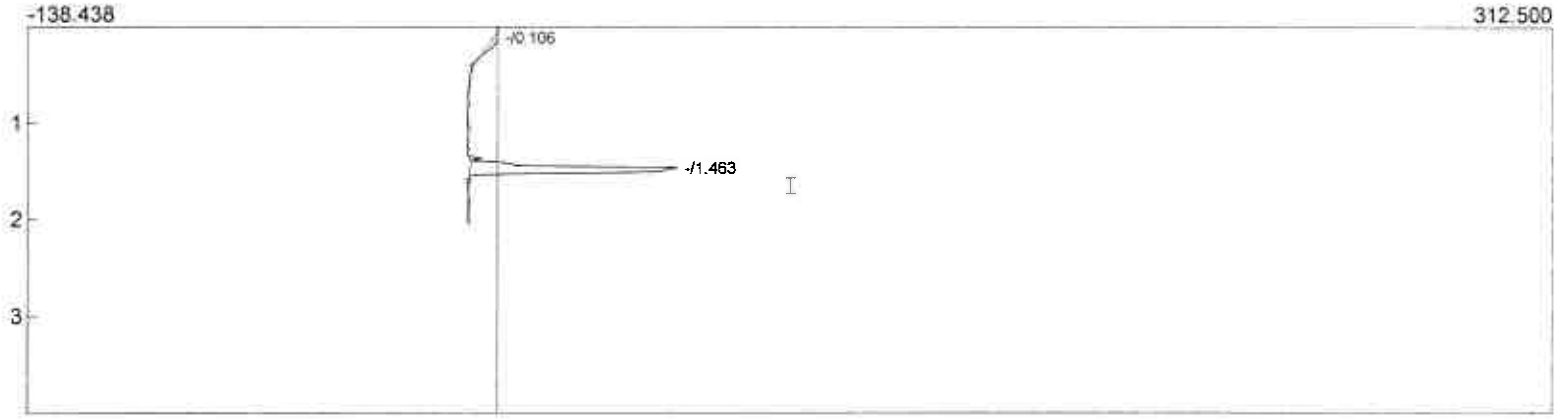
Lab name: SRI Instruments
Client: ArcelorMittal Burns Harbor
Client ID: N2024
Analysis date: 09/07/2016 09:14:22
Method: Air Sample
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_529.CHR ()
Sample: Underfire Stack
Comments: Underfire Stack Gas Analysis

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.106	20.5923	1.289	0.0000	
-	1.463	277.0056	61.791	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		297.5979		0.0000	

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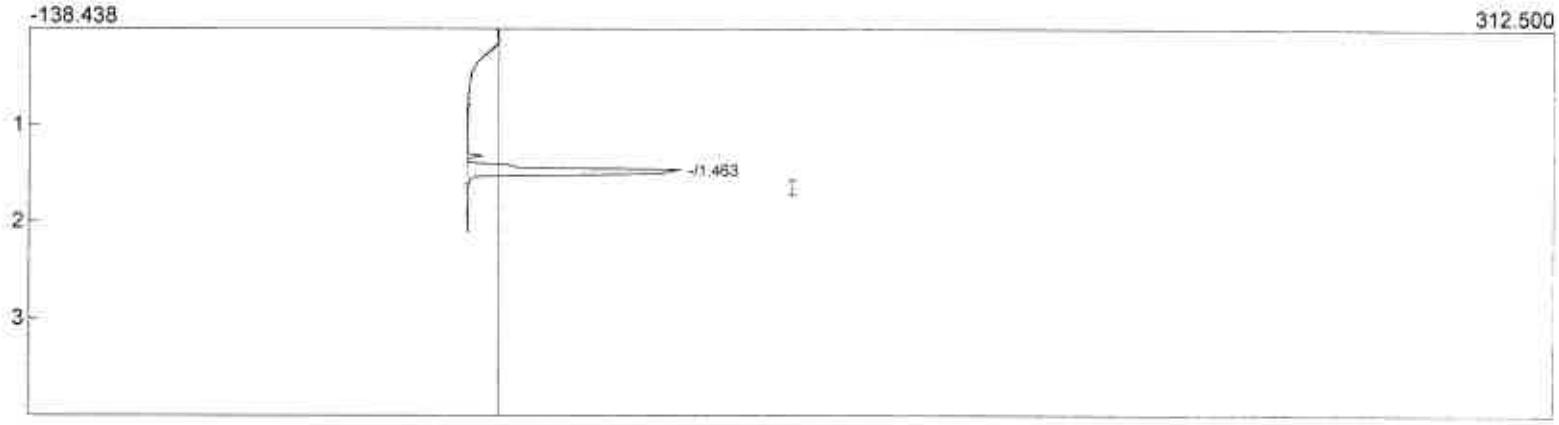
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 09:24:38
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_531.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	285.6802	63.048	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		285.6802		0.0000	

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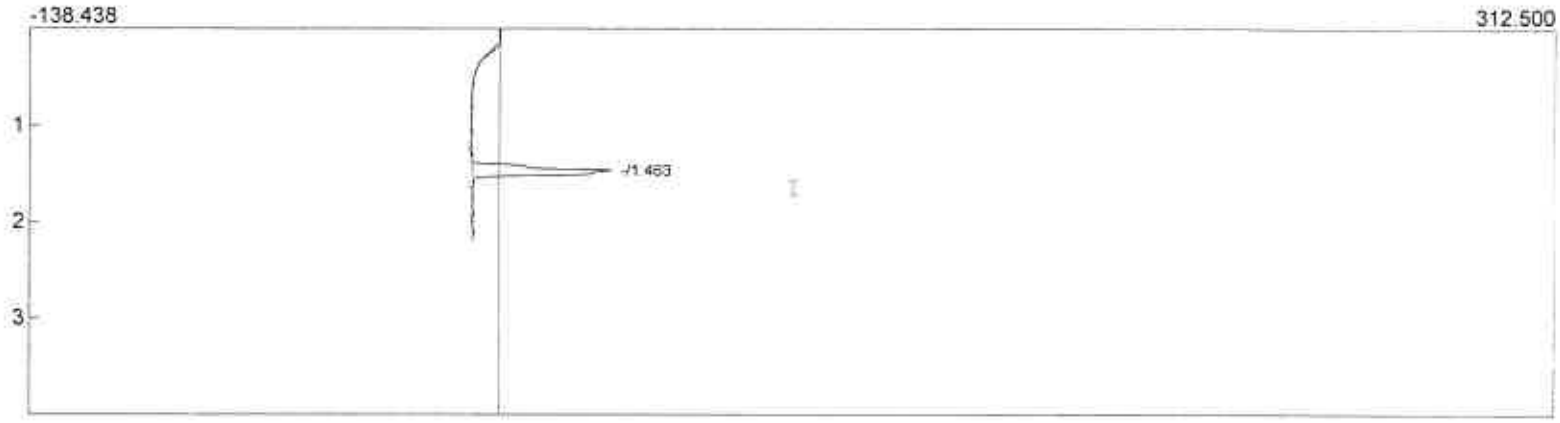
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 09:35:08
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_533.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	204.1248	41.743	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		204.1248		0.0000	

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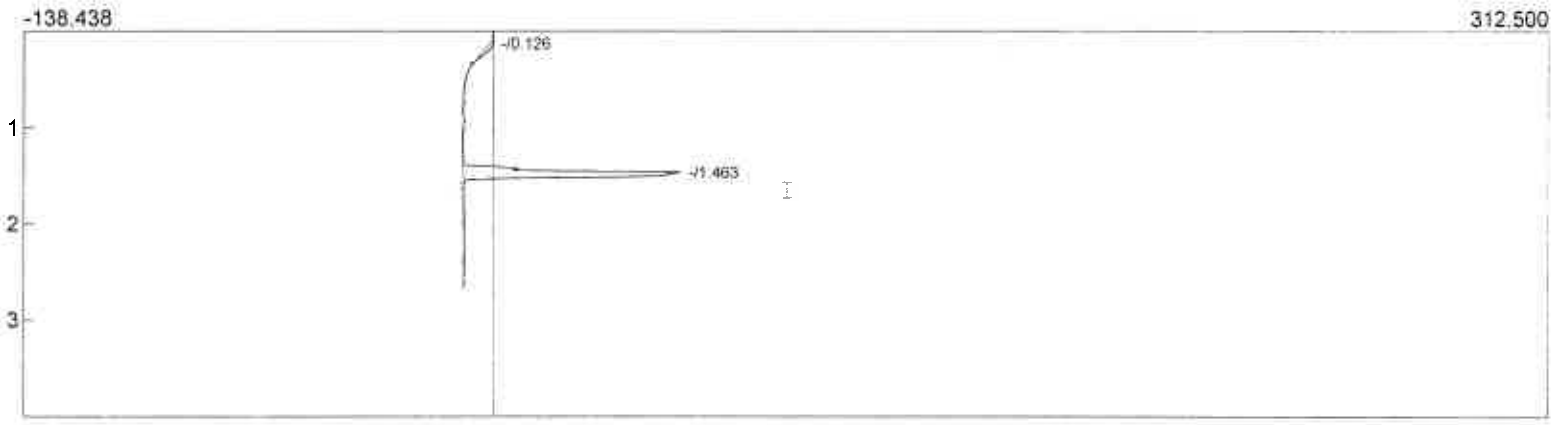
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 09:44:38
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_535.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.126	13.1744	1.092	0.0000	
-	1.463	294.3725	64.393	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		307.5469		0.0000	

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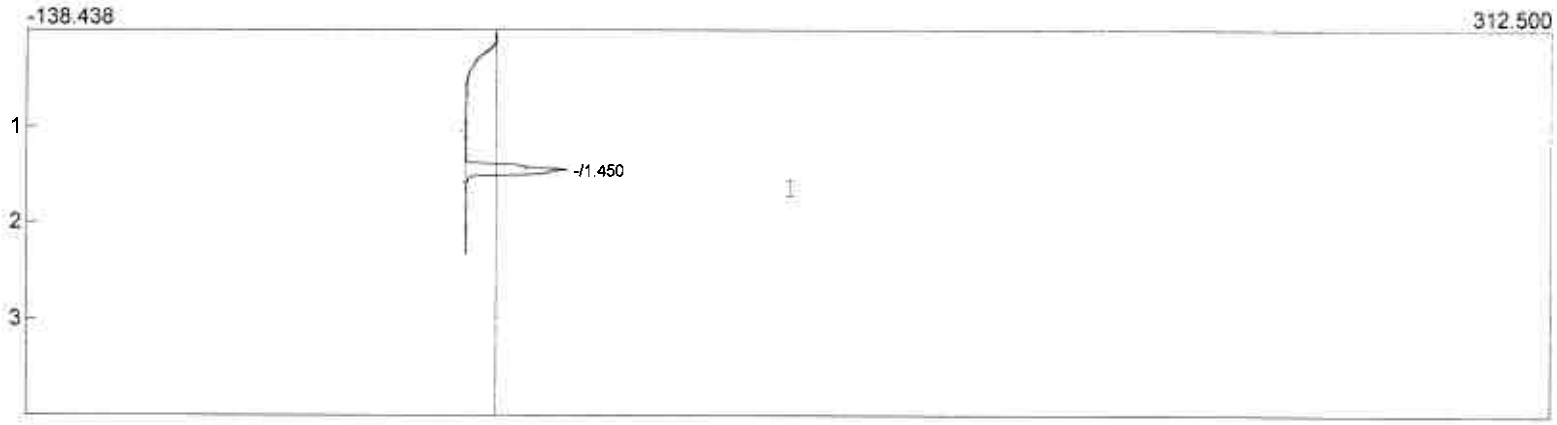
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 09:55:32
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_537.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.450	159.6643	29.915	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		159.6643		0.0000	

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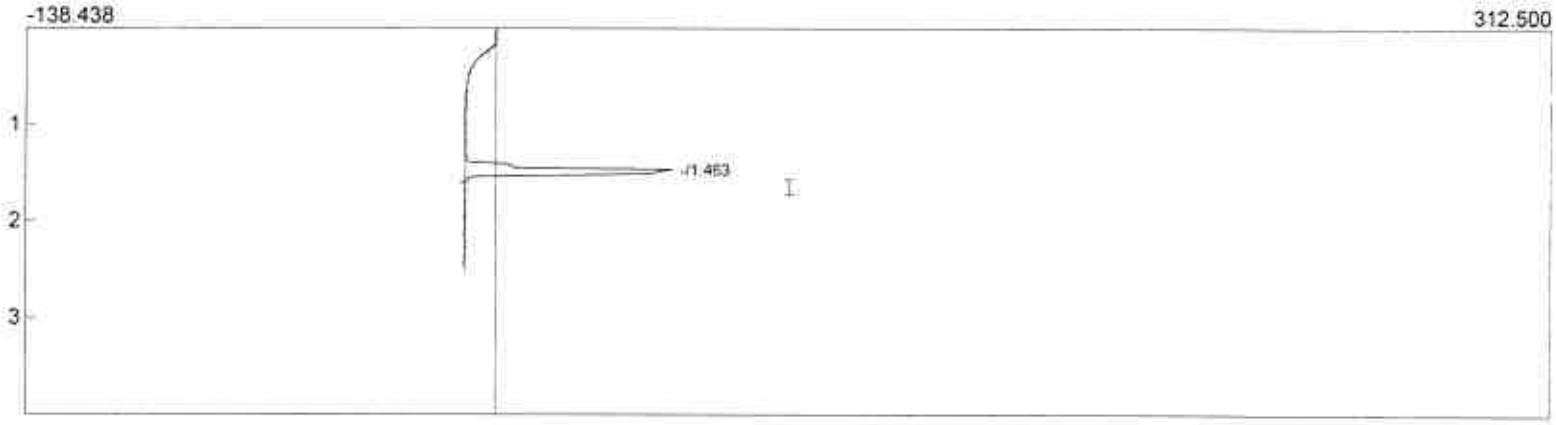
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 10:04:40
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_539.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
	1.463	284.8210	61.345	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		284.8210		0.0000	

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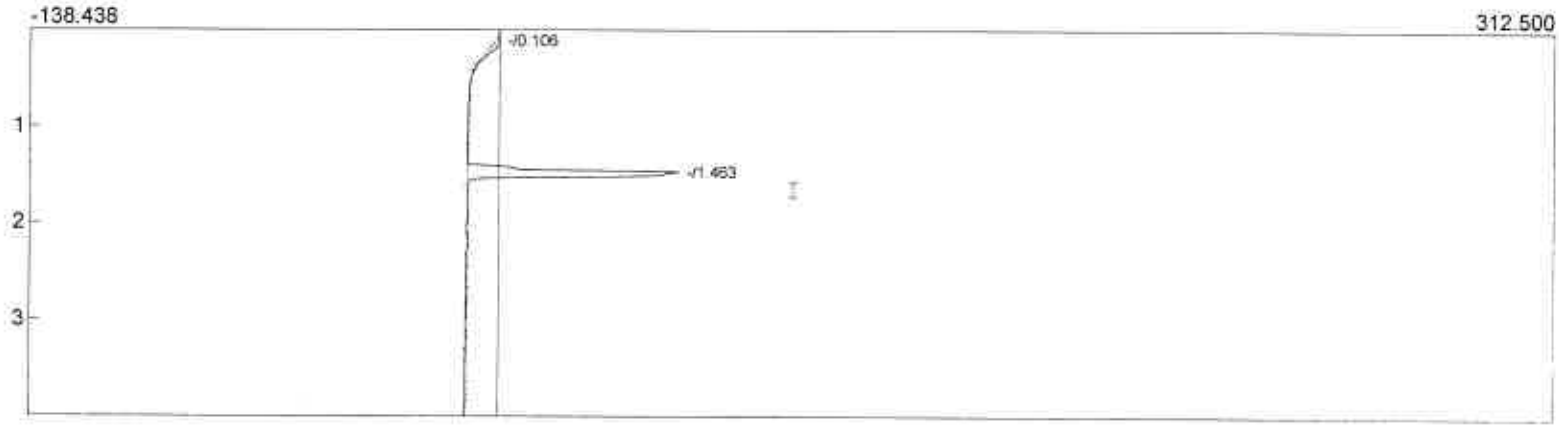
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 10:13:42
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_541.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
	0.106	20.2576	1.243	0.0000	
	1.463	287.1531	62.666	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		307.4107		0.0000	

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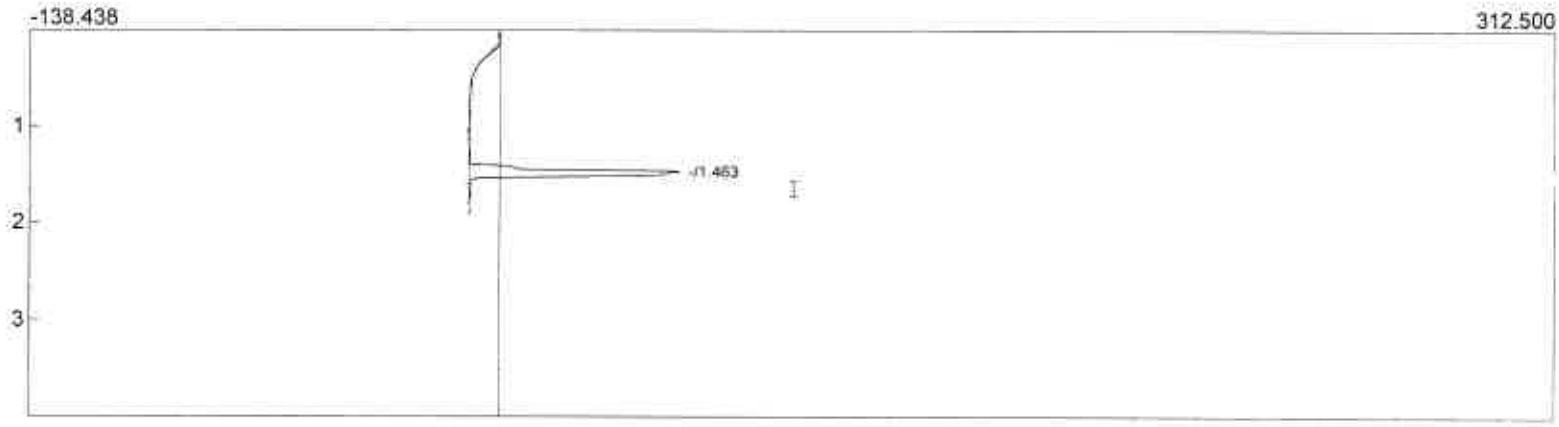
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 10:24:37
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_543.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	283.9722	62.600	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		283.9722		0.0000	

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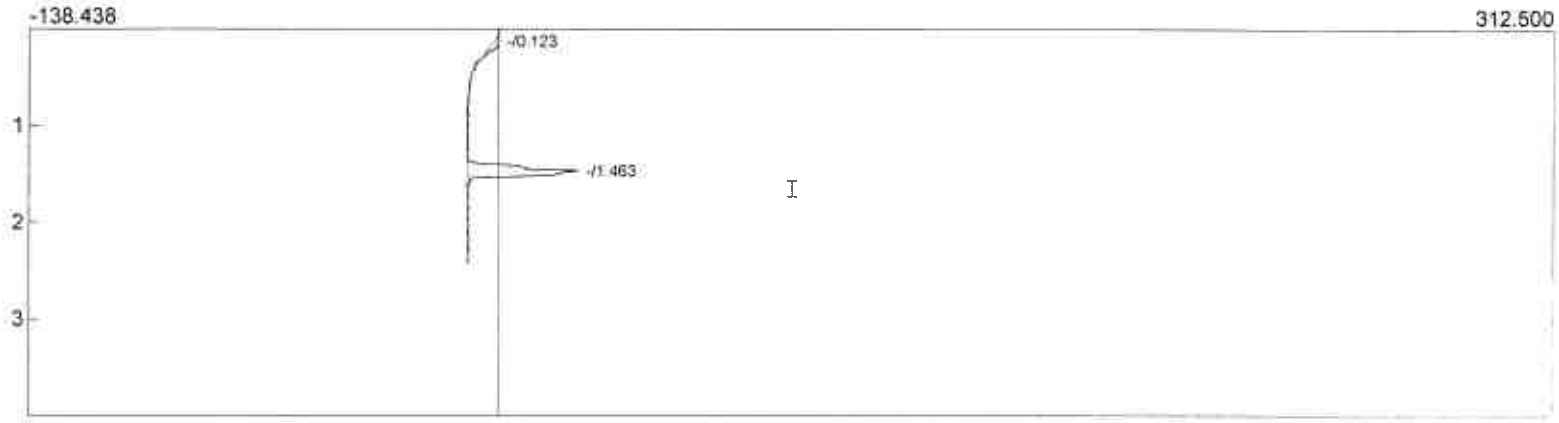
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 10:34:52
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_545.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
	0.123	18.3972	1.575	0.0000	
	1.463	175.8670	32.599	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		194.2642		0.0000	

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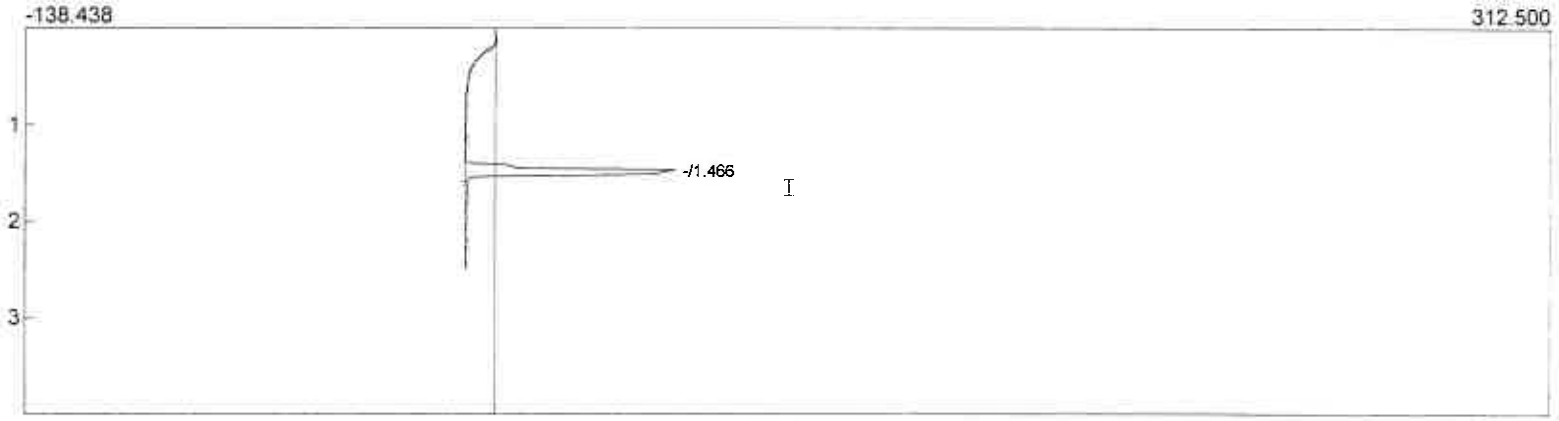
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 10:44:27
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_547.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	286.7548	62.569	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		286.7548		0.0000	

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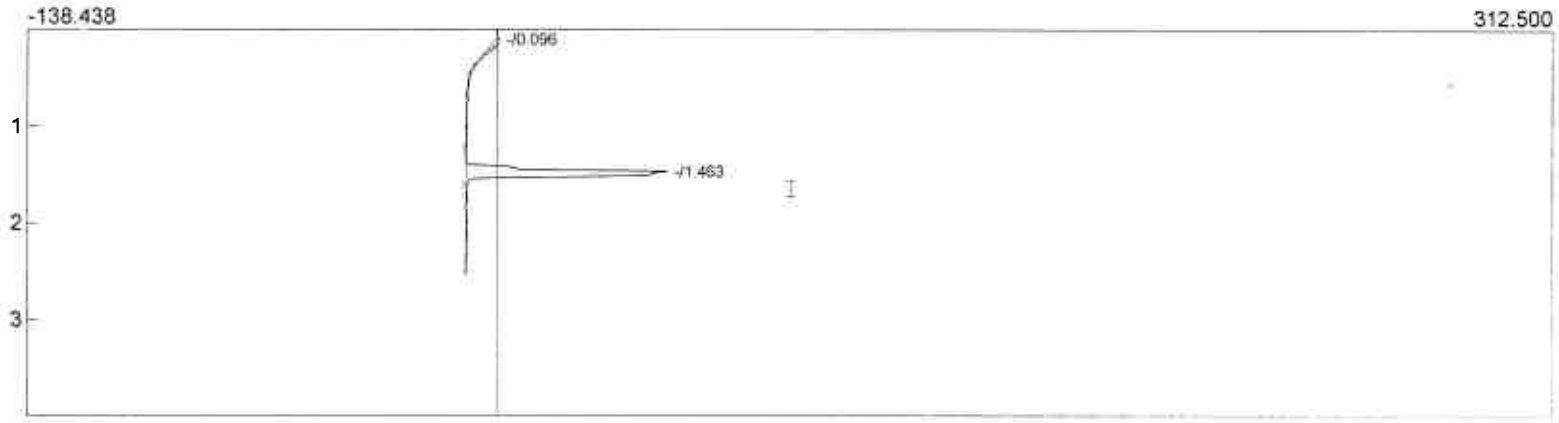
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 10:54:13
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_549.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.096	14.6772	0.816	0.0000	
-	1.463	272.7632	59.278	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		287.4404		0.0000	

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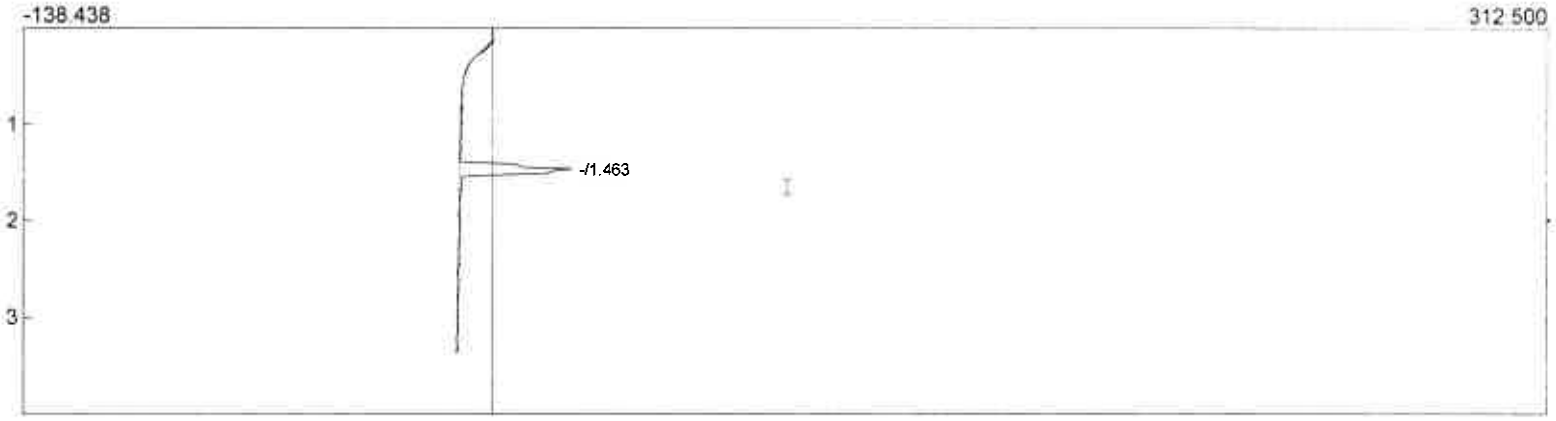
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 11:14:30
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_553.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	174.0528	33.137	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		174.0528		0.0000	

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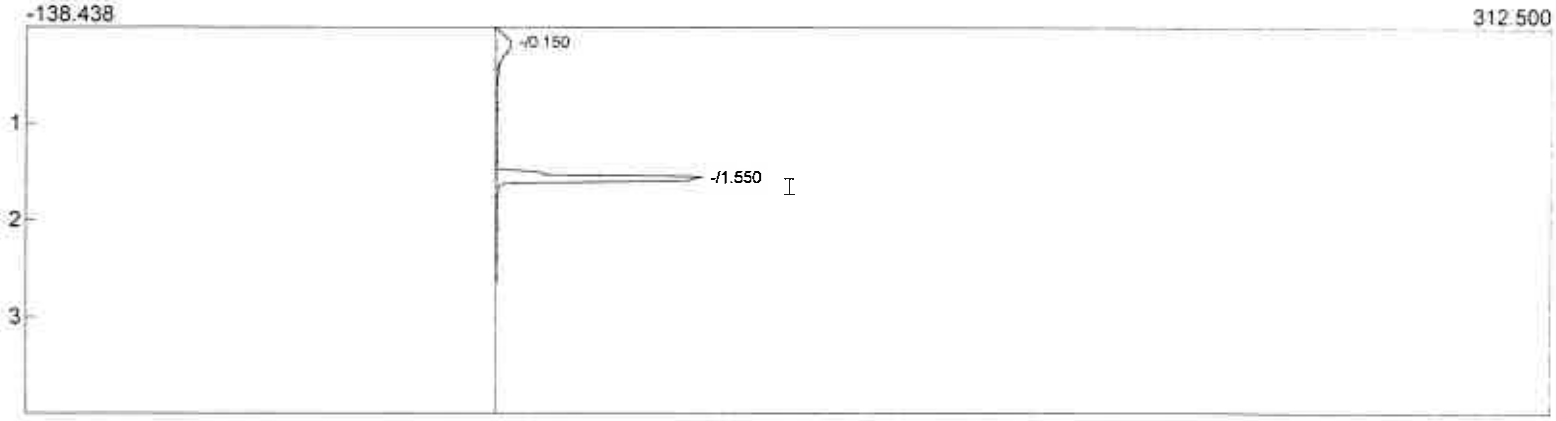
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 11:24:19
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_555.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.150	56.8146	4.563	0.0000	
-	1.550	276.3110	61.163	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		333.1256		0.0000	

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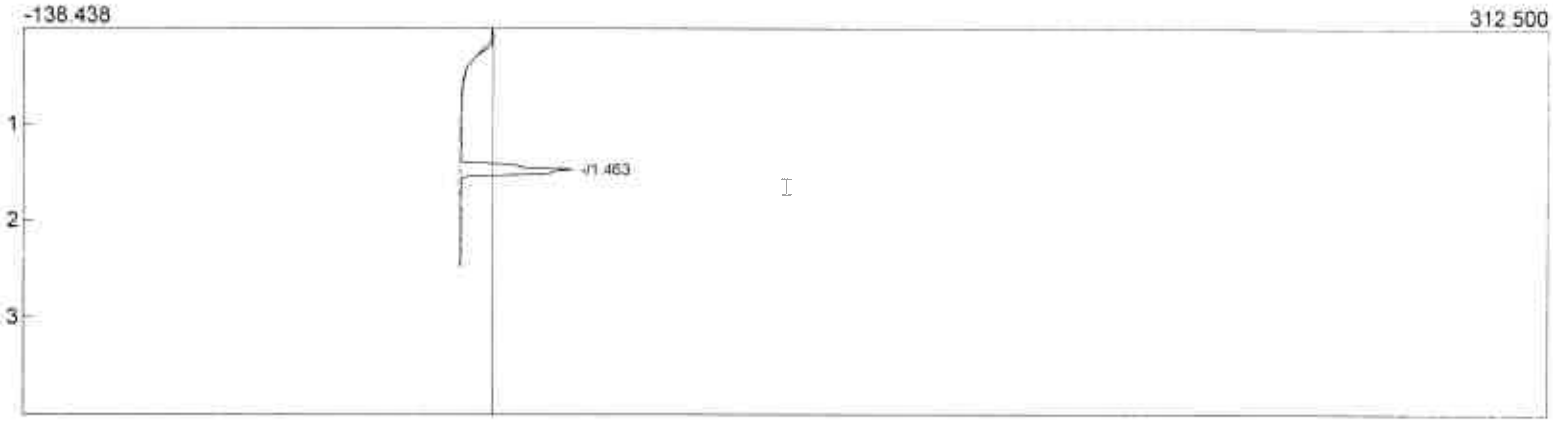
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 11:34:18
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_557.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	175.6020	33.406	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		175.6020		0.0000	

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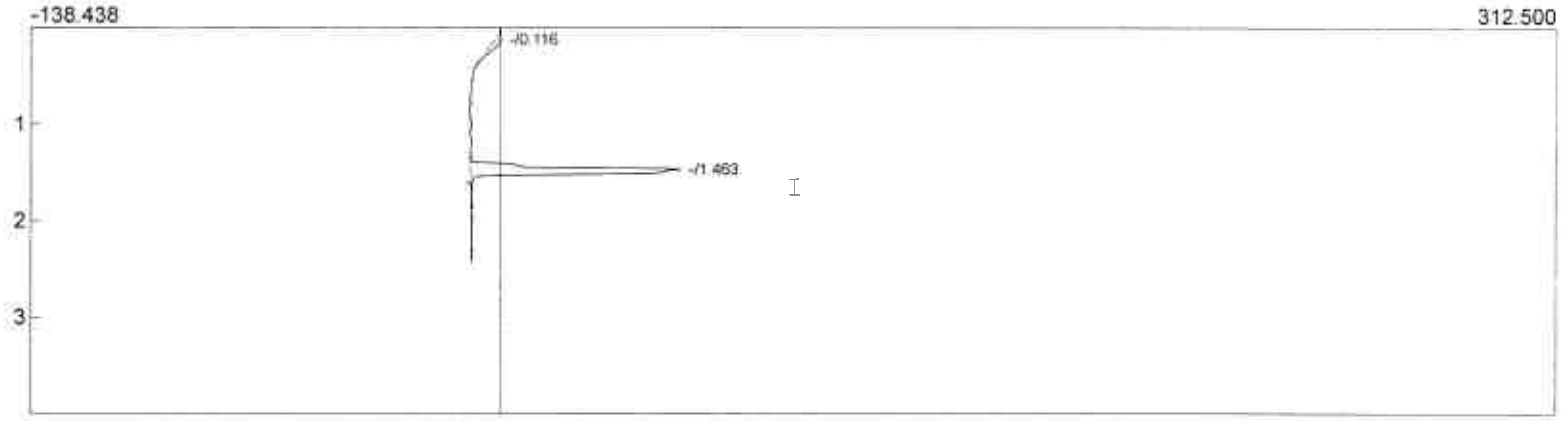
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 11:49:17
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_560.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.116	21.1984	1.811	0.0000	
-	1.463	285.9176	62.232	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		307.1160		0.0000	

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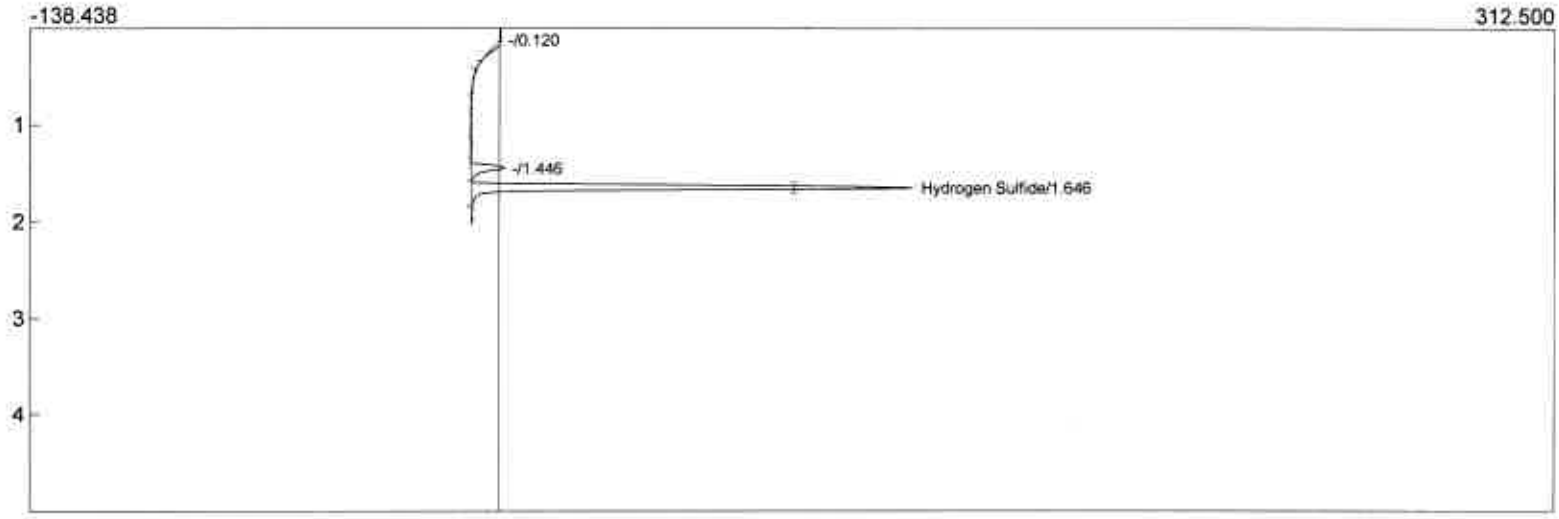
Lab name: Mostardi Platt
Client: ArcelorMittal Burns Harbor
Analysis date: 09/07/2016 11:59:25
Method: Air Sample
Description: FPD-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_564.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
	0.120	11.1562	0.545	0.0000	
	1.446	42.4468	9.829	0.0000	
Hydrogen Sulfide	1.646	403.4892	130.773	8.3496	
		457.0922		8.3496	

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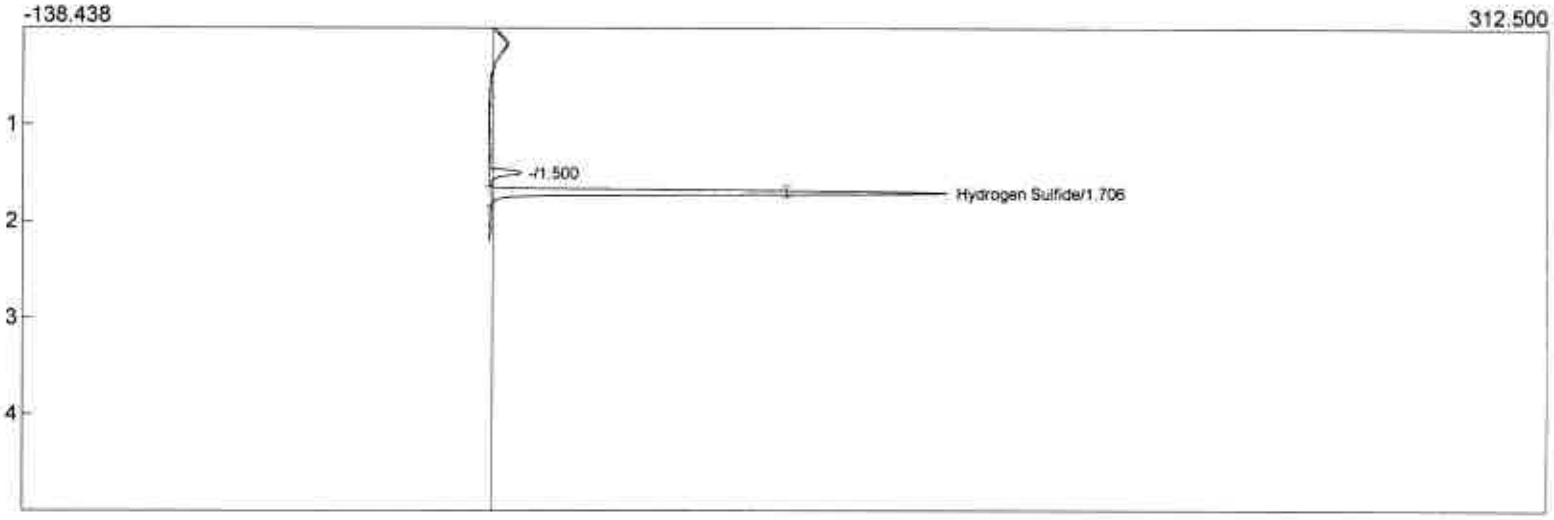
Lab name: Mostardi Platt
Client: ArcelorMittal Burns Harbor
Analysis date: 09/07/2016 12:24:32
Method: Air Sample
Description: FPD-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_567.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.500	41.3594	9.622	0.0000	
Hydrogen Sulfide	1.706	412.3768	135.854	8.4295	
		453.7362		8.4295	

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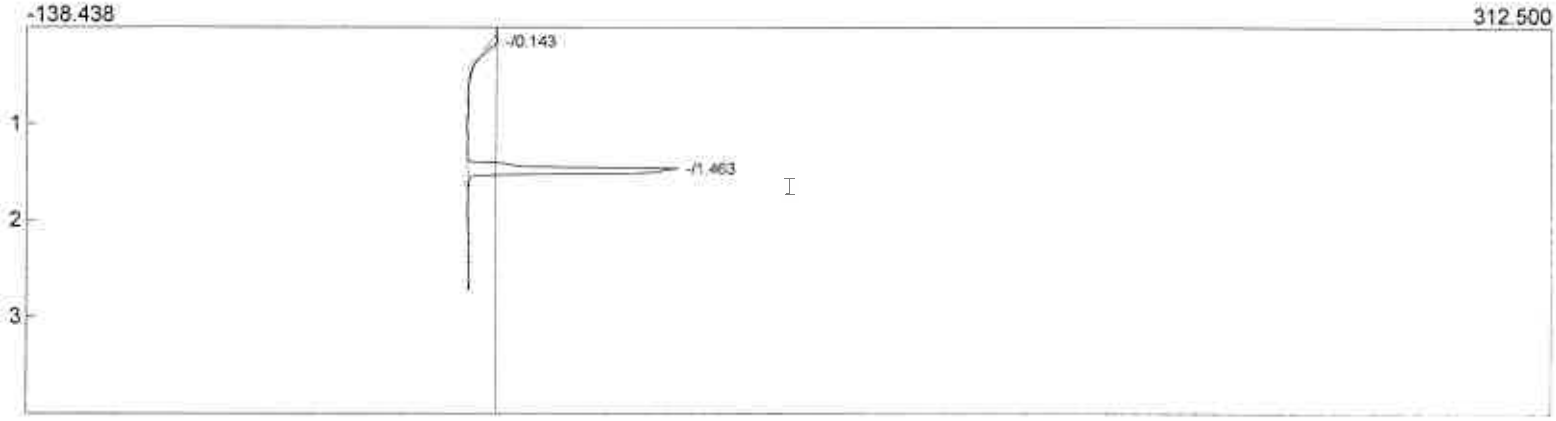
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 12:28:27
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_568.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.143	18.8668	2.063	0.0000	
-	1.463	284.6398	62.482	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		303.5066		0.0000	

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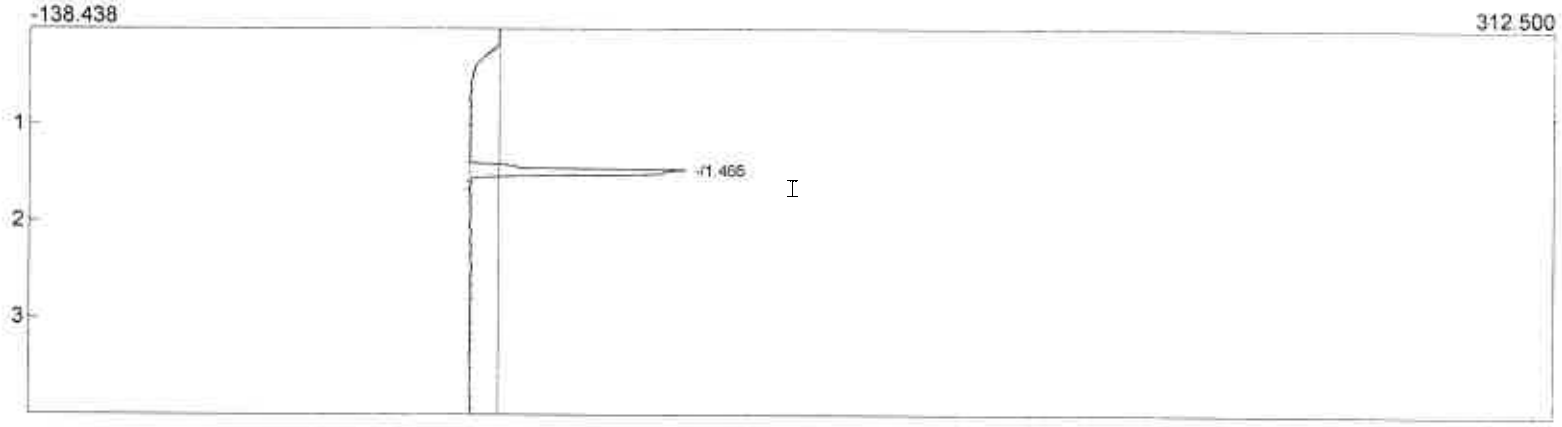
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 12:37:22
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_570.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	293.4562	64.466	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		293.4562		0.0000	

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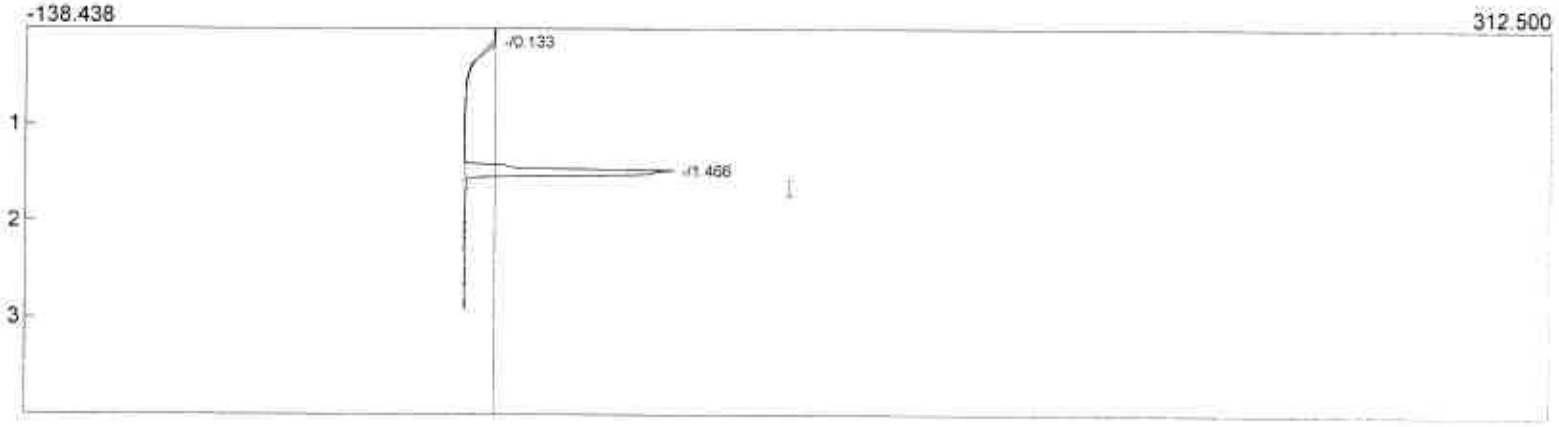
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 12:47:23
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_572.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.133	13.0250	1.130	0.0000	
-	1.466	280.6772	61.513	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		293.7022		0.0000	

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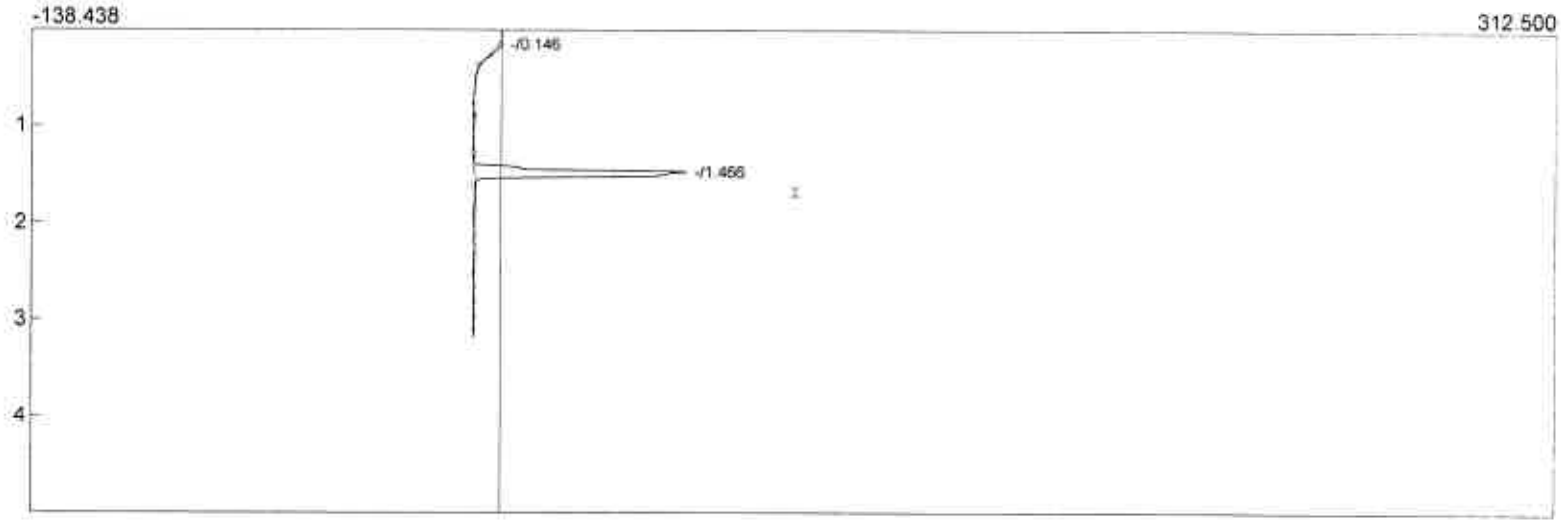
Lab name: SRI Instruments
Client: Valued Customer
Analysis date: 09/07/2016 13:03:41
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_574.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.146	10.0983	1.261	0.0000	
-	1.466	287.9349	63.125	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		298.0332		0.0000	

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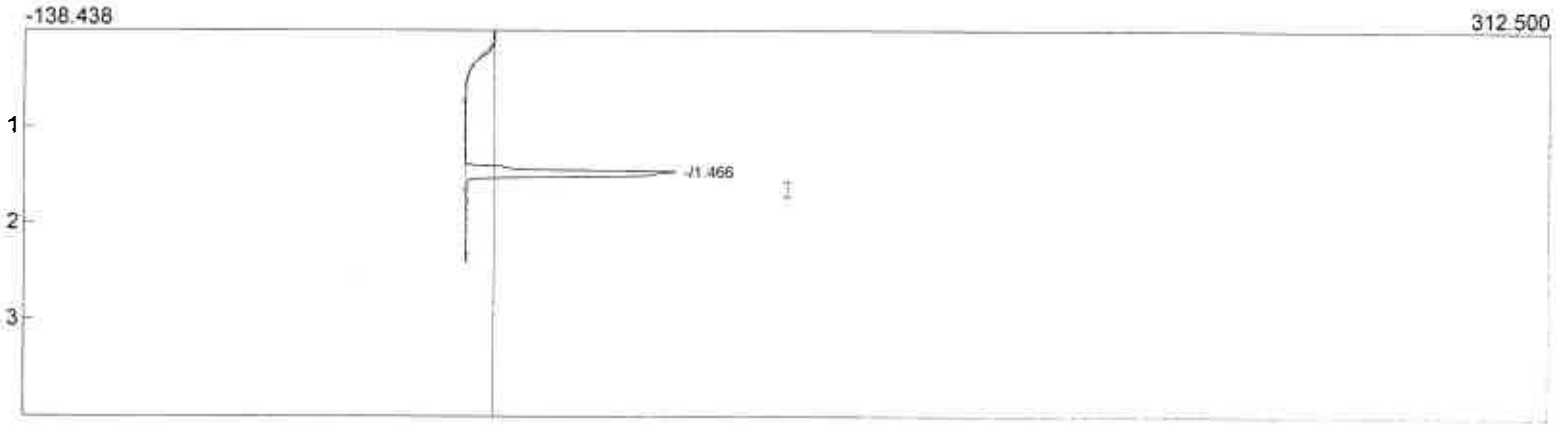
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 13:08:03
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_575.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	286.2506	62.531	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		286.2506		0.0000	

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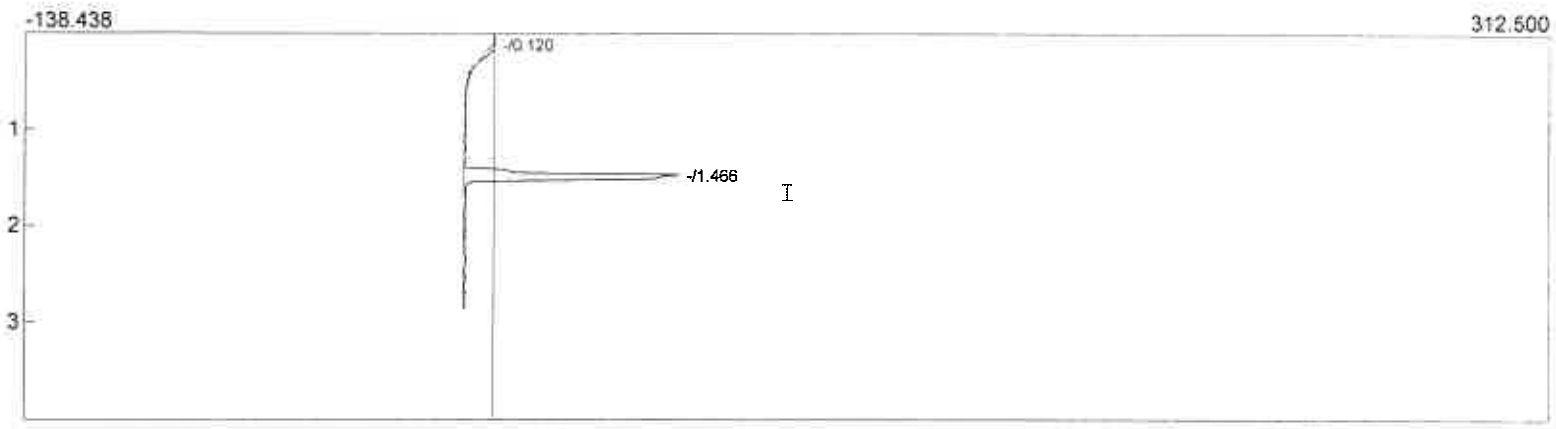
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 13:17:33
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_577.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.120	13.6502	1.000	0.0000	
-	1.466	293.4616	63.917	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		307.1118		0.0000	

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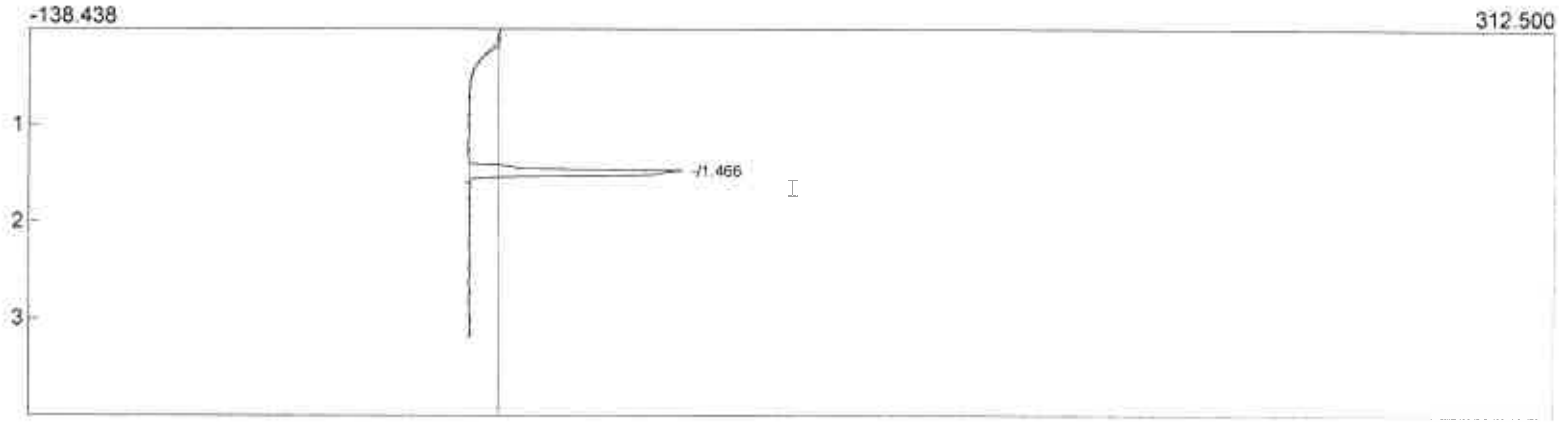
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 13:28:13
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_579.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	289.5972	63.494	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		289.5972		0.0000	

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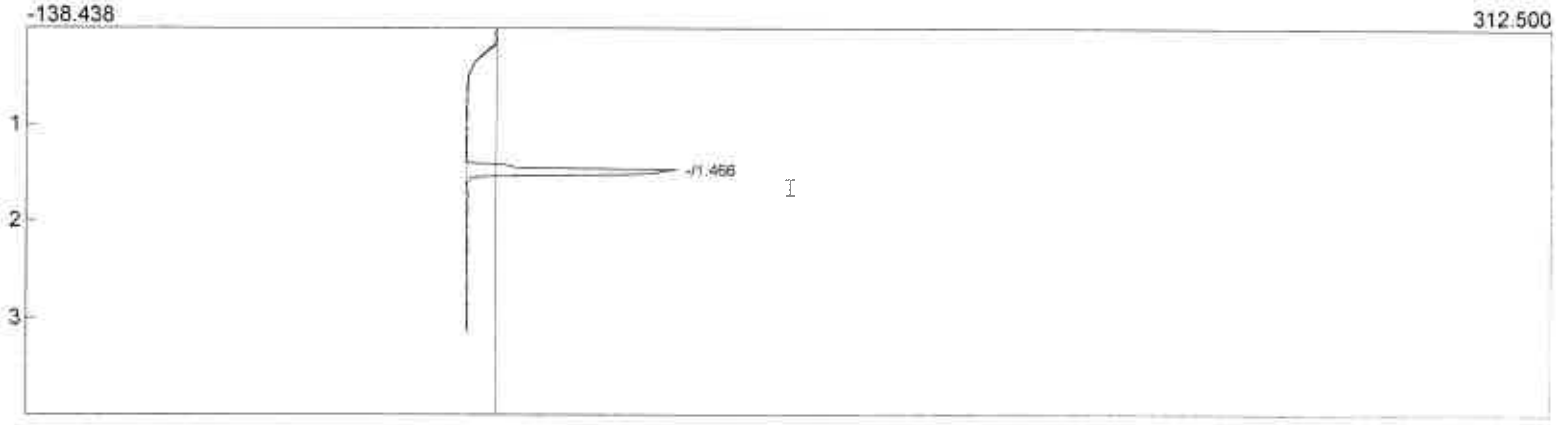
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 13:37:56
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_581.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	288.5969	62.787	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		288.5969		0.0000	

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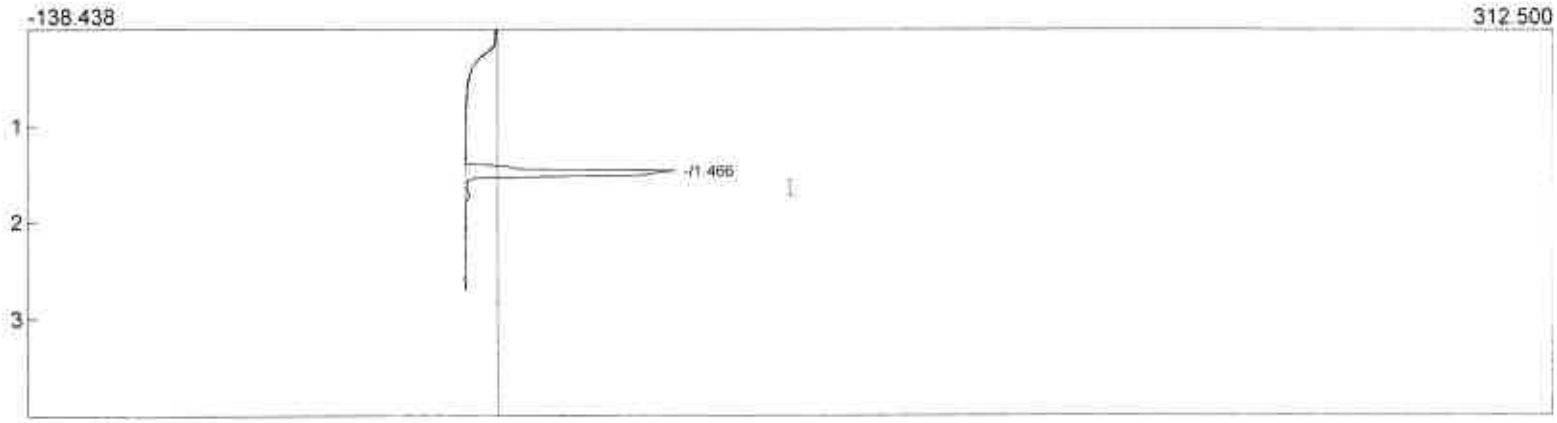
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 13:48:12
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_583.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	283.9248	62.341	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		283.9248		0.0000	

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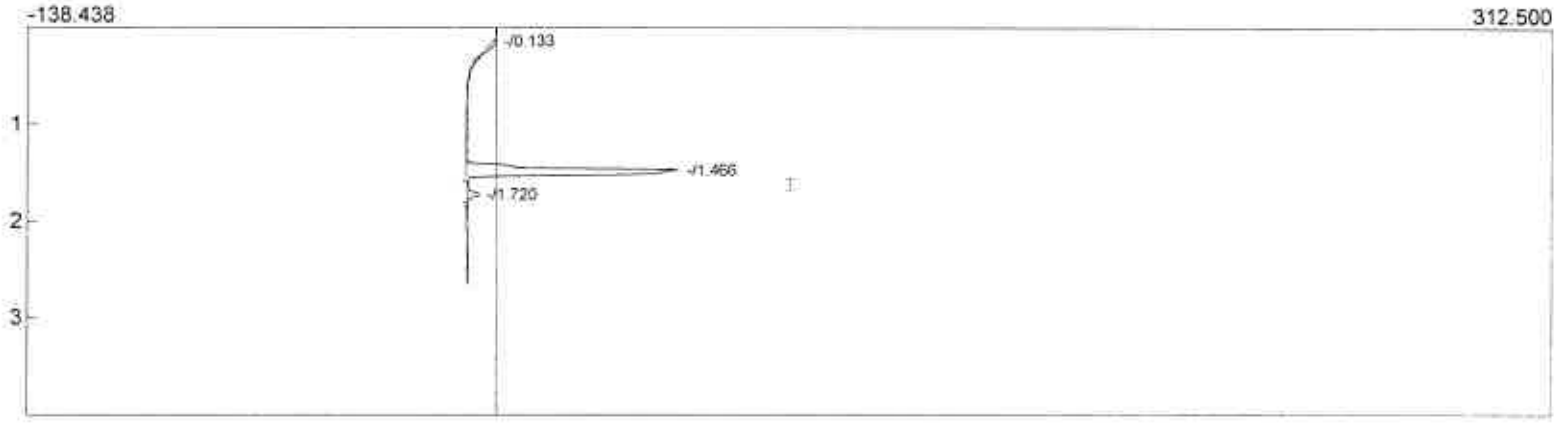
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 13:58:25
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_585.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.133	10.8354	0.935	0.0000	
-	1.466	289.6390	62.802	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
-	1.720	11.6567	3.390	0.0000	
		312.1311		0.0000	

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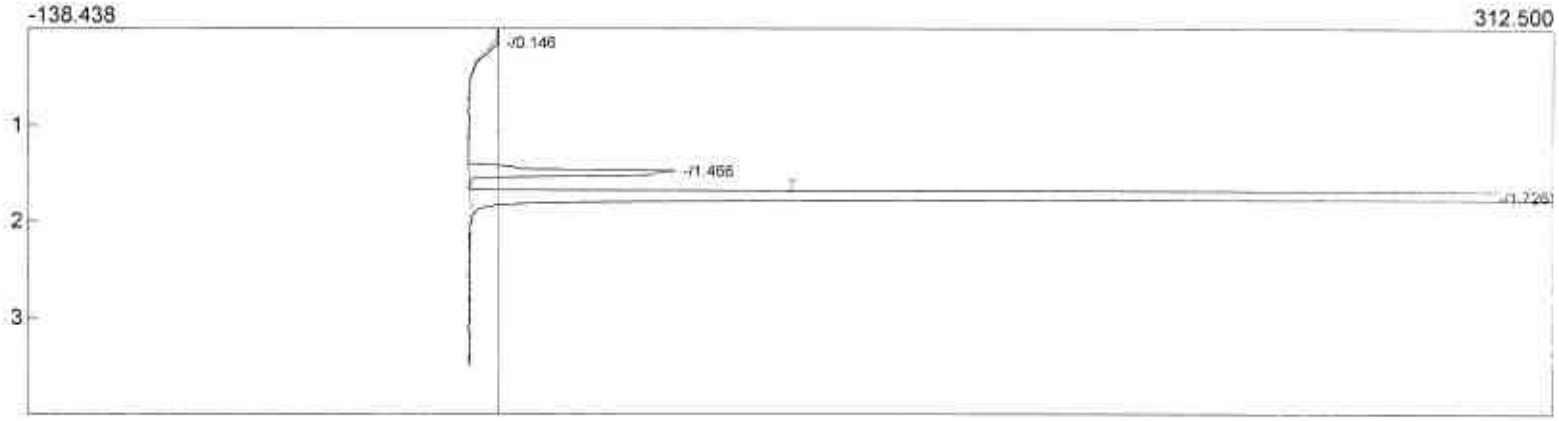
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 14:07:17
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_587.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.146	12.9639	1.479	0.0000	
-	1.466	280.0275	61.340	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
-	1.726	11823.6790	3477.801	0.0000	
		12116.6704		0.0000	

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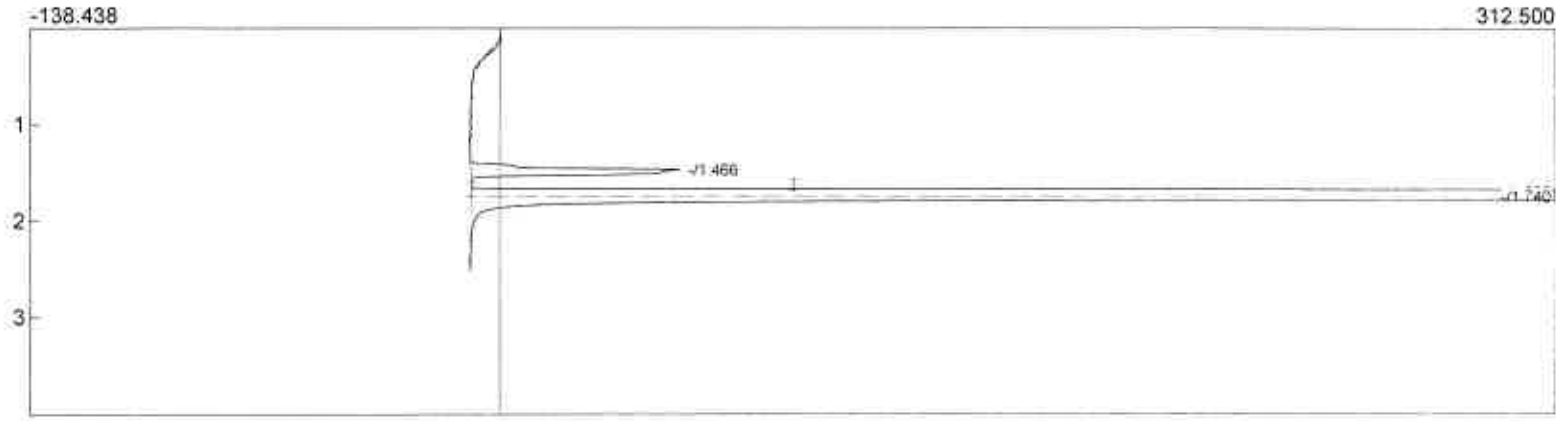
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 14:17:37
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_589.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	279.7688	62.140	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
-	1.690	15309.9226	4531.461	0.0000	
-	1.740	6247.1678	4498.188	0.0000	
		21836.8592		0.0000	

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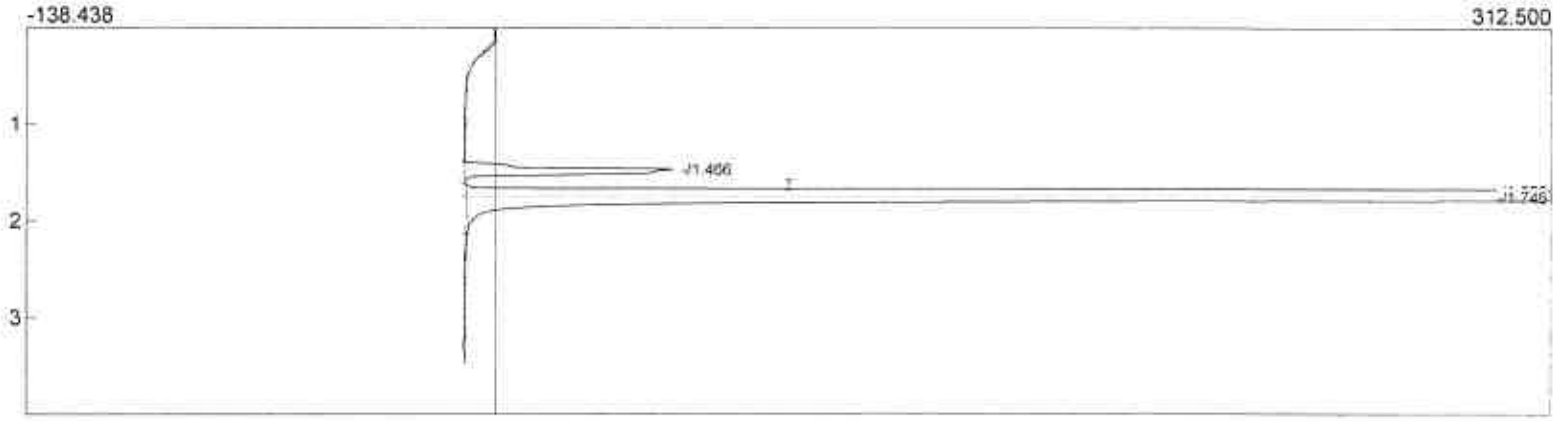
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 14:27:34
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_591.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	283.0044	62.245	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
-	1.686	17965.2390	4459.770	0.0000	
-	1.746	6201.3958	4468.350	0.0000	
		24449.6392		0.0000	

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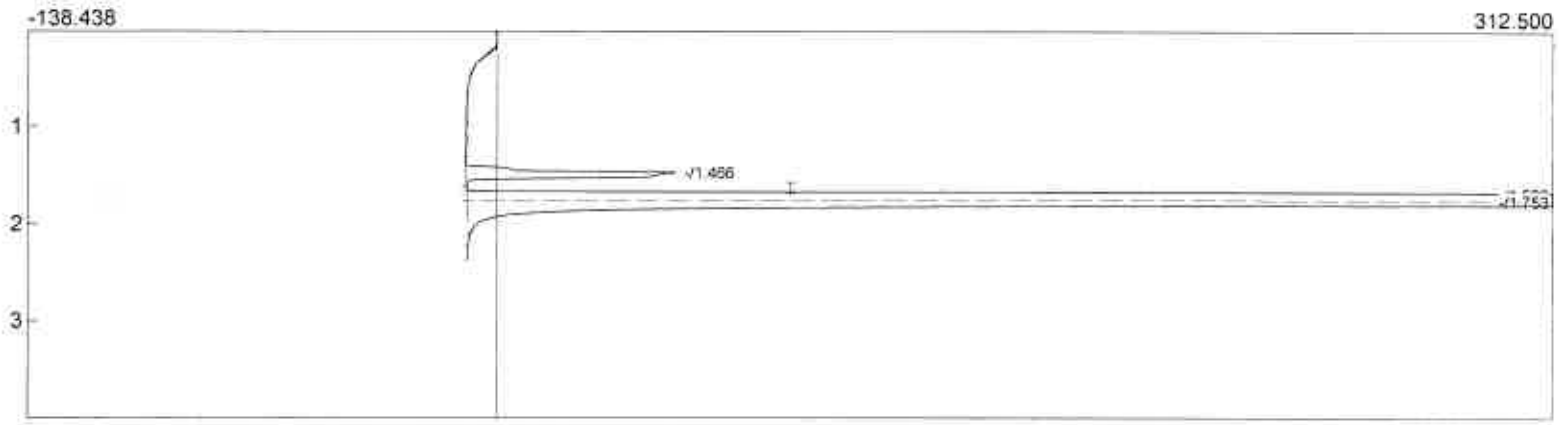
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/07/2016 14:38:05
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_593.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	280.3320	62.274	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
-	1.683	19680.9017	4533.770	0.0000	
-	1.753	6483.9294	4518.598	0.0000	
		26445.1631		0.0000	

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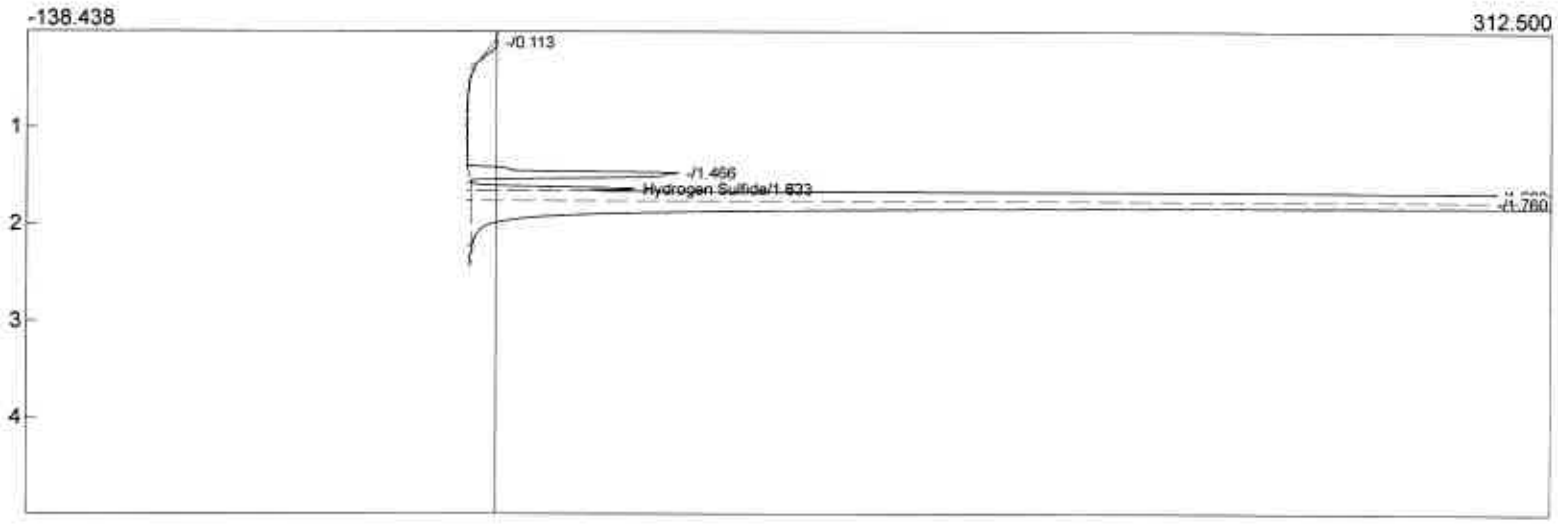
Lab name: SRI Instruments
Client: Valued Customer
Analysis date: 09/07/2016 14:47:17
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_595.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.113	15.5748	1.118	0.0000	
-	1.466	277.8484	62.085	0.0000	
Hydrogen Sulfide	1.633	111.7072	48.609	4.6789	
-	1.683	22001.4209	4459.805	0.0000	
-	1.760	7498.4776	4556.722	0.0000	
		29905.0289		4.6789	

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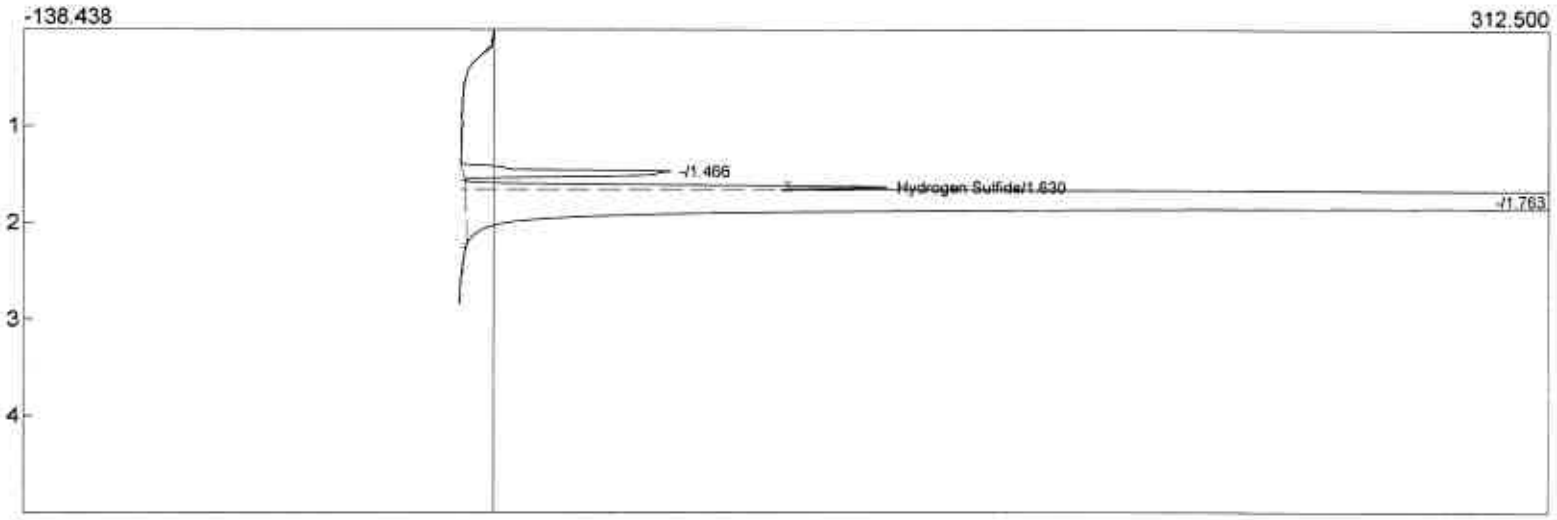
Lab name: SRI Instruments
Client: Valued Customer
Analysis date: 09/07/2016 15:02:34
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_598.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.466	277.5024	62.093	0.0000	
Hydrogen Sulfide	1.630	321.8678	125.645	7.5425	
-	1.763	33147.7786	4461.035	0.0000	
		33747.1488		7.5425	

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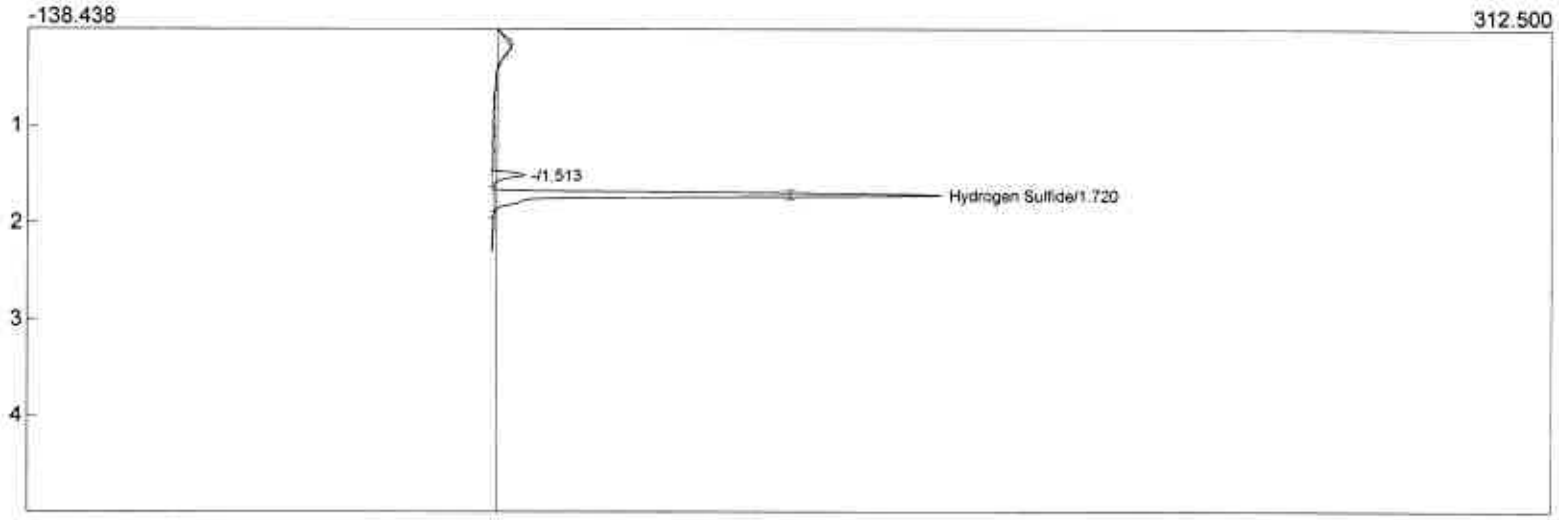
Lab name: Mostardi Platt
Client: ArcelorMittal Burns Harbor
Analysis date: 09/07/2016 15:08:27
Method: Air Sample
Description: FPD-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_600.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.513	38.8566	9.320	0.0000	
Hydrogen Sulfide	1.720	426.8488	132.785	8.5596	
		465.7054		8.5596	

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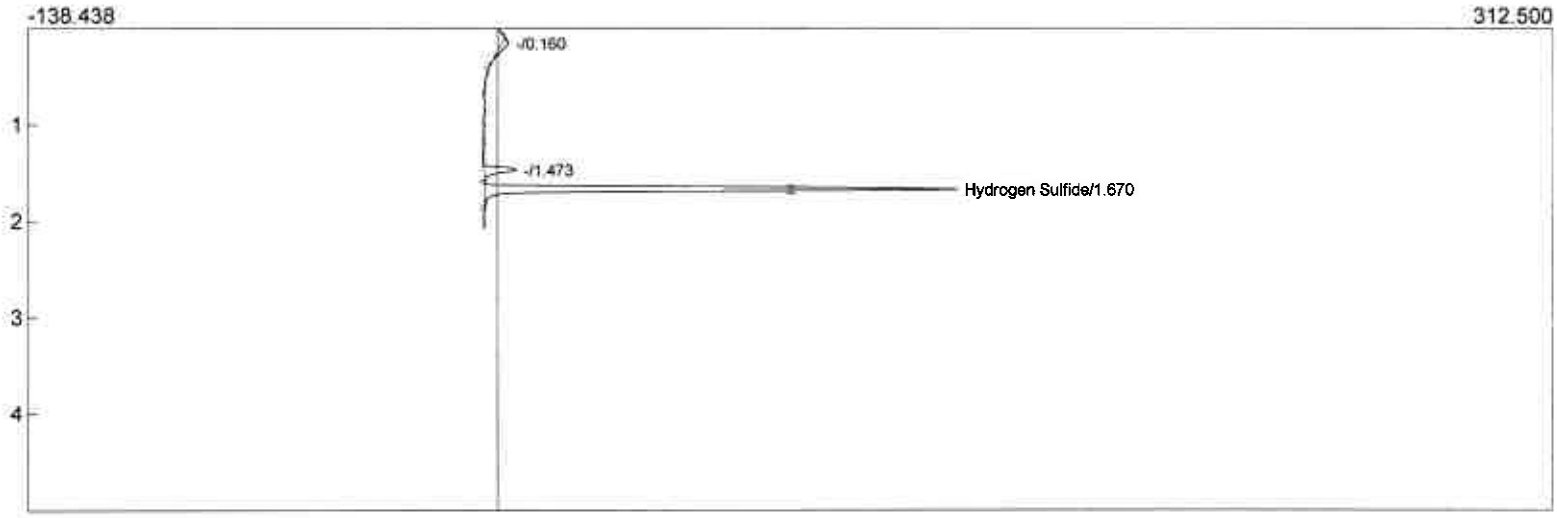
Lab name: Mostardi Platt
Client: ArcelorMittal Burns Harbor
Analysis date: 09/08/2016 07:45:22
Method: Air Sample
Description: FPD-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_637.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.160	16.8438	2.129	0.0000	
-	1.473	36.2458	9.579	0.0000	
Hydrogen Sulfide	1.670	405.0700	140.186	8.6419	
		458.1596		8.6419	

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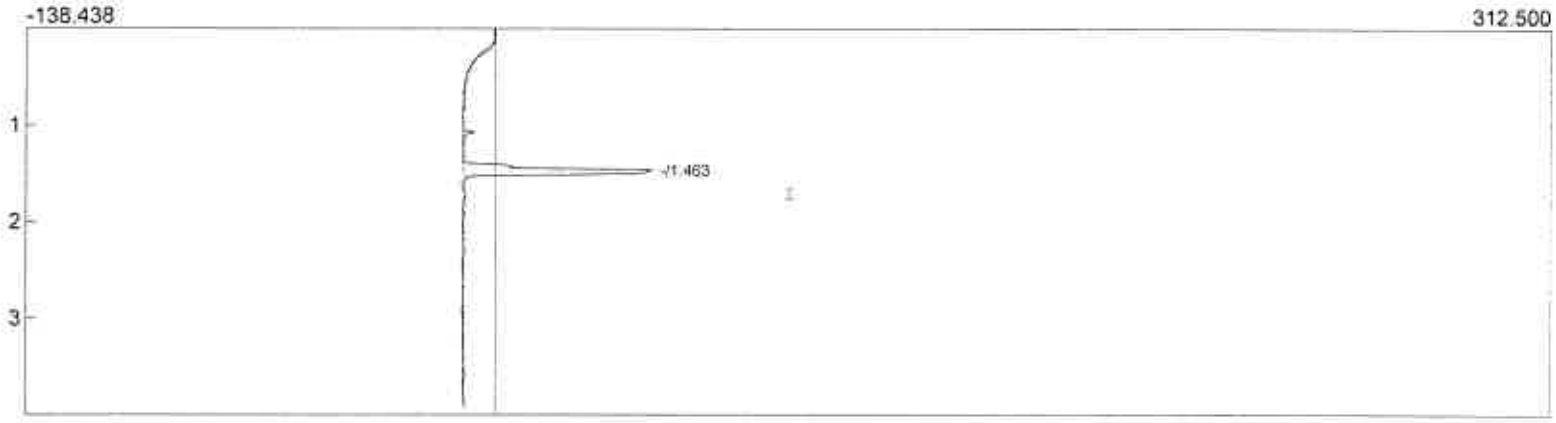
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 08:27:28
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_650.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	246.8178	55.784	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		246.8178		0.0000	

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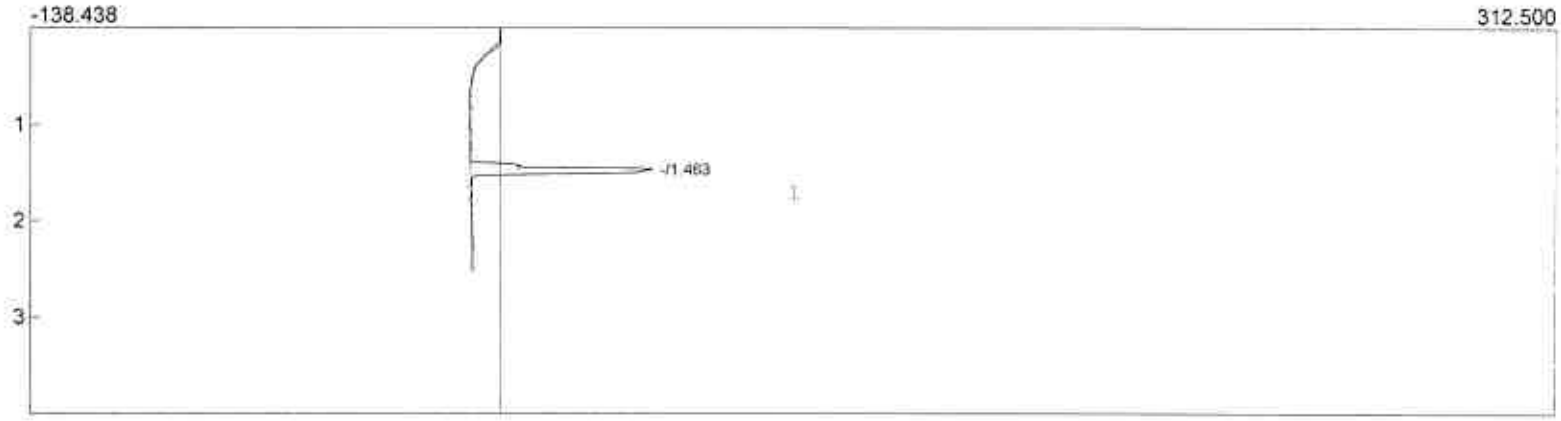
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 08:38:31
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_652.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	241.5084	54.169	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		241.5084		0.0000	

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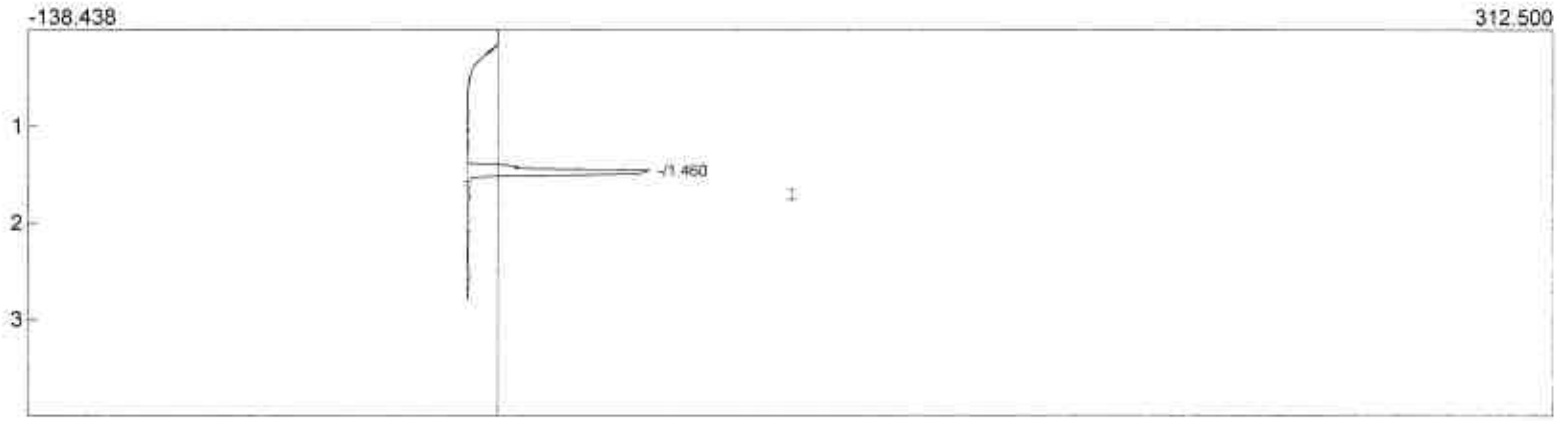
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 08:47:25
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_654.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.460	241.9986	53.898	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		241.9986		0.0000	

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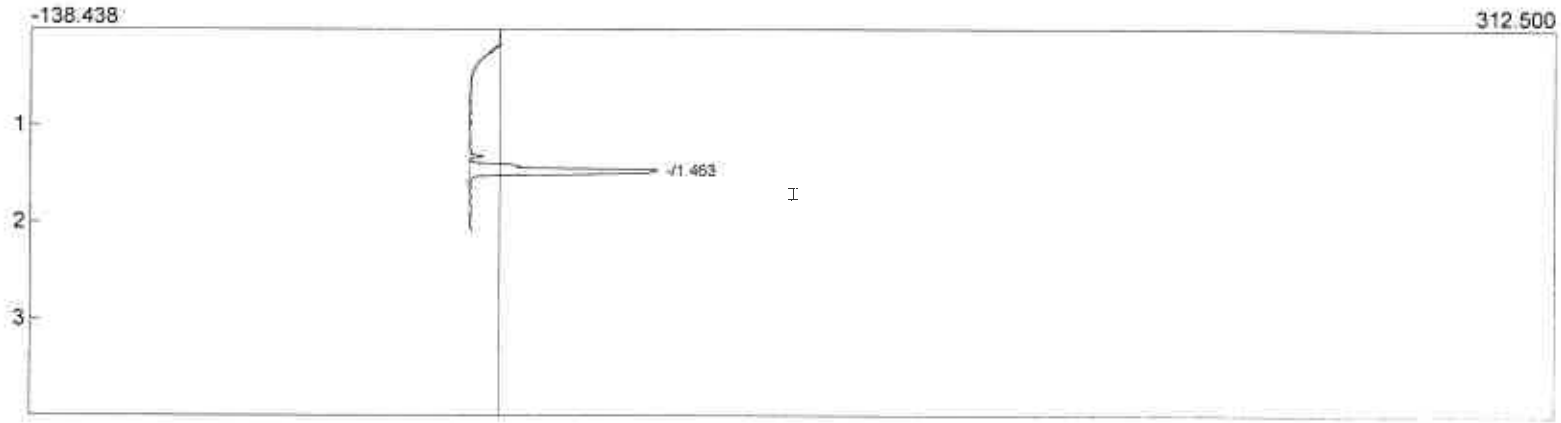
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 08:57:18
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_656.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	248.9651	55.807	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		248.9651		0.0000	

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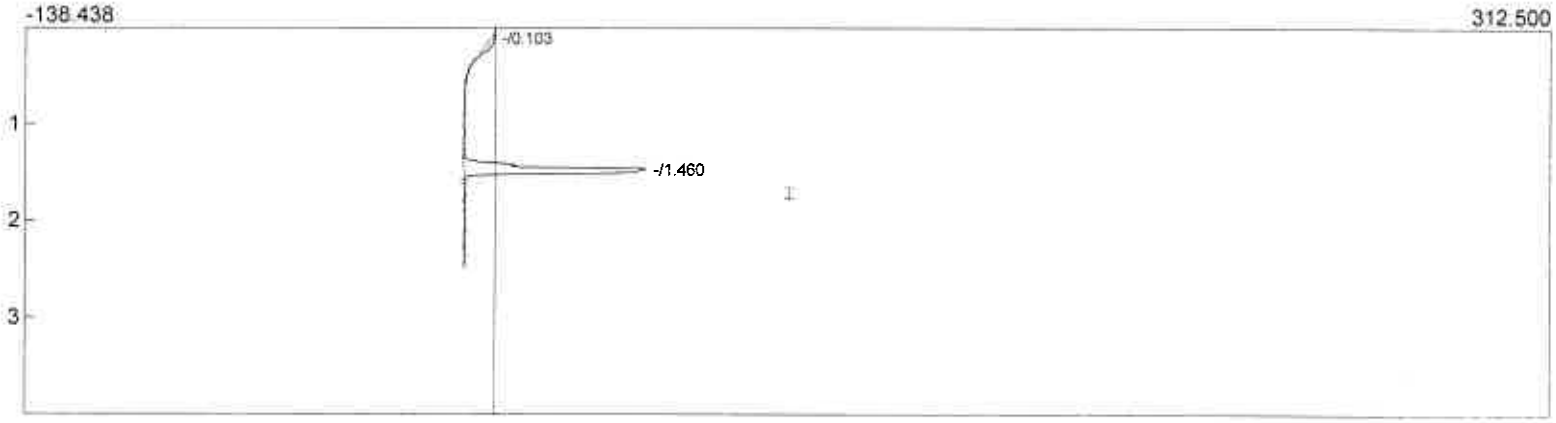
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 09:07:12
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_658.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.103	17.8650	0.972	0.0000	
-	1.460	251.5230	54.191	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		269.3880		0.0000	

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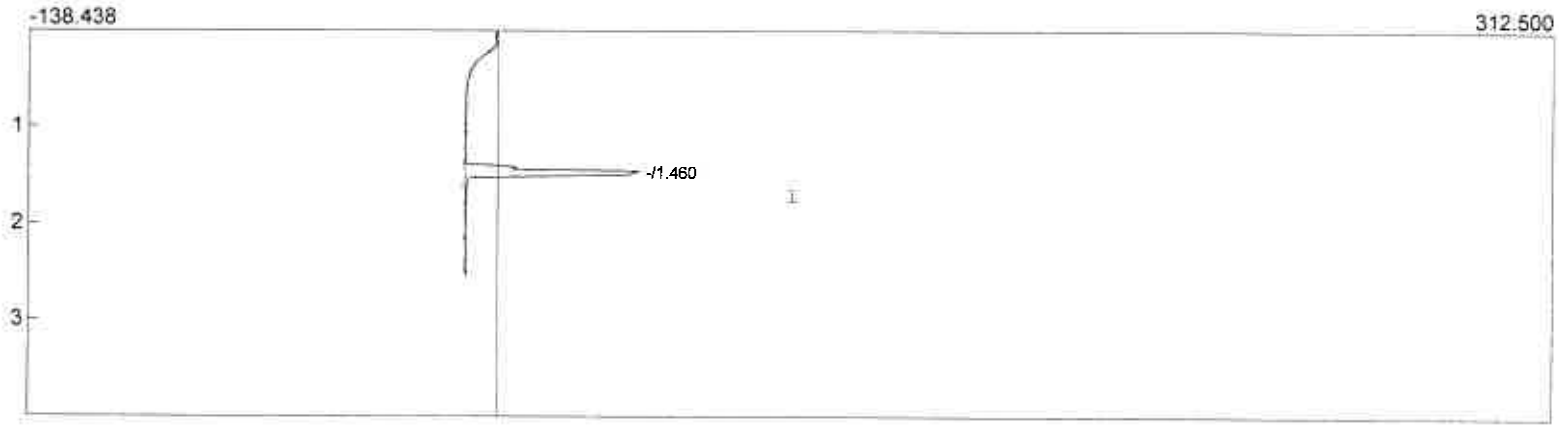
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 09:17:35
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_660.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.460	235.1940	51.484	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		235.1940		0.0000	

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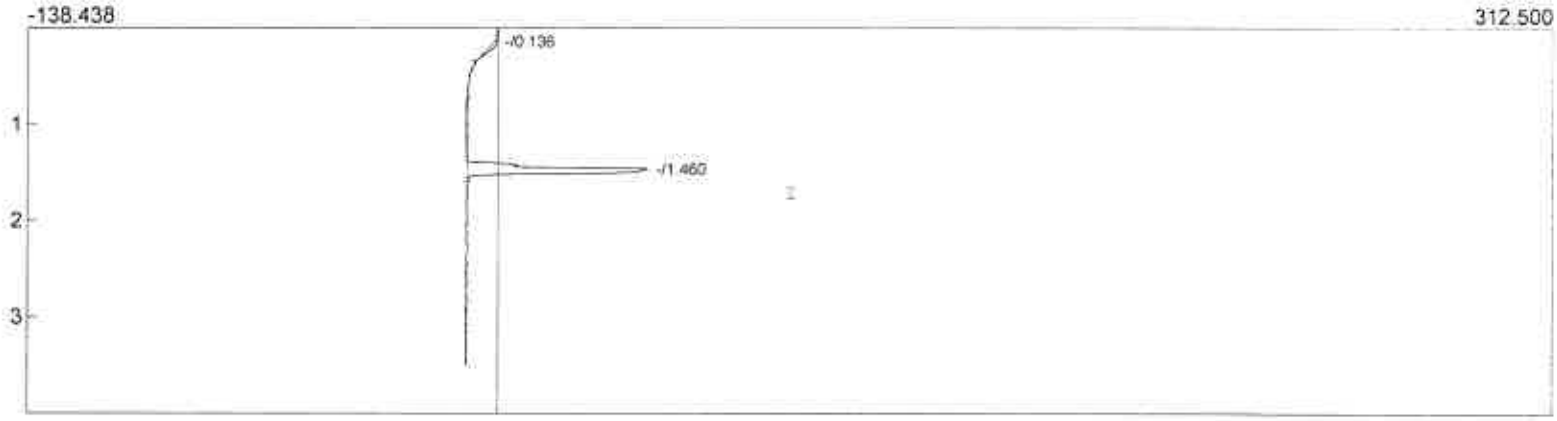
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 09:27:14
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_662.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.136	10.9416	0.722	0.0000	
-	1.460	240.4784	53.878	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		251.4200		0.0000	

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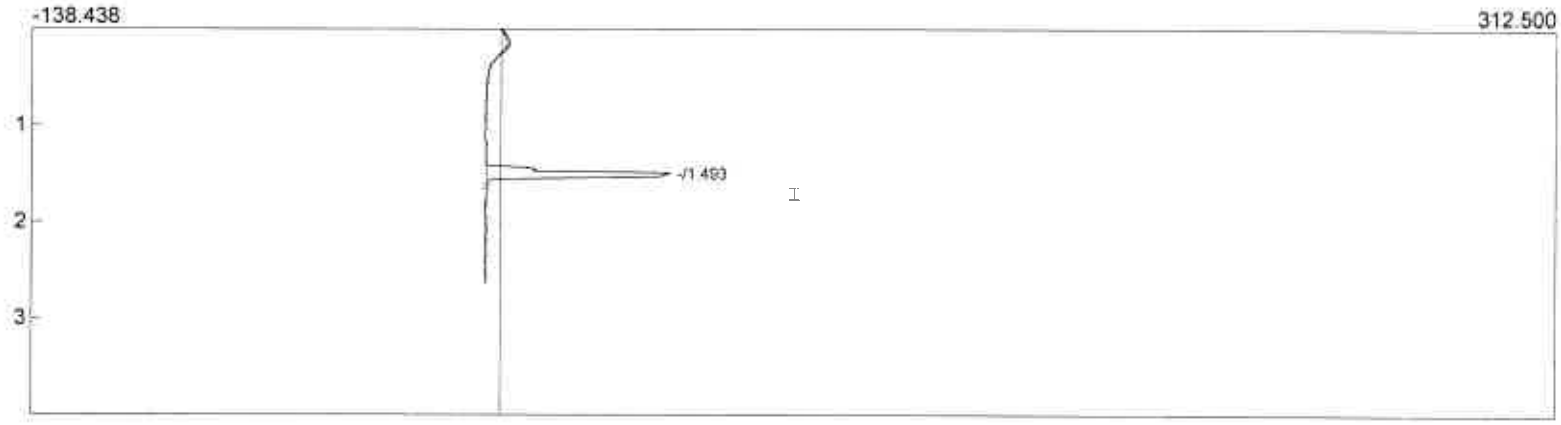
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 09:37:53
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_664.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.493	241.3200	54.054	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		241.3200		0.0000	

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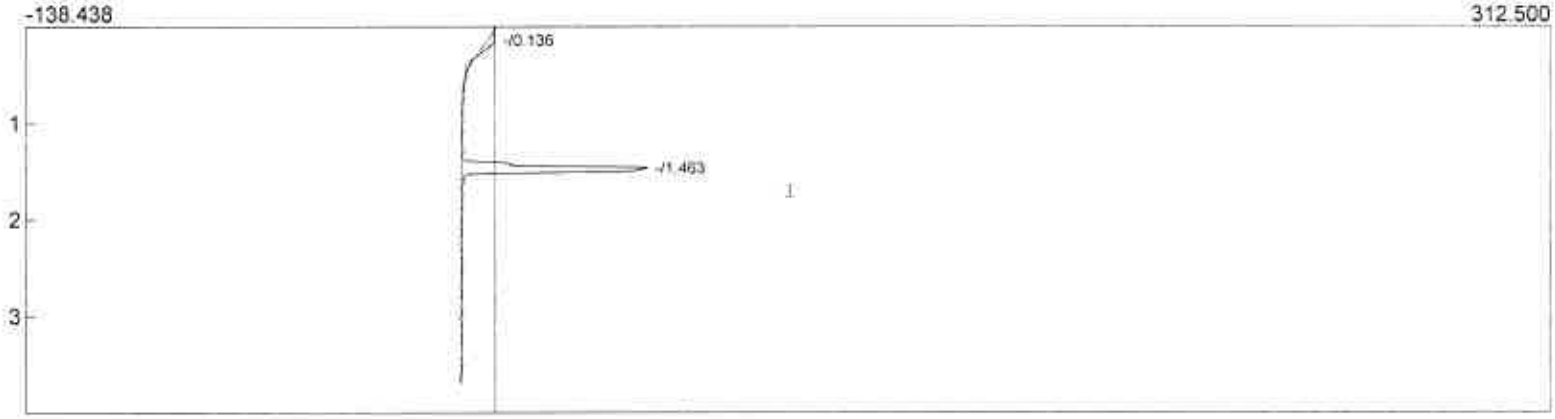
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 09:47:32
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_666.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.136	22.7308	2.449	0.0000	
-	1.463	246.6617	54.994	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		269.3925		0.0000	

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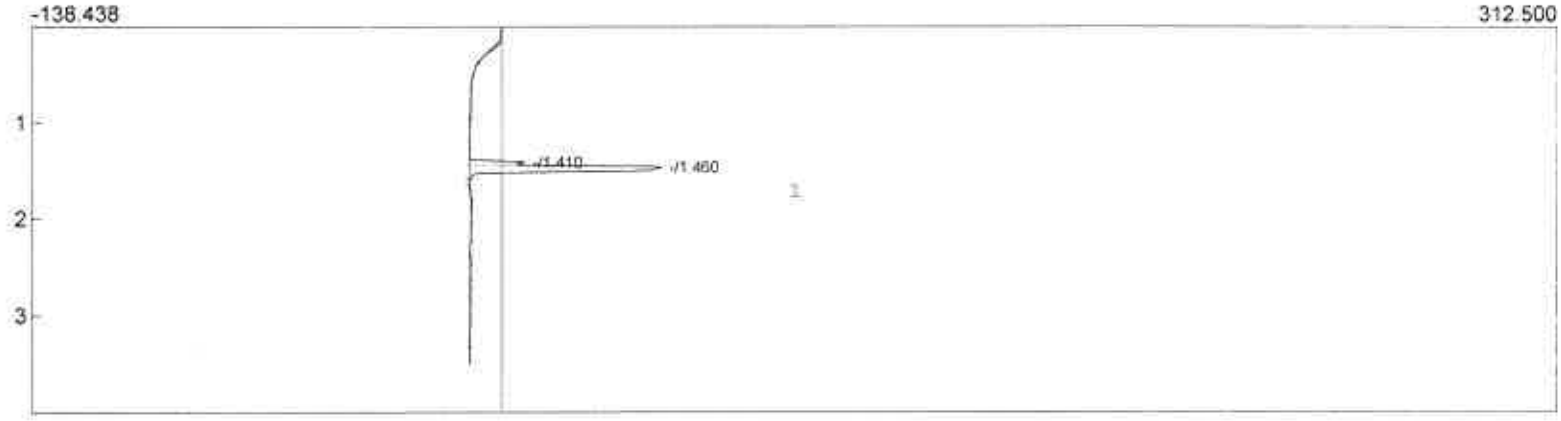
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 10:07:16
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_670.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.410	38.0144	16.664	0.0000	
-	1.460	223.1398	56.943	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		261.1542		0.0000	

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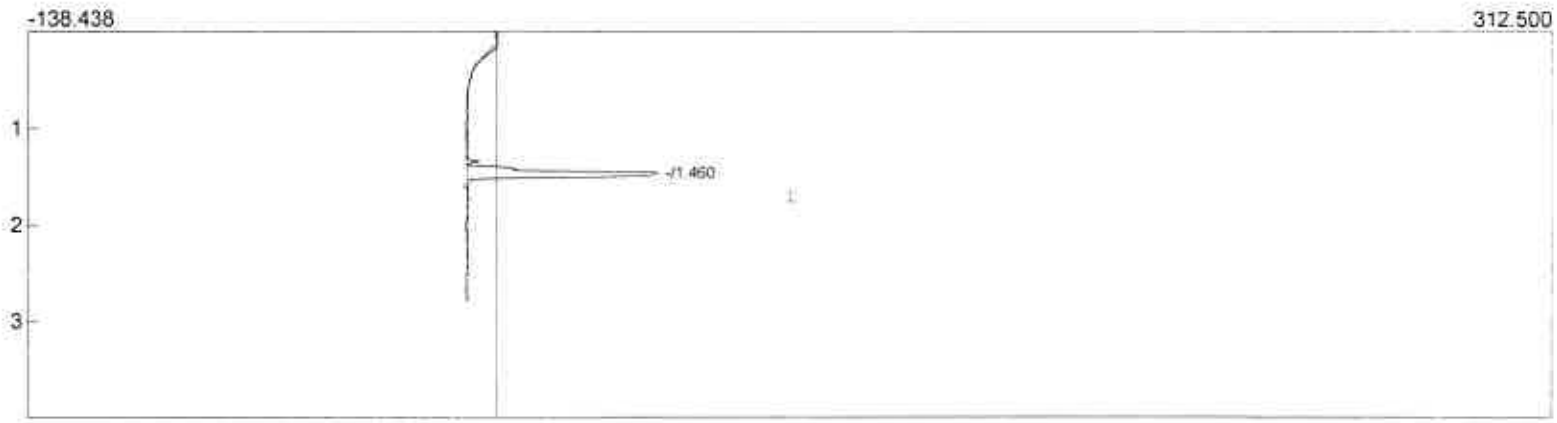
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 10:17:29
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_672.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.460	252.6242	56.506	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		252.6242		0.0000	

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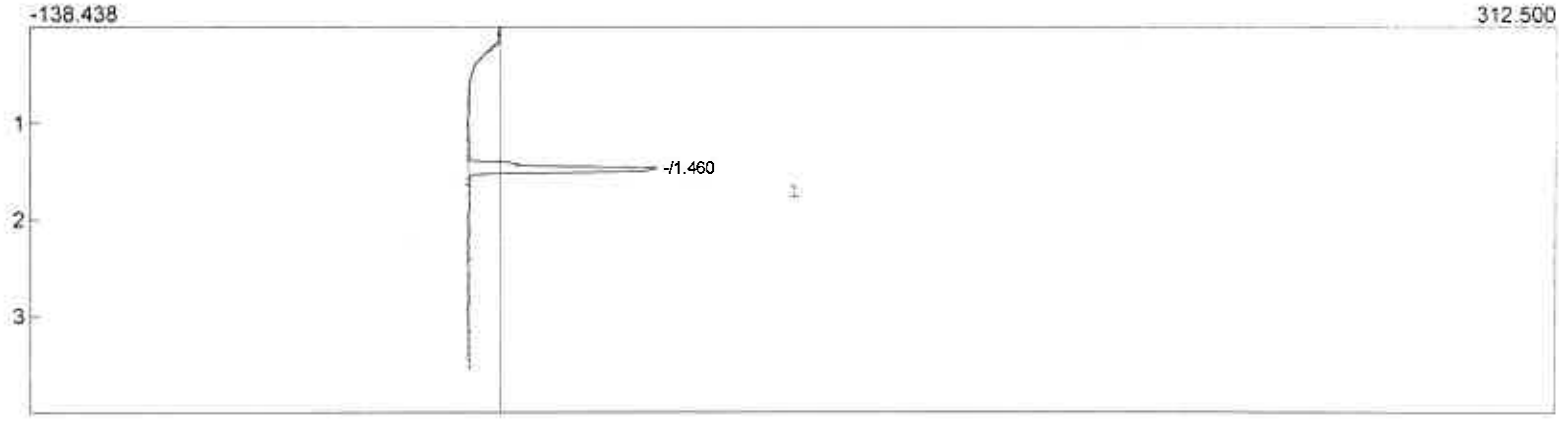
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 10:28:01
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_674.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.460	248.6934	55.695	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		248.6934		0.0000	

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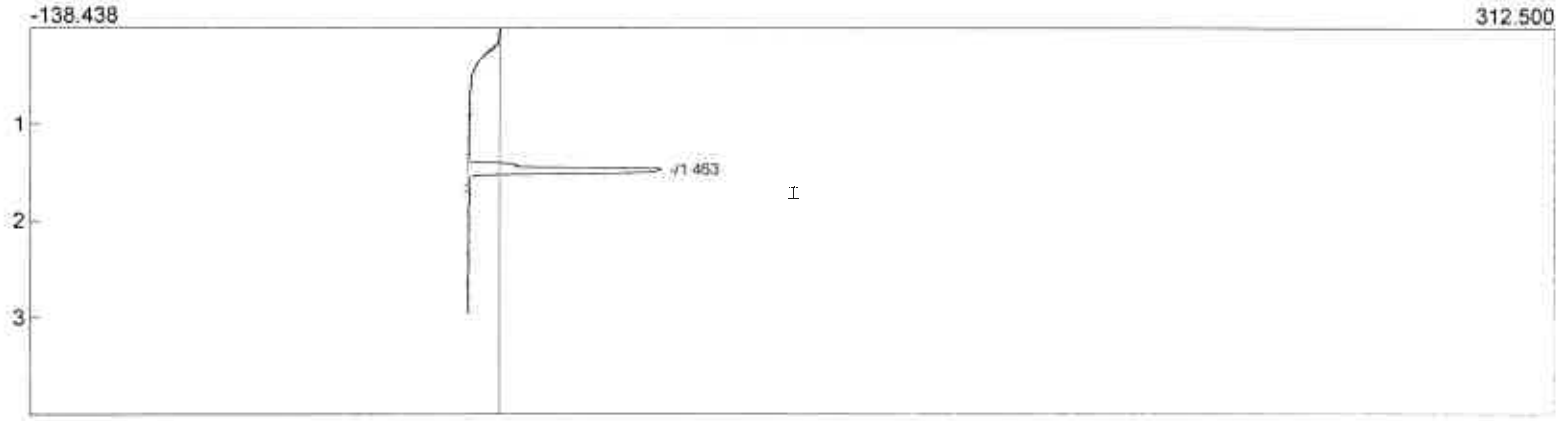
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 10:37:34
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_676.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.463	258.0876	57.200	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		258.0876		0.0000	

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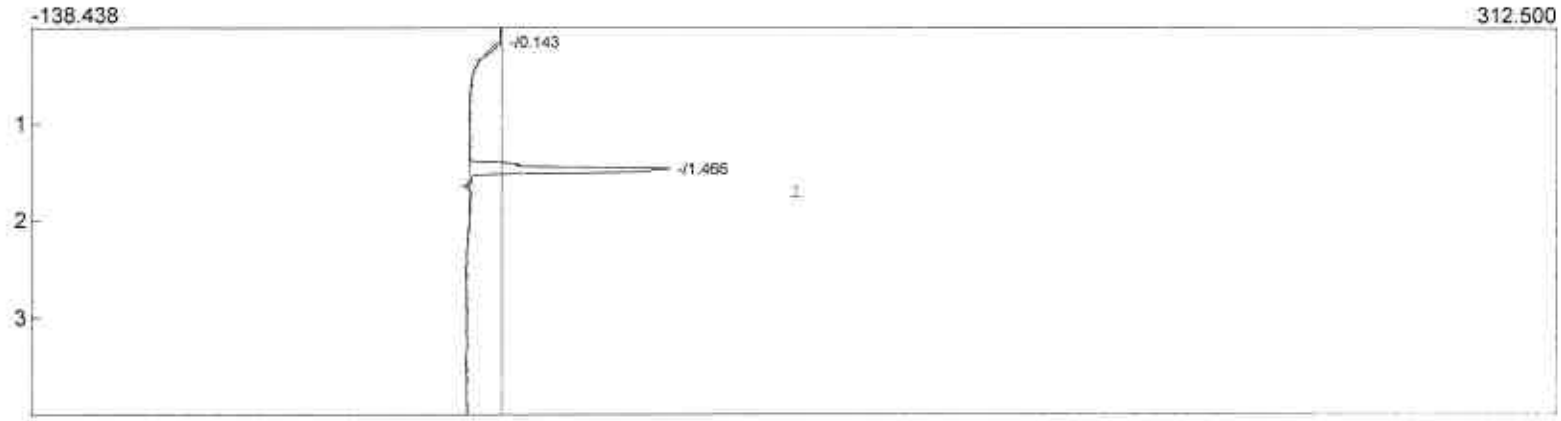
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 10:48:32
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_677.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.143	12.7628	1.320	0.0000	
-	1.466	253.9587	59.384	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		266.7215		0.0000	

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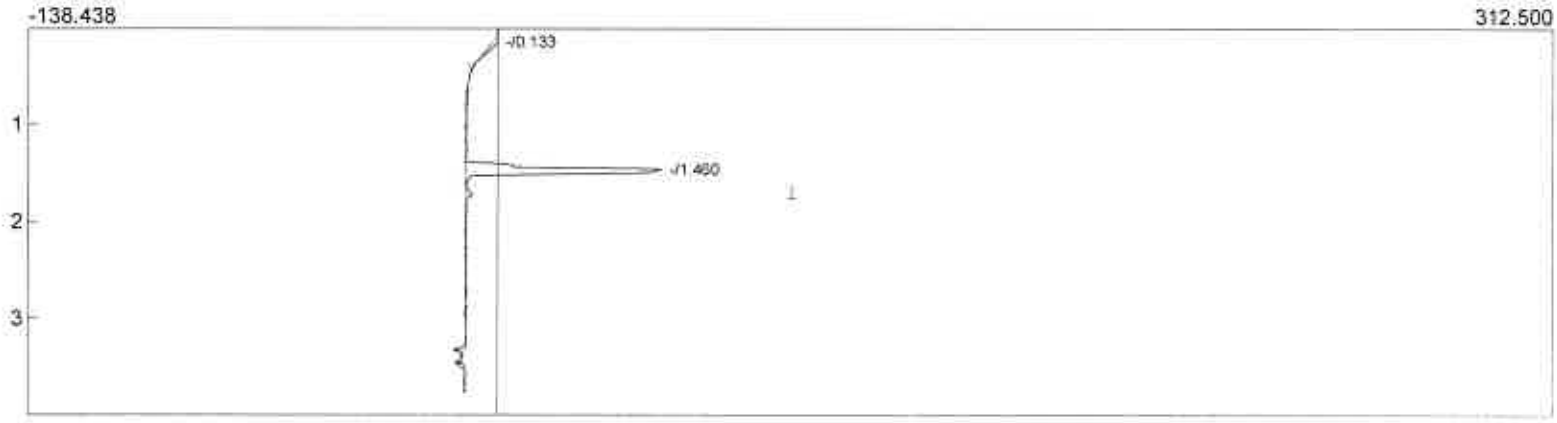
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 10:58:44
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_679.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.133	15.3418	1.399	0.0000	
-	1.460	258.5725	58.007	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		273.9143		0.0000	

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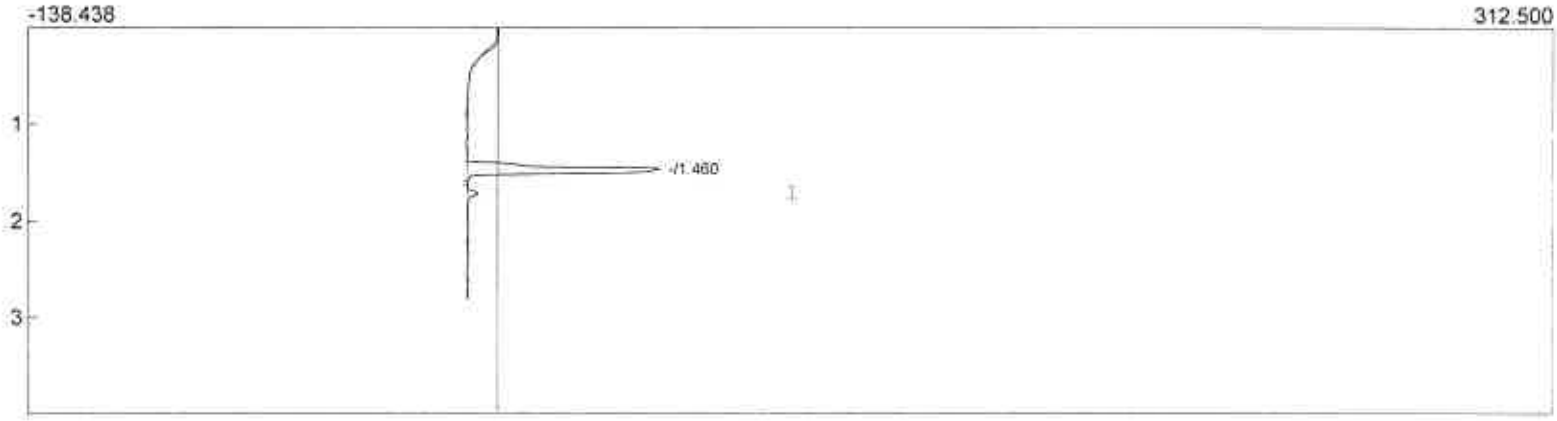
Lab name: SRI Instruments
Client: Valued Customer
Client ID: N2024
Analysis date: 09/08/2016 11:06:51
Method: Syringe Injection
Description: FID-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_681.CHR ()
Sample: RUN1
Comments: TYPE YOUR COMMENTS HERE

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	1.460	262.4036	57.349	0.0000	
Hydrogen Sulfide	0.000	0.0000	0.000	0.0000	
		262.4036		0.0000	

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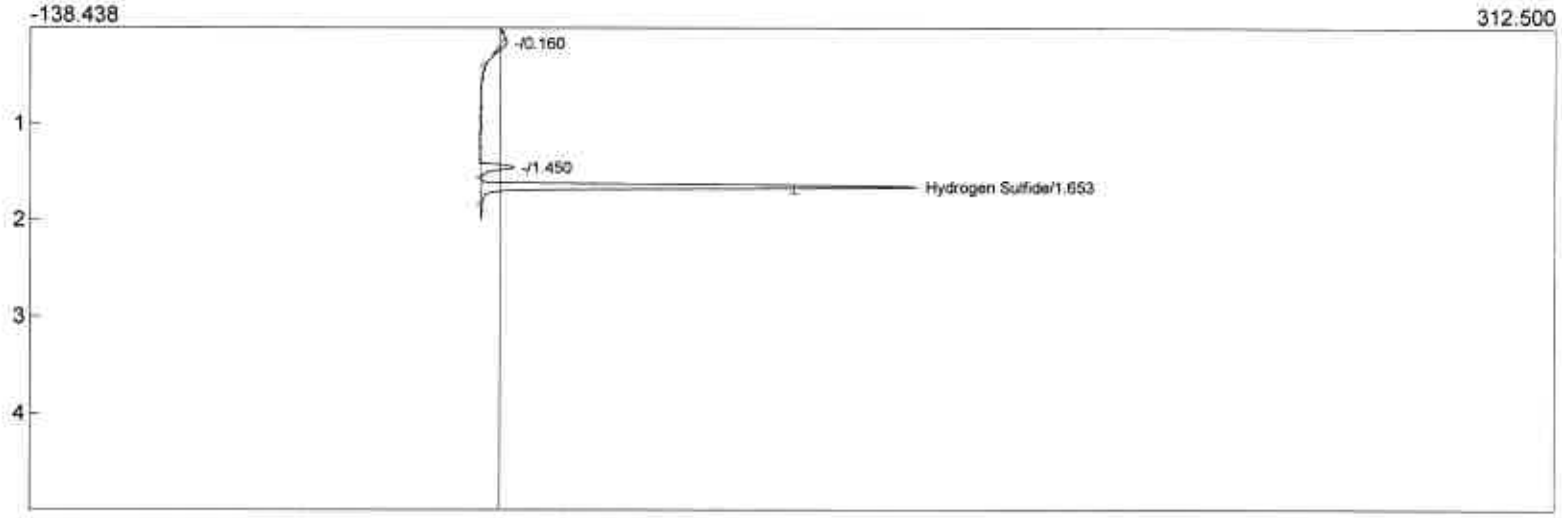
Lab name: Mostardi Platt
Client: ArcelorMittal Burns Harbor
Analysis date: 09/08/2016 11:24:07
Method: Air Sample
Description: FPD-CHANNEL 1
Column: RESTEK 15METER MXT-1
Carrier: HELIUM AT 5 PSI
Integration: Peak sens=95.0 Base sens=60.0 Min area= 10.00 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: ChannelOne 8_23_17_688.CHR ()

Temperature program:

Init temp	Hold	Ramp	Final temp

Events:

Time	Event



Component	Retention	Area	Height	External	Units
-	0.160	13.9987	1.718	0.0000	
-	1.450	39.3121	10.013	0.0000	
Hydrogen Sulfide	1.653	380.2472	129.286	8.3979	
		433.5580		8.3979	

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Arcelor Mittal Burns Harbor, LLC
Burns Harbor, Indiana
Coke Battery No. 2 Underfire Stack
HCl, HCN, and HF Summary

Run	Date	Start Time	End Time	HCl (mg/dscm)	HCN (mg/dscm)	HF (mg/dscm)	DSCFM	HCl (lb/hr)	HCN (lb/hr)	HF (lb/hr)
1	9/7/2016	9:07	11:55	6.13E+00	8.27E-01	4.08E-01	100,594	2.31E+00	3.12E-01	1.54E-01
2	9/7/2016	12:30	15:08	6.32E+00	8.27E-01	3.06E-01	99,696	2.36E+00	3.09E-01	1.14E-01
3	9/8/2016	8:30	11:11	3.14E+00	8.21E-01	3.04E-01	100,278	1.18E+00	3.08E-01	1.14E-01
Test average				**5.20E+00**	**8.25E-01**	**3.39E-01**	**100,189**	**1.95E+00**	**3.10E-01**	**1.27E-01**

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UFO - Run 1

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_008622.LAB	9/7/2016	9:07:41	3.1	< 0.6	0.5	18.7	4.9	190.1	1.000
UFO_008623.LAB	9/7/2016	9:08:41	3.9	< 0.6	0.5	19.1	5.0	190.1	1.000
UFO_008624.LAB	9/7/2016	9:09:42	3.4	< 0.6	0.5	19.3	4.9	190.1	1.002
UFO_008625.LAB	9/7/2016	9:10:42	3.3	< 0.6	0.5	18.9	4.8	190.1	1.001
UFO_008626.LAB	9/7/2016	9:11:42	5.2	< 0.6	0.5	18.5	4.7	190.2	1.001
UFO_008627.LAB	9/7/2016	9:12:42	3.1	< 0.6	0.5	18.6	4.7	190.2	1.000
UFO_008628.LAB	9/7/2016	9:13:42	4.2	< 0.6	0.6	18.5	4.7	190.2	1.001
UFO_008629.LAB	9/7/2016	9:14:42	4.0	< 0.6	0.6	19.2	5.0	190.2	1.002
UFO_008630.LAB	9/7/2016	9:15:42	3.7	< 0.6	0.3	11.2	2.2	190.2	1.001
UFO_008631.LAB	9/7/2016	9:16:42	3.7	< 0.6	0.5	14.0	3.7	190.2	1.001
UFO_008632.LAB	9/7/2016	9:17:42	4.1	< 0.6	0.4	18.0	5.0	190.2	1.002
UFO_008633.LAB	9/7/2016	9:18:43	2.8	< 0.6	0.4	19.2	5.1	190.2	1.001
UFO_008634.LAB	9/7/2016	9:19:43	3.2	< 0.6	0.5	19.8	5.1	190.2	1.000
UFO_008635.LAB	9/7/2016	9:20:43	3.1	< 0.6	0.5	19.5	5.0	190.2	1.003
UFO_008636.LAB	9/7/2016	9:21:43	3.6	< 0.6	0.5	19.5	5.0	190.2	1.002
UFO_008637.LAB	9/7/2016	9:22:43	4.3	< 0.6	0.5	19.4	5.0	190.2	1.001
UFO_008638.LAB	9/7/2016	9:23:43	3.3	< 0.6	0.4	19.4	5.0	190.2	1.000
UFO_008639.LAB	9/7/2016	9:24:43	3.3	< 0.6	0.4	19.3	5.0	190.2	1.000
UFO_008640.LAB	9/7/2016	9:25:43	3.2	0.6	0.4	19.4	5.0	190.2	1.003
UFO_008641.LAB	9/7/2016	9:26:43	3.3	< 0.6	0.4	19.6	5.0	190.2	1.001
UFO_008642.LAB	9/7/2016	9:27:44	3.0	< 0.6	0.4	18.3	4.8	190.2	1.001
UFO_008643.LAB	9/7/2016	9:28:44	3.4	< 0.6	0.5	19.1	5.0	190.2	1.001
UFO_008644.LAB	9/7/2016	9:29:44	3.4	< 0.6	0.5	19.4	5.0	190.1	1.001
UFO_008645.LAB	9/7/2016	9:30:44	3.0	0.6	0.5	19.2	4.9	190.2	1.001
UFO_008646.LAB	9/7/2016	9:31:44	3.3	< 0.6	0.4	19.5	5.0	190.2	1.000
UFO_008647.LAB	9/7/2016	9:32:44	3.1	< 0.6	0.5	19.5	5.0	190.1	1.000
UFO_008648.LAB	9/7/2016	9:33:44	3.4	0.6	0.4	19.5	5.0	190.1	1.003
UFO_008649.LAB	9/7/2016	9:34:44	4.9	< 0.6	0.5	19.3	4.9	190.1	1.001
UFO_008650.LAB	9/7/2016	9:35:44	4.3	< 0.6	< 0.3	11.0	2.0	190.2	1.003
UFO_008651.LAB	9/7/2016	9:36:45	4.3	< 0.6	0.4	14.4	3.8	190.2	1.002
UFO_008652.LAB	9/7/2016	9:37:45	3.0	< 0.6	0.4	17.9	5.0	190.1	1.002
UFO_008653.LAB	9/7/2016	9:38:45	2.7	< 0.6	0.3	18.6	5.0	190.1	1.003
UFO_008654.LAB	9/7/2016	9:39:45	2.9	< 0.6	0.3	19.5	5.0	190.1	1.001
UFO_008655.LAB	9/7/2016	9:40:45	2.6	< 0.6	< 0.3	19.6	5.1	190.1	1.001
UFO_008656.LAB	9/7/2016	9:41:45	3.1	< 0.6	0.4	19.7	5.1	190.1	1.003
UFO_008657.LAB	9/7/2016	9:42:45	3.7	< 0.6	< 0.3	19.9	5.0	190.1	1.000
UFO_008658.LAB	9/7/2016	9:43:45	3.6	< 0.6	0.3	19.3	5.0	190.1	1.002
UFO_008659.LAB	9/7/2016	9:44:45	3.1	< 0.6	0.4	19.6	5.0	190.1	1.002
UFO_008660.LAB	9/7/2016	9:45:46	3.2	< 0.6	0.4	19.5	5.0	190.1	1.001
UFO_008661.LAB	9/7/2016	9:46:46	3.0	< 0.6	0.4	19.5	5.0	190.2	1.002
UFO_008662.LAB	9/7/2016	9:47:46	3.3	< 0.6	0.4	18.4	4.9	190.1	1.001
UFO_008663.LAB	9/7/2016	9:48:46	2.9	< 0.6	0.4	19.3	5.0	190.1	1.002
UFO_008664.LAB	9/7/2016	9:49:46	3.4	< 0.6	0.4	18.9	4.9	190.1	1.002
UFO_008665.LAB	9/7/2016	9:50:46	5.1	< 0.6	0.4	18.3	4.6	190.1	1.001
UFO_008666.LAB	9/7/2016	9:51:46	3.6	< 0.6	0.4	18.6	4.7	190.0	1.003
UFO_008667.LAB	9/7/2016	9:52:46	2.8	< 0.6	0.4	18.8	4.9	190.0	1.002
UFO_008668.LAB	9/7/2016	9:53:47	3.4	< 0.6	0.3	19.0	4.8	190.1	1.003
UFO_008669.LAB	9/7/2016	9:54:47	4.1	< 0.6	0.4	19.1	4.9	190.1	1.002
UFO_008670.LAB	9/7/2016	9:55:47	2.7	< 0.6	< 0.3	10.5	1.9	190.1	1.004
UFO_008671.LAB	9/7/2016	9:56:47	3.2	< 0.6	< 0.3	14.5	3.8	190.1	1.001
UFO_008672.LAB	9/7/2016	9:57:47	4.4	< 0.6	0.3	17.7	4.9	190.1	1.001
UFO_008673.LAB	9/7/2016	9:58:47	2.5	< 0.6	< 0.3	18.9	4.9	190.1	1.001
UFO_008674.LAB	9/7/2016	9:59:47	3.1	< 0.6	0.4	18.7	4.9	190.1	1.003
UFO_008675.LAB	9/7/2016	10:00:47	3.2	< 0.6	0.3	19.2	4.9	190.1	1.001
UFO_008676.LAB	9/7/2016	10:01:47	2.6	< 0.6	0.3	18.7	4.8	190.1	1.001
UFO_008677.LAB	9/7/2016	10:02:48	3.0	< 0.6	< 0.3	19.0	4.8	190.1	1.002
UFO_008678.LAB	9/7/2016	10:03:48	3.9	< 0.6	0.4	18.9	4.9	190.0	1.001
UFO_008679.LAB	9/7/2016	10:04:48	3.0	< 0.6	0.3	18.6	4.8	190.0	1.002
UFO_008680.LAB	9/7/2016	10:05:48	3.6	0.6	< 0.3	18.8	4.8	190.0	1.002
UFO_008681.LAB	9/7/2016	10:06:48	2.9	0.7	0.3	19.1	4.9	190.0	1.002
UFO_008682.LAB	9/7/2016	10:07:48	3.2	< 0.6	< 0.3	18.5	4.9	190.1	1.003
UFO_008683.LAB	9/7/2016	10:08:48	2.7	< 0.6	0.3	18.9	4.9	190.1	1.003
UFO_008684.LAB	9/7/2016	10:09:48	3.8	0.6	< 0.3	19.1	4.8	190.0	1.001
UFO_008685.LAB	9/7/2016	10:10:48	3.2	< 0.6	0.4	18.9	4.8	190.1	1.002
UFO_008686.LAB	9/7/2016	10:11:49	3.1	< 0.6	0.3	18.8	4.9	190.1	1.002
UFO_008687.LAB	9/7/2016	10:12:49	3.6	< 0.6	0.4	19.0	4.9	190.1	1.002
UFO_008688.LAB	9/7/2016	10:13:49	2.8	0.7	0.3	18.7	4.9	190.1	1.001
UFO_008689.LAB	9/7/2016	10:14:49	3.8	0.6	0.4	19.0	4.9	190.1	1.001

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UFO - Run 1

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_008690.LAB	9/7/2016	10:15:49	2.5	< 0.6	< 0.3	10.2	1.8	190.1	1.002
UFO_008691.LAB	9/7/2016	10:16:49	4.4	< 0.6	< 0.3	14.9	4.0	190.1	1.002
UFO_008692.LAB	9/7/2016	10:17:49	2.7	< 0.6	< 0.3	17.9	4.9	190.1	1.001
UFO_008693.LAB	9/7/2016	10:18:49	2.8	< 0.6	< 0.3	18.9	5.0	190.1	1.002
UFO_008694.LAB	9/7/2016	10:19:49	3.3	< 0.6	< 0.3	19.2	4.9	190.1	1.002
UFO_008695.LAB	9/7/2016	10:20:50	3.2	< 0.6	< 0.3	19.3	4.9	190.1	1.001
UFO_008696.LAB	9/7/2016	10:21:50	3.6	< 0.6	0.4	19.4	5.0	190.1	1.001
UFO_008697.LAB	9/7/2016	10:22:50	3.5	< 0.6	0.4	19.1	4.9	190.1	1.000
UFO_008698.LAB	9/7/2016	10:23:50	2.9	< 0.6	< 0.3	19.1	4.9	190.1	1.001
UFO_008699.LAB	9/7/2016	10:24:50	3.0	< 0.6	0.3	19.2	5.0	190.0	1.002
UFO_008700.LAB	9/7/2016	10:25:50	3.9	< 0.6	< 0.3	18.6	4.8	190.0	1.002
UFO_008701.LAB	9/7/2016	10:26:50	3.4	< 0.6	< 0.3	18.7	4.7	190.0	1.002
UFO_008702.LAB	9/7/2016	10:27:50	2.8	< 0.6	< 0.3	17.6	4.7	190.0	1.003
UFO_008703.LAB	9/7/2016	10:28:50	3.3	< 0.6	0.4	19.0	4.9	190.0	1.000
UFO_008704.LAB	9/7/2016	10:29:51	4.1	< 0.6	0.4	19.0	4.9	190.1	1.000
UFO_008705.LAB	9/7/2016	10:30:51	3.0	< 0.6	< 0.3	18.8	4.8	190.1	1.000
UFO_008706.LAB	9/7/2016	10:31:51	3.0	< 0.6	0.3	18.9	4.9	190.0	1.000
UFO_008707.LAB	9/7/2016	10:32:51	3.5	< 0.6	0.3	18.8	4.9	190.1	1.000
UFO_008708.LAB	9/7/2016	10:33:51	3.6	< 0.6	0.3	19.1	4.9	190.2	1.001
UFO_008709.LAB	9/7/2016	10:34:51	2.8	< 0.6	0.3	19.0	4.9	190.2	1.001
UFO_008710.LAB	9/7/2016	10:35:51	2.8	< 0.6	< 0.3	10.1	1.7	190.1	1.003
UFO_008711.LAB	9/7/2016	10:36:51	3.9	< 0.6	< 0.3	15.0	4.1	190.1	1.000
UFO_008712.LAB	9/7/2016	10:37:51	3.7	< 0.6	0.4	17.6	4.9	190.1	1.001
UFO_008713.LAB	9/7/2016	10:38:52	2.6	< 0.6	0.4	19.0	5.0	190.1	1.002
UFO_008714.LAB	9/7/2016	10:39:52	2.7	< 0.6	0.4	19.1	5.0	190.2	1.000
UFO_008715.LAB	9/7/2016	10:40:52	3.0	0.6	< 0.3	19.1	5.0	190.2	1.002
UFO_008716.LAB	9/7/2016	10:41:52	3.0	< 0.6	0.4	19.0	4.9	190.1	1.000
UFO_008717.LAB	9/7/2016	10:42:52	3.1	0.7	< 0.3	18.8	4.9	190.2	1.001
UFO_008718.LAB	9/7/2016	10:43:52	3.4	0.7	0.3	18.9	4.9	190.2	1.004
UFO_008719.LAB	9/7/2016	10:44:52	4.3	< 0.6	0.4	19.1	4.9	190.2	1.000
UFO_008720.LAB	9/7/2016	10:45:52	3.1	0.8	0.3	19.0	4.9	190.2	1.002
UFO_008721.LAB	9/7/2016	10:46:52	3.3	< 0.6	< 0.3	18.8	4.8	190.2	1.002
UFO_008722.LAB	9/7/2016	10:47:53	3.1	< 0.6	0.3	18.0	4.8	190.2	1.003
UFO_008723.LAB	9/7/2016	10:48:53	3.0	< 0.6	< 0.3	19.0	5.0	190.1	1.002
UFO_008724.LAB	9/7/2016	10:49:53	3.6	< 0.6	0.3	19.0	4.9	190.2	1.001
UFO_008725.LAB	9/7/2016	10:50:53	3.8	< 0.6	0.4	18.9	4.9	190.2	1.001
UFO_008726.LAB	9/7/2016	10:51:53	3.0	< 0.6	0.3	19.1	4.9	190.1	1.002
UFO_008727.LAB	9/7/2016	10:52:53	3.1	< 0.6	0.3	19.3	5.0	190.2	1.002
UFO_008728.LAB	9/7/2016	10:53:53	4.1	0.7	0.4	19.1	4.9	190.1	1.002
UFO_008729.LAB	9/7/2016	10:54:53	3.1	0.6	< 0.3	19.1	4.9	190.2	1.001
UFO_008730.LAB	9/7/2016	10:55:54	3.2	< 0.6	< 0.3	9.8	1.6	190.2	1.004
UFO_008731.LAB	9/7/2016	10:56:54	3.5	< 0.6	< 0.3	15.6	4.3	190.2	1.000
UFO_008732.LAB	9/7/2016	10:57:54	3.9	< 0.6	0.3	18.3	5.1	190.2	1.002
UFO_008733.LAB	9/7/2016	10:58:59	2.5	< 0.6	< 0.3	19.0	5.0	190.2	1.003
UFO_008734.LAB	9/7/2016	10:59:58	3.1	< 0.6	< 0.3	19.3	5.0	190.2	1.001
UFO_008735.LAB	9/7/2016	11:00:58	3.0	< 0.6	0.3	19.4	5.0	190.1	1.002
UFO_008736.LAB	9/7/2016	11:01:58	3.3	< 0.6	< 0.3	19.0	4.9	190.1	1.001
UFO_008737.LAB	9/7/2016	11:02:59	3.0	< 0.6	< 0.3	18.8	4.9	190.1	1.002
UFO_008738.LAB	9/7/2016	11:03:59	3.4	< 0.6	0.3	18.6	4.9	190.2	1.002
UFO_008739.LAB	9/7/2016	11:04:58	2.7	< 0.6	< 0.3	19.5	5.0	190.2	1.001
UFO_008740.LAB	9/7/2016	11:05:58	2.9	< 0.6	0.4	18.8	4.8	190.2	1.001
UFO_008741.LAB	9/7/2016	11:07:07	3.0	< 0.6	0.3	18.7	4.8	190.2	1.002
UFO_008742.LAB	9/7/2016	11:08:12	3.0	< 0.6	< 0.3	18.4	4.9	190.2	1.001
UFO_008743.LAB	9/7/2016	11:09:10	2.8	< 0.6	< 0.3	18.8	4.9	190.2	1.002
UFO_008744.LAB	9/7/2016	11:10:10	3.7	< 0.6	0.3	19.2	4.9	190.2	1.000
UFO_008745.LAB	9/7/2016	11:11:10	2.8	< 0.6	< 0.3	19.3	5.0	190.2	1.002
UFO_008746.LAB	9/7/2016	11:12:10	3.6	< 0.6	0.3	19.4	5.0	190.1	1.003
UFO_008747.LAB	9/7/2016	11:13:11	4.2	< 0.6	0.3	19.2	5.0	190.2	1.002
UFO_008748.LAB	9/7/2016	11:14:11	2.8	< 0.6	0.3	19.3	4.9	190.2	1.002
UFO_008749.LAB	9/7/2016	11:15:11	2.8	< 0.6	< 0.3	18.1	4.4	190.1	1.001
UFO_008750.LAB	9/7/2016	11:16:11	3.3	< 0.6	< 0.3	9.4	1.6	190.1	1.002
UFO_008751.LAB	9/7/2016	11:17:11	4.2	< 0.6	< 0.3	17.0	4.7	190.1	1.001
UFO_008752.LAB	9/7/2016	11:18:11	2.6	< 0.6	< 0.3	18.5	5.0	190.1	1.002
UFO_008753.LAB	9/7/2016	11:19:12	2.4	< 0.6	< 0.3	18.9	5.0	190.1	1.002
UFO_008754.LAB	9/7/2016	11:20:11	3.3	< 0.6	0.3	19.3	4.9	190.1	1.002
UFO_008755.LAB	9/7/2016	11:21:12	2.7	< 0.6	< 0.3	19.0	4.9	190.1	1.001
UFO_008756.LAB	9/7/2016	11:22:12	3.3	0.6	0.3	19.2	5.0	190.2	1.001
UFO_008757.LAB	9/7/2016	11:23:12	2.9	< 0.6	< 0.3	19.1	5.0	190.1	1.001

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Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_008758.LAB	9/7/2016	11:24:12	4.0	< 0.6	0.4	19.0	4.9	190.1	1.001
UFO_008759.LAB	9/7/2016	11:25:12	3.7	< 0.6	0.3	18.8	4.9	190.1	1.002
UFO_008760.LAB	9/7/2016	11:26:12	3.1	< 0.6	< 0.3	19.2	4.9	190.1	1.001
UFO_008761.LAB	9/7/2016	11:27:12	3.2	< 0.6	< 0.3	18.5	4.8	190.2	0.999
UFO_008762.LAB	9/7/2016	11:28:12	3.5	< 0.6	< 0.3	18.3	4.9	190.1	1.001
UFO_008763.LAB	9/7/2016	11:29:12	3.2	< 0.6	< 0.3	19.1	4.9	190.1	1.002
UFO_008764.LAB	9/7/2016	11:30:13	2.9	< 0.6	< 0.3	18.7	4.8	190.1	1.001
UFO_008765.LAB	9/7/2016	11:31:13	3.3	0.6	0.3	18.8	4.9	190.2	1.001
UFO_008766.LAB	9/7/2016	11:32:13	3.7	< 0.6	< 0.3	19.1	4.9	190.1	1.001
UFO_008767.LAB	9/7/2016	11:33:13	2.6	< 0.6	< 0.3	19.0	4.9	190.1	1.001
UFO_008768.LAB	9/7/2016	11:34:13	2.9	< 0.6	0.4	19.0	4.8	190.1	1.002
UFO_008769.LAB	9/7/2016	11:35:13	2.8	< 0.6	0.4	17.6	4.3	190.1	1.001
UFO_008770.LAB	9/7/2016	11:36:13	4.6	< 0.6	< 0.3	9.4	1.7	190.1	1.002
UFO_008771.LAB	9/7/2016	11:37:13	2.6	< 0.6	< 0.3	17.1	4.8	190.1	1.000
UFO_008772.LAB	9/7/2016	11:38:13	3.2	< 0.6	< 0.3	19.0	5.0	190.1	1.002
UFO_008773.LAB	9/7/2016	11:39:13	3.0	< 0.6	0.3	19.3	5.0	190.2	1.001
UFO_008774.LAB	9/7/2016	11:40:14	3.1	< 0.6	< 0.3	18.9	4.9	190.2	1.002
UFO_008775.LAB	9/7/2016	11:41:14	3.0	< 0.6	< 0.3	19.1	4.9	190.1	1.002
UFO_008776.LAB	9/7/2016	11:42:14	3.2	< 0.6	0.3	19.1	5.0	190.1	1.002
UFO_008777.LAB	9/7/2016	11:43:14	3.9	< 0.6	< 0.3	19.3	4.9	190.1	1.003
UFO_008778.LAB	9/7/2016	11:44:14	3.1	< 0.6	0.3	18.7	4.9	190.1	1.001
UFO_008779.LAB	9/7/2016	11:45:14	3.4	< 0.6	< 0.3	19.2	4.9	190.2	1.003
UFO_008780.LAB	9/7/2016	11:46:14	4.0	< 0.6	0.3	19.3	5.0	190.1	1.001
UFO_008781.LAB	9/7/2016	11:47:14	3.0	< 0.6	0.3	18.7	4.8	190.2	1.003
UFO_008782.LAB	9/7/2016	11:48:15	3.0	< 0.6	< 0.3	18.9	4.9	190.1	1.001
UFO_008783.LAB	9/7/2016	11:49:15	4.2	< 0.6	0.4	19.3	4.9	190.1	1.001
UFO_008784.LAB	9/7/2016	11:50:15	3.2	< 0.6	< 0.3	18.7	4.8	190.1	1.002
UFO_008785.LAB	9/7/2016	11:51:15	3.5	< 0.6	0.3	18.8	4.9	190.1	1.001
UFO_008786.LAB	9/7/2016	11:52:15	3.1	< 0.6	0.3	19.0	4.9	190.1	1.002
UFO_008787.LAB	9/7/2016	11:53:15	2.7	< 0.6	0.4	18.9	4.9	190.1	1.002
UFO_008788.LAB	9/7/2016	11:54:15	3.6	< 0.6	< 0.3	19.1	4.8	190.1	1.002
UFO_008789.LAB	9/7/2016	11:55:15	3.1	0.6	< 0.3	17.2	4.1	190.1	1.000
9/7/2016 - UFO Run 1 9:07 - 11:55	Minimum		2.4	< 0.6	< 0.3	9.4	1.6		
	Maximum		5.2	0.8	0.6	19.9	5.1		
	Average*		3.3	0.6	0.4	18.4	4.7		

*When calculating averages, any value less than the determined detection limit will be assigned the detection limit value.

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UFO - Run 2

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_008851.LAB	9/7/2016	12:30:39	4.1	< 0.6	< 0.3	19.6	5.0	190.1	1.002
UFO_008852.LAB	9/7/2016	12:31:39	2.9	< 0.6	0.3	19.2	4.9	190.1	1.001
UFO_008853.LAB	9/7/2016	12:32:39	3.5	< 0.6	0.4	19.1	4.9	190.1	1.001
UFO_008854.LAB	9/7/2016	12:33:39	3.6	0.7	0.3	19.2	4.9	190.1	1.001
UFO_008855.LAB	9/7/2016	12:34:39	2.9	< 0.6	0.3	19.3	5.0	190.1	1.001
UFO_008856.LAB	9/7/2016	12:35:39	2.8	< 0.6	< 0.3	11.8	2.3	190.1	1.001
UFO_008857.LAB	9/7/2016	12:36:39	4.6	< 0.6	< 0.3	13.8	3.6	190.1	0.998
UFO_008858.LAB	9/7/2016	12:37:39	2.8	< 0.6	0.3	18.4	5.0	190.1	0.998
UFO_008859.LAB	9/7/2016	12:38:40	3.6	< 0.6	0.4	18.7	5.0	190.1	1.000
UFO_008860.LAB	9/7/2016	12:39:40	2.6	< 0.6	< 0.3	19.3	5.0	190.1	1.000
UFO_008861.LAB	9/7/2016	12:40:40	2.5	< 0.6	0.3	19.3	5.0	190.0	1.001
UFO_008862.LAB	9/7/2016	12:41:40	3.0	< 0.6	0.4	19.6	5.0	190.0	1.001
UFO_008863.LAB	9/7/2016	12:42:40	3.1	< 0.6	< 0.3	19.1	4.9	190.1	1.001
UFO_008864.LAB	9/7/2016	12:43:40	3.2	< 0.6	< 0.3	19.3	4.9	190.1	1.000
UFO_008865.LAB	9/7/2016	12:44:40	3.2	< 0.6	0.3	19.4	4.9	190.1	1.000
UFO_008866.LAB	9/7/2016	12:45:40	3.3	< 0.6	< 0.3	19.3	5.0	190.1	0.999
UFO_008867.LAB	9/7/2016	12:46:40	3.4	0.7	0.3	19.1	4.9	190.1	1.001
UFO_008868.LAB	9/7/2016	12:47:41	5.9	< 0.6	0.3	18.1	4.8	190.1	1.000
UFO_008869.LAB	9/7/2016	12:48:41	3.2	< 0.6	< 0.3	18.9	4.9	190.1	1.001
UFO_008870.LAB	9/7/2016	12:49:41	3.3	< 0.6	< 0.3	18.9	4.9	190.1	1.003
UFO_008871.LAB	9/7/2016	12:50:41	4.7	< 0.6	< 0.3	19.3	5.0	190.1	1.002
UFO_008872.LAB	9/7/2016	12:51:41	3.0	< 0.6	0.3	19.5	5.0	190.1	1.000
UFO_008873.LAB	9/7/2016	12:52:41	2.6	< 0.6	< 0.3	19.1	4.9	190.0	1.001
UFO_008874.LAB	9/7/2016	12:53:41	4.9	< 0.6	< 0.3	19.3	4.9	190.1	1.000
UFO_008875.LAB	9/7/2016	12:54:41	2.9	< 0.6	0.3	19.2	4.9	190.1	1.002
UFO_008876.LAB	9/7/2016	12:55:41	2.7	< 0.6	< 0.3	11.2	2.2	190.1	1.002
UFO_008877.LAB	9/7/2016	12:56:42	3.4	< 0.6	< 0.3	14.1	3.7	190.1	1.001
UFO_008878.LAB	9/7/2016	12:57:42	3.5	< 0.6	0.3	18.2	4.9	190.2	1.000
UFO_008879.LAB	9/7/2016	12:58:42	4.6	< 0.6	0.3	18.9	5.0	190.1	1.002
UFO_008880.LAB	9/7/2016	12:59:42	2.4	< 0.6	< 0.3	18.7	5.0	190.1	1.001
UFO_008881.LAB	9/7/2016	13:00:42	2.7	< 0.6	< 0.3	18.9	4.9	190.1	1.001
UFO_008882.LAB	9/7/2016	13:01:42	3.4	< 0.6	< 0.3	18.8	4.9	190.1	0.999
UFO_008883.LAB	9/7/2016	13:02:42	3.3	< 0.6	0.3	19.5	5.0	190.1	1.001
UFO_008884.LAB	9/7/2016	13:03:42	3.0	< 0.6	0.3	19.5	5.0	190.1	1.000
UFO_008885.LAB	9/7/2016	13:04:43	3.2	< 0.6	0.4	19.5	5.0	190.1	1.002
UFO_008886.LAB	9/7/2016	13:05:43	3.3	< 0.6	0.3	19.2	4.9	190.1	1.002
UFO_008887.LAB	9/7/2016	13:06:43	4.3	< 0.6	0.3	19.2	4.9	190.1	1.002
UFO_008888.LAB	9/7/2016	13:07:43	3.0	< 0.6	< 0.3	18.7	4.9	190.1	1.003
UFO_008889.LAB	9/7/2016	13:08:43	3.0	< 0.6	< 0.3	19.2	5.0	190.1	1.002
UFO_008890.LAB	9/7/2016	13:09:43	2.9	< 0.6	< 0.3	19.2	5.0	190.1	0.999
UFO_008891.LAB	9/7/2016	13:10:43	2.9	< 0.6	< 0.3	19.1	5.0	190.1	1.002
UFO_008892.LAB	9/7/2016	13:11:43	2.8	< 0.6	< 0.3	18.5	4.7	190.1	1.001
UFO_008893.LAB	9/7/2016	13:12:44	2.9	< 0.6	< 0.3	18.6	4.8	190.1	1.001
UFO_008894.LAB	9/7/2016	13:13:44	3.0	< 0.6	< 0.3	18.9	4.8	190.1	0.999
UFO_008895.LAB	9/7/2016	13:14:44	3.0	< 0.6	< 0.3	18.8	4.9	190.1	1.000
UFO_008896.LAB	9/7/2016	13:15:44	3.3	< 0.6	< 0.3	10.8	2.0	190.1	1.002
UFO_008897.LAB	9/7/2016	13:16:44	3.7	< 0.6	< 0.3	14.1	3.7	190.1	1.001
UFO_008898.LAB	9/7/2016	13:17:44	6.2	< 0.6	0.3	18.2	5.0	190.2	1.000
UFO_008899.LAB	9/7/2016	13:18:44	3.9	< 0.6	0.3	18.8	5.1	190.1	1.000
UFO_008900.LAB	9/7/2016	13:19:44	2.5	< 0.6	0.3	19.0	5.1	190.1	1.001
UFO_008901.LAB	9/7/2016	13:20:45	2.8	< 0.6	0.3	19.3	5.0	190.1	1.001
UFO_008902.LAB	9/7/2016	13:21:45	3.1	< 0.6	0.4	19.2	5.0	190.1	1.001
UFO_008903.LAB	9/7/2016	13:22:45	3.2	< 0.6	< 0.3	19.6	5.0	190.1	0.999
UFO_008904.LAB	9/7/2016	13:23:45	3.6	< 0.6	0.4	19.6	5.0	190.1	0.999
UFO_008905.LAB	9/7/2016	13:24:45	2.8	< 0.6	0.3	19.7	5.1	190.1	0.999
UFO_008906.LAB	9/7/2016	13:25:45	3.7	< 0.6	0.3	19.6	5.1	190.1	1.001
UFO_008907.LAB	9/7/2016	13:26:45	3.2	0.6	< 0.3	19.1	4.9	190.1	1.001
UFO_008908.LAB	9/7/2016	13:27:45	3.1	< 0.6	< 0.3	18.1	4.8	190.1	1.001
UFO_008909.LAB	9/7/2016	13:28:45	2.8	< 0.6	0.3	19.0	5.0	190.1	0.999
UFO_008910.LAB	9/7/2016	13:29:46	2.9	< 0.6	0.3	19.1	5.0	190.1	1.000
UFO_008911.LAB	9/7/2016	13:30:46	2.5	0.6	< 0.3	19.5	5.1	190.1	1.000
UFO_008912.LAB	9/7/2016	13:31:46	2.8	< 0.6	< 0.3	19.4	5.1	190.1	1.002
UFO_008913.LAB	9/7/2016	13:32:46	2.7	< 0.6	< 0.3	19.3	5.0	190.1	1.001
UFO_008914.LAB	9/7/2016	13:33:46	2.7	< 0.6	< 0.3	19.3	5.0	190.1	1.001
UFO_008915.LAB	9/7/2016	13:34:46	2.6	< 0.6	0.3	19.3	5.0	190.1	1.000
UFO_008916.LAB	9/7/2016	13:35:46	3.6	< 0.6	< 0.3	10.8	2.0	190.1	1.003
UFO_008917.LAB	9/7/2016	13:36:46	6.8	< 0.6	0.3	15.0	4.0	190.1	0.999
UFO_008918.LAB	9/7/2016	13:37:46	3.0	< 0.6	0.3	18.6	5.1	190.1	1.001

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UFO - Run 2

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_008919.LAB	9/7/2016	13:38:47	5.2	< 0.6	0.3	18.8	5.1	190.1	1.002
UFO_008920.LAB	9/7/2016	13:39:47	2.7	< 0.6	< 0.3	19.1	5.0	190.1	1.001
UFO_008921.LAB	9/7/2016	13:40:47	2.8	< 0.6	< 0.3	19.2	5.0	190.1	0.999
UFO_008922.LAB	9/7/2016	13:41:47	2.6	< 0.6	< 0.3	19.2	5.1	190.1	1.002
UFO_008923.LAB	9/7/2016	13:42:47	2.5	< 0.6	0.3	19.0	5.0	190.1	0.999
UFO_008924.LAB	9/7/2016	13:43:47	2.9	< 0.6	0.4	19.6	5.1	190.1	0.998
UFO_008925.LAB	9/7/2016	13:44:47	3.5	< 0.6	0.3	19.3	5.1	190.1	0.999
UFO_008926.LAB	9/7/2016	13:45:47	3.0	< 0.6	0.3	19.3	5.0	190.1	1.001
UFO_008927.LAB	9/7/2016	13:46:48	3.1	< 0.6	< 0.3	19.3	5.0	190.1	1.000
UFO_008928.LAB	9/7/2016	13:47:48	2.9	< 0.6	< 0.3	17.9	4.9	190.1	1.000
UFO_008929.LAB	9/7/2016	13:48:48	3.3	< 0.6	0.4	19.0	5.0	190.1	1.001
UFO_008930.LAB	9/7/2016	13:49:48	4.6	< 0.6	0.4	19.1	5.0	190.1	1.002
UFO_008931.LAB	9/7/2016	13:50:48	2.7	< 0.6	< 0.3	18.9	4.9	190.1	1.000
UFO_008932.LAB	9/7/2016	13:51:48	2.8	< 0.6	< 0.3	19.0	4.9	190.1	1.001
UFO_008933.LAB	9/7/2016	13:52:48	3.3	< 0.6	0.3	19.3	5.0	190.2	1.000
UFO_008934.LAB	9/7/2016	13:53:48	3.4	< 0.6	< 0.3	19.3	5.0	190.1	1.002
UFO_008935.LAB	9/7/2016	13:54:48	3.3	< 0.6	0.3	19.3	5.0	190.2	1.000
UFO_008936.LAB	9/7/2016	13:55:49	5.8	< 0.6	< 0.3	10.5	1.9	190.2	1.000
UFO_008937.LAB	9/7/2016	13:56:49	3.7	< 0.6	< 0.3	15.1	4.1	190.2	0.999
UFO_008938.LAB	9/7/2016	13:57:49	4.5	< 0.6	0.4	18.5	5.1	190.2	1.001
UFO_008939.LAB	9/7/2016	13:58:49	3.0	< 0.6	0.3	18.8	5.1	190.2	0.998
UFO_008940.LAB	9/7/2016	13:59:49	2.7	< 0.6	0.3	18.9	5.1	190.1	0.998
UFO_008941.LAB	9/7/2016	14:00:49	2.7	< 0.6	0.3	19.1	5.0	190.2	0.999
UFO_008942.LAB	9/7/2016	14:01:49	2.7	< 0.6	0.3	18.9	5.0	190.2	1.000
UFO_008943.LAB	9/7/2016	14:02:49	3.0	< 0.6	< 0.3	18.8	4.9	190.2	0.999
UFO_008944.LAB	9/7/2016	14:03:50	3.4	< 0.6	0.3	19.2	5.0	190.2	1.001
UFO_008945.LAB	9/7/2016	14:04:50	3.7	< 0.6	0.4	19.1	5.0	190.2	1.000
UFO_008946.LAB	9/7/2016	14:05:50	2.9	< 0.6	0.4	19.0	5.0	190.2	1.000
UFO_008947.LAB	9/7/2016	14:06:50	3.2	< 0.6	0.3	19.2	4.9	190.2	0.999
UFO_008948.LAB	9/7/2016	14:07:50	3.2	< 0.6	0.4	17.7	4.8	190.2	1.000
UFO_008949.LAB	9/7/2016	14:08:50	3.3	< 0.6	0.3	18.9	5.0	190.2	1.000
UFO_008950.LAB	9/7/2016	14:09:50	3.4	< 0.6	0.4	18.9	4.9	190.2	1.001
UFO_008951.LAB	9/7/2016	14:10:51	3.3	< 0.6	0.4	18.8	4.9	190.2	1.000
UFO_008952.LAB	9/7/2016	14:11:50	3.6	< 0.6	< 0.3	18.7	4.9	190.2	1.001
UFO_008953.LAB	9/7/2016	14:12:51	3.7	< 0.6	0.3	18.7	4.8	190.1	0.999
UFO_008954.LAB	9/7/2016	14:13:51	3.6	< 0.6	0.3	18.8	4.9	190.1	0.999
UFO_008955.LAB	9/7/2016	14:14:51	3.6	< 0.6	0.4	18.8	4.9	190.1	0.998
UFO_008956.LAB	9/7/2016	14:15:51	3.0	< 0.6	< 0.3	9.7	1.8	190.1	1.001
UFO_008957.LAB	9/7/2016	14:16:51	3.6	< 0.6	< 0.3	15.5	4.1	190.1	0.997
UFO_008958.LAB	9/7/2016	14:17:51	3.5	< 0.6	0.4	18.6	5.0	190.1	1.000
UFO_008959.LAB	9/7/2016	14:18:51	3.4	< 0.6	0.3	18.9	5.1	190.1	1.002
UFO_008960.LAB	9/7/2016	14:19:51	3.7	< 0.6	0.4	18.7	5.1	190.1	0.999
UFO_008961.LAB	9/7/2016	14:20:52	3.2	< 0.6	0.4	19.3	5.1	190.1	0.998
UFO_008962.LAB	9/7/2016	14:21:52	2.8	< 0.6	< 0.3	19.0	5.0	190.1	0.998
UFO_008963.LAB	9/7/2016	14:22:52	2.7	< 0.6	< 0.3	19.1	5.1	190.1	0.998
UFO_008964.LAB	9/7/2016	14:23:52	2.8	< 0.6	< 0.3	19.0	5.0	190.1	0.999
UFO_008965.LAB	9/7/2016	14:24:52	2.7	< 0.6	< 0.3	19.1	5.0	190.1	0.999
UFO_008966.LAB	9/7/2016	14:25:52	2.7	< 0.6	< 0.3	19.0	5.0	190.1	1.001
UFO_008967.LAB	9/7/2016	14:26:52	3.0	< 0.6	< 0.3	19.2	5.0	190.1	1.000
UFO_008968.LAB	9/7/2016	14:27:52	3.2	< 0.6	0.4	18.3	4.9	190.1	1.001
UFO_008969.LAB	9/7/2016	14:28:53	3.3	< 0.6	0.5	19.1	5.0	190.1	1.000
UFO_008970.LAB	9/7/2016	14:29:53	3.1	0.7	0.4	19.0	5.0	190.1	1.000
UFO_008971.LAB	9/7/2016	14:30:53	2.9	< 0.6	0.4	19.1	5.0	190.1	0.999
UFO_008972.LAB	9/7/2016	14:31:53	2.9	< 0.6	0.3	19.0	5.0	190.1	0.999
UFO_008973.LAB	9/7/2016	14:32:53	2.9	< 0.6	< 0.3	18.9	5.0	190.1	1.000
UFO_008974.LAB	9/7/2016	14:33:53	2.9	< 0.6	0.4	18.9	5.0	190.1	1.000
UFO_008975.LAB	9/7/2016	14:34:53	2.9	< 0.6	< 0.3	17.0	4.7	190.1	1.001
UFO_008976.LAB	9/7/2016	14:35:53	3.2	< 0.6	< 0.3	9.0	1.7	190.1	0.999
UFO_008977.LAB	9/7/2016	14:36:54	3.4	< 0.6	< 0.3	14.1	4.1	190.1	0.997
UFO_008978.LAB	9/7/2016	14:37:54	3.2	< 0.6	< 0.3	17.7	5.1	190.1	0.997
UFO_008979.LAB	9/7/2016	14:38:54	3.2	< 0.6	0.3	18.6	5.1	190.1	0.999
UFO_008980.LAB	9/7/2016	14:39:54	2.8	< 0.6	0.4	18.6	5.0	190.2	0.999
UFO_008981.LAB	9/7/2016	14:40:54	2.4	< 0.6	< 0.3	18.9	5.1	190.1	1.000
UFO_008982.LAB	9/7/2016	14:41:54	2.3	< 0.6	< 0.3	19.1	5.1	190.1	1.000
UFO_008983.LAB	9/7/2016	14:42:54	2.5	< 0.6	< 0.3	19.1	5.1	190.2	1.001
UFO_008984.LAB	9/7/2016	14:43:54	2.4	< 0.6	0.4	19.0	5.0	190.1	1.000
UFO_008985.LAB	9/7/2016	14:44:54	2.6	< 0.6	< 0.3	19.0	5.0	190.1	0.999
UFO_008986.LAB	9/7/2016	14:45:55	3.3	< 0.6	< 0.3	19.3	5.0	190.1	0.997

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UFO - Run 2

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_008987.LAB	9/7/2016	14:46:55	5.3	< 0.6	0.4	19.4	5.0	190.1	0.999
UFO_008988.LAB	9/7/2016	14:47:55	3.9	< 0.6	< 0.3	18.5	4.9	190.1	0.999
UFO_008989.LAB	9/7/2016	14:48:55	9.4	< 0.6	0.5	19.0	5.1	190.1	1.000
UFO_008990.LAB	9/7/2016	14:49:55	6.9	< 0.6	0.4	19.1	5.1	190.1	0.999
UFO_008991.LAB	9/7/2016	14:50:55	2.9	< 0.6	0.3	19.2	5.1	190.2	0.999
UFO_008992.LAB	9/7/2016	14:51:55	2.6	< 0.6	0.3	19.3	5.1	190.1	1.000
UFO_008993.LAB	9/7/2016	14:52:55	2.7	< 0.6	< 0.3	19.4	5.1	190.1	0.997
UFO_008994.LAB	9/7/2016	14:53:56	2.8	< 0.6	0.3	18.8	5.0	190.1	0.999
UFO_008995.LAB	9/7/2016	14:54:56	2.9	< 0.6	0.4	19.0	5.0	190.1	0.998
UFO_008996.LAB	9/7/2016	14:55:56	3.7	< 0.6	< 0.3	9.5	1.6	190.1	0.999
UFO_008997.LAB	9/7/2016	14:56:56	5.9	< 0.6	< 0.3	16.2	4.6	190.1	0.997
UFO_008998.LAB	9/7/2016	14:57:56	8.6	< 0.6	0.4	18.6	5.3	190.1	1.000
UFO_008999.LAB	9/7/2016	14:58:56	2.8	< 0.6	< 0.3	18.9	5.3	190.1	0.998
UFO_009000.LAB	9/7/2016	14:59:56	2.4	< 0.6	< 0.3	19.2	5.3	190.1	0.998
UFO_009001.LAB	9/7/2016	15:00:56	2.6	< 0.6	< 0.3	19.1	5.2	190.1	0.998
UFO_009002.LAB	9/7/2016	15:01:57	2.6	< 0.6	< 0.3	19.3	5.3	190.1	0.998
UFO_009003.LAB	9/7/2016	15:02:57	5.1	< 0.6	0.5	19.7	5.1	190.1	0.999
UFO_009004.LAB	9/7/2016	15:03:57	3.8	< 0.6	0.3	19.0	5.1	190.2	0.998
UFO_009005.LAB	9/7/2016	15:04:57	4.5	< 0.6	< 0.3	19.1	5.1	190.1	0.999
UFO_009006.LAB	9/7/2016	15:05:57	5.7	0.7	0.3	19.1	5.1	190.1	0.998
UFO_009007.LAB	9/7/2016	15:06:57	5.6	< 0.6	0.4	19.4	5.1	190.2	0.999
UFO_009008.LAB	9/7/2016	15:07:57	3.6	< 0.6	< 0.3	18.9	5.1	190.1	0.999
UFO_009009.LAB	9/7/2016	15:08:57	4.5	< 0.6	< 0.3	19.1	5.1	190.1	0.999
9/7/2016 - UFO Run 2 12:30 - 15:08	Minimum		2.3	< 0.6	< 0.3	9.0	1.6		
	Maximum		9.4	0.7	0.5	19.7	5.3		
	Average*		3.4	0.6	0.3	18.4	4.8		

*When calculating averages, any value less than the determined detection limit will be assigned the detection limit value.

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UFO - Run 3

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_009662.LAB	9/8/2016	8:30:39	1.7	0.7	< 0.3	19.0	4.9	190.2	0.999
UFO_009663.LAB	9/8/2016	8:31:39	1.8	< 0.6	< 0.3	18.8	4.8	190.2	0.999
UFO_009664.LAB	9/8/2016	8:32:39	1.9	< 0.6	< 0.3	18.9	4.8	190.2	0.998
UFO_009665.LAB	9/8/2016	8:33:39	2.1	0.7	0.3	18.9	4.9	190.2	0.996
UFO_009666.LAB	9/8/2016	8:34:39	3.2	0.7	< 0.3	18.8	4.8	190.2	0.998
UFO_009667.LAB	9/8/2016	8:35:39	3.1	< 0.6	< 0.3	11.6	2.3	190.2	1.000
UFO_009668.LAB	9/8/2016	8:36:39	2.1	< 0.6	< 0.3	12.6	3.5	190.2	0.996
UFO_009669.LAB	9/8/2016	8:37:40	1.2	0.6	< 0.3	16.9	4.8	190.2	0.999
UFO_009670.LAB	9/8/2016	8:38:40	1.8	< 0.6	< 0.3	19.0	4.8	190.2	0.997
UFO_009671.LAB	9/8/2016	8:39:40	1.4	0.7	< 0.3	18.5	4.8	190.2	0.998
UFO_009672.LAB	9/8/2016	8:40:40	1.3	0.7	< 0.3	18.4	4.8	190.2	0.998
UFO_009673.LAB	9/8/2016	8:41:40	1.5	0.6	< 0.3	18.5	4.8	190.2	0.999
UFO_009674.LAB	9/8/2016	8:42:40	1.4	< 0.6	< 0.3	18.6	4.8	190.2	0.998
UFO_009675.LAB	9/8/2016	8:43:40	1.4	< 0.6	< 0.3	18.7	4.8	190.2	0.998
UFO_009676.LAB	9/8/2016	8:44:40	1.6	0.8	0.3	18.2	4.7	190.2	0.998
UFO_009677.LAB	9/8/2016	8:45:40	1.9	0.7	< 0.3	18.0	4.7	190.2	0.998
UFO_009678.LAB	9/8/2016	8:46:41	1.4	0.7	< 0.3	17.9	4.6	190.2	0.999
UFO_009679.LAB	9/8/2016	8:47:41	1.5	0.7	< 0.3	16.9	4.6	190.2	0.999
UFO_009680.LAB	9/8/2016	8:48:41	1.5	0.7	< 0.3	18.0	4.8	190.2	0.997
UFO_009681.LAB	9/8/2016	8:49:41	1.5	0.6	< 0.3	18.3	4.7	190.2	0.999
UFO_009682.LAB	9/8/2016	8:50:41	1.5	0.7	< 0.3	18.5	4.8	190.2	0.996
UFO_009683.LAB	9/8/2016	8:51:41	1.5	0.7	< 0.3	18.5	4.8	190.2	0.998
UFO_009684.LAB	9/8/2016	8:52:41	1.7	0.9	< 0.3	18.4	4.7	190.2	0.999
UFO_009685.LAB	9/8/2016	8:53:41	1.9	0.6	0.3	18.6	4.8	190.2	1.000
UFO_009686.LAB	9/8/2016	8:54:41	2.2	< 0.6	< 0.3	18.4	4.7	190.2	0.997
UFO_009687.LAB	9/8/2016	8:55:42	2.6	< 0.6	< 0.3	10.9	2.1	190.2	0.999
UFO_009688.LAB	9/8/2016	8:56:42	1.8	< 0.6	< 0.3	13.0	3.6	190.2	0.998
UFO_009689.LAB	9/8/2016	8:57:42	1.8	< 0.6	< 0.3	17.7	4.8	190.2	0.997
UFO_009690.LAB	9/8/2016	8:58:42	1.5	< 0.6	< 0.3	18.3	4.9	190.2	0.999
UFO_009691.LAB	9/8/2016	8:59:42	2.3	< 0.6	0.3	18.9	4.8	190.2	0.998
UFO_009692.LAB	9/8/2016	9:00:42	1.4	0.6	< 0.3	18.2	4.8	190.2	0.998
UFO_009693.LAB	9/8/2016	9:01:42	1.5	< 0.6	< 0.3	18.3	4.8	190.2	0.998
UFO_009694.LAB	9/8/2016	9:02:43	1.6	< 0.6	< 0.3	18.5	4.8	190.2	0.999
UFO_009695.LAB	9/8/2016	9:03:43	1.6	0.7	< 0.3	18.5	4.7	190.2	1.000
UFO_009696.LAB	9/8/2016	9:04:43	1.7	0.7	< 0.3	18.5	4.8	190.2	0.998
UFO_009697.LAB	9/8/2016	9:05:43	2.0	< 0.6	< 0.3	18.4	4.7	190.2	1.000
UFO_009698.LAB	9/8/2016	9:06:43	1.4	0.6	< 0.3	18.1	4.7	190.2	0.999
UFO_009699.LAB	9/8/2016	9:07:43	2.0	0.8	< 0.3	16.5	4.6	190.2	0.998
UFO_009700.LAB	9/8/2016	9:08:43	1.4	0.7	< 0.3	17.6	4.8	190.2	0.999
UFO_009701.LAB	9/8/2016	9:09:43	1.4	0.6	< 0.3	18.5	4.8	190.2	0.997
UFO_009702.LAB	9/8/2016	9:10:43	1.3	0.6	< 0.3	18.9	4.9	190.1	0.999
UFO_009703.LAB	9/8/2016	9:11:44	1.7	< 0.6	< 0.3	18.7	4.8	190.2	0.999
UFO_009704.LAB	9/8/2016	9:12:44	1.7	< 0.6	< 0.3	18.9	4.9	190.2	0.999
UFO_009705.LAB	9/8/2016	9:13:44	1.4	0.7	< 0.3	18.9	4.9	190.2	0.998
UFO_009706.LAB	9/8/2016	9:14:44	1.5	0.6	< 0.3	18.7	4.8	190.2	0.999
UFO_009707.LAB	9/8/2016	9:15:44	2.6	< 0.6	< 0.3	11.0	2.1	190.2	1.001
UFO_009708.LAB	9/8/2016	9:16:44	1.8	< 0.6	< 0.3	13.4	3.7	190.1	0.997
UFO_009709.LAB	9/8/2016	9:17:44	1.9	0.6	< 0.3	17.9	4.8	190.1	0.997
UFO_009710.LAB	9/8/2016	9:18:44	1.7	< 0.6	< 0.3	18.0	4.6	190.1	0.997
UFO_009711.LAB	9/8/2016	9:19:45	1.4	0.8	< 0.3	17.4	4.6	190.1	1.000
UFO_009712.LAB	9/8/2016	9:20:45	1.2	0.6	< 0.3	18.0	4.7	190.2	1.000
UFO_009713.LAB	9/8/2016	9:21:45	1.5	0.7	< 0.3	18.2	4.7	190.2	1.001
UFO_009714.LAB	9/8/2016	9:22:45	1.3	0.8	< 0.3	18.4	4.7	190.2	1.001
UFO_009715.LAB	9/8/2016	9:23:45	1.3	< 0.6	< 0.3	18.5	4.8	190.2	0.999
UFO_009716.LAB	9/8/2016	9:24:45	1.8	0.6	< 0.3	18.4	4.7	190.2	0.998
UFO_009717.LAB	9/8/2016	9:25:45	1.4	0.8	< 0.3	18.4	4.8	190.2	0.999
UFO_009718.LAB	9/8/2016	9:26:45	1.4	0.6	< 0.3	18.0	4.6	190.2	0.998
UFO_009719.LAB	9/8/2016	9:27:46	1.8	0.8	< 0.3	16.8	4.5	190.2	1.000
UFO_009720.LAB	9/8/2016	9:28:46	2.2	< 0.6	< 0.3	17.9	4.8	190.2	0.999
UFO_009721.LAB	9/8/2016	9:29:46	1.5	0.7	< 0.3	18.3	4.7	190.1	0.999
UFO_009722.LAB	9/8/2016	9:30:46	1.5	0.8	< 0.3	18.3	4.7	190.2	1.000
UFO_009723.LAB	9/8/2016	9:31:46	1.6	< 0.6	0.3	18.6	4.8	190.2	1.000
UFO_009724.LAB	9/8/2016	9:32:46	2.0	0.6	< 0.3	18.8	4.8	190.2	1.000
UFO_009725.LAB	9/8/2016	9:33:46	1.7	0.6	0.3	18.9	4.9	190.2	0.999
UFO_009726.LAB	9/8/2016	9:34:46	1.7	0.9	< 0.3	18.8	4.8	190.2	0.997
UFO_009727.LAB	9/8/2016	9:35:46	2.5	< 0.6	< 0.3	10.6	2.0	190.2	0.998
UFO_009728.LAB	9/8/2016	9:36:47	2.5	< 0.6	< 0.3	13.7	3.9	190.2	0.998
UFO_009729.LAB	9/8/2016	9:37:47	2.2	< 0.6	< 0.3	18.2	4.8	190.2	0.999

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UFO - Run 3

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_009730.LAB	9/8/2016	9:38:47	1.7	< 0.6	< 0.3	18.2	4.9	190.2	1.000
UFO_009731.LAB	9/8/2016	9:39:47	2.3	0.6	< 0.3	18.8	4.8	190.2	0.999
UFO_009732.LAB	9/8/2016	9:40:47	1.6	< 0.6	< 0.3	18.5	4.9	190.2	0.999
UFO_009733.LAB	9/8/2016	9:41:47	1.5	< 0.6	< 0.3	18.6	4.9	190.2	0.998
UFO_009734.LAB	9/8/2016	9:42:47	1.6	< 0.6	< 0.3	18.8	4.9	190.2	0.998
UFO_009735.LAB	9/8/2016	9:43:48	1.6	0.7	< 0.3	18.9	4.8	190.2	0.996
UFO_009736.LAB	9/8/2016	9:44:48	1.8	0.7	0.3	18.8	4.8	190.2	0.999
UFO_009737.LAB	9/8/2016	9:45:48	2.0	0.7	< 0.3	18.8	4.8	190.2	1.000
UFO_009738.LAB	9/8/2016	9:46:48	1.7	0.6	< 0.3	18.5	4.7	190.2	0.998
UFO_009739.LAB	9/8/2016	9:47:48	2.0	< 0.6	< 0.3	17.5	4.7	190.2	1.000
UFO_009740.LAB	9/8/2016	9:48:48	2.1	< 0.6	< 0.3	18.4	4.8	190.1	1.000
UFO_009741.LAB	9/8/2016	9:49:48	1.7	< 0.6	< 0.3	18.4	4.8	190.1	0.999
UFO_009742.LAB	9/8/2016	9:50:48	1.8	< 0.6	< 0.3	18.7	4.8	190.1	0.999
UFO_009743.LAB	9/8/2016	9:51:48	1.8	0.7	< 0.3	18.8	4.8	190.2	0.997
UFO_009744.LAB	9/8/2016	9:52:48	1.9	0.7	0.3	18.7	4.8	190.1	1.000
UFO_009745.LAB	9/8/2016	9:53:49	2.4	0.6	< 0.3	18.6	4.8	190.2	1.000
UFO_009746.LAB	9/8/2016	9:54:49	1.9	0.6	< 0.3	18.7	4.8	190.2	0.999
UFO_009747.LAB	9/8/2016	9:55:49	2.2	< 0.6	< 0.3	10.4	1.9	190.1	1.000
UFO_009748.LAB	9/8/2016	9:56:49	2.2	< 0.6	< 0.3	14.1	4.0	190.1	0.998
UFO_009749.LAB	9/8/2016	9:57:49	2.9	< 0.6	< 0.3	18.4	4.8	190.2	0.998
UFO_009750.LAB	9/8/2016	9:58:49	1.6	0.7	< 0.3	18.3	4.9	190.2	0.999
UFO_009751.LAB	9/8/2016	9:59:49	2.2	< 0.6	0.3	18.9	4.9	190.2	0.998
UFO_009752.LAB	9/8/2016	10:00:49	1.5	< 0.6	< 0.3	18.4	4.8	190.2	1.000
UFO_009753.LAB	9/8/2016	10:01:49	1.4	0.6	< 0.3	18.3	4.8	190.2	0.998
UFO_009754.LAB	9/8/2016	10:02:50	1.5	0.7	< 0.3	18.3	4.8	190.2	0.999
UFO_009755.LAB	9/8/2016	10:03:50	1.6	0.6	< 0.3	18.4	4.7	190.2	0.999
UFO_009756.LAB	9/8/2016	10:04:50	1.6	0.6	< 0.3	18.6	4.8	190.3	0.998
UFO_009757.LAB	9/8/2016	10:05:50	1.7	0.7	< 0.3	18.6	4.8	190.2	1.000
UFO_009758.LAB	9/8/2016	10:06:50	2.1	0.7	< 0.3	18.5	4.8	190.2	0.999
UFO_009759.LAB	9/8/2016	10:07:50	1.7	0.7	< 0.3	18.2	4.8	190.2	0.999
UFO_009760.LAB	9/8/2016	10:08:50	1.8	0.8	< 0.3	18.7	4.9	190.2	1.000
UFO_009761.LAB	9/8/2016	10:09:50	1.5	0.6	0.3	18.6	4.8	190.1	0.999
UFO_009762.LAB	9/8/2016	10:10:51	1.6	0.7	< 0.3	18.5	4.7	190.1	1.001
UFO_009763.LAB	9/8/2016	10:11:51	1.8	0.7	0.3	18.7	4.8	190.2	0.999
UFO_009764.LAB	9/8/2016	10:12:51	2.6	0.7	< 0.3	18.6	4.8	190.2	0.999
UFO_009765.LAB	9/8/2016	10:13:51	1.6	0.7	< 0.3	18.9	4.9	190.2	1.000
UFO_009766.LAB	9/8/2016	10:14:51	1.7	0.6	< 0.3	18.8	4.8	190.2	0.999
UFO_009767.LAB	9/8/2016	10:15:51	2.5	< 0.6	< 0.3	10.0	1.8	190.2	0.998
UFO_009768.LAB	9/8/2016	10:16:51	1.8	< 0.6	< 0.3	14.2	4.1	190.2	0.998
UFO_009769.LAB	9/8/2016	10:17:51	2.2	0.7	< 0.3	18.1	4.8	190.2	0.999
UFO_009770.LAB	9/8/2016	10:18:52	1.5	< 0.6	< 0.3	17.9	4.9	190.2	1.001
UFO_009771.LAB	9/8/2016	10:19:52	2.3	< 0.6	0.3	18.9	4.9	190.2	1.001
UFO_009772.LAB	9/8/2016	10:20:52	1.4	0.7	< 0.3	18.5	4.9	190.1	0.999
UFO_009773.LAB	9/8/2016	10:21:52	1.5	0.6	< 0.3	18.7	4.9	190.1	0.998
UFO_009774.LAB	9/8/2016	10:22:52	1.4	< 0.6	< 0.3	18.6	4.8	190.1	0.999
UFO_009775.LAB	9/8/2016	10:23:52	1.4	< 0.6	< 0.3	18.4	4.8	190.2	1.000
UFO_009776.LAB	9/8/2016	10:24:52	1.4	< 0.6	< 0.3	18.7	4.9	190.3	0.999
UFO_009777.LAB	9/8/2016	10:25:52	1.4	0.6	< 0.3	18.8	4.9	190.2	0.998
UFO_009778.LAB	9/8/2016	10:26:53	1.5	< 0.6	< 0.3	18.3	4.7	190.2	1.002
UFO_009779.LAB	9/8/2016	10:27:53	1.7	0.7	< 0.3	17.3	4.7	190.2	1.001
UFO_009780.LAB	9/8/2016	10:28:53	1.8	< 0.6	< 0.3	18.3	4.8	190.2	1.000
UFO_009781.LAB	9/8/2016	10:29:53	2.2	0.6	< 0.3	18.6	4.8	190.2	0.998
UFO_009782.LAB	9/8/2016	10:30:53	1.4	< 0.6	< 0.3	18.7	4.8	190.2	1.001
UFO_009783.LAB	9/8/2016	10:31:53	1.6	0.7	< 0.3	18.8	4.8	190.2	1.001
UFO_009784.LAB	9/8/2016	10:32:53	1.7	0.6	0.3	18.9	4.9	190.2	0.999
UFO_009785.LAB	9/8/2016	10:33:53	1.6	0.6	< 0.3	18.7	4.8	190.2	0.999
UFO_009786.LAB	9/8/2016	10:34:54	1.8	< 0.6	< 0.3	19.0	4.9	190.2	1.000
UFO_009787.LAB	9/8/2016	10:35:54	2.7	< 0.6	< 0.3	9.9	1.7	190.2	1.000
UFO_009788.LAB	9/8/2016	10:36:54	1.4	< 0.6	< 0.3	14.5	4.2	190.2	0.999
UFO_009789.LAB	9/8/2016	10:37:54	2.2	0.7	< 0.3	18.3	4.8	190.2	1.000
UFO_009790.LAB	9/8/2016	10:38:54	1.2	0.7	< 0.3	18.4	5.0	190.2	1.001
UFO_009791.LAB	9/8/2016	10:39:54	2.0	0.6	< 0.3	18.9	4.8	190.2	0.999
UFO_009792.LAB	9/8/2016	10:40:54	1.5	0.7	< 0.3	18.6	4.9	190.2	0.998
UFO_009793.LAB	9/8/2016	10:41:54	1.4	< 0.6	< 0.3	18.4	4.8	190.2	1.000
UFO_009794.LAB	9/8/2016	10:42:55	1.3	0.6	< 0.3	18.5	4.8	190.2	1.000
UFO_009795.LAB	9/8/2016	10:43:55	1.7	0.8	< 0.3	18.9	4.9	190.2	0.998
UFO_009796.LAB	9/8/2016	10:44:55	1.4	0.7	< 0.3	18.8	4.9	190.2	0.999
UFO_009797.LAB	9/8/2016	10:45:55	1.8	0.6	< 0.3	18.7	4.8	190.2	1.000

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UFO - Run 3

Spectrum	Date	Time	HCl (ppmv wet)	HCN (ppmv wet)	HF (ppmv wet)	H2O (%v)	CO2 (%v wet)	FTIR Gas Cell Temp (C)	Pressure (Atm)
UFO_009798.LAB	9/8/2016	10:46:55	1.5	0.6	< 0.3	18.4	4.7	190.2	1.001
UFO_009799.LAB	9/8/2016	10:47:55	1.7	0.7	< 0.3	17.5	4.7	190.2	0.998
UFO_009800.LAB	9/8/2016	10:48:55	1.8	0.7	< 0.3	18.3	4.8	190.2	0.999
UFO_009801.LAB	9/8/2016	10:49:56	1.4	0.7	< 0.3	18.4	4.8	190.2	1.000
UFO_009802.LAB	9/8/2016	10:50:56	1.5	0.6	< 0.3	18.5	4.8	190.2	1.000
UFO_009803.LAB	9/8/2016	10:51:56	1.6	0.6	< 0.3	18.7	4.8	190.2	0.999
UFO_009804.LAB	9/8/2016	10:52:56	1.7	< 0.6	0.3	18.9	4.9	190.2	0.999
UFO_009805.LAB	9/8/2016	10:53:56	2.2	< 0.6	< 0.3	18.8	4.8	190.2	1.001
UFO_009806.LAB	9/8/2016	10:54:56	1.6	0.8	< 0.3	18.8	4.8	190.2	1.002
UFO_009807.LAB	9/8/2016	10:55:56	2.0	< 0.6	< 0.3	9.7	1.6	190.2	1.000
UFO_009808.LAB	9/8/2016	10:56:56	2.0	0.6	< 0.3	15.3	4.4	190.2	0.999
UFO_009809.LAB	9/8/2016	10:57:57	2.2	< 0.6	< 0.3	18.6	4.9	190.2	0.999
UFO_009810.LAB	9/8/2016	10:58:57	1.6	0.6	< 0.3	18.9	5.0	190.2	0.999
UFO_009811.LAB	9/8/2016	10:59:57	1.6	0.7	< 0.3	18.7	4.9	190.1	0.999
UFO_009812.LAB	9/8/2016	11:00:57	1.3	< 0.6	< 0.3	18.6	4.9	190.2	0.999
UFO_009813.LAB	9/8/2016	11:01:57	1.5	0.7	< 0.3	18.7	4.8	190.2	0.999
UFO_009814.LAB	9/8/2016	11:02:57	1.6	0.8	< 0.3	18.7	4.8	190.2	1.000
UFO_009815.LAB	9/8/2016	11:03:57	1.7	0.6	< 0.3	18.9	4.9	190.2	1.001
UFO_009816.LAB	9/8/2016	11:04:57	1.8	< 0.6	< 0.3	18.9	4.9	190.2	0.997
UFO_009817.LAB	9/8/2016	11:05:58	1.5	0.7	< 0.3	18.7	4.8	190.2	0.998
UFO_009818.LAB	9/8/2016	11:06:58	1.6	< 0.6	< 0.3	18.7	4.8	190.2	0.998
UFO_009819.LAB	9/8/2016	11:07:58	1.6	< 0.6	< 0.3	18.9	4.9	190.2	0.999
UFO_009820.LAB	9/8/2016	11:08:58	1.6	< 0.6	< 0.3	18.7	4.8	190.2	1.000
UFO_009821.LAB	9/8/2016	11:09:58	1.8	< 0.6	< 0.3	18.8	4.8	190.2	0.998
UFO_009822.LAB	9/8/2016	11:10:58	1.8	< 0.6	< 0.3	18.9	4.9	190.2	1.000
9/8/2016 - UFO Run 3 8:30 - 11:10	Minimum		1.2	< 0.6	< 0.3	9.7	1.6		
	Maximum		3.2	0.9	0.3	19.0	5.0		
	Average*		1.7	0.6	0.3	17.8	4.6		

*When calculating averages, any value less than the determined detection limit will be assigned the detection limit value.

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Client:	ArcelorMittal Burns Harbor, LLC		
Facility:	Burns Harbor, Indiana		
Test Location:	Coke Battery No. 2 Underfire Stack		
Project #:	M162810		
Test Method:	0010/23		
Test Engineer:	CSE		
Test Technician:	BM		
lb/mmBtu Emissions by:			
Type of Fuel Firing:	Other		
	R1	**R2**	**R3**
Heat Input, mmBtu/hr:			
Temp ID:	CM3	CM3	CM3
Meter ID:	CM3	CM3	CM3
Pitot ID:	123	123	123
Filter ID:	Unweighed	Unweighed HP	Unweighed HP
Filter Pre-Weight (grams):	N/A	N/A	N/A
Nozzle Diameter (Inches):	0.500	0.500	0.500
Meter Calibration Date:	8/4/2016	8/4/2016	8/4/2016
Meter Calibration Factor (Y):	1.016	1.016	1.016
Meter Orifice Setting (Delta H):	1.525	1.525	1.525
Nozzle Kit ID Number and Material:		0	0
Pitot Tube Coefficient:	0.840		
Probe Length (Feet):	12.0		
Probe Liner Material:	Glass		
Sample Plane:	Horizontal		
Port Length (Inches):	50.00		
Port Size (Diameter, Inches):	6.00		
Port Type:	Flange		
Duct Shape:	Circular		
Diameter (Feet):	14.5		
Duct Area (Square Feet):	165.130		
Upstream Diameters:	> 0.5		
Downstream Diameters:	> 2.0		
Number of Ports Sampled:	4		
Number of Points per Port:	6		
Minutes per Point:	8.0		
Minutes per Reading:	4.0		
Total Number of Traverse Points:	24		
Test Length (Minutes):	192		
Train Type:	Hot Box		
Source Condition:	Normal		
Servomex Serial Number:	0114D01/3791		
Moisture Balance ID:	S10-35		
# of Runs	3		

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Client:	ArcelorMittal Burns Harbor, LLC		
Facility:	Burns Harbor, Indiana		
Test Location:	Coke Battery No. 2 Underfire Stack		
Project #:	M162810		
Test Method:	0010/23		
Test Engineer:	CSE		
Test Technician:	BM		
	R1	**R2**	**R3**
Temp ID:	CM3	CM3	CM3
Meter ID:	CM3	CM3	CM3
Pitot ID:	123	123	123
Nozzle Diameter (Inches):	0.500	0.500	0.500
Meter Calibration Date:	8/4/2016	8/4/2016	8/4/2016
Meter Calibration Factor (Y):	1.016	1.016	1.016
Meter Orifice Setting (Delta H):	1.525	1.525	1.525
Pitot Tube Coefficient:	0.840		
Probe Length (Feet):	12.0		
Probe Liner Material:	Glass		
Sample Plane:	Horizontal		
Port Length (Inches):	50.00		
Port Size (Diameter, Inches):	6.00		
Port Type:	Flange		
Duct Shape:	Circular		
Diameter (Feet):	14.5		
Duct Area (Square Feet):	165.130		
Upstream Diameters:	> 0.5		
Downstream Diameters:	> 2.0		
Number of Ports Sampled:	4		
Number of Points per Port:	6		
Minutes per Point:	8.0		
Minutes per Reading:	4.0		
Total Number of Traverse Points:	24		
Test Length (Minutes):	192		
Train Type:	Hot Box		
Source Condition:	Normal		
Servomex Serial Number:	0114D01/3791		
Moisture Balance ID:	S10-35		
# of Runs	3		

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Run 1-Method 0010/23

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/12/16
Start Time: 11:00
End Time: 14:26

DRY GAS METER CONDITIONS

ΔH:	1.84	in. H_2O
Meter Temperature, Tm:	81.3	°F
Sqrt ΔP:	0.276	in. H_2O
Stack Temperature, Ts:	447.6	°F
Meter Volume, Vm:	160.690	ft^3
Meter Volume, Vmstd:	156.929	dscf
Meter Volume, Vwstd:	32.339	wscf
Isokinetic Variance:	100.3	%I
Test Length:	192.00	in mins.
Nozzle Diameter:	0.500	in inches
Barometric Pressure:	29.35	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	29.31	in. Hg. abs.
Carbon Dioxide:	6.50	%
Oxygen:	8.20	%
Nitrogen:	85.30	%
Gas Weight dry, Md:	29.368	lb/lb mole
Gas Weight wet, Ms:	27.426	lb/lb mole
Excess Air:	57.266	%
Gas Velocity, Vs:	21.088	fps
Volumetric Flow:	208,932	acfm
Volumetric Flow:	98,710	dscfm
Volumetric Flow:	119,051	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2448.3	ml	Silica Initial Wt.	844.1	grams
Final Impinger Content:	3101.2	ml	Silica Final Wt.	877.8	grams
Impinger Difference:	652.9	ml	Silica Difference:	33.7	grams

Total Water Gain: 686.6 Moisture, Bws: 0.171

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	11:00:00	0.09	2.20	62.620	446	74	74	250	249	60
1	11:04:00	0.09	2.20	66.340	455	75	74	248	250	63
2	11:08:00	0.08	1.90	69.670	464	76	74	251	249	65
2	11:12:00	0.08	1.90	73.310	468	76	74	251	249	64
3	11:16:00	0.08	1.90	76.550	427	78	75	251	249	65
3	11:20:00	0.08	1.90	80.150	427	78	75	251	249	65
4	11:24:00	0.08	1.90	83.540	444	79	75	249	249	65
4	11:28:00	0.08	1.90	86.980	444	79	75	249	249	65
5	11:32:00	0.08	1.90	90.290	425	79	76	249	249	65
5	11:36:00	0.08	1.90	93.680	425	79	76	249	249	65
6	11:40:00	0.05	1.20	97.240	430	80	76	250	250	64
6	11:44:00	0.05	1.20	99.900	430	80	76	250	250	64
	11:48:00			102.670						
2-1	11:53:00	0.08	1.90	102.670	438	79	77	250	250	64
1	11:57:00	0.08	1.90	106.140	438	79	77	250	250	64
2	12:01:00	0.08	2.10	109.560	403	81	78	251	249	62
2	12:05:00	0.08	2.10	113.150	403	81	76	251	249	62
3	12:09:00	0.08	1.90	116.690	463	82	78	250	250	63
3	12:13:00	0.08	1.90	119.840	463	82	78	250	250	63
4	12:17:00	0.08	1.90	123.270	480	83	79	250	250	64
4	12:21:00	0.08	1.90	126.710	480	83	79	250	250	64
5	12:25:00	0.07	1.60	130.080	490	83	79	250	250	62
5	12:29:00	0.07	1.60	133.070	490	83	79	250	250	62
6	12:33:00	0.07	1.60	136.190	500	84	80	251	250	63
6	12:37:00	0.07	1.60	139.360	500	84	80	251	250	63
	12:41:00			142.420						
3-1	12:45:00	0.08	2.00	142.420	425	83	81	250	250	63
1	12:49:00	0.08	2.00	145.580	425	83	81	250	250	63
2	12:53:00	0.08	2.00	149.510	417	84	81	250	250	64
2	12:57:00	0.08	2.00	152.980	417	84	81	250	250	64
3	13:01:00	0.08	2.00	156.540	432	86	81	250	250	65
3	13:05:00	0.08	2.00	159.800	432	86	81	250	250	65
4	13:09:00	0.08	1.90	163.350	449	87	82	250	250	65
4	13:13:00	0.08	1.90	166.770	449	87	82	250	250	65
5	13:17:00	0.08	1.90	170.390	442	87	83	250	251	65
5	13:21:00	0.08	1.90	173.610	442	87	83	250	251	65
6	13:25:00	0.08	1.90	177.060	470	87	83	250	254	65
6	13:29:00	0.08	1.90	180.610	470	87	83	250	254	65
	13:33:00			183.870						
4-1	13:38:00	0.08	2.00	183.870	430	85	83	250	249	65
1	13:42:00	0.08	2.00	187.440	430	85	83	250	249	65
2	13:46:00	0.08	1.90	190.750	440	86	84	251	251	64
2	13:50:00	0.08	1.90	194.330	440	86	84	251	251	64
3	13:54:00	0.08	1.90	197.660	459	86	84	249	250	65
3	13:58:00	0.08	1.90	201.110	459	86	84	249	250	65
4	14:02:00	0.08	1.90	204.510	461	86	84	251	250	63
4	14:06:00	0.08	1.90	208.130	461	86	84	250	250	63
5	14:10:00	0.07	1.60	211.550	463	86	84	250	249	63
5	14:14:00	0.07	1.60	214.500	463	86	84	250	249	63
6	14:18:00	0.05	1.20	217.790	418	87	84	250	250	63
6	14:22:00	0.05	1.20	220.510	418	87	84	250	250	63
	14:26:00			223.310						
Total	3:12:00			160.690		82.9	79.8			
Average			1.84		447.6	81.3				
Min			1.20		403.0	74.0				
Max			2.20		500.0	87.0				

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Run 2-Method 0010/23

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/13/16
Start Time: 8:35
End Time: 11:59

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	1.80	in. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	79.3	°F	Flue Pressure (Ps):	29.23	in. Hg. abs.
Sqrt ΔP:	0.271	in. H_2O	Carbon Dioxide:	6.20	%
Stack Temperature, Ts:	440.0	°F	Oxygen:	8.90	%
Meter Volume, Vm:	159.000	ft^3	Nitrogen:	84.9	%
Meter Volume, Vmstd:	155.438	dscf	Gas Weight dry, Md:	29.348	lb/lb mole
Meter Volume, Vwstd:	31.435	wscf	Gas Weight wet, Ms:	27.439	lb/lb mole
Isokinetic Variance:	100.8	%I	Excess Air:	65.860	%
			Gas Velocity, Vs:	20.603	fps
Test Length:	192.00	in mins.	Volumetric Flow:	204,128	acfm
Nozzle Diameter:	0.500	in inches	Volumetric Flow:	97,304	dscfm
Barometric Pressure:	29.27	in Hg	Volumetric Flow:	116,982	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2880.5	ml	Silica Initial Wt.	844.9	grams
Final Impinger Content:	3305.2	ml	Silica Final Wt.	887.6	grams
Impinger Difference:	624.7	ml	Silica Difference:	42.7	grams

Total Water Gain: 667.4 Moisture, Bws: 0.168

Port-Point No.	Clock Time	Velocity Head Δp In. H2O	Orifice ΔH In. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	8:35:00	0.08	2.00	24.810	417	70	69	253	249	53
1	8:39:00	0.08	2.00	28.170	417	70	69	253	249	53
2	8:43:00	0.09	2.20	31.770	443	70	69	252	250	53
2	8:47:00	0.09	2.20	35.410	443	70	69	252	250	53
3	8:51:00	0.08	1.90	38.860	467	72	70	250	250	61
3	8:55:00	0.08	1.90	42.290	467	72	70	250	250	61
4	8:59:00	0.07	1.70	45.750	431	74	71	250	250	63
4	9:03:00	0.07	1.70	48.870	431	74	71	250	250	63
5	9:07:00	0.07	1.70	52.220	435	76	71	250	250	63
5	9:11:00	0.07	1.70	55.490	435	76	71	250	250	63
6	9:15:00	0.05	1.20	58.730	453	77	72	250	250	63
6	9:19:00	0.05	1.20	61.400	453	77	72	250	250	63
	9:23:00			64.120						
2-1	9:27:00	0.08	1.90	64.120	446	78	73	250	250	63
1	9:31:00	0.08	1.90	67.460	446	78	73	250	250	63
2	9:35:00	0.08	2.00	71.030	406	80	74	250	250	57
2	9:39:00	0.08	2.00	74.450	406	80	74	250	250	57
3	9:43:00	0.08	1.90	77.900	446	82	76	250	250	58
3	9:47:00	0.08	1.90	81.220	446	82	76	250	250	58
4	9:51:00	0.07	1.70	84.740	462	83	77	250	250	59
4	9:55:00	0.07	1.70	87.810	462	83	77	250	250	59
5	9:59:00	0.08	2.00	91.130	438	84	78	250	250	57
5	10:03:00	0.08	2.00	94.590	438	84	78	250	250	57
6	10:07:00	0.08	1.90	98.020	457	85	78	253	250	54
6	10:11:00	0.08	1.90	101.440	457	85	78	253	250	54
	10:15:00			104.870						
3-1	10:19:00	0.08	2.00	104.870	434	83	80	250	250	52
1	10:23:00	0.08	2.00	108.460	434	83	80	250	250	52
2	10:27:00	0.07	1.70	111.210	455	83	80	251	250	54
2	10:31:00	0.07	1.70	115.140	455	83	80	251	250	54
3	10:35:00	0.07	1.80	118.480	410	83	80	250	250	55
3	10:39:00	0.07	1.80	121.810	410	83	80	250	250	55
4	10:43:00	0.07	1.70	125.160	441	84	80	250	250	55
4	10:47:00	0.07	1.70	128.330	441	84	80	250	250	55
5	10:51:00	0.07	1.70	131.600	460	85	81	250	250	56
5	10:55:00	0.07	1.70	134.680	460	85	81	250	250	56
6	10:59:00	0.05	1.20	138.140	431	86	81	250	250	57
6	11:03:00	0.05	1.20	140.890	431	86	81	250	250	57
	11:07:00			143.470						
4-1	11:11:00	0.08	1.90	143.470	464	85	82	250	250	57
1	11:15:00	0.08	1.90	146.780	464	85	82	250	250	57
2	11:19:00	0.08	2.00	150.290	426	86	82	250	249	60
2	11:23:00	0.08	2.00	153.800	426	86	82	250	249	60
3	11:27:00	0.08	2.00	157.440	446	86	82	250	250	62
3	11:31:00	0.08	2.00	160.900	446	86	82	250	250	62
4	11:35:00	0.08	2.00	164.390	405	86	83	250	251	65
4	11:39:00	0.08	2.00	167.770	405	86	83	250	251	65
5	11:43:00	0.08	2.00	171.310	435	85	83	249	250	65
5	11:47:00	0.08	2.00	174.780	435	85	83	249	250	65
6	11:51:00	0.05	1.20	178.470	452	86	83	250	251	65
6	11:55:00	0.05	1.20	181.060	452	86	83	250	251	65
	11:59:00			183.810						
Total	3:12:00			159.000		81.2	77.3			
Average			1.80		440.0	79.3				
Min			1.20		405.0	69.0				
Max			2.20		467.0	86.0				

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Client:	ArcelorMittal Burns Harbor, LLC		
Facility:	Burns Harbor, Indiana		
Test Location:	Coke Battery No. 2 Underfire Stack		
Project #:	M162810		
Test Method:	315		
Test Engineer:	BVG		
Test Technician:	BRM 1		
Type of Fuel Firing:	Other		
	R1	**R2**	**R3**
Temp ID:	CM23	CM23	CM23
Meter ID:	CM23	CM23	CM23
Pitot ID:	235	235	235
Nozzle Diameter (Inches):	0.437	0.437	0.437
Meter Calibration Date:	8/4/2016	8/4/2016	8/4/2016
Meter Calibration Factor (Y):	1.001	1.001	1.001
Meter Orifice Setting (Delta H):	1.405	1.405	1.405
Pitot Tube Coefficient:	0.840		
Probe Length (Feet):	12.0		
Probe Liner Material:	Glass		
Sample Plane:	Horizontal		
Port Length (Inches):	50.00		
Port Size (Diameter, Inches):	6.00		
Port Type:	Flange		
Duct Shape:	Circular		
Diameter (Feet):	14.5		
Duct Area (Square Feet):	165.130		
Upstream Diameters:	> 0.5		
Downstream Diameters:	> 2.0		
Number of Ports Sampled:	4		
Number of Points per Port:	6		
Minutes per Point:	5.0		
Minutes per Reading:	5.0		
Total Number of Traverse Points:	24		
Test Length (Minutes):	120		
Train Type:	Hot Box		
Source Condition:	Normal		
Servomex Serial Number:	01440D1/3791		
Moisture Balance ID:	S10-35		
# of Runs	3		

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Run 1-Method 315

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/12/16
Start Time: 11:30
End Time: 13:43

DRY GAS METER CONDITIONS

ΔH:	0.88	in. H_2O
Meter Temperature, Tm:	84.4	°F
Sqrt ΔP:	0.261	in. H_2O
Stack Temperature, Ts:	450.1	°F
Meter Volume, Vm:	72.910	ft^3
Meter Volume, Vmstd:	69.587	dscf
Meter Volume, Vwstd:	14.855	wscf
Isokinetic Variance:	99.1	%I
Test Length:	120.00	in mins.
Nozzle Diameter:	0.437	in inches
Barometric Pressure:	29.35	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	29.31	in. Hg. abs.
Carbon Dioxide:	6.50	%
Oxygen:	8.20	%
Nitrogen:	85.30	%
Gas Weight dry, Md:	29.368	lb/lb mole
Gas Weight wet, Ms:	27.368	lb/lb mole
Excess Air:	57.266	%
Gas Velocity, Vs:	19.998	fps
Volumetric Flow:	198,137	acfm
Volumetric Flow:	92,781	dscfm
Volumetric Flow:	112,588	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1943.5	ml	Silica Initial Wt.	729.2	grams
Final Impinger Content:	2242.5	ml	Silica Final Wt.	745.6	grams
Impinger Difference:	299.0	ml	Silica Difference:	16.4	grams

Total Water Gain: 315.4 Moisture, Bws: 0.176

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	11:30:00	0.07	0.91	27.310	443	77	76	254	247	66
-2	11:35:00	0.06	0.80	30.350	429	78	76	253	251	64
-3	11:40:00	0.06	0.80	33.250	442	79	77	253	252	65
-4	11:45:00	0.07	0.91	36.100	458	82	77	253	252	64
-5	11:50:00	0.08	1.00	39.100	471	83	78	253	252	59
-6	11:55:00	0.09	1.10	42.400	428	85	79	254	253	58
	12:00:00			45.880						
2-1	12:05:00	0.08	1.00	45.880	441	84	79	254	252	57
-2	12:10:00	0.06	0.75	49.100	466	87	80	253	251	58
-3	12:15:00	0.07	0.88	51.950	472	87	80	253	252	58
-4	12:20:00	0.06	0.75	55.000	482	87	81	252	253	57
-5	12:25:00	0.05	0.61	57.750	505	87	82	252	253	58
-6	12:30:00	0.05	0.61	60.240	503	88	82	252	252	60
	12:35:00			62.810						
3-1	12:39:00	0.06	0.73	62.810	514	86	82	253	252	62
-2	12:44:00	0.06	0.73	65.500	497	88	83	253	253	58
-3	12:49:00	0.07	0.93	68.300	415	89	83	253	251	58
-4	12:54:00	0.08	1.00	71.450	400	90	84	253	252	58
-5	12:59:00	0.08	1.00	74.750	446	91	84	253	252	58
-6	13:04:00	0.08	1.00	78.000	468	91	85	253	252	59
	13:09:00			81.250						
4-1	13:13:00	0.07	0.91	81.250	450	91	85	252	252	59
-2	13:18:00	0.07	0.93	84.350	400	92	85	253	253	60
-3	13:23:00	0.06	0.80	87.450	415	92	86	253	250	61
-4	13:28:00	0.06	0.79	90.300	455	92	86	253	250	61
-5	13:33:00	0.08	1.10	93.200	400	92	86	253	252	62
-6	13:38:00	0.08	1.10	96.650	403	92	86	252	252	62
	13:43:00			100.220						
Total	2:00:00			72.910		87.1	81.8			
Average			0.88		450.1	84.4				
Min			0.61		400.0	76.0				
Max			1.10		514.0	92.0				

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Run 2-Method 315

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/13/16
Start Time: 9:05
End Time: 11:17

DRY GAS METER CONDITIONS

ΔH:	0.92	In. H_2O
Meter Temperature, Tm:	81.1	°F
Sqrt ΔP:	0.263	In. H_2O
Stack Temperature, Ts:	447.3	°F
Meter Volume, Vm:	75.380	ft^3
Meter Volume, Vmstd:	72.197	dscf
Meter Volume, Vwstd:	14.860	wscf
Isokinetic Variance:	101.6	%I
Test Length:	120.00	in mins.
Nozzle Diameter:	0.437	in inches
Barometric Pressure:	29.27	in Hg

STACK CONDITIONS

Static Pressure	-0.60	in. H_2O
Flue Pressure (Ps):	29.23	in. Hg. abs.
Carbon Dioxide:	6.20	%
Oxygen:	8.90	%
Nitrogen:	84.9	%
Gas Weight dry, Md:	29.348	lb/lb mole
Gas Weight wet, Ms:	27.411	lb/lb mole
Excess Air:	65.860	%
Gas Velocity, Vs:	20.118	fps
Volumetric Flow:	199,323	acfm
Volumetric Flow:	93,964	dscfm
Volumetric Flow:	113,305	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	2081.7	ml	Silica Initial Wt.	848.4	grams
Final Impinger Content:	2372.4	ml	Silica Final Wt.	873.2	grams
Impinger Difference:	290.7	ml	Silica Difference:	24.8	grams

Total Water Gain: 315.5 Moisture, Bws: 0.171

Port-Point No.	Clock Time	Velocity Head Δp in. H2O	Orifice ΔH in. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	9:05:00	0.05	0.68	1.970	421	70	70	255	254	63
-2	9:10:00	0.06	0.79	4.650	463	73	71	254	254	65
-3	9:15:00	0.08	1.00	7.500	430	74	72	253	253	63
-4	9:20:00	0.07	0.92	10.900	440	76	75	254	253	66
-5	9:25:00	0.07	0.92	14.000	458	79	77	254	259	66
-6	9:30:00	0.06	0.78	17.100	468	80	74	253	253	64
	9:35:00			19.885						
2-1	9:39:00	0.07	0.95	19.885	429	80	75	253	253	68
-2	9:44:00	0.08	1.00	23.100	443	82	75	250	252	66
-3	9:49:00	0.07	0.92	26.500	457	84	76	253	256	67
-4	9:54:00	0.09	1.20	29.650	439	85	77	254	253	67
-5	9:59:00	0.08	1.00	33.250	437	87	78	253	252	66
-6	10:04:00	0.07	0.92	36.600	452	88	79	254	253	65
	10:09:00			39.795						
3-1	10:13:00	0.07	0.92	39.795	470	86	80	254	253	66
-2	10:18:00	0.07	0.97	42.950	428	88	81	254	254	66
-3	10:23:00	0.08	1.00	46.200	440	88	81	254	253	67
-4	10:28:00	0.06	0.81	49.500	454	88	82	254	252	65
-5	10:33:00	0.06	0.81	52.500	466	88	82	253	253	60
-6	10:38:00	0.06	0.83	55.400	424	88	82	253	252	59
	10:43:00			58.425						
4-1	10:47:00	0.07	0.94	58.425	454	86	82	253	254	65
-2	10:52:00	0.06	0.79	61.600	465	87	82	250	252	65
-3	10:57:00	0.07	0.97	64.500	432	88	82	253	251	65
-4	11:02:00	0.08	1.00	67.700	445	88	82	253	252	62
-5	11:07:00	0.07	0.94	71.100	455	89	83	253	253	63
-6	11:12:00	0.07	0.92	74.250	465	89	83	253	250	62
	11:17:00			77.350						
Total	2:00:00			75.380		83.8	78.4			
Average			0.92		447.3	81.1				
Min			0.68		421.0	70.0				
Max			1.20		470.0	89.0				

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Run 3-Method 315

Client: ArcelorMittal Burns Harbor, LLC
Facility: Burns Harbor, Indiana
Test Location: Coke Battery No. 2 Underfire Stack
Source Condition: Normal

Date: 9/13/16
Start Time: 13:15
End Time: 15:28

DRY GAS METER CONDITIONS			STACK CONDITIONS		
ΔH:	0.93	in. H_2O	Static Pressure	-0.60	in. H_2O
Meter Temperature, Tm:	92.0	°F	Flue Pressure (Ps):	29.23	in. Hg. abs.
Sqrt ΔP:	0.263	in. H_2O	Carbon Dioxide:	6.50	%
Stack Temperature, Ts:	445.1	°F	Oxygen:	8.20	%
Meter Volume, Vm:	76.277	ft^3	Nitrogen:	85.3	%
Meter Volume, Vmstd:	71.608	dscf	Gas Weight dry, Md:	29.368	lb/lb mole
Meter Volume, Vwstd:	15.830	wscf	Gas Weight wet, Ms:	27.310	lb/lb mole
Isokinetic Variance:	101.7	%I	Excess Air:	57.266	%
			Gas Velocity, Vs:	20.134	fps
Test Length:	120.00	in mins.	Volumetric Flow:	199,488	acfm
Nozzle Diameter:	0.437	in inches	Volumetric Flow:	93,091	dscfm
Barometric Pressure:	29.27	in Hg	Volumetric Flow:	113,670	scfm

MOISTURE DETERMINATION

Initial Impinger Content:	1958.6	ml	Silica Initial Wt.	724.3	grams
Final Impinger Content:	2276.1	ml	Silica Final Wt.	742.9	grams
Impinger Difference:	317.5	ml	Silica Difference:	18.6	grams

Total Water Gain: 336.1 Moisture, Bws: 0.181

Port-Point No.	Clock Time	Velocity Head Δp In. H2O	Orifice ΔH In. H2O	Actual Meter Vol. ft^3	Stack Temp °F	Meter Temp Inlet °F	Meter Temp Outlet °F	Probe Temp °F	Filter Exit Temp °F	Impinger Exit Temp °F
1-1	13:15:00	0.07	0.97	77.880	419	85	84	254	253	56
-2	13:20:00	0.07	0.94	81.100	440	85	84	254	252	56
-3	13:25:00	0.06	0.81	84.250	452	87	85	254	253	59
-4	13:30:00	0.06	0.79	87.250	465	87	85	253	253	64
-5	13:35:00	0.07	0.92	90.100	473	88	85	253	253	63
-6	13:40:00	0.05	0.69	93.250	434	90	86	254	252	62
	13:45:00			95.985						
2-1	13:49:00	0.07	0.94	95.985	459	91	87	255	252	64
-2	13:54:00	0.06	0.83	99.200	405	93	88	255	253	64
-3	13:59:00	0.08	1.00	102.150	433	94	88	254	254	64
-4	14:04:00	0.08	1.00	105.550	452	96	89	253	252	64
-5	14:09:00	0.07	0.92	108.950	464	96	89	253	254	64
-6	14:14:00	0.07	0.98	112.100	405	96	90	252	254	64
	14:19:00			115.325						
3-1	14:23:00	0.06	0.81	115.325	445	95	90	254	252	65
-2	14:28:00	0.07	0.95	118.250	456	96	91	253	254	63
-3	14:33:00	0.08	1.00	121.500	467	97	91	253	254	65
-4	14:38:00	0.08	1.00	124.850	470	98	91	253	254	65
-5	14:43:00	0.08	1.10	128.250	437	98	92	254	255	66
-6	14:48:00	0.07	0.95	131.700	454	99	93	253	252	67
	14:53:00			134.855						
4-1	14:58:00	0.08	1.10	134.855	430	97	93	252	253	66
-2	15:03:00	0.08	1.10	138.350	451	99	94	255	254	66
-3	15:08:00	0.07	0.93	141.750	464	99	94	251	252	66
-4	15:13:00	0.06	0.80	144.900	470	100	94	254	250	65
-5	15:18:00	0.06	0.84	147.900	416	100	95	259	251	65
-6	15:23:00	0.07	0.98	150.850	422	100	94	253	253	65
	15:28:00			154.157						
Total	2:00:00			76.277		94.4	89.7			
Average			0.93		445.1	92.0				
Min			0.69		405.0	84.0				
Max			1.10		473.0	100.0				

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Appendix G - Field Data Sheets

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Isokinetic Sampling Cover Sheet

Test Engineer: BVG
Test Technician: BRM 1

Plant Information

Run Number: 1
Date: 9-14-16
Project Number: M162810
Test Location: UNDERFIRE STACK 2
Client Name: ARCELOR MITTAL
Plant Name: BURNS HARBOR
Duct Shape: Circular or Rectangular
Length: _____ Width: _____ or Diameter: 14.5
Flue Area: ~~145~~ 165.130
Upstream Diameters: _____
Downstream Diameters: _____
Port Type: FLANGE
Port Length: 50
Port Diameter: 6"
Test Method: 5/29
Source Condition: NORMAL

Meter and Probe Data

Meter ID: CM23
Meter Y Value: 1.001
ΔH Value: 1.405
Pitot ID: 235
Pitot Coefficient: .840
Train Type: HOT BOX
Nozzle Kit ID: GLASS
Nozzle Diameter: .502
Filter Number/Weight: 9441 .4432
Probe Length: 12'
Probe Liner: GLASS
Thimble Number/Weight: _____
Pre-Test Nozzle Leak Check: ✓ @ 10 "Hg
Post-Test Nozzle Leak Check: ✓ @ 10 "Hg
Pre-Test Pitot Leak Check: ✓ @ 7 "H_2O
Post-Test Pitot Leak Check: ✓ @ 7 "H_2O

Traverse Data

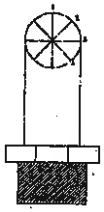
Ports Sampled: 4
Points/Port: 6
Min/Point: 5
Total Points: 24
Total Test Time: 144
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.4
Static Pressure: -.6
CO_2 %: ___/___/___/ Avg. 6.1
O_2 %: ___/___/___/Avg. 8.7
Determined by: Method 3 or Method 3A
Imp and/or silica balance Model and S/N: 310-35
Servomex Serial #: 0104051 / 37191
Initial Imp. Volume or Weight: 4157.0
Final Imp. Volume or Weight: 4655.6
Imp. Volume or Weight Gain: 498.6
Initial Silica Weight: 815
Final Silica Weight: 831
Silica Weight Gain: 16

Comments:

Post-Test Nozzle Verification:



1) ____ 2) ✓ 3) ✓ 4) ✓

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420° = 24.815 3.233
450° = 23.997 3.174
470 = 23.491 3.145

Isokinetic Sampling Field Data Sheet

Project Number: M162810 Date: 9-14-16 Test Number: 1
Client: ARCELOR MITTAL Test Location: UNDERFIRE 2 Operator: BVG Test Tech: BRN
Plant: BURNS HARBOR Test Method: 5/29 Page Number: 1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft³, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft³, per point	Theoretical Meter Volume, (V_m) ft³, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1005	.06	1.4	56.010	.244	.786	4.719		452	75	75	5	255	253	65
2	1011	.07	1.6	60.75	.264	.817	4.902	60.729	468	76	75	5	253	252	60
3	1017	.08	1.9	65.75	.282	.897	5.384	65.631	428	79	75	6	250	252	61
4	1023	.08	1.8	71.10	.282	.848	5.293	71.027	455	83	76	5	253	252	61
5	1029	.07	1.6	76.35	.264	.817	4.902	76.315	465	84	77	5	253	252	63
6	1035	.07	1.6	81.25	.244	.817	4.902	81.217	440	85	79	5	253	252	63
	1041			86.130				86.119							
2-1	1045	.07	1.6	86.130	.264	.826	4.956		453	84	78	5	253	252	65
2	1051	.08	1.8	91.10	.282	.889	5.337	91.086	465	85	79	5	253	253	61
3	1057	.07	1.7	96.45	.264	.855	5.132	96.423	432	87	80	5	253	252	61
4	1103	.08	1.9	101.60	.282	.899	5.394	101.555	447	87	80	6	253	252	61
5	1109	.06	1.4	106.95	.244	.778	4.672	106.949	459	88	87	5	253	252	62
6	1115	.06	1.4	111.65	.244	.770	4.622	111.621	472	88	81	5	253	252	62
	1121			116.280				116.243							
3-1	1125	.07	1.6	116.288	.264	.841	5.046		448	85	81	5	252	252	63
2	1131	.08	1.8	121.35	.282	.889	5.337	121.334	465	88	82	5	258	252	62
3	1137	.08	1.9	126.70	.282	.899	5.394	126.671	445	88	82	5	253	252	62
4	1143	.07	1.6	132.10	.264	.841	5.046	132.065	448	89	83	5	252	252	63
5	1149	.07	1.6	137.15	.264	.832	4.992	137.111	463	89	82	5	253	252	63
6	1155	.06	1.4	142.10	.244	.791	4.751	142.103	411	89	83	5	253	252	65
	1201			146.930				146.854							
4-1	1205	.08	1.4	146.930	.244	.778	4.672		448	87	83	5	253	252	65
2	1211	.08	1.9	151.65	.282	.899	5.394	151.602	465	88	83	5	251	251	57
3	1217	.08	1.9	156.95	.282	.914	5.486	156.996	424	89	83	5	252	252	57
4	1223	.07	1.6	162.50	.264	.841	5.046	162.482	450	90	83	5	252	252	57
5	1229	.07	1.6	167.55	.264	.832	4.992	167.528	462	90	83	5	253	252	58
6	1235	.07	1.6	172.55	.264	.832	4.992	172.520	465	90	84	5	252	251	59
	1241			177.610				177.512							

Project No. M162810B
Coke Battery #2 Underfire Stack

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IMPINGER WEIGHT SHEET

PLANT: Arcelor Mittal BH

UNIT NO:

LOCATION: #2 Underfire Stack

DATE: 9-14-16

TEST NO: 1

METHOD: 5/29

WEIGHED/MEASURED BY: SLB

BALANCE ID: 510-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	948.6	666.5	282.1	empty
IMPINGER 2	915.7	730.5	185.2	HNO_3/H_2O_2
IMPINGER 3	787	748.0	39.0	HNO_3/H_2O_2
IMPINGER 4	592.0	589.0	3.0	empty
IMPINGER 5	655.8	647.8	8.0	KMNO4
IMPINGER 6	756.5	755.2		KMNO4
IMPINGER 7	831.0	815.0	16	Silica
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	4655.6	4137.0	518.6

	FINAL TOTAL	INITIAL TOTAL	TOTAL SILICA GAIN
SILICA	831.0	815.0	16

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Isokinetic Sampling Cover Sheet

Test Engineer: JEA
Test Technician: BM

Plant Information

Run Number: 2
Test Location: #2 Underfire Stack
Duct Shape: Circular or Rectangular
Flue Area: 165.130 sq ft
Port Type: Flange
Test Method: 5/29

Date: 9-15-16
Client Name: Arcelor Mittal
Length: ____ Width: ____ or Diameter: 14.5
Upstream Diameters: >2.5
Port Length: 50
Source Condition: Normal

Project Number: M162810
Plant Name: Burns Harbor
Downstream Diameters: >2.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM 23
Pitot ID: 235
Nozzle ID #: Glass
Probe Length: 12'
Pre-Test Nozzle Leak Check: .093 @ 6 "Hg
Pre-Test Pitot Leak Check: Ø4 "H_2O

Meter Y Value: 1.001
Pitot Coefficient: 0.840
Nozzle Diameter: 0.502
Probe Liner: Glass

ΔH Value: 1.405
Train Type: Hot Box
Filter Number/Weight: 10100 / .4570
Thimble Number/Weight:
Post-Test Nozzle Leak Check: ____ @ ____ "Hg
Post-Test Pitot Leak Check: Ø5 "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 24

Points/Port: 6
Total Test Time: 144

Min/Point: 6
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.56
CO_2 %: ____ / ____ / ____ / Avg. 6.2
Imp and/or silica balance Model and S/N: 010-35
Initial Imp. Volume or Weight: 4037.0
Initial Silica Weight: 327.4

Static Pressure: -.66
O_2 %: ____ / ____ / ____ / Avg. 8.8
Servomex Serial #: 01440D1/13791
Final Imp. Volume or Weight: 4555.3
Final Silica Weight: 343.1

Determined by: Method 3 or Method 3A
Imp. Volume or Weight Gain: 518.3
Silica Weight Gain: 16.1

Comments:

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Isokinetic Sampling Field Data Sheet

Project Number: M162810
Client: ArcelorMittal
Plant: Burns Harbor, IN

Date: 9-15-16
Test Location: #2 Underfire Stack
Test Method: 5/29

Test Number: 2
Operator: SEL
Test Tech: BM
Page Number: 1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	850	.07	1.59	78.537					461	71	70	5	251	252	57
2	856	.07	1.59	83.470				83.360	440	73	70	5	251	251	57
3	902	.07	1.63	88.246				88.46	440	73	70	5	250	251	58
4	908	.08	1.69	93.180				93.173	446	74	71	5	250	251	59
5	914	.08	1.66	98.410				98.349	449	74	71	5	251	251	59
6	920	.08	1.86	103.530				103.560	461	77	72	5	251	250	59
	926			108.860				108.749							
2-1	931	.07	1.60	108.860					468	80	74	5	251	250	61
2	937	.07	1.60	113.830				113.722	477	82	75	5	251	250	62
3	943	.06	1.44	118.640				118.587	428	84	76	6	252	251	63
4	949	.06	1.44	123.270				123.215	433	85	76	6	252	252	64
5	955	.08	1.89	127.960				127.834	449	87	77	6	252	252	64
6	1001	.08	1.87	133.179				133.134	457	87	77	6	252	251	62
	1007			138.490				138.412							
3-1	1013	.07	1.64	138.490					458	89	78	6	251	252	59
2	1018	.07	1.64	143.520				143.436	464	90	79	6	251	252	59
3	1024	.08	1.96	148.440				148.376	421	92	82	6	251	251	60
4	1030	.08	1.95	153.890				153.812	429	92	82	6	252	251	61
5	1036	.08	1.94	159.310				159.222	436	93	83	7	252	251	61
6	1042	.07	1.67	164.680				164.620	449	93	83	7	251	251	62
	1048			169.711				169.634							
4-1	1055	.06	1.41	169.711					462	92	84	7	251	251	62
2	1059	.06	1.41	174.570				174.320	467	93	85	7	251	252	62
3	1105	.07	1.66	178.960				178.974	449	93	85	7	251	252	63
4	1111	.07	1.69	183.980				183.947	444	94	86	7	252	252	63
5	1117	.06	1.89	189.030				188.897	462	94	86	7	252	252	64
6	1123	.08	1.90	196.690				196.554	458	95	86	7	251	251	64
	1129			204.177				204.172							

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IMPINGER WEIGHT SHEET

PLANT: ArcelorMittal BH

UNIT NO:

LOCATION: #2 Underfire Stack

DATE: 9-15-16

TEST NO: 2

METHOD: 5/29

WEIGHED/MEASURED BY: SLB

BALANCE ID: 310-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	841.1	559.9	281.2	empty
IMPINGER 2	925.8	738.4	187.4	HNO_3/H_2O_2
IMPINGER 3	798.4	757.9	40.5	HNO_3/H_2O_2
IMPINGER 4	594	592.6	1.4	empty
IMPINGER 5	658.7	650.9	7.8	KMNO4
IMPINGER 6	737.3	737.3	0	KMNO4
IMPINGER 7	842.1	826	16.1	silica
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	4555.3	4037.0	518.3

	FINAL TOTAL	INITIAL TOTAL	TOTAL SILICA GAIN
SILICA	842.1	826	16.1

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Isokinetic Sampling Cover Sheet

Test Engineer: JEK
Test Technician: BM

Plant Information

Run Number: 3
Test Location: #2 Underfire Stack
Duct Shape: Circular or Rectangular
Flue Area: 165.130 sq ft
Port Type: Flange
Test Method: 5/29

Date: 9-15-16
Client Name: Arcelor Mittal
Length: _____ Width: _____ or Diameter: 14.5'
Upstream Diameters: >2
Port Length: 50"
Source Condition: Normal

Project Number: M162810
Plant Name: Burns Harbor
Downstream Diameters: >3
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM23
Pitot ID: 235
Nozzle ID #: Glass
Probe Length: 12'
Pre-Test Nozzle Leak Check: 0 @ 6 "Hg
Pre-Test Pitot Leak Check: Yes "H_2O

Meter Y Value: 1.001
Pitot Coefficient: 0.840
Nozzle Diameter: 0.302
Probe Liner: Glass

ΔH Value: 1.495
Train Type: Hot Box
Filter Number/Weight: #9984 / 1.41555
Thimble Number/Weight:
Post-Test Nozzle Leak Check: .002 @ 9 "Hg
Post-Test Pitot Leak Check: Yes "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 24

Points/Port: 6
Total Test Time: 144

Min/Point: 6
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.56
Static Pressure: -.60
CO_2 %: ___/___/___/ Avg. 6.3
O_2 %: ___/___/___/Avg. 9.1
Determined by: Method 3 or Method 3A
Imp and/or silica balance Model and S/N: S10-35
Servomex Serial #: 014400 / 3791
Initial Imp. Volume or Weight: 4162.2
Final Imp. Volume or Weight: 4655
Imp. Volume or Weight Gain: 492.3
Initial Silica Weight: 794.2
Final Silica Weight: 811.9
Silica Weight Gain: 17.7

Comments:

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Isokinetic Sampling Field Data Sheet

Project Number:	M162810	Date:	9-15-16	Test Number:	3
Client:	Arcelor Mittal	Test Location:	Underfire	Operator:	JEA Test Tech: BM
Plant:	Burns Harbor	Test Method:	5/29	Page Number:	1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1345	.07	1.66	4.730					445	83	83	5	251	251	62
2	1351	.07	1.65	9.760				9.709	451	83	83	5	251	251	62
3	1357	.07	1.65	14.710				14.671	454	84	83	5	252	251	62
4	1403	.07	1.68	19.670				19.629	456	85	83	5	251	251	62
5	1409	.08	1.89	24.740				24.642	450	87	83	5	250	251	63
6	1415	.08	1.92	29.990				29.969	438	87	83	5	250	251	64
	1421			35.398				35.332							
2-1	1424	.07	1.71	35.398					421	88	83	5	250	250	63
2	1430	.07	1.68	40.490				40.467	440	89	89	5	250	251	67
3	1436	.06	1.45	45.520				45.492	436	91	84	5	250	251	67
4	1442	.06	1.45	50.140				50.162	440	92	85	5	251	251	61
5	1448	.08	1.96	54.920				54.831	423	92	85	5	251	251	60
6	1454	.06	1.92	60.210				60.274	445	93	86	5	251	252	59
	1500			65.195				65.660							
3-1	1504	.07	1.67	65.695					450	94	87	5	251	250	59
2	1510	.07	1.69	70.760				70.726	443	95	88	5	251	250	60
3	1516	.07	1.72	75.836				75.791	438	95	89	5	251	250	60
4	1522	.08	1.84	80.940				80.900	439	95	89	5	252	250	61
5	1528	.08	1.91	86.370				85.828	436	94	90	5	252	250	61
6	1534	.08	1.93	91.760				91.706	447	94	90	5	252	250	61
	1540			97.168				97.111							
4-1	1543	.07	1.70	97.168					440	95	90	5	251	250	60
2	1549	.07	1.67	102.290				102.268	456	96	90	6	251	250	60
3	1555	.06	1.45	107.360				107.307	443	96	90	6	251	250	60
4	1601	.07	1.74	112.140				112.007	424	97	91	6	251	251	60
5	1607	.08	1.97	117.180				117.146	436	98	91	6	250	251	61
6	1613	.08	1.95	122.730				122.608	440	98	91	6	250	251	61
	1619			128.110				128.058							

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IMPINGER WEIGHT SHEET

PLANT: Arcelor Mittal BH

UNIT NO:

LOCATION: #2 Underfire

DATE: 9-15-16

TEST NO: 3

METHOD: 5/29

WEIGHED/MEASURED BY: SLB

BALANCE ID: S10-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	806.6	561		empty
IMPINGER 2	944.2	751.5		HNO_3/H_2O_2
IMPINGER 3	701.5	659.3		HNO_3/H_2O_2
IMPINGER 4	585	582.3		empty
IMPINGER 5	733.3	727		KMNO4
IMPINGER 6	884.4	881.6		KMNO4
IMPINGER 7	811.9	794.2		Silica
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	4655	4162.2	492.8

	FINAL TOTAL	INITIAL TOTAL	TOTAL SILICA GAIN
SILICA	811.9	794.2	17.7

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Isokinetic Sampling Cover Sheet

Test Engineer: CSE
Test Technician: BM

Plant Information

Run Number: 1
Test Location: 2 UnderFIRE
Duct Shape: Circular or Rectangular
Flue Area: 165.130
Port Type: Flange
Test Method: M 201A / 202

Date: 9-14-16
Client Name: Arcelor Mittal
Length: _____ Width: _____ or Diameter: 14.5
Upstream Diameters: >.5
Port Length: 50"
Source Condition: Normal

Project Number: M162810
Plant Name: Burns Harbor, IN
Downstream Diameters: >2.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM3
Pitot ID: 123
Nozzle ID #: Glass
Probe Length: 12'
Pre-Test Nozzle Leak Check: ✓ 0.00 @ 10 "Hg
Pre-Test Pitot Leak Check: ✓ 0.5 "H_2O

Meter Y Value: 1.016
Pitot Coefficient: .84
Nozzle Diameter: .318
Probe Liner: Glass

ΔH Value: 1.525
Train Type: Hot Box
Filter Number/Weight: 1711 / 20607
Thimble Number/Weight: _____
Post-Test Nozzle Leak Check: ✓ 0.00 @ 10 "Hg
Post-Test Pitot Leak Check: ✓ @ ✓ 6 "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 48

Points/Port: 12
Total Test Time: 384

Min/Point: DWELL TIME
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.4
CO_2 %: / / / Avg. 6.1
Imp and/or silica balance Model and S/N: 5-10 35
Initial Imp. Volume or Weight: 1997.2
Initial Silica Weight: 807.8

Static Pressure: -.60
O_2 %: / / / Avg. 8.7
Determined by: Method 3 or Method 3A
Servomex Serial #: 0144001 / 3791
Final Imp. Volume or Weight: 2337.9
Final Silica Weight: 823.9

Imp. Volume or Weight Gain: 343.7
Silica Weight Gain: 16.1

Comments:

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TCON-17.72

K 1.233

Isokinetic Sampling Field Data Sheet-M23

Project Number:	M162810	Date:	9-14-16	Test Number:	1
Client:	ArcelorMittal	Test Location:	2 Underfire	Operator:	CSE / Test Tech: BM
Plant:	Burns Harbor, IN	Test Method:	M201A/202	Page Number:	1 of 2

1.74

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	CPM Filter Temp °F	Impinger Outlet Well Temp. °F
1-1	1000	.08	.33	50.890	.282		1.74		438	74	74	5	250	249	70	65
1	1005	.08		52.72	.282			52.63	458	74	74	5	250	249	70	63
2	1010	.08		54.49	.282			54.37	472	75	74	5	250	249	72	62
2	1015	.08		56.19	.282			56.11	421	75	74	5	250	249	72	62
3	1020	.08		57.90	.282			57.85	446	76	75	5	250	250	71	63
3	1025	.08		59.66	.282			59.59	450	76	75	5	250	250	71	62
4	1030	.08		61.44	.282			61.33	465	76	75	5	249	250	71	62
4	1035	.08		63.15	.282			63.07	470	76	75	5	251	250	71	62
5	1040	.08		64.89	.282			64.81	434	76	75	5	249	250	70	63
5	1045	.08		66.61	.282			66.55	451	76	75	5	250	251	71	63
6	1050	.06		68.33	.244		1.343	68.29	455	76	75	5	250	250	71	64
6	1054.45	.06		69.69	.244		1.343	69.633	461	76	75	5	250	250	72	64
	1059.30			71.010				70.976								
2-1	1104	.08		71.010	.282		1.74		458	76	75	5	250	250	70	64
1	1109	.08		72.81				72.75	470	76	75	5	250	250	70	64
2	1114	.08		74.57				74.49	463	76	76	5	250	250	72	61
2	1119	.08		76.33				76.23	451	76	76	5	250	250	73	61
3	1124	.08		79.02				77.97	440	76	76	5	250	250	73	60
3	1129	.08		79.79				79.71	449	77	76	5	250	250	74	66
4	1134	.08		81.51				81.45	464	77	76	5	248	252	75	66
4	1139	.08		83.28	.282			83.19	427	77	76	5	250	250	74	66
5	1144	.07		84.98	.264		1.448	84.93	440	77	76	5	250	250	75	65
5	1148.45	.07		86.44	.264		1.448	86.378	456	77	76	5	250	250	73	64
6	1153.30	.06		87.90	.244		1.343	87.826	440	77	76	5	250	250	73	64
6	1158.15	.06	✓	89.22	.244		1.343	89.169	437	77	76	5	250	249	73	64
	1203			90.590				90.512								

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K 1.233

Isokinetic Sampling Field Data Sheet-M23

Project Number: M162810 | Date: 9-14-16 | Test Number: 1

Client: Arcelor Mittal | Test Location: 2 Underfire | Operator: CSE | Test Tech: BM

Plant: Burns Harbor, IN | Test Method: M201A/202 [redacted] | Page Number: 2 of 2

59.5/59.5/59/59

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	CPM Filter Temp °F	Impinger Outlet Well Temp. °F
3-1	1207	.08	.33	90.590	.282		1.74		457	77	77	5	250	250	71	61
1	1212	.08		92.39	.282			92.33	457	77	77	5	250	250	71	61
2	1217	.08		94.15	.282			94.07	417	78	77	5	250	250	70	61
2	1222	.08		95.89	.282			95.81	417	78	77	5	250	250	70	61
3	1227	.08		97.66	.282			97.55	452	78	78	5	250	250	70	61
3	1232	.08		99.35	.282			99.29	452	78	78	5	250	250	70	61
4	1237	.08		101.15	.282			101.03	438	78	78	5	250	250	71	61
4	1242	.08		102.86	.282			102.77	438	78	78	5	250	250	71	61
5	1247	.08		104.59	.282			104.51	448	78	78	5	250	250	71	60
5	1252	.08		106.33	.282			106.25	448	78	78	5	250	250	71	60
6	1257	.07		108.05	.264		1.448	107.99	458	78	78	5	250	250	71	60
6	130145	.07		109.56	.264		1.448	109.438	458	78	78	5	250	250	71	60
	130630			110.970				110.886								
4	1310	.08		110.970	.282		1.74		459	78	78	5	249	249	72	64
	1315	.08		112.77	.282			112.71	459	78	78	5	249	249	72	64
2	1320	.08		114.53	.282			114.45	442	78	78	5	250	250	71	60
2	1325	.08		116.22	.282			116.19	442	78	78	5	250	250	71	60
3	1330	.08		118.01	.282			117.93	453	78	78	5	250	250	71	59
3	1335	.08		[illegible]	.282			119.67	453	78	78	5	250	250	71	59
4	1340	.08		[illegible]	.282			121.41	430	78	78	5	250	250	71	60
4	1345	.08		[illegible]	.264			123.15	430	78	78	5	250	250	71	60
5	1350	.07		[illegible]	.264		1.448	124.89	451	78	78	5	250	250	71	59
5	135445	.07		[illegible]	.264		1.448	126.338	451	78	78	5	250	250	71	59
6	135930	.07		[illegible]	.264		1.448	127.786	466	78	78	5	250	250	71	61
6	140415	.07	✓	[illegible]	.264		1.448	129.234	466	78	78	5	250	250	71	61
	1409			[illegible]				130.682								

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IMPINGER WEIGHT SHEET

1711 2.0607

PLANT: ArcelorMittal BH

UNIT NO: #2 Underfire Stack

LOCATION:

DATE: 9-14-16

TEST NO: 1

METHOD: 201A / 202

WEIGHED/MEASURED BY: SLB

BALANCE ID: S10-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	913.2	594.9		empty
IMPINGER 2	618	600		empty
IMPINGER 3	706.7	694.3		DI
IMPINGER 4	823.9	807.8		silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2237.9	1889.2	348.7

	FINAL TOTAL	INITIAL TOTAL	TOTAL SILICA GAIN
SILICA	823.9	807.8	16.1

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Isokinetic Sampling Cover Sheet

Test Engineer: SLB
Test Technician: BM

Plant Information

Run Number: 2
Test Location: 2 Underfire
Duct Shape: (Circular) or Rectangular
Flue Area: 165.13054 ft²
Port Type: Flange
Test Method: M201A/202

Date: 9-15-16
Client Name: ArcelorMittal
Length: _____ Width: _____ or Diameter: 14.5
Upstream Diameters: 7.5
Port Length: 50"
Source Condition: Normal

Project Number: M162810
Plant Name: Burns Harbor, IN
Downstream Diameters: >2.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CMM
Pitot ID: 125
Nozzle ID #: GLASS
Probe Length: 12
Pre-Test Nozzle Leak Check: 0 @ 9 "Hg
Pre-Test Pitot Leak Check: Ja.6 "H_2O

Meter Y Value: 1.016
Pitot Coefficient: 0.840
Nozzle Diameter: .318
Probe Liner: Glass

ΔH Value: 1.525
Train Type: Hot Box
Filter Number/Weight: 1712 / 2.8838
Thimble Number/Weight: EMP ASS
Post-Test Nozzle Leak Check: .001 @ 11 "Hg
Post-Test Pitot Leak Check: Ja.7 "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 48

Points/Port: 12
Total Test Time: 3:59:45

Min/Point: DWELL TIME
Sample Plane: (Horizontal) or Vertical

Stack Parameters

Barometric Pressure: 29.56
CO_2 %: ___ / ___ / ___ / Avg. 6.1
Imp and/or silica balance Model and S/N: 510-59
Initial Imp. Volume or Weight: 1964.8
Initial Silica Weight: 354.6

Static Pressure: -.60
O_2 %: ___ / ___ / ___ / Avg. 8.7
Final Imp. Volume or Weight: 2232.4
Final Silica Weight: 374.1

Determined by: Method 3 or (Method 3A)
Servomex Serial #: 0144001 / 3791
Imp. Volume or Weight Gain: 227.6
Silica Weight Gain: 19.5

Comments:

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Isokinetic Sampling Field Data Sheet

Project Number: M162810
Client: Arcelor Mittal
Plant: Burns Harbor

Date: 9-15-16
Test Location: 2 underfire
Test Method: 201A / 202

Test Number: 2
Operator: SLB
Test Tech: BM
Page Number: 1 of 2

1.028

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F	CPM Filter
1-1	820	.07	.32	31.7	.265		1.54		444	68	68	3	252	251	60	69
1	824:45	.07		33.36	.265		1.54	33.24	452	68	68	3	250	253	60	69
-2	829:30	.07		34.5	.265		1.54	34.78	449	69	69	3	251	253	59	70
2	834:25	.07		36.43	.265		1.54	36.32	438	70	69	3	253	252	58	69
-3	839	.06		37.92	.245		1.35	37.86	434	70	69	3	250	249	59	69
3	843:30	.06		39.38	.245		1.35	39.21	445	71	70	3	251	251	59	70
-4	848	.08		40.44	.283		1.82	40.56	448	71	70	3	252	251	59	71
4	853:15	.08		42.46	.283		1.82	42.37	446	72	70	3	249	252	59	71
-5	858:30	.08		44.34	.283		1.82	44.19	444	72	71	3	249	253	61	70
-5	903:45	.08		45.87	.283		1.82	46.01	441	73	72	3	246	253	61	71
-6	909	.08		47.76	.283		1.82	47.83	439	74	72	3	248	251	62	72
6	914:15	.08		49.72	.283		1.82	49.65	428	74	72	3	248	251	62	72
	919:30			51.5				51.47								
2-1	923	.07	.32	51.5	.265		1.54		441	74	73	4	251	248	63	72
1	927:45	.07		53.2	.265		1.54	53.04	461	75	73	4	252	249	62	71
-2	932:15	.07		54.6	.265		1.54	54.58	457	75	74	4	252	251	61	71
2	937	.07		55.95	.265		1.54	56.12	472	76	74	4	253	251	61	71
-3	941:45	.08		57.42	.283		1.82	57.66	461	76	75	4	254	252	61	71
3	947	.08		59.0	.283		1.82	59.48	444	77	75	4	254	253	61	71
-4	952:15	.08		61.4	.283		1.82	61.3	462	77	76	4	256	253	59	71
4	957:30	.08		63.6	.283		1.82	63.12	466	77	76	4	256	254	60	71
-5	1002:45	.08		65.2	.283		1.82	64.94	460	78	77	4	252	254	61	72
-5	1008	.08		66.8	.283		1.82	66.76	456	79	77	4	252	251	61	72
-6	1013:15	.08		68.2	.283		1.82	68.58	463	79	78	4	253	252	61	72
6	1018:30	.08		70.66	.283		1.82	7.04	428	79	78	4	257	252	61	72
	1023:45			72.57				72.22								

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Isokinetic Sampling Field Data Sheet

Project Number: M162810 | Date: 9-15-16 | Test Number: 2

Client: ArcelorMittal | Test Location: 2 Underfire | Operator: SB | Test Tech: BM

Plant: Burns Harbor | Test Method: 201A / 202 | Page Number: 2 of 2

1.228

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F	CFM Filter
3-1	1027	.06	.32	72.57	.245		1.35		457	79	79	4	252	249	61	72
-1	1031:30	.06		73.42	.245		1.35	73.92	452	80	79	4	257	253	61	72
-2	1036	.07		75.3	.265		1.54	75.27	431	81	79	4	248	253	62	73
-2	1040:45	.07		76.55	.265		1.54	76.81	440	81	80	4	249	254	62	73
-3	1045:30	.08		77.9	.283		1.82	78.35	442	81	80	4	252	254	63	72
-3	1050:45	.08		79.9	.283		1.82	80.17	450	82	80	4	249	253	62	72
-4	1056	.08		81.72	.283		1.82	81.99	445	82	81	4	249	251	62	71
-4	1101:15	.08		83.26	.283		1.82	83.81	436	83	81	4	251	252	62	74
-5	1106:30	.08		85.92	.283		1.82	85.63	456	84	82	4	253	253	63	74
-5	1111:45	.08		87.6	.283		1.82	87.45	462	84	83	4	253	252	62	76
-6	1117	.08		89.32	.283		1.82	89.27	455	84	83	4	252	251	62	76
-6	1122:15	.08		90.87	.283		1.82	91.09	443	84	83	4	251	250	62	76
	1127:30			92.88				92.91								
4-1	1132	.06	.32	92.88	.245		1.35		460	84	83	4	251	250	63	77
-1	1136:30	.06		94.27	.245		1.35	94.22	466	84	83	4	251	250	63	77
-2	1141	.06		95.61	.245		1.35	95.58	440	82	83	4	251	250	62	77
-2	1145:30	.06		96.97	.245		1.35	96.93	444	83	83	4	250	251	62	77
-3	1150	.08		98.32	.283		1.82	98.28	451	83	83	4	251	252	63	78
-3	1155:15	.08		100.16	.283		1.82	100.1	454	83	83	4	251	252	63	78
-4	1200:30	.08		101.97	.283		1.82	101.92	460	83	83	4	250	251	63	78
-4	1205:45	.08		103.79	.283		1.82	103.74	444	83	83	4	251	251	63	78
-5	1211	.08		105.61	.283		1.82	105.56	452	83	83	4	251	250	63	78
-5	1216:25	.08		107.42	.283		1.82	107.38	459	83	83	4	252	251	64	78
-6	1221:30	.07		109.28	.265		1.54	109.2	464	83	83	4	252	251	64	78
-6	1226:15	.07		110.81	.265		1.54	110.74	434	83	83	4	251	251	64	78
	1231			112.31				112.28								

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IMPINGER WEIGHT SHEET

1712/28836

PLANT: ArcelorMittal B&H

UNIT NO:

LOCATION: #2 Underfire Stack

DATE: 9-15-16

TEST NO: 2

METHOD: 201A/202

WEIGHED/MEASURED BY: SUB

BALANCE ID: 510-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	903	582.6		empty
IMPINGER 2	597.6	596		empty
IMPINGER 3	731.8	726.2		DI
IMPINGER 4	874.1	854.6		silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2232.4	1904.8	327.6
SILICA	874.1	854.6	19.5

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Isokinetic Sampling Cover Sheet

Test Engineer: SLB
Test Technician: BM

Plant Information

Run Number: 2
Test Location: 2 Underfire
Duct Shape: Circular or Rectangular
Flue Area: 165.130 sq ft
Port Type: Flange
Test Method: 201A/202

Date: 9-15-16
Client Name: Arcelor Mittal
Length: ____ Width: ____ or Diameter: 14.5
Upstream Diameters: >2.5
Port Length: 50"
Source Condition: Normal

Project Number: M162810
Plant Name: Burns Harbor, IN
Downstream Diameters: >2.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM3
Pitot ID: 123
Nozzle ID # Glass
Probe Length: 12'
Pre-Test Nozzle Leak Check: 0 @ 6 "Hg
Pre-Test Pitot Leak Check: Jos "H_2O

Meter Y Value: 1.016
Pitot Coefficient: 0.840
Nozzle Diameter: .318
Probe Liner: Glass
Post-Test Nozzle Leak Check: ✓ @ 10 "Hg
Post-Test Pitot Leak Check: Jos "H_2O

ΔH Value: 1.525
Train Type: Hot Box
Filter Number/Weight: T617
Thimble Number/Weight:

Traverse Data

Ports Sampled: 4
Total Points: 48
Points/Port: 12
Total Test Time: 241 m
Min/Point: DWELL TIME
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.56
Static Pressure: -.60
CO_2 %: ___ / ___ / ___ / Avg. 6.1
O_2 %: ___ / ___ / ___ / Avg. 8.7
Determined by: Method 3 or Method 3A
Imp and/or silica balance Model and S/N: 510-35
Servomex Serial #: 01149001 / 3791
Initial Imp. Volume or Weight: 1932.0
Initial Silica Weight: 813.1
Final Imp. Volume or Weight: 2266.9
Final Silica Weight: 829.2
Imp. Volume or Weight Gain: 334.9
Silica Weight Gain: 16.0

Comments:

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Isokinetic Sampling Field Data Sheet

Project Number: M162810 | Date: 9-15-16 | Test Number: 3

Client: Arcelor Mittal | Test Location: 2 Underfire | Operator: SLB | Test Tech: BM

Plant: Burns Harbor | Test Method: 201A | Page Number: 1 of 2

1.228

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F	CPM Filter
1-1	1314	.07	.32	12.863	.265		1.55		442	80	80	4	253	251	61	72
1	1318:45	.07		14.52	.265		1.55	14.413	430	81	82	4	254	251	67	73
2	1323:30	.07		16.09	.265		1.55	15.96	448	82	82	4	251	251	62	73
2	1328:15	.07		17.44	.265		1.51	17.51	452	82	82	4	249	249	62	74
3	1333	.08		19.120	.283		1.82	19.06	464	82	82	4	250	250	62	74
3	1338:15	.08		20.920	.283		1.82	20.88	461	82	82	4	251	251	62	74
4	1343:30	.08		22.740	.283		1.82	22.7	441	82	82	4	251	250	63	74
4	1348:45	.08		24.610	.283		1.82	24.52	453	82	82	4	251	250	63	75
5	1354	.08		26.390	.283		1.82	26.34	454	83	82	4	250	251	63	75
5	1359:15	.08		28.220	.283		1.82	28.16	421	83	82	4	251	250	64	76
6	1404:30	.08		30.040	.283		1.82	29.98	436	83	82	4	250	250	64	76
6	1409:45	.08		31.860	.283		1.82	31.8	450	83	82	4	251	251	62	75
	1415			33.670				33.62								
2-1	1418	.06	.32	33.670	.245		1.35		429	83	82	4	250	249	62	75
1	1422:30	.06		34.92	.245		1.35	35.02	443	84	84	5	251	250	63	76
2	1427	.06		36.430	.265		1.55	36.37	453	84	84	5	251	250	64	76
2	1431:45	.07		37.960	.265		1.55	37.92	440	85	84	5	251	251	64	76
3	1435:30	.07		39.520	.265		1.82	39.47	448	85	84	5	251	251	64	77
3	1440:45	.08		41.320	.265		1.82	41.29	436	85	84	5	251	250	64	78
4	1446	.08		43.160	.265		1.82	43.11	441	85	84	5	251	250	65	78
4	1451:15	.08		44.970	.265		1.82	44.93	420	85	84	5	250	250	65	78
5	1456:30	.08		46.810	.265		1.82	46.75	443	85	84	5	250	250	65	78
5	1501:45	.08		48.620	.265		1.82	48.57	430	85	84	5	250	250	65	78
6	1507	.08		50.430	.265		1.82	50.39	450	85	85	5	250	251	66	78
6	1512:25	.08		52.160	.265		1.82	52.21	446	85	85	5	250	251	65	77
	1517:30			54.20				54.03								

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Isokinetic Sampling Field Data Sheet

Project Number:	M162810	Date:	9-15-16	Test Number:	3
Client:	Arcelor Mittal	Test Location:	2 Underfire	Operator:	SLB Test Tech: BM
Plant:	Burns Harbor	Test Method:	201A	Page Number:	2 of 2

1.228

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F	CPM Filter
3-1	1521	.08	.32	54.28	.283		1.82		443	85	85	5	252	253	62	81
1	1526:15	.08		56.22	.283		1.82	56.1	455	86	86	5	253	251	63	80
2	1531:30	.08		57.6	.283		1.82	57.92	460	86	86	5	253	251	63	80
2	1536:45	.08		59.72	.283		1.82	59.74	467	86	86	5	251	250	63	80
3	1542	.08		61.2	.283		1.82	61.56	463	87	86	5	244	251	62	79
3	1547:15	.08		63.55	.283		1.82	63.38	456	87	86	5	250	249	62	79
4	1552:30	.08		65.87	.283		1.82	65.2	443	87	86	5	251	249	63	78
4	1557:45	.08		67.110	.283		1.82	67.02	420	87	86	5	249	250	63	79
5	1603	.07		68.910	.265		1.55	68.84	431	86	86	5	248	251	62	80
5	1607:45	.07		70.45	.265		1.55	70.39	439	86	86	5	248	250	61	80
6	1612:30	.07		71.72	.265		1.55	71.94	442	87	86	5	249	252	61	79
6	1617:15	.07		73.36	.265		1.55	73.49	419	87	86	5	249	545	62	79
	1622			75.39				75.04								
4-1	1625	.08	.32	75.39	.283		1.82		446	86	86	5	249	250	63	78
1	1630:15	.08		77.34	.283		1.82	77.2	451	86	86	5	250	249	63	78
2	1635:30	.08		78.86	.283		1.82	79.02	442	86	86	5	250	250	63	79
2	1640:45	.08		80.49	.283		1.82	80.84	435	87	86	5	248	251	64	82
3	1646	.07		82.34	.265		1.55	82.66	451	87	86	5	248	252	64	82
3	1650:45	.07		84.00	.265		1.55	84.21	456	87	86	5	249	252	62	81
4	1655:30	.07		85.42	.265		1.55	85.76	466	87	86	5	249	253	62	81
4	1700:15	.07		87.56	.265		1.55	87.31	438	87	86	5	250	253	63	79
5	1705	.08		88.9	.283		1.82	88.86	451	86	86	5	251	253	63	80
5	1710:15	.08		90.72	.283		1.82	90.68	466	86	85	5	251	252	61	80
6	1715:30	.06		92.64	.245		1.35	92.5	458	86	85	5	251	252	62	80
6	1720	.06		93.95	.245		1.35	93.85	439	86	85	5	251	252	62	80
	1724:30			95.46				95.2								

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IMPINGER WEIGHT SHEET

PLANT: ArcelorMittal BH

UNIT NO:

LOCATION: #2 Underfire Stack

DATE: 9-15-16

TEST NO: 3

METHOD: 201A / 202

WEIGHED/MEASURED BY: SLB

BALANCE ID: 510-34

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	910.2	598.1		empty
IMPINGER 2	638.1	636.7		empty
IMPINGER 3	718.6	706.2		DI
IMPINGER 4	829.2	813.2		silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2266.9	1932.0	334.9
SILICA	829.2	813.2	16

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MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: HILLCOK MITTAL B&H
Date: 9-7-16
Test Location: UNDERFIRE STACK SOUTH
Source Condition: NORMAL
Test Method: 0031
Meter ID: 30B 774
Pre-Calibration Date: 7-28-16
Meter ΔH: _____
Meter Y: 1.000
Test Engineer: BVG

Test (Run) No. 1A
Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
0907	0.000	1	80	79	65	2
0912	4.950	1	82	80	65	2
0917	10.400	1	82	82	65	2
0922	15.250	1	82	82	65	2
0927	20.209					

Total Vol. in ft³ (V_m)= 20.209
Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE @ 250°

Comments: TRAPS CWX 386-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 1B
Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
0934	0.000	1	82	83	65	4
0939	4.900	1	82	83	65	4
0944	10.300	1	83	83	65	4
0949	15.250	1	83	83	65	4
0954	20.314					

Total Vol. in ft³ (V_m)= 20.314
Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE @ 250°

Comments: CWX 364-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

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MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: ARCELORMITTAL BH MIKE Date: 9-7-16
Test Location: UNDERFIRE STACK SOUTH Source Condition: Normal
Test Method: 0031 Meter ID: 30B #4 Pre-Calibration Date:
Meter ΔH: Meter Y: 1.000 Test Engineer:

Test (Run) No. 1C Barometric Pressure (P_{bar}) in. Hg
Static Pressure: Stack Temperature: (From Method Test Data)

Gas Sample Analysis
%CO_2 %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1005	0.000	1	84	84	65	5
1010	4.850	1	84	84	65	5
1015	10.150	1	85	85	65	5
1020	15.300	1	86	86	65	5
1025	20.176					

Total Vol. in ft³ (V_m)= 20.176 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate
mls (V_f)
- mls (V_i)
= mls gained

Silica Gel or Train
grams (W_f)
- grams (W_i)
= grams gained

Average Meter Temperature:
(average of both inlet and outlet if applicable)

PROBE @ 250°

Comments: CWX 363-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 1D Barometric Pressure (P_{bar}) in. Hg
Static Pressure: Stack Temperature: (From Method Test Data)

Gas Sample Analysis
%CO_2 %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1034	0.000	1	85	85	65	4
1039	4.900	1	86	86	65	4
1044	10.000	1	86	87	65	4
1049	15.200	1	87	87	65	4
1054	20.305					

Total Vol. in ft³ (V_m)= 20.305 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate
mls (V_f)
- mls (V_i)
= mls gained

Silica Gel or Train
grams (W_f)
- grams (W_i)
= grams gained

Average Meter Temperature:
(average of both inlet and outlet if applicable)

PROBE @ 250°

Comments: CWX 356-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

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MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: ARCELOR MITTAL MIS Date: 9-7-16
Test Location: UNDERFIRE STACK SOUTH Source Condition: NORMAL
Test Method: 0031 Meter ID: 32K #4 Pre-Calibration Date: _____
Meter ΔH: _____ Meter Y: 1.000 Test Engineer: BVG

Test (Run) No. E Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1102	0.000	1	87	87	65	5
1107	5.000	1	87	88	65	5
1112	10.750	1	87	88	65	5
1117	15.100	1	88	88	65	5
1122	20.413					

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE HEATED @ 250°

Total Vol. in ft³ (V_m)= 20.413 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Comments: CWX 357-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. F Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1135	0.000	1	89	89	65	5
1140	4.950	1	89	89	65	5
1145	10.000	1	90	89	65	5
1150	15.100	1	90	90	65	5
1155	20.220					

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE HEATED @ 250°

Total Vol. in ft³ (V_m)= 20.220 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Comments: CWX 355-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: ARCELOR MITTAL M162810 Date: 9-7-16
Test Location: UNDERFIRE STACK SOUTH Source Condition: NORMAL
Test Method: 0031 Meter ID: SOB #9 Pre-Calibration Date: 7-29-16
Meter ΔH: Meter Y: 1.000 Test Engineer: BVB

Test (Run) No. 2A Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1230	0.000	1	89	88	65	5
1235	4.950	1	89	89	65	5
1240	10.100	1	90	90	65	5
1245	15.200	1	90	91	65	5
1250	20.129					

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Total Vol. in ft³ (V_m)= 20.129 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Comments: CNZ 428-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 2B Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1257	0.000	1	90	90	65	5
1302	5.106	1	90	90	65	5
1307	10.00	1	91	90	65	5
1312	15.200	1	91	91	65	5
1317	20.210					

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Total Vol. in ft³ (V_m)= 20.210 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Comments: CNZ 427-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

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MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: ARCELOR MITTAL M162810 Date: 9-7-16
Test Location: UNDERFIRE STACK SOUTH Source Condition: normal
Test Method: 0031 Meter ID: 3DB 124 Pre-Calibration Date: 7-28-16
Meter ΔH: Meter Y: Test Engineer: BWB

Test (Run) No. 2C Barometric Pressure (P_{bar}) in. Hg
Static Pressure: Stack Temperature: (From Method Test Data)

Gas Sample Analysis: %CO_2 %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1324	0.000	1	90	91	65	5
1329	5.00	1	91	91	65	5
1334	10.100	1	91	91	65	5
1339	15.200	1	91	92	65	5
1344	20.306					

Total Vol. in ft³ (V_m)= 20.306 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate: mls (V_f) - mls (V_i) = mls gained

Silica Gel or Train: grams (W_f) - grams (W_i) = grams gained

Average Meter Temperature: (average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments:

Pre-Test Leak Check: ✓ @ 5 "Hg Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 2D Barometric Pressure (P_{bar}) in. Hg
Static Pressure: Stack Temperature: (From Method Test Data)

Gas Sample Analysis: %CO_2 %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1352	0.000	1	91	91	65	5
1357	5.000	1	91	91	65	5
1402	8.950	1	92	92	65	5
1407	15.150	1	93	92	65	5
1412	20.404					

Total Vol. in ft³ (V_m)= 20.404 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate: mls (V_f) - mls (V_i) = mls gained

Silica Gel or Train: grams (W_f) - grams (W_i) = grams gained

Average Meter Temperature: (average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: CWZ 425-01

Pre-Test Leak Check: @ "Hg Post-Test Leak Check: @ "Hg

MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: ARCELOR MITTAL MIK2310 Date: 9-7-16
Test Location: UNDERFIRE STACK SOUTH Source Condition: NORMAL
Test Method: 0031 Meter ID: 30B #4 Pre-Calibration Date: 7-28-16
Meter ΔH: Meter Y: 1.000 Test Engineer: BVB

Test (Run) No. 2F Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft^3 or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1420	0.000	1	93	92	65	5
1425	4.900	1	93	92	65	5
1430	10.000	1	93	92	65	5
1435	15.150	1	93	92	65	5
1440	20.336					

Total Vol. in ft^3 (V_m)= 20.336 Multiply total volume collected in Liters by 0.035315 to convert to ft^3

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: CWZ 424-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 2F Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft^3 or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1448	0.000	1	93	92	65	5
1453	5.110	1	93	92	65	5
1458	10.150	1	93	92	65	5
1503	15.00	1	93	92	65	5
1508	20.228					

Total Vol. in ft^3 (V_m)= 20.228 Multiply total volume collected in Liters by 0.035315 to convert to ft^3

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments:

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

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MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: ARCELOR MITTAL BH M162810 Date: 7-8-16
Test Location: UNDERFIRE STACK SOUTH Source Condition: normal
Test Method: 0231 Meter ID: 508 44 Pre-Calibration Date: 7-28-16
Meter ΔH: Meter Y: 1.000 Test Engineer: BVB

Test (Run) No. 3A Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis: _____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
0830	0.000	1	71	72	65	4
0835	5.100	1	72	72	65	4
0840	10.150	1	73	73	65	4
0845	15.150	1	73	73	65	4
0850	20.215					

Total Vol. in ft³ (V_m)= 20.215 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate: _____ mls (V_f) - _____ mls (V_i) = _____ mls gained

Silica Gel or Train: _____ grams (W_f) - _____ grams (W_i) = _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: CWX 359-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 3B Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis: _____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
0858	0.000	1	74	74	65	4
0903	4.950	1	74	74	65	4
0908	10.100	1	74	74	65	4
0913	15.000	1	75	75	65	4
0918	20.167					

Total Vol. in ft³ (V_m)= 20.167 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate: _____ mls (V_f) - _____ mls (V_i) = _____ mls gained

Silica Gel or Train: _____ grams (W_f) - _____ grams (W_i) = _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: CWX 358-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

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MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: ARCELOR MITTAL MIDDLETOWN Date: 7-8-16
Test Location: UNDERFIRE STACK SOUTH Source Condition: Normal
Test Method: 0631 Meter ID: 308 H4 Pre-Calibration Date: 7-29-16
Meter ΔH: _____ Meter Y: 1.000 Test Engineer: BUS

Test (Run) No. 3C Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
0925	0.000	1	75	75	65	4
0930	5.000	1	75	75	65	4
0935	10.150	1	75	75	65	4
0940	15.000	1	75	75	65	4
0945	20.125					

Total Vol. in ft³ (V_m)= 20.125 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: CWZ 422-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 3D Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis
_____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
0953	0.000	1	74	74	65	4
0958	5.000	1	74	74	65	4
1002	10.150	1	75	75	65	4
1007	15.000	1	75	75	65	4
1013	20.255					

Total Vol. in ft³ (V_m)= 20.255 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate
_____ mls (V_f)
- _____ mls (V_i)
= _____ mls gained

Silica Gel or Train
_____ grams (W_f)
- _____ grams (W_i)
= _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: 3D CWZ 421-01

Pre-Test Leak Check: ✓ @ 3 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

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MULTI METHOD NON-ISOKINETIC FIELD DATA SHEET

Project Name/Number: Arizona Boiler BH M162810 Date: 9-8-16
Test Location: Underfire 2 Stack Source Condition: normal
Test Method: 0031 Meter ID: 30A #4 Pre-Calibration Date: 7-20-16
Meter ΔH: _____ Meter Y: 1.00 Test Engineer: SVG

Test (Run) No. 3 Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis: _____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1020	0.000	1	75	75	65	5
1025	4.950	1	75	75	65	5
1030	10.000	1	76	76	65	5
1035	15.000	1	76	76	65	5
1040	20.118					

Total Vol. in ft³ (V_m)= _____ Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate: _____ mls (V_f) - _____ mls (V_i) = _____ mls gained

Silica Gel or Train: _____ grams (W_f) - _____ grams (W_i) = _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: CWZ 420-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Test (Run) No. 3 Barometric Pressure (P_{bar}) _____ in. Hg
Static Pressure: _____ Stack Temperature: _____ (From Method _____ Test Data)

Gas Sample Analysis: _____ %CO_2 _____ %O_2

Clock Time 24 hour	Meter Volume (V_m) ft³ or L (Circle One)	Meter Gage Pressure (ΔH) in. H_2O	Meter Inlet Temp. (t_m) °F	Meter Outlet Temp. (t_m) °F	Impinger Outlet Temp °F	Meter Vacuum "Hg
1050	0.000	1	75	75	65	5
1055	5.000	1	75	75	65	5
1100	10.000	1	76	76	65	5
1105	15.150	1	76	76	65	5
1110	20.296					

Total Vol. in ft³ (V_m)= 20.296 Multiply total volume collected in Liters by 0.035315 to convert to ft³

Condensate: _____ mls (V_f) - _____ mls (V_i) = _____ mls gained

Silica Gel or Train: _____ grams (W_f) - _____ grams (W_i) = _____ grams gained

Average Meter Temperature: _____
(average of both inlet and outlet if applicable)

PROBE TEMP @ 250

Comments: CWZ 419-01

Pre-Test Leak Check: ✓ @ 5 "Hg
Post-Test Leak Check: ✓ @ 5 "Hg

Isokinetic Sampling Cover Sheet

Test Engineer: [illegible]
Test Technician: BNG

Plant Information

Run Number: #1
Test Location: #2 UNDERFIRE STACK
Duct Shape: Circular or Rectangular
Flue Area: 165.130
Port Type: FLANGE
Test Method: M316

Date: 9-2-16
Client Name: ARCELORMITTAL
Length: N/A Width: N/A or Diameter: 14.5
Upstream Diameters: 70.50
Port Length: 50"
Source Condition: NORMAL

Project Number: M162810
Plant Name: BUENS HARBOR
Downstream Diameters: 72.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM23
Pitot ID:
Nozzle ID # 6002
Probe Length: 12
Pre-Test Nozzle Leak Check: 0.00 @ 10 "Hg
Pre-Test Pitot Leak Check: ✓ "H_2O

Meter Y Value: 1.001
Pitot Coefficient: 0.840
Nozzle Diameter: 0.435
Probe Liner: GLASS
Post-Test Nozzle Leak Check: 0.00 @ 10 "Hg
Post-Test Pitot Leak Check: ✓ "H_2O

ΔH Value: 1.405
Train Type: HOT BOX
Filter Number/Weight: BYPASS
Thimble Number/Weight: N/A

Traverse Data

Ports Sampled: 4
Total Points: 24

Points/Port: 6
Total Test Time: 120

Min/Point: 5
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.21
CO_2 %: / / / Avg 6.1
Imp and/or silica balance Model and S/N: 510-35
Initial Imp. Volume or Weight: 1913.7
Initial Silica Weight: 863.9

Static Pressure: -0.6
O_2 %: / / / Avg. 8.29
Servomex Serial #: 014400 1/3791
Final Imp. Volume or Weight: 2268.7
Final Silica Weight: 881.3

Determined by: Method 3 or Method 3A
Imp. Volume or Weight Gain: 355
Silica Weight Gain: 17.4

Comments:

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450 14.05 / 2.46
460 13.90 2.40
470 13.75 2.39

JWD 630-993-2661
JMC 993 2662

Isokinetic Sampling Field Data Sheet

Project Number: M162810
Client: ArcelorMittal
Plant: Burns Harbor

Date: 9-7-16
Test Location: #2 Underfire
Test Method: M316

Test Number: #1
Operator: [illegible]
Test Tech: BC
Page Number: 1 of 1

X5

Port-Point #.	Time	(ΔP)	14.37 Orifice Setting (ΔH)	Meter Volume (V_m) ft³, Actual	Square Root, ΔP	2.45 Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft³, per point	Theoretical Meter Volume, (V_m) ft³, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	0907	.08	1.15	74.039	.283	.69	3.46		462	81	80	5.0	250	250	62
-2	0912	.08	1.15	77.50	.283	.69	3.46	77.50	478	81	80	5.0	250	249	62
-3	0917	.09	1.29	80.96	.300	.74	3.68	80.96	429	82	80	5.0	250	252	62
-4	0922	.09	1.26	84.64	.300	.73	3.63	84.64	445	82	81	5.0	250	249	62
-5	0927	.08	1.11	88.27	.283	.68	3.39	88.27	458	83	81	5.0	250	250	62
-6	0932	.08	1.11	91.66	.283	.69	3.39	91.66	463	83	81	5.0	250	250	62
	0937			95.05				95.05							
2-1	0940	.09	1.26	95.05	.300	.73	3.63		450	83	81	5.0	250	250	62
-2	0945	.09	1.26	98.68	.300	.73	3.63	98.68	451	83	81	5.0	250	250	62
-3	0950	.08	1.10	102.31	.283	.68	3.38	102.31	468	84	81	5.0	250	251	62
-4	0955	.08	1.10	105.69	.283	.68	3.38	105.69	474	84	82	5.0	250	252	62
-5	1000	.08	1.15	109.07	.283	.69	3.46	109.07	436	85	82	5.0	250	250	62
-6	1005	.07	.98	112.53	.265	.64	3.20	112.53	449	85	82	5.0	250	251	62
	1010			115.73				115.73							
3-1	1013	.08	1.10	115.73	.283	.68	3.38		473	85	82	5.0	250	250	62
-2	1018	.09	1.29	119.11	.300	.74	3.68	119.11	433	85	82	5.0	250	251	62
-3	1023	.09	1.26	122.79	.300	.73	3.63	122.79	450	86	82	5.0	250	250	62
-4	1028	.08	1.11	126.42	.283	.68	3.39	126.42	460	86	83	5.0	250	250	62
-5	1033	.08	1.10	129.81	.283	.68	3.38	129.81	477	87	83	5.0	250	248	62
-6	1038	.08	1.15	133.19	.283	.69	3.46	133.19	430	87	83	5.0	250	250	62
	1043			136.65				136.65							
4-1	1046	.08	1.12	136.65	.283	.68	3.42		453	87	83	5.0	250	250	62
-2	1051	.08	1.10	140.07	.283	.68	3.38	140.07	476	87	83	5.0	250	250	62
-3	1056	.08	1.12	143.45	.283	.68	3.42	143.45	451	88	83	5.0	250	250	62
-4	1101	.09	1.29	146.87	.300	.73	3.68	146.87	439	88	84	5.0	250	250	62
-5	1106	.08	1.12	150.55	.283	.68	3.42	150.55	450	89	84	5.0	250	250	62
-6	1111	.07	.97	153.97	.265	.63	3.17	153.97	458	89	84	5.0	250	250	62
	1116			157.14				157.14							

IMPINGER WEIGHT SHEET

PLANT: ArcelorMittal Burns Harbor

UNIT NO: #2 Underfire

LOCATION: Stack

DATE: 9-9-16

TEST NO: #1

METHOD: M31b

WEIGHED/MEASURED BY: [illegible]

BALANCE ID: S10-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	939.2	658.7		DI
IMPINGER 2	689.5	622.6		DI
IMPINGER 3	640.0	632.4		Blank
IMPINGER 4	881.3	863.8		Silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2268.7	1913.7	355
SILICA	881.3	863.9	17.4

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Isokinetic Sampling Cover Sheet

Test Engineer: [illegible]
Test Technician: BVC

Plant Information

Run Number: #2
Test Location: #2 UNDERFIRE
Duct Shape: Circular or Rectangular
Flue Area: 165.130
Port Type: FLANGE
Test Method: M316

Date: 9-7-16
Client Name: Arcelor Mittal
Length: N/A Width: N/A or Diameter: 14.5
Upstream Diameters: 70.50
Port Length: 50"
Source Condition: Normal

Project Number: M162810
Plant Name: Burns Harbor
Downstream Diameters: >2.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM-23
Pitot ID:
Nozzle ID #
Probe Length: 12
Pre-Test Nozzle Leak Check: 0.00 @ 10 "Hg
Pre-Test Pitot Leak Check: ✓ "H_2O

Meter Y Value: 1.001
Pitot Coefficient: 0.840
Nozzle Diameter: 0.435
Probe Liner: GLASS

ΔH Value: 1.405
Train Type: Hot Box
Filter Number/Weight: BYPASS
Thimble Number/Weight: N/A
Post-Test Nozzle Leak Check: 0.00 @ 10 "Hg
Post-Test Pitot Leak Check: ✓ "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 24

Points/Port: 6
Total Test Time: 120

Min/Point: 5
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 26.21
CO_2 %: / / / Avg. 6.36
Imp and/or silica balance Model and S/N: [illegible]
Initial Imp. Volume or Weight: 2002.5
Initial Silica Weight: 806.2

Static Pressure: -.60
O_2 %: / / / Avg. 8.91
Final Imp. Volume or Weight: 2347.8
Final Silica Weight: 827.8

Determined by: Method 3 or Method 3A
Servomex Serial #: 0144001 / 3 Gal
Imp. Volume or Weight Gain: 345.3
Silica Weight Gain: 21.6

Comments:

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Isokinetic Sampling Field Data Sheet

430 13.63/2.41 450 13.33/2.38
460 13.19/2.37
440 - 13.48/2.40 470 - 13.05/2.36

Project Number: M162810 Date: 9-7-16 Test Number: #2
Client: ArcelorMittal Test Location: #2 UNDERFIRE Operator: [illegible] Test Tech: BVC
Plant: Burns Harbor Test Method: M316 Page Number: 1 of 1

x 5

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft³, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft³, per point	Theoretical Meter Volume, (V_m) ft³, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1230	.08	1.04	58.128	.283	.67	3.34		475	89	89	5.0	250	253	62
-2	1235	.08	1.09	61.47	.283	.68	3.41	61.47	426	89	89	5.0	250	250	62
-3	1240	.08	1.08	64.88	.283	.68	3.39	64.88	439	90	89	5.0	250	248	62
-4	1245	.09	1.20	68.27	.300	.71	3.57	68.27	450	90	90	5.0	250	252	62
-5	1250	.09	1.19	71.84	.300	.71	3.56	71.84	461	91	90	5.0	250	249	62
-6	1255	.07	.91	75.40	.265	.62	3.12	75.40	468	91	90	5.0	250	249	62
	1300			78.52				78.52							
2-1	1303	.08	1.08	78.52	.283	.68	3.39		441	91	90	5.0	250	249	62
-2	1308	.08	1.06	81.91	.283	.67	3.35	81.91	463	91	90	5.0	250	249	62
-3	1313	.08	1.04	85.26	.283	.67	3.34	85.26	470	92	90	5.0	250	249	62
-4	1318	.08	1.04	88.60	.283	.67	3.34	88.60	481	92	91	5.0	250	249	62
-5	1323	.08	1.08	91.94	.283	.68	3.39	91.94	437	93	91	5.0	250	251	62
-6	1328	.08	1.07	95.33	.283	.67	3.37	95.33	450	93	91	5.0	250	250	62
	1333			98.70				98.70							
3-1	1336	.08	1.04	98.70	.283	.67	3.34		474	93	91	5.0	250	250	62
-2	1341	.09	1.23	102.04	.300	.72	3.62	102.04	421	93	91	5.0	250	248	62
-3	1346	.08	1.07	105.66	.283	.67	3.37	105.66	446	94	91	5.0	251	250	62
-4	1351	.08	1.06	109.03	.283	.67	3.35	109.03	462	94	92	5.0	250	249	62
-5	1356	.09	1.17	112.38	.300	.71	3.54	112.38	476	95	92	5.0	250	251	62
-6	1401	.09	1.22	115.92	.300	.72	3.61	115.92	433	95	92	5.0	250	250	62
	1406			119.54				119.54							
4-1	1409	.08	1.06	119.54	.283	.67	3.35		459	95	92	5.0	250	249	62
-2	1414	.08	1.06	122.89	.283	.67	3.35	122.89	464	95	92	5.0	249	248	62
-3	1419	.08	1.04	126.24	.283	.67	3.34	126.24	478	96	92	5.0	250	251	62
-4	1424	.08	1.08	129.58	.283	.68	3.39	129.58	440	96	93	5.0	250	251	62
-5	1429	.08	1.07	132.97	.283	.67	3.37	132.97	453	97	93	5.0	250	248	62
-6	1434	.07	.91	136.34	.265	.62	3.12	136.34	468	97	93	5.0	250	250	62
	1439			139.462				139.46							

IMPINGER WEIGHT SHEET

PLANT: ArcelorMittal - Burns Harbor

UNIT NO: #2 Underfire

LOCATION: Stack

DATE: 9-7-16

TEST NO: #2

METHOD: M5/6

WEIGHED/MEASURED BY: [illegible]

BALANCE ID: S10-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	971.6	708.6		DI
IMPINGER 2	823.1	754.1		DI
IMPINGER 3	553.1	539.8		Empty
IMPINGER 4	827.8	806.2		Silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2347.8	2002.5	345.3
SILICA	827.8	806.2	21.6

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Isokinetic Sampling Cover Sheet

Test Engineer: [illegible]
Test Technician: BVG

Plant Information

Run Number: #3
Date: 9-8-16
Project Number: M162810
Test Location: #2 Underfire Stack
Client Name: ArcelorMittal
Plant Name: Burns Harbor
Duct Shape: Circular or Rectangular
Length: N/A Width: N/A or Diameter: 14.5
Flue Area: 165.130
Upstream Diameters: 70.50
Downstream Diameters: 72.0
Port Type: Flange
Port Length: 50"
Port Diameter: 6"
Test Method: M316
Source Condition: Normal

Meter and Probe Data

Meter ID: CM-23
Meter Y Value: 1.001
ΔH Value: 1.405
Pitot ID:
Pitot Coefficient: 0.840
Train Type: Hot Box
Nozzle ID #
Nozzle Diameter: 0.435
Filter Number/Weight: Bypass
Probe Length: 12
Probe Liner: Glass
Thimble Number/Weight: N/A
Pre-Test Nozzle Leak Check: 0.00 @ 10 "Hg
Post-Test Nozzle Leak Check: 0.00 @ 10 "Hg
Pre-Test Pitot Leak Check: ✓ "H_2O
Post-Test Pitot Leak Check: ✓ "H_2O

Traverse Data

Ports Sampled: 4
Points/Port: 6
Min/Point: 5
Total Points: 24
Total Test Time: 120
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.12
Static Pressure: -.60
CO_2 %: / / / Avg. 6.12
O_2 %: / / / Avg. 8.69
Determined by: Method 3 or Method 3A
Imp and/or silica balance Model and S/N: 510-35
Servomex Serial #: 0144001 / 8791
Initial Imp. Volume or Weight: 1921.8
Final Imp. Volume or Weight: 2265.6
Imp. Volume or Weight Gain: 343.4
Initial Silica Weight: 853.4
Final Silica Weight: 870.3
Silica Weight Gain: 16.9

Comments:

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Isokinetic Sampling Field Data Sheet

430 - 13.19 / 2.33
440 13.04 / 2.32
450 12.80 / 2.31
460 12.76 / 2.29
470 12.62 / 2.28

Project Number:	M162810	Date:	9-8-16	Test Number:	#3
Client:	ArcelorMittal	Test Location:	#2 Underfire	Operator:	[illegible] Test Tech: RVG
Plant:	Burns Harbor	Test Method:	M3116	Page Number:	1 of 1

x5

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft³, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft³, per point	Theoretical Meter Volume, (V_m) ft³, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	0830	.08	1.01	39.900	.283	.64	3.22		470	69	69	5.0	250	252	61
-2	0835	.08	1.06	43.12	.283	.66	3.30	43.12	427	69	69	5.0	250	251	61
-3	0840	.09	1.17	46.42	.300	.70	3.48	46.42	436	70	69	5.0	250	251	61
-4	0845	.09	1.16	49.90	.300	.69	3.46	49.90	449	70	70	5.0	250	250	61
-5	0850	.08	1.02	53.37	.283	.65	3.24	53.37	458	71	70	5.0	250	249	61
-6	0855	.08	1.01	56.61	.283	.64	3.22	56.61	473	71	70	5.0	250	250	61
	0900			59.83				59.83							
2-1	0903	.08	1.04	59.83	.283	.66	3.28		436	72	71	5.0	250	250	61
-2	0908	.08	1.02	63.11	.283	.65	3.24	63.11	457	72	71	5.0	250	250	61
-3	0913	.09	1.14	66.35	.300	.68	3.42	66.35	470	73	71	5.0	250	251	61
-4	0918	.09	1.17	69.77	.300	.70	3.48	69.77	440	73	72	5.0	250	253	61
-5	0923	.09	1.17	73.25	.300	.70	3.48	73.25	442	74	72	5.0	250	250	61
-6	0928	.08	1.02	76.73	.283	.65	3.24	76.73	462	74	72	5.0	250	250	61
	0933			79.97				79.97							
3-1	0936	.08	1.01	79.97	.283	.64	3.22		469	75	73	5.0	250	253	61
-2	0941	.08	1.06	83.19	.283	.66	3.30	83.19	430	75	73	5.0	250	248	61
-3	0946	.08	1.03	86.49	.283	.65	3.27	86.49	446	76	73	5.0	250	250	61
-4	0951	.08	1.02	89.76	.283	.65	3.24	89.76	461	76	74	5.0	250	251	61
-5	0956	.08	1.06	93.00	.283	.66	3.30	93.00	428	77	74	5.0	250	250	61
-6	001	.07	.91	96.30	.283	.61	3.07	96.30	440	77	74	5.0	250	251	61
	1006			99.37				99.37							
4-1	1009	.08	1.03	99.37	.283	.65	3.27		453	78	75	5.0	250	250	61
-2	1014	.08	1.01	102.64	.283	.64	3.22	102.64	474	78	75	5.0	250	250	61
-3	1019	.08	1.02	105.86	.283	.65	3.24	105.86	461	79	75	5.0	250	250	61
-4	1024	.08	1.02	109.10	.283	.65	3.24	109.10	463	79	76	5.0	250	250	61
-5	1029	.08	1.01	112.34	.283	.64	3.22	112.34	468	80	76	5.0	250	250	61
-6	1034	.09	1.03	115.56	.283	.65	3.27	115.56	450	80	76	5.0	250	250	61
	1039			119.833				119.83							

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IMPINGER WEIGHT SHEET

PLANT: ArcelorMittal Burns Harbor

UNIT NO: #2 Underfire

LOCATION: Stack

DATE: 9-8-16

TEST NO: #3

METHOD: M.316

WEIGHED/MEASURED BY: [illegible]

BALANCE ID: S10-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	921.4	657.8		DI
IMPINGER 2	703.0	630.1		DI
IMPINGER 3	641.2	633.9		Empty
IMPINGER 4	870.3	853.4		Silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2265.6	1921.8	343.8

	FINAL TOTAL	INITIAL TOTAL	TOTAL SILICA GAIN
SILICA	870.3	853.4	16.9

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Isokinetic Sampling Cover Sheet

Test Engineer: CSG
Test Technician: BM

Plant Information

Run Number: 1
Test Location: 2 Underfire STACK
Duct Shape: (Circular) or Rectangular
Flue Area: 165.130
Port Type: Flange
Test Method: M0010

Date: 9-12-16
Client Name: Arcelor Mittal
Length: — Width: — or Diameter: 14.5
Upstream Diameters: >.5
Port Length: 50"
Source Condition: Normal

Project Number: M162810
Plant Name: Burns, Harbor, IN
Downstream Diameters: >2.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM 3
Pitot ID: 123
Nozzle ID #: Glass
Probe Length: 12'
Pre-Test Nozzle Leak Check: ✓0.00 @ 10 "Hg
Pre-Test Pitot Leak Check: ✓@5 "H_2O

Meter Y Value: 1.016
Pitot Coefficient: .84
Nozzle Diameter: .500
Probe Liner: Glass

ΔH Value: 1.525
Train Type: Hot Box
Filter Number/Weight: —
Thimble Number/Weight: —
Post-Test Nozzle Leak Check: ✓0.00 @ 20 "Hg
Post-Test Pitot Leak Check: ✓@5 "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 24

Points/Port: 6
Total Test Time: 192

Min/Point: 4
Sample Plane: (Horizontal) or Vertical

Stack Parameters

Barometric Pressure: 29.35
CO_2 %: / / / Avg. 6.1
Imp and/or silica balance Model and S/N: 510-34
Initial Imp. Volume or Weight: 2448.3
Initial Silica Weight: 844.1

Static Pressure: -.6
O_2 %: / / /Avg. 8.29
Servomex Serial #: 24400D / 37091
Final Imp. Volume or Weight: 3101.2
Final Silica Weight: 877.8

Determined by: Method 3 or (Method 3A)
Imp. Volume or Weight Gain: 652.9
Silica Weight Gain: 33.7

Comments:

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470 K-2.963 x4 K'-23.913
400 K-3 K'-26.343
K-3.039 x4 K'-24.928
K-3.051 x4 K'-27.895

Isokinetic Sampling Field Data Sheet

Project Number: M162810
Client: Arcelor Mittal
Plant: Burns Harbor, IN

Date: 9-12-16
Test Location: 2 Underfire
Test Method: M5010

Test Number: 1
Operator: CSG
Test Tech: BM
Page Number: 1 of 2

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1100	.09	2.2	62.620	.300	.968	3.634		446	74	74	8	250	249	60
1	1104	.09	2.2	66.34	.300	.915	3.661	66.254	455	75	74	11	248	250	63
2	1108	.08	1.9	69.87	.282	.838	3.352	69.915	464	76	74	11	251	249	65
2	1112	.08	1.9	73.31	.282	.838	3.352	73.267	468	76	74	11	251	249	64
3	1116	.08	1.9	76.55	.282	.856	3.426	76.619	427	78	75	11	251	249	65
3	1120	.08	1.9	80.15	.282	.856	3.426	80.045	427	78	75	11	251	249	65
4	1124	.08	1.9	83.54	.282	.860	3.441	83.471	444	79	75	12	249	249	65
4	1128	.08	1.9	86.98	.282	.860	3.441	86.912	444	79	75	12	249	249	65
5	1132	.08	1.9	90.29	.282	.854	3.416	90.353	425	79	76	12	249	249	65
5	1136	.08	1.9	93.68	.282	.854	3.416	93.769	425	79	76	12	249	249	65
6	1140	.05	1.2	97.24	.223	.677	2.709	97.185	430	80	76	12	250	250	64
6	1144	.05	1.2	99.90	.223	.677	2.709	99.894	430	80	76	12	250	250	64
	1148			102.670				102.603							
2-1	1153	.08	1.9	102.670	.282	.856	3.426		438	79	77	12	250	250	64
1	1157	.08	1.9	106.14	.282	.856	3.426	106.096	438	79	77	12	250	250	64
2	1201	.08	2.1	109.66	.282	.885	3.540	109.522	403	81	78	12	251	249	62
2	1205	.08	2.1	113.15	.282	.885	3.540	113.062	403	81	78	12	251	249	62
3	1209	.08	1.9	116.69	.282	.838	3.352	116.602	463	82	78	12	250	250	63
3	1213	.08	1.9	119.84	.282	.838	3.352	119.954	463	82	78	12	250	250	63
4	1217	.08	1.9	123.27	.282	.838	3.352	123.306	480	83	79	12	250	250	64
4	1221	.08	1.9	126.71	.282	.838	3.352	126.658	480	83	79	12	250	250	64
5	1225	.07	1.6	130.09	.264	.783	3.135	130.010	490	83	79	12	250	250	62
5	1229	.07	1.6	133.07	.264	.783	3.135	133.145	490	83	79	12	250	250	62
6	1233	.07	1.6	136.19	.264	.783	3.135	136.280	500	84	80	12	251	250	63
6	1237	.07	1.6	139.36	.264	.783	3.135	139.415	500	84	80	12	251	250	63
	1241			142.420				142.550							

Project No: M162810B
Coke Battery #2 Underfire Stack
325 of 404
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500 - [illegible]
[illegible] - 3.010 - 24.230
450 - 3.051 - 24.895
425 - 3.094 - 25.599
X4

Isokinetic Sampling Field Data Sheet

Project Number: M162810
Client: Arcelor Mittal
Plant: Burns Harbor, IN

Date: 9-12-16
Test Location: 2 Underfire
Test Method: M0010

Test Number: 1
Operator: CSG
Test Tech: BM
Page Number: 2 of 2

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
2-1	1245	.08	2.0	142.420	.282	.875	3.500	—	425	83	81	14	250	250	63
1	1249	.08	2.0	145.86	.282	.875	3.500	145.920	425	83	81	14	250	250	63
2	1253	.08	2.0	149.51	.282	.875	3.500	149.420	417	84	81	14	250	250	64
2	1257	.08	2.0	152.96	.282	.875	3.500	152.920	417	84	81	14	250	250	64
3	1301	.08	2.0	156.54	.282	.875	3.500	156.420	432	86	81	14	250	250	65
3	1305	.08	2.0	159.80	.282	.875	3.500	159.920	432	86	81	14	250	250	65
4	1309	.08	1.9	163.35	.282	.860	3.441	163.420	449	87	82	14	250	250	65
4	1313	.08	1.9	166.77	.282	.860	3.441	166.861	449	87	82	14	250	250	65
5	1317	.08	1.9	170.39	.282	.860	3.441	170.302	442	87	83	14	250	251	65
5	1321	.08	1.9	173.61	.282	.860	3.441	173.743	442	87	83	14	250	251	65
6	1325	.08	1.9	177.05	.282	.848	3.395	177.184	470	87	83	14	250	254	65
6	1329	.08	1.9	180.61	.282	.848	3.395	180.579	470	87	83	14	250	254	65
	1333			183.870				183.974							
4-1	1338	.08	2.0	183.870	.282	.872	3.490	—	430	85	83	14	250	249	65
1	1342	.08	2.0	187.44	.282	.872	3.490	187.360	430	85	83	14	250	249	65
2	1346	.08	1.9	190.75	.282	.860	3.441	190.850	440	86	84	14	251	251	64
2	1350	.08	1.9	194.33	.282	.860	3.441	194.291	440	86	84	14	251	251	64
3	1354	.08	1.9	197.66	.282	.860	3.441	197.732	459	86	84	14	249	250	65
3	1358	.08	1.9	201.11	.282	.860	3.441	201.173	459	86	84	14	249	250	65
4	1402	.08	1.9	204.51	.282	.860	3.441	204.614	461	86	84	14	251	250	63
4	1406	.08	1.9	208.13	.282	.860	3.441	208.055	461	86	84	14	250	250	63
5	1410	.07	1.6	211.55	.264	.794	3.178	211.496	483	86	84	14	250	249	63
5	1414	.07	1.6	214.50	.264	.794	3.178	214.674	483	86	84	14	250	249	63
6	1418	.05	1.2	217.79	.223	.691	2.767	217.852	418	87	84	11	250	250	63
6	1422	.05	1.2	220.51	.223	.691	2.767	220.619	418	87	84	11	250	250	63
	1426			223.310				223.386							

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IMPINGER WEIGHT SHEET

PLANT: Arcelor Mittal

UNIT NO: #2 Underfire

LOCATION:

DATE: 9-12-16

TEST NO: 1

METHOD: M0010

WEIGHED/MEASURED BY: CSE

BALANCE ID: 510-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	919.6	400.7		MT
IMPINGER 2	762.5	700.7		DI
IMPINGER 3	762.4	708.5		DI
IMPINGER 4	656.5	638.4		MT
IMPINGER 5	877.8	844.1		SILICA
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	3101.2 FINAL TOTAL	2448.3 INITIAL TOTAL	652.9 TOTAL IMPINGER GAIN
SILICA	877.8 FINAL TOTAL	844.1 INITIAL TOTAL	33.7 TOTAL SILICA GAIN

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Isokinetic Sampling Cover Sheet

Test Engineer: CSE
Test Technician: BM

Plant Information

Run Number: 2
Test Location: 2 Underfire STACK
Duct Shape: Circular or Rectangular
Flue Area: 165.130
Port Type: Flange
Test Method: M0010

Date: 9-13-16
Client Name: ArcelorMittal
Length: _____ Width: _____ or Diameter: 14.5
Upstream Diameters: 2.5
Port Length: 50"
Source Condition: Normal

Project Number: M162810
Plant Name: Burns Harbor, IN
Downstream Diameters: 22.0
Port Diameter: 6"

Meter and Probe Data

Meter ID: CM3
Pitot ID: 12.3
Nozzle ID #: Glass
Probe Length: 12'
Pre-Test Nozzle Leak Check: ✓ 0.00 @ 10 "Hg
Pre-Test Pitot Leak Check: ✓@5 "H_2O

Meter Y Value: 1.016
Pitot Coefficient: .84
Nozzle Diameter: .500
Probe Liner: Glass

ΔH Value: 1.525
Train Type: Hot Box
Filter Number/Weight: —
Thimble Number/Weight: —
Post-Test Nozzle Leak Check: ✓0.00 @ 15 "Hg
Post-Test Pitot Leak Check: ✓@5 "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 24

Points/Port: 6
Total Test Time: 192

Min/Point: 4
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.27
CO_2 %: ____ / ____ / ____ / Avg. 6.36
Imp and/or silica balance Model and S/N: 510-35
Initial Imp. Volume or Weight: 268025
Initial Silica Weight: 844.9

Static Pressure: -.6
O_2 %: ____ / ____ / ____ /Avg. 8.19
Final Imp. Volume or Weight: 3305.2
Final Silica Weight: 887.6

Determined by: Method 3 or Method 3A
Servomex Serial #: 0144001 / 3791
Imp. Volume or Weight Gain: 624.7
Silica Weight Gain: 42.7

Comments:

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450 - 3.016 - 24.525
475 - 2.975 - 23.918
500 - 2.936 - 23.295

Isokinetic Sampling Field Data Sheet

Project Number: M162810
Client: Arcelor Mittal
Plant: Burns Harbor, IN
Date: 9-13-16
Test Location: 2 Underfire
Test Method: M0010
Test Number: 2
Operator: CSE
Test Tech: BM
Page Number: 1 of 2

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	835	.08	2.0	24.810	.282	.864	3.459		417	70	69	11	253	249	53
1	839	.08	2.0	28.17	.282	.864	3.459	28.269	417	70	69	11	253	249	53
2	843	.09	2.2	31.77	.300	.904	3.619	31.728	443	70	69	13	250	250	53
2	847	.09	2.2	35.41	.300	.904	3.619	35.347	443	70	69	13	250	250	53
3	851	.08	1.9	38.88	.282	.841	3.365	38.966	467	78	70	13	250	250	61
3	855	.08	1.9	42.29	.282	.841	3.365	42.331	467	78	70	13	250	250	61
4	859	.07	1.7	45.75	.264	.809	3.236	45.696	431	74	71	10	250	250	63
4	903	.07	1.7	49.27	.264	.809	3.236	48.932	431	74	71	10	250	250	63
5	907	.07	1.7	52.22	.264	.809	3.236	52.168	435	76	71	10	250	249	63
5	911	.07	1.7	55.49	.264	.809	3.236	55.404	435	76	71	10	250	249	63
6	915	.05	1.2	58.73	.223	.671	2.697	58.640	453	77	72	10	250	250	62
6	919	.05	1.2	61.40	.223	.671	2.697	61.337	453	77	72	10	250	250	62
	923			64.120				64.034							
2-1	927	.08	1.9	64.120	.282	.853	3.412		446	78	73	11	250	250	63
1	931	.08	1.9	67.48	.282	.853	3.412	67.532	446	78	73	11	250	250	63
2	935	.08	2.0	71.03	.282	.864	3.459	70.944	406	80	74	11	250	250	57
2	939	.08	2.0	74.45	.282	.864	3.459	74.403	406	80	74	11	250	250	57
3	943	.08	1.9	77.90	.282	.853	3.412	77.862	446	82	76	11	250	250	58
3	947	.08	1.9	81.22	.282	.853	3.412	81.274	446	82	76	11	250	250	58
4	951	.07	1.7	84.74	.264	.797	3.191	84.686	462	83	77	11	250	250	59
4	955	.07	1.7	87.81	.264	.797	3.191	87.877	462	83	77	11	250	250	59
5	959	.08	2.0	91.13	.282	.864	3.459	91.068	438	84	78	11	250	250	57
5	1003	.08	2.0	94.59	.282	.864	3.459	94.527	438	84	78	11	250	250	57
6	1007	.08	1.9	98.02	.282	.853	3.412	97.986	457	85	78	11	253	250	54
6	1011	.08	1.9	101.44	.282	.853	3.412	101.398	457	85	78	11	253	250	54
	1015			104.870				104.810							

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450 - 3.072 - 25.032
475 - 3.031 - 24.363
500 - 3.031 - 23.728

Isokinetic Sampling Field Data Sheet

Project Number: M162810
Client: Arcelor Mittal
Plant: Burns Harbor, IN

Date: 9-13-16
Test Location: 2 Underfire
Test Method: M0010

Test Number: 2
Operator: CSE
Test Tech: BM
Page Number: 2 of 2

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
3-1	1019	.08	2.0	104.870	.282	.881	3.524		434	83	80	13	250	250	52
1	1023	.08	2.0	108.46	.282	.881	3.524	108.394	434	83	80	13	250	250	52
2	1027	.07	1.7	111.21	.264	.812	3.251	111.918	455	83	80	10	251	250	54
2	1031	.07	1.7	115.14	.264	.812	3.251	115.169	455	83	80	10	251	250	54
3	1035	.07	1.8	118.48	.264	.824	3.296	118.420	410	83	80	10	250	250	55
3	1039	.07	1.8	121.81	.264	.824	3.296	121.716	410	83	80	10	250	250	55
4	1043	.07	1.7	125.16	.264	.812	3.251	125.012	441	84	80	10	250	250	55
4	1047	.07	1.7	128.33	.264	.812	3.251	128.263	441	84	80	10	250	250	55
5	1051	.07	1.7	131.60	.264	.812	3.251	131.514	460	85	81	10	250	250	56
5	1055	.07	1.7	134.69	.264	.812	3.251	134.765	460	85	81	10	250	250	56
6	1059	.05	1.2	138.14	.223	.696	2.786	138.016	431	86	81	10	250	250	57
6	1103	.05	1.2	140.89	.223	.696	2.786	140.802	431	86	81	10	250	250	57
	1107			143.470				143.588							
4-1	1111	.08	1.9	143.470	.282	.857	3.429		464	85	82	10	250	250	57
1	1115	.08	1.9	146.78	.282	.857	3.429	146.899	464	85	82	10	250	250	57
2	1119	.08	2.0	150.29	.282	.881	3.524	150.328	425	86	82	13	250	249	60
2	1123	.08	2.0	153.80	.282	.881	3.524	153.852	425	86	82	13	250	249	60
3	1127	.08	2.0	157.44	.282	.868	3.475	157.376	446	86	82	13	250	250	62
3	1131	.08	2.0	160.90	.282	.868	3.475	160.851	446	86	82	13	250	250	62
4	1135	.08	2.0	164.39	.282	.881	3.524	164.376	405	86	83	13	250	251	65
4	1139	.08	2.0	167.77	.282	.881	3.524	167.850	405	86	83	13	250	251	65
5	1143	.08	2.0	171.31	.282	.881	3.524	171.374	435	85	83	13	249	250	65
5	1147	.08	2.0	174.78	.282	.881	3.524	174.898	435	85	83	13	249	250	65
6	1151	.05	1.2	178.47	.223	.686	2.747	178.422	452	86	83	10	250	251	65
6	1155	.05	1.2	181.06	.223	.686	2.747	181.169	452	86	83	10	250	251	65
	1159			183.810				183.916							

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IMPINGER WEIGHT SHEET

PLANT: Arcelor Mittal

UNIT NO: #2 Under Fire

LOCATION:

DATE: 9-13-16

TEST NO: 2

METHOD: M0010

WEIGHED/MEASURED BY: CSE

BALANCE ID: 510-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	987.6 85	512.9		MT
IMPINGER 2	763.8	756.0		DI
IMPINGER 3	785.6	737.6		DI
IMPINGER 4	683.2	674.0		MT
IMPINGER 5	887.6	844.9		Silica
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	3305.2 FINAL TOTAL	2680.5 INITIAL TOTAL	624.7 TOTAL IMPINGER GAIN
SILICA	887.6 FINAL TOTAL	844.9 INITIAL TOTAL	42.7 TOTAL SILICA GAIN

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Isokinetic Sampling Cover Sheet

Test Engineer: CSE
Test Technician: BM

Plant Information

Run Number: 3
Date: 9-13-16
Project Number: M162810
Test Location: 2 Underfire stack
Client Name: Arcelor Mittal
Plant Name: Burns Harbor, IN
Duct Shape: Circular or Rectangular
Length: ____ Width: ____ or Diameter: 14.5
Flue Area: 165.130
Upstream Diameters: 2.5
Downstream Diameters: >2.0
Port Type: Flange
Port Length: 50"
Port Diameter: 6"
Test Method: Method
Source Condition: Normal

Meter and Probe Data

Meter ID: CM3
Meter Y Value: 1.016
ΔH Value: 1.525
Pitot ID: 123
Pitot Coefficient: .84
Train Type: Hot Box
Nozzle ID #: Glass
Nozzle Diameter: .500
Filter Number/Weight:
Probe Length: 10'
Probe Liner: Glass
Thimble Number/Weight:
Pre-Test Nozzle Leak Check: ✓0.00 @ 10 "Hg
Post-Test Nozzle Leak Check: ✓0.00 @ 17 "Hg
Pre-Test Pitot Leak Check: ✓@5 "H_2O
Post-Test Pitot Leak Check: ✓@5 "H_2O

Traverse Data

Ports Sampled: 4
Points/Port: 6
Min/Point: 4
Total Points: 24
Total Test Time: 192
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.27
Static Pressure: -.6
CO_2 %: / / / Avg. 6.12
O_2 %: / / /Avg. 8.64
Determined by: Method 3 or Method 3A
Imp and/or silica balance Model and S/N: S10-35
Servomex Serial #: 0144001 / 3791
Initial Imp. Volume or Weight: 2467.2
Final Imp. Volume or Weight: 3122.8
Imp. Volume or Weight Gain: 655.6
Initial Silica Weight: 853.9
Final Silica Weight: 890.9
Silica Weight Gain: 37.0

Comments:

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[illegible] - 3.072 - 25.032
475 - 3.031 - 24.363
[illegible] - 2.991 - 23.728

Isokinetic Sampling Field Data Sheet-M23

Project Number: M162810
Client: Arcelor Mittal
Plant: Burns Harbor, IN

Date: 9-13-16
Test Location: 2 Underfire
Test Method: M0010

Test Number: 3
Operator: CSG
Test Tech: BM
Page Number: 1 of 2

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	CPM Filter Temp °F	Impinger Outlet Well Temp. °F
1-1	1245	.08	2.0	85.720	.282	.868	3.475	—	451	84	84	13	250	250		65
1	1249	.08	2.0	89.31	.282	.868	3.475	89.255	451	84	84	13	250	250		65
2	1253	.08	1.9	92.77	.282	.857	3.429	92.730	470	86	84	13	250	250		65
2	1257	.08	1.9	96.27	.282	.857	3.429	96.159	470	86	84	13	250	250		65
3	1301	.07	1.8	99.166	.264	.824	3.296	99.588	430	87	84	13	253	251		65
3	1305	.07	1.8	102.78	.264	.824	3.296	102.884	430	87	84	13	253	251		65
4	1309	.07	1.7	106.22	.264	.817	3.251	106.180	452	88	85	13	250	250		60
4	1313	.07	1.7	109.54	.264	.817	3.251	109.431	452	88	85	13	250	250		60
5	1317	.08	2.0	112.55	.282	.881	3.524	112.682	484	88	85	12	250	249		63
5	1321	.08	2.0	116.29	.282	.881	3.524	116.206	484	88	85	13	250	249		63
6	1325	.05	1.2	119.84	.223	.686	2.747	119.730	441	89	86	10	249	250		64
6	1329	.05	1.2	122.36	.223	.686	2.747	122.477	441	89	86	10	249	250		64
	1333			125.200				125.224								
2-1	1337	.08	2.0	125.200	.282	.881	3.524	—	415	88	86	14	250	250		65
1	1341	.08	2.0	128.79	.282	.881	3.524	128.724	415	88	86	14	250	250		65
2	1345	.08	2.0	132.31	.282	.881	3.524	132.248	434	90	87	14	250	250		66
2	1349	.08	2.0	135.65	.282	.881	3.524	135.772	434	90	87	14	250	250		66
3	1353	.08	2.0	139.17	.282	.868	3.475	139.296	451	90	87	14	250	250		66
3	1357	.08	2.0	142.70	.282	.868	3.475	142.771	451	90	87	14	250	250		66
4	1401	.08	2.0	146.31	.282	.881	3.524	146.246	431	90	87	14	250	250		66
4	1405	.08	2.0	149.71	.282	.881	3.524	149.770	431	90	87	14	250	250		66
5	1409	.06	1.5	153.36	.244	.752	3.009	153.294	446	91	88	12	250	250		65
5	1413	.06	1.5	156.29	.244	.752	3.009	156.303	446	91	88	12	250	250		65
6	1417	.06	1.5	159.37	.244	.763	3.052	159.312	421	91	88	12	250	250		54
6	1421	.06	1.5	162.22	.244	.763	3.052	162.364	421	91	88	12	250	250		54
	1425			165.380				165.416								

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450 - 3.072 - 25.032
475 - 3.031 - 24.363
500 - 2.991 - 23.728

Isokinetic Sampling Field Data Sheet-M23

Project Number: M162810
Client: Arcelor Mittal
Plant: Burns Harbor, IN

Date: 9-13-16
Test Location: 2 Under Fire
Test Method: Modified 23

Test Number: 3
Operator: CSE
Test Tech: BM
Page Number: 2 of 2

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	CPM Filter Temp °F	Impinger Outlet Well Temp. °F
2-1	1429	.08	2.0	165.380	.282	.868	3.475		451	92	89	14	250	250		55
1	1433	.08	2.0	168.76	.282	.868	3.475	168.855	451	92	89	14	250	250		55
2	1437	.08	2.0	172.44	.282	.881	3.524	172.330	417	93	89	14	250	250		55
3	1441	.08	2.0	175.91	.282	.881	3.524	175.854	417	93	89	14	250	250		55
4	1445	.08	2.0	179.44	.282	.868	3.475	179.378	441	93	90	14	250	250		55
5	1449	.08	2.0	182.97	.282	.868	3.475	182.853	441	93	90	14	250	250		55
6	1453	.07	1.7	186.41	.264	.801	3.207	186.328	467	93	90	14	250	250		56
1	1457	.07	1.7	189.65	.264	.801	3.207	189.535	467	93	90	14	250	250		56
2	1501	.07	1.8	192.83	.264	.822	3.289	192.742	434	93	90	14	250	250		56
3	1505	.07	1.8	196.15	.264	.822	3.289	196.031	434	93	90	14	250	250		56
4	1509	.07	1.7	199.40	.264	.812	3.251	199.320	453	93	90	14	250	250		57
5	1513	.07	1.7	202.47	.264	.812	3.251	202.571	453	93	90	14	250	250		57
	1517			205.790				205.882								
4-1	1521	.07	1.8	205.790	.264	.824	3.296		435	92	90	14	251	250		57
1	1525	.07	1.8	209.13	.264	.824	3.296	209.086	435	92	90	14	251	250		57
2	1529	.07	1.7	212.33	.264	.812	3.251	212.282	453	93	91	14	251	250		58
3	1533	.07	1.7	215.56	.264	.812	3.251	215.633	453	93	91	14	251	250		58
4	1537	.08	2.0	218.94	.282	.881	3.524	218.884	427	93	91	14	250	250		58
5	1541	.08	2.0	222.55	.282	.881	3.524	222.408	427	93	91	14	250	250		58
6	1545	.08	2.0	225.84	.282	.866	3.465	225.932	448	94	91	14	250	250		57
1	1549	.08	2.0	229.30	.282	.866	3.465	229.397	448	94	91	14	250	250		57
2	1553	.06	1.4	232.71	.244	.742	2.969	232.862	466	93	91	12	250	250		58
3	1557	.06	1.4	235.79	.244	.742	2.969	235.831	466	93	91	12	250	250		58
4	1601	.06	1.5	238.89	.244	.763	3.052	238.800	405	93	91	12	250	250		58
5	1605	.06	1.5	241.81	.244	.763	3.052	241.852	405	93	91	12	250	250		58
	1609			244.970				244.904								

Project No. M162810B
Coke Battery #2 Underfire Stack
334 of 404
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IMPINGER WEIGHT SHEET

PLANT: Arcelor Mittal BH

UNIT NO: #2 Underfire

LOCATION:

DATE: 9-13-16

TEST NO: 3

METHOD: 0010

WEIGHED/MEASURED BY: SCB

BALANCE ID: 510-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	450.5 79	402.3		empty
IMPINGER 2	742.4	723.6		DI
IMPINGER 3	706.9	700.3		DI
IMPINGER 4	644	641		empty
IMPINGER 5	890.9	853.9		silica
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	3122.8 FINAL TOTAL	2467.2 INITIAL TOTAL	655.6 TOTAL IMPINGER GAIN
SILICA	890.9 FINAL TOTAL	853.9 INITIAL TOTAL	37.0 TOTAL SILICA GAIN

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Isokinetic Sampling Cover Sheet

Test Engineer: BJG
Test Technician: BRM 1

Plant Information

Run Number: 1
Test Location: COKE BATTERY 2 UNDERFIRE STACK
Duct Shape: Circular or Rectangular
Flue Area: 165.130
Port Type: FLANGE
Test Method: 315

Date: 9-12-16
Client Name: ARCELOR MITTAL
Length: _____ Width: _____ or Diameter: 14.5
Upstream Diameters: >.50
Downstream Diameters: >2.0
Port Length: 50"
Port Diameter: 6"
Source Condition: normal

Project Number: M162810
Plant Name: BURNS HARBOR

Meter and Probe Data

Meter ID: CM23
Pitot ID: 235
Nozzle ID #: GLASS
Probe Length: 121
Pre-Test Nozzle Leak Check: ✓ @ 8 "Hg
Pre-Test Pitot Leak Check: ✓ @ 4 "H_2O

Meter Y Value: 1.007
Pitot Coefficient: .840
Nozzle Diameter: .735
Probe Liner: GLASS

ΔH Value: 1.905
Train Type: HOT BOX
Filter Number/Weight: 8919 / .4403
Thimble Number/Weight: N/A
Post-Test Nozzle Leak Check: ✓ @ 10 "Hg
Post-Test Pitot Leak Check: ✓ @ 4 "H_2O

Traverse Data

Ports Sampled: 4
Total Points: 24

Points/Port: 6
Total Test Time: 120

Min/Point: 5
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.35
CO_2 %: / / / Avg. 6.1
Imp and/or silica balance Model and S/N: 310-35
Initial Imp. Volume or Weight: 1943.5
Initial Silica Weight: 727.2

Static Pressure: -.6
O_2 %: / / / Avg. 8.20
Final Imp. Volume or Weight: 2242.5
Final Silica Weight: 745.6

Determined by: Method 3 or Method 3A
Servomex Serial #: 0 1 1 0 P 1 / 3791
Imp. Volume or Weight Gain: 299.0
Silica Weight Gain: 18.4

Comments:

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455 12.529 2.295 471 12.608 2.275
415 13.415 2.347 500 12.227
440 13.042 2.314 2.240

Isokinetic Sampling Field Data Sheet

400
14.032
2.133

Project Number:	M162810	Date:	9-12-14
Client:	ARCELOR MITTAL	Test Location:	Coke Battery 2 UNDERFIRE STACK
Plant:	BURNS HARBOR	Test Method:	315

Test Number: 1
Operator: BWE Test Tech: BRM
Page Number: 1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1130	.07	.91	27.310	.264	.612	3.061		443	77	76	3	254	247	66
2	1135	.06	.80	30.35	.244	.574	2.874	30.371	429	78	76	2	253	251	64
3	1140	.06	.80	33.25	.244	.574	2.874	33.245	442	79	77	2	253	252	65
4	1145	.07	.91	36.10	.264	.612	3.061	36.119	458	82	77	3	253	252	64
5	1150	.08	1.0	39.10	.282	.643	3.217	39.130	471	83	78	4	253	252	59
6	1155	.09	1.1	42.40	.300	.694	3.471	42.397	428	85	79	4	254	253	58
	1200			45.860				45.868							
2-1	1205	.08	1.0	45.860	.282	.654	3.272		441	84	79	4	254	252	57
2	1210	.06	.75	49.10	.244	.557	2.786	49.152	444	87	80	3	253	251	58
3	1215	.07	.88	51.95	.264	.601	3.009	51.938	472	87	80	3	253	252	58
4	1220	.06	.75	55.00	.244	.557	2.786	54.947	482	87	81	3	252	253	57
5	1225	.05	.61	57.75	.223	.500	2.504	57.733	505	87	82	3	252	253	58
6	1230	.05	.61	60.24	.223	.500	2.507	60.237	503	88	82	3	252	252	60
	1235			62.810				62.741							
3-1	1239	.06	.73	62.810	.244	.545	2.743		514	86	82	3	253	252	62
2	1244	.06	.73	65.50	.244	.545	2.743	65.553	497	88	83	3	253	253	58
3	1249	.07	.93	68.30	.264	.620	3.104	68.296	415	89	83	4	253	251	58
4	1254	.08	1.0	71.45	.282	.643	3.319	71.400	400	90	84	4	253	252	58
5	1259	.08	1.0	74.75	.282	.654	3.272	74.719	446	91	84	4	253	252	58
6	1304	.08	1.0	78.00	.282	.643	3.217	77.991	468	91	85	4	253	252	59
	1309			81.250				81.208							
4-1	1313	.07	.91	81.250	.264	.612	3.061		450	91	85	4	252	252	59
2	1318	.07	.93	84.35	.264	.620	3.104	84.311	400	92	85	4	253	253	60
3	1323	.06	.80	87.45	.244	.574	2.874	87.415	415	92	86	4	253	250	61
4	1328	.06	.79	90.30	.244	.579	2.896	90.259	455	92	86	4	253	250	61
5	1333	.09	1.1	93.20	.282	.640	3.440	93.195	400	92	86	4	253	252	62
6	1338	.09	1.1	96.65	.282	.640	3.440	96.625	403	92	86	4	252	252	62
	1343			100.220				100.045							

Project No. M162810B
Coke Battery #2 Underfire Stack
337 of 404
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IMPINGER WEIGHT SHEET

PLANT: Arcelor Mittal

UNIT NO: #2 Underfire

LOCATION:

DATE: 9-12-16

TEST NO: 1

METHOD: M 315

WEIGHED/MEASURED BY: CSE

BALANCE ID:

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	971.2	721.2		DI
IMPINGER 2	684.5	641.4		DI
IMPINGER 3	586.8	580.9		MT
IMPINGER 4	745.6	729.2		Silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2242.5	1943.5	299.0

	FINAL TOTAL	INITIAL TOTAL	TOTAL SILICA GAIN
SILICA	745.6	729.2	16.4

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Isokinetic Sampling Cover Sheet

Test Engineer: BJG
Test Technician: BRM

Plant Information

Run Number: 2
Date: 9-13-16
Project Number: M162810
Test Location: COKE BATTERY 2 UNDERFIRE STACK
Client Name: ARCELOR MITTAL
Plant Name: BURNS HARBOR
Duct Shape: Circular or Rectangular
Length: ____ Width: ____ or Diameter: 14.5
Flue Area: 165.130
Upstream Diameters: >1.50
Downstream Diameters: >2.1
Port Type: FLANGE
Port Length: 50"
Port Diameter: 6"
Test Method: 315
Source Condition: NORMAL

Meter and Probe Data

Meter ID: CM23
Meter Y Value: 1.001
ΔH Value: 1.905
Pitot ID: 235
Pitot Coefficient: .840
Train Type: HOT BOX
Nozzle ID #: GLASS
Nozzle Diameter: .431
Filter Number/Weight: 9907 .9907
Probe Length: 12'
Probe Liner: GLASS
Thimble Number/Weight: ____
Pre-Test Nozzle Leak Check: ✓ @ 8 "Hg
Post-Test Nozzle Leak Check: ✓ @ 8 "Hg
Pre-Test Pitot Leak Check: ✓ @ 4 "H_2O
Post-Test Pitot Leak Check: ✓ @ 4 "H_2O

Traverse Data

Ports Sampled: 4
Points/Port: 4
Min/Point: 5
Total Points: 24
Total Test Time: 120
Sample Plane: Horizontal or Vertical

Stack Parameters

Barometric Pressure: 29.27
Static Pressure: -.6
CO_2 %: ____ / ____ / ____ / Avg. 6.36
O_2 %: ____ / ____ / ____ / Avg. 8.19
Determined by: Method 3 or Method 3A
Imp and/or silica balance Model and S/N: 510-55
Servomex Serial #: 014910D1 / 3791
Initial Imp. Volume or Weight: 2087.7
Final Imp. Volume or Weight: 2372.4
Imp. Volume or Weight Gain: 290.7
Initial Silica Weight: 848.4
Final Silica Weight: 873.4
Silica Weight Gain: 24.8

Comments:

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420° 13.967 / 2.431 470° 13.216 2.365
450° 13.506 / 2.391

Isokinetic Sampling Field Data Sheet

Project Number: M162810 | Date: 9-12-16 | Test Number: 2
Client: ARCELOR MITTAL | Test Location: UNDERFIRE (2) STACK | Operator: BVG | Test Tech: BRM
Plant: BURNS HARBOR | Test Method: 315 | Page Number: 1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft³, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft³, per point	Theoretical Meter Volume, (V_m) ft³, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	0905	.05	.63	1.970	.223	.533	2.665		421	70	70	3	255	254	63
2	0910	.06	.79	4.65	.244	.584	2.874	4.638	463	73	71	3	254	254	65
3	0915	.08	1.0	7.50	.282	.675	3.375	7.512	430	74	72	4	253	253	63
4	0920	.07	.92	10.90	.264	.620	3.104	10.867	440	76	75	4	254	253	64
5	0925	.07	.92	14.00	.264	.620	3.104	13.971	458	79	77	4	254	254	64
6	0930	.06	.78	17.10	.244	.573	2.869	17.095	468	80	74	4	253	253	64
	0935			19.885				19.964							
2-1	0939	.07	.95	19.885	.264	.631	3.157		429	80	78	5	253	253	68
2	0944	.08	1.0	23.10	.282	.675	3.375	23.092	443	82	75	5	250	252	66
3	0949	.07	.92	26.50	.264	.631	3.157	26.447	457	84	76	5	253	256	67
4	0954	.09	1.2	29.65	.300	.716	3.580	29.624	439	85	77	5	254	253	67
5	0959	.08	1.0	33.25	.282	.675	3.375	33.204	437	87	78	5	253	252	66
6	1004	.07	.92	36.60	.264	.620	3.104	36.579	452	88	79	5	254	253	65
	1009			39.795				39.683							
3-1	1013	.07	.92	39.795	.264	.625	3.125		470	86	80	5	254	253	66
2	1018	.07	.97	42.95	.264	.643	3.215	42.923	428	88	81	5	254	254	66
3	1023	.08	1.0	46.20	.282	.676	3.381	46.138	440	88	81	5	254	253	67
4	1028	.06	.81	49.50	.244	.585	2.928	49.519	454	88	82	5	254	252	65
5	1033	.06	.81	52.50	.244	.585	2.928	52.447	466	88	82	5	253	253	60
6	1038	.06	.83	55.40	.244	.595	2.977	55.375	424	88	82	5	253	252	59
	1043			58.425				58.357							
4-1	1047	.07	.94	58.425	.264	.632	3.162		454	86	82	5	253	254	65
2	1052	.06	.79	61.60	.244	.579	2.896	61.587	465	87	82	5	250	252	65
3	1057	.07	.91	64.50	.264	.643	3.215	64.483	432	88	82	5	253	251	65
4	1102	.08	1.0	67.70	.282	.676	3.381	67.698	445	88	82	5	253	252	62
5	1107	.07	.94	71.10	.264	.632	3.162	71.079	455	89	83	5	253	253	63
6	1112	.07	.92	74.25	.264	.625	3.128	74.241	465	89	83	5	253	250	62
	1117			77.350				77.309							

IMPINGER WEIGHT SHEET

PLANT: Arcelor Mittal

UNIT NO: #2 Underfire

LOCATION:

DATE: 9-13-16

TEST NO: 2

METHOD: M315

WEIGHED/MEASURED BY: CSE

BALANCE ID: 510-35

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	969.4	744.2		DI
IMPINGER 2	790.3	735.6		DI
IMPINGER 3	612.7	601.9		MT
IMPINGER 4	873.2	848.4		Silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

	FINAL TOTAL	INITIAL TOTAL	TOTAL IMPINGER GAIN
IMPINGERS	2312.4	2081.7	290.7
SILICA	873.2	848.4	24.8

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Isokinetic Sampling Cover Sheet

Test Engineer: BLG
Test Technician: CRM 1

Plant Information

Run Number: 3
Date: 9-13-16
Project Number: M162810
Test Location: UNDERFIRE 2 STACK
Client Name: ARCELOR MITTAL
Plant Name: BURNS HARBOR
Duct Shape: ~~Circular~~ or Rectangular
Length: _____ Width: _____ or Diameter: 14.5
Flue Area: 165.130
Upstream Diameters: >.50
Downstream Diameters: >2.0
Port Type: FLANGE
Port Length: 50"
Port Diameter: 6"
Test Method: 315
Source Condition: NORMAL

Meter and Probe Data

Meter ID: CM 23
Meter Y Value: 1.001
ΔH Value: 1.405
Pitot ID: 235
Pitot Coefficient: .840
Train Type: HOT BOX
Nozzle ID #: GLASS
Nozzle Diameter: .437
Filter Number/Weight: 9173 / 0.9389
Probe Length: 12'
Probe Liner: GLASS
Thimble Number/Weight: _____
Pre-Test Nozzle Leak Check: ✓ @ 8 "Hg
Post-Test Nozzle Leak Check: ✓ @ 8 "Hg
Pre-Test Pitot Leak Check: ✓ @ 7 "H_2O
Post-Test Pitot Leak Check: ✓ @ 7 "H_2O

Traverse Data

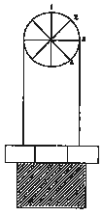
Ports Sampled: 4
Points/Port: 6
Min/Point: 5
Total Points: 24
Total Test Time: 120
Sample Plane: ~~Horizontal~~ or Vertical

Stack Parameters

Barometric Pressure: 29.37
Static Pressure: -.6
CO_2 %: ____ / ____ / ____ / Avg. 6.12
O_2 %: ____ / ____ / ____ / Avg. 7.69
Determined by: Method 3 or Method 3A
Imp and/or silica balance Model and S/N: 510-33
Servomex Serial #: 0144001 / 3791
Initial Imp. Volume or Weight: 1958.6
Final Imp. Volume or Weight: 2276.1
Imp. Volume or Weight Gain: 317.5
Initial Silica Weight: 724.3
Final Silica Weight: 742.9
Silica Weight Gain: 18.6

Comments:

Post-Test Nozzle Verification:



1) ✓ 2) ✓ 3) ✓ 4) ✓

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470° 13.336 | 2.388

Isokinetic Sampling Field Data Sheet

Project Number: M162810 | Date: 9-13-16 | Test Number: 3

Client: ARCELOR MITTAL | Test Location: UNDER FIRE 2 STACK | Operator: BVG | Test Tech: BRM

Plant: BURNS HARBOR | Test Method: 315 | Page Number: 1 of 1

Port-Point #.	Time	(ΔP)	Orifice Setting (ΔH)	Meter Volume (V_m) ft^3, Actual	Square Root, ΔP	Meter Rate, Cubic Feet/ Min.	Theoretical Meter Volume, (V_m) ft^3, per point	Theoretical Meter Volume, (V_m) ft^3, total	Stack Temp, °F	Meter Temp Inlet, °F	Meter Temp Outlet, °F	Pump Vacuum, " Hg	Probe Temp. °F	Filter Temp. °F	Impinger Outlet Well Temp. °F
1-1	1315	.07	.97	77.990	.264	.643	3.215		419	95	84	5	254	253	56
2	1320	.07	.94	81.10	.264	.634	3.170	81.085	440	85	84	5	254	252	56
3	1325	.06	.81	84.25	.244	.587	2.935	84.765	452	87	85	5	254	253	59
4	1330	.06	.79	87.25	.244	.519	2.596	87.200	465	87	85	5	253	253	64
5	1335	.07	.92	90.10	.264	.625	3.128	90.096	473	88	85	5	253	253	62
6	1340	.05	.69	93.25	.223	.543	2.717	93.224	434	90	86	4	254	252	62
	1345			95.985				95.941							
2-1	1349	.07	.94	95.985	.264	.634	3.170		459	91	87	5	255	252	64
2	1354	.06	.83	99.20	.244	.545	2.977	99.155	405	93	89	5	255	253	64
3	1359	.08	1.0	102.15	.282	.677	3.389	102.132	433	94	89	5	254	254	64
4	1404	.08	1.0	105.55	.282	.677	3.389	105.521	452	96	89	5	253	252	64
5	1409	.07	.92	108.95	.264	.625	3.128	108.910	464	96	89	5	253	254	64
6	1414	.07	.98	112.10	.264	.649	3.245	112.038	405	96	90	5	252	254	64
	1419			115.525				115.283							
3-1	1423	.06	.81	115.325	.244	.590	2.954		445	95	90	5	254	252	65
2	1428	.07	.95	118.25	.264	.639	3.190	118.279	456	96	91	5	253	254	65
3	1433	.08	1.0	121.50	.282	.674	3.374	121.469	467	97	91	5	253	254	65
4	1438	.08	1.0	124.85	.282	.674	3.374	124.943	470	98	91	5	253	254	65
5	1443	.09	1.1	128.25	.282	.693	3.469	128.217	457	98	92	5	254	255	66
6	1448	.07	.95	131.70	.264	.639	3.190	131.686	459	99	93	5	253	252	67
	1453			134.855				134.876							
4-1	1458	.08	1.1	134.855	.282	.693	3.469		430	97	93	5	252	253	66
2	1503	.09	1.1	138.35	.282	.632	3.44	138.324	451	99	94	5	255	254	66
3	1508	.07	.93	141.75	.264	.631	3.159	141.735	464	99	94	5	251	252	66
4	1513	.06	.80	144.98	.244	.584	2.922	144.894	470	100	94	5	254	250	65
5	1518	.06	.84	147.85	.244	.600	3.004	147.816	416	100	95	5	254	251	65
6	1523	.07	.98	150.85	.264	.649	3.245	150.820	422	100	94	5	253	253	65
	1528			154.157				154.065							

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IMPINGER WEIGHT SHEET

PLANT: ArcelorMittal BH

UNIT NO: #2 Underfire

LOCATION:

DATE: 9-13-16

TEST NO: 3

METHOD: 315

WEIGHED/MEASURED BY: SCB

BALANCE ID:

Circle One:	FINAL WEIGHT MLS / GRAMS	INITIAL WEIGHT MLS / GRAMS	IMPINGER GAIN	IMPINGER CONTENTS
IMPINGER 1	961.0	685.7		DI
IMPINGER 2	678.2	640.7		DI
IMPINGER 3	636.9	632.2		empty
IMPINGER 4	742.9	724.3		silica
IMPINGER 5				
IMPINGER 6				
IMPINGER 7				
IMPINGER 8				

IMPINGERS	2276.1 FINAL TOTAL	1958.6 INITIAL TOTAL	317.5 TOTAL IMPINGER GAIN
SILICA	742.9 FINAL TOTAL	724.3 INITIAL TOTAL	18.6 TOTAL SILICA GAIN

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Appendix H - Calibration Data

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Procedures for Method 5 and Flow Calibration

Nozzles

The nozzles are measured according to Method 5, Section 10.1

Dry Gas Meters

The test meters are calibrated according to Method 5, Section 10.3 and 16.1. and "Procedures for Calibrating and Using Dry Gas Volume Meters as Calibration Standards" by P.R. Westlin and R.T. Shigehara, March 10, 1978.

Analytical Balance

The accuracy of the analytical balance is checked with Class S, Stainless Steel Type 303 weights manufactured by F. Hopken and Son, Jersey City, New Jersey.

Temperature Sensing Devices

The potentiometer and thermocouples are calibrated utilizing a NIST traceable millivolt source.

Pitot Tubes

The pitot tubes utilized during this test program are manufactured according to the specification described and illustrated in the *Code of Federal Regulations*, Title 40, Part 60, Appendix A, Methods 1 and 2. The pitot tubes comply with the alignment specifications in Method 2, Section 10.1; and the pitot tube assemblies are in compliance with specifications in the same section.

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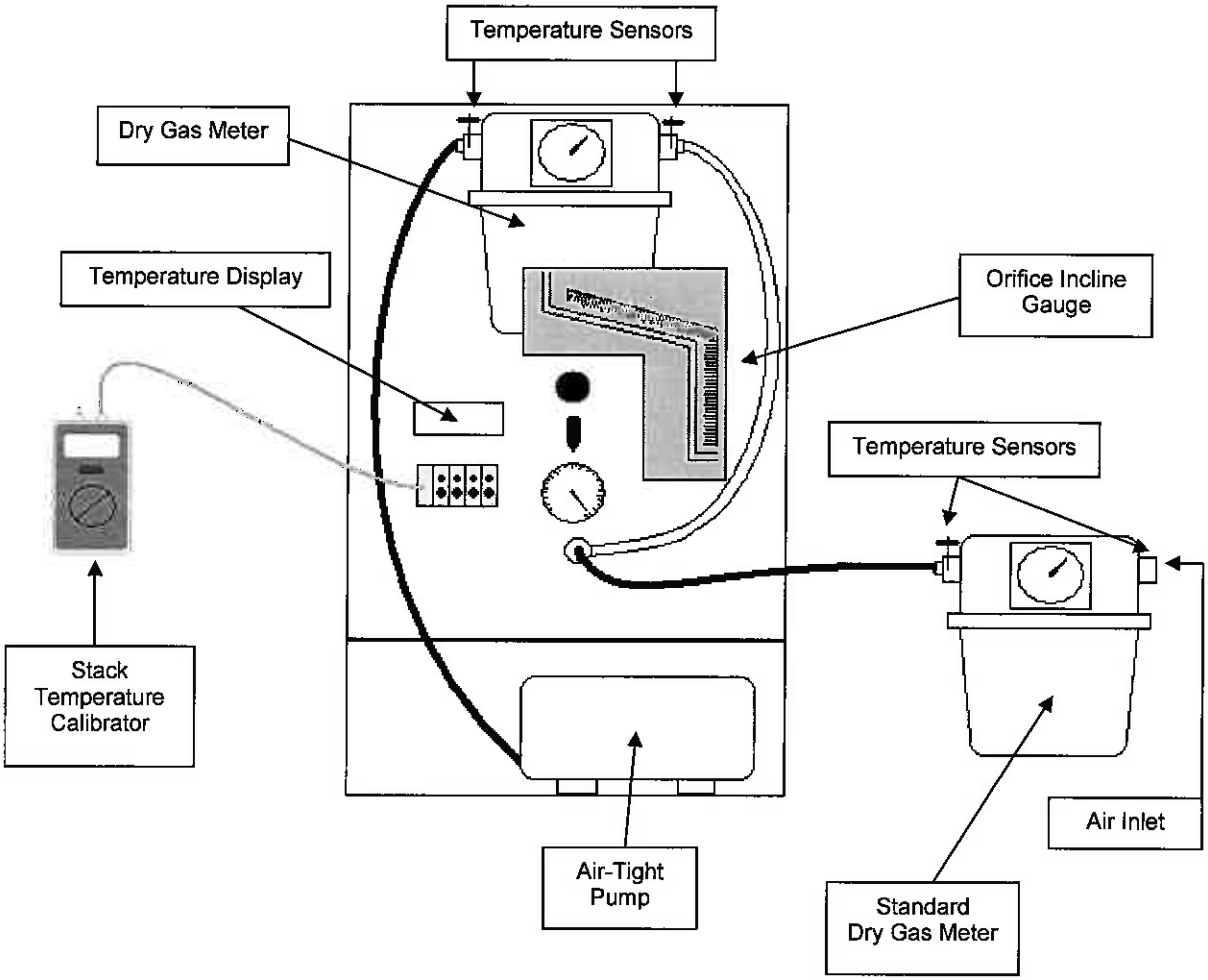
Dry Gas Meter/Control Module Calibration Diagram



Meter Box Calibration

Dry Gas Meter Calibration Data

Dry Gas Meter No.	CM23	Date:	August 4, 2016
Standard Meter No.	16745468	Calibrated By:	JDV
Standard Meter (Y)	1.0006	Barometric Pressure:	29.47

Run Number		Orifice Setting in H_2O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final			93.689	67.574	84	91	88					
Initial			83.589	57.371	83	91	87					
Difference	1	0.20	10.100	10.203	84	91	88	89	35	9	1.000	1.400
Final			102.502	76.473	85	93	89					
Initial			93.942	67.836	84	90	89					
Difference	2	0.50	8.560	8.637	85	92	89	90	18	50	1.000	1.402
Final			10.771	84.797	85	94	90					
Initial			2.674	76.645	85	93	89					
Difference	3	0.70	8.097	8.152	85	94	90	92	15	3	1.003	1.400
Final			21.122	95.144	80	81	80					
Initial			11.157	85.184	79	79	79					
Difference	4	0.90	9.965	9.960	80	80	80	80	16	20	0.999	1.402
Final			29.130	103.142	80	85	81					
Initial			21.554	95.559	80	83	81					
Difference	5	1.20	7.576	7.583	80	84	81	83	10	46	1.001	1.400
Final			83.490	57.271	83	93	87					
Initial			75.736	49.494	82	86	83					
Difference	6	2.00	7.754	7.777	83	90	85	87	8	37	1.001	1.428
									Average		**1.001**	**1.405**

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Stack Temperature Sensor Calibration

Meter Box # : CM23 *Name :* JDV

Ambient Temperature : 83 °F *Date :* August 4, 2016

Calibrator Model # : CL23A

Serial # : T-249465

Date Of Certification : January 8, 2016

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (° F)	Test Thermometer Temperature (° F)	Temperature Difference %
0	0	0.0
250	251	0.1
600	601	0.1
1200	1205	0.3

$$\frac{(\text{Ref. Temp., °F} + 460) - (\text{Test Therm. Temp., °F} + 460)}{\text{Ref. Temp., °F} + 460} * 100 <= 1.5\ \%$$

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Meter Box Calibration

Dry Gas Meter Calibration Data

Dry Gas Meter No.	CM23	Date:	October 20, 2016
Standard Meter No.	16745468	Calibrated By:	JDV
Standard Meter (Y)	1.0006	Barometric Pressure:	29.50

Run Number		Orifice Setting in H_2O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final			11.240	45.629	69	72	69					
Initial			5.415	39.785	69	69	67					
Difference	1	0.20	5.825	5.844	69	71	68	69	20	28	0.997	1.402
Final			16.826	51.243	69	74	71					
Initial			11.484	45.872	69	72	69					
Difference	2	0.50	5.342	5.371	69	73	70	72	11	55	0.998	1.407
Final			25.253	59.701	68	77	72					
Initial			17.405	51.809	69	75	71					
Difference	3	0.70	7.848	7.892	69	76	72	74	14	57	1.003	1.428
Final			34.470	69.000	68	79	73					
Initial			25.664	60.128	68	77	72					
Difference	4	0.90	8.806	8.872	68	78	73	75	14	58	1.004	1.454
Final			42.414	77.004	69	81	74					
Initial			34.778	69.291	69	79	73					
Difference	5	1.20	7.636	7.713	69	80	74	77	11	51	1.002	1.618
Final			105.329	39.700	69	69	66					
Initial			98.419	32.879	69	66	65					
Difference	6	2.00	6.910	6.821	69	68	66	67	7	42	1.003	1.418
										Average	**1.001**	**1.454**

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Stack Temperature Sensor Calibration

Meter Box #: CM23 *Name:* JDV

Ambient Temperature: 69 °F *Date:* October 20, 2016

Calibrator Model #: CL23A

Serial #: T-249465

Date Of Certification: January 8, 2016

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (° F)	Test Thermometer Temperature (° F)	Temperature Difference %
0	1	0.2
250	251	0.1
600	602	0.2
1200	1205	0.3

$$\frac{(\text{Ref. Temp., °F} + 460) - (\text{Test Therm. Temp., °F} + 460)}{\text{Ref. Temp., °F} + 460} * 100 <= 1.5\ \%$$

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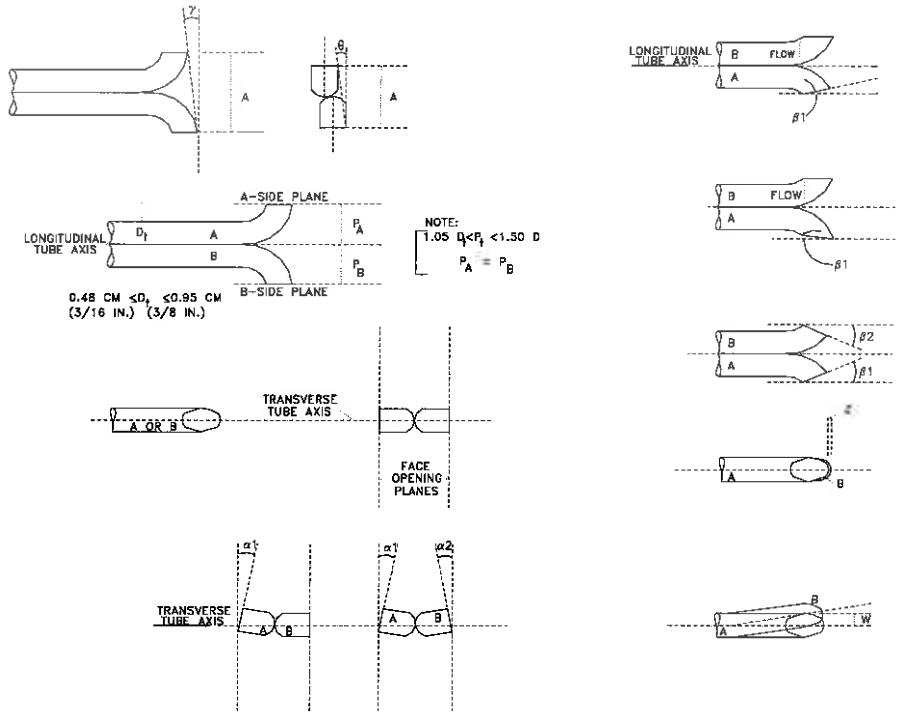
S TYPE PITOT TUBE INSPECTION WORKSHEET

Pitot Tube No: 235 Date: 7/8/2016 Inspector's Name: SMO

Type of Probe: (circle one) M2 M5 M17 Probe Length: 10 ft.



Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

a_1 = 1.5 ° (<10°), a_2 = 2 ° (<10°) z = A sin g = 0.000 (in.); (<0.125 in.)

b_1 = 2.5 ° (<5°), b_2 = 1.5 ° (<5°) w = A sin q = 0.008 (in.); (<0.03125 in.)

γ = 0 °, θ = 0.5 °, A = 0.963 (in.) P_A = 0.481 (in.), P_B = 0.481 (in.), D_t = 0.375 (in.)

Calibration required? ____ yes x no

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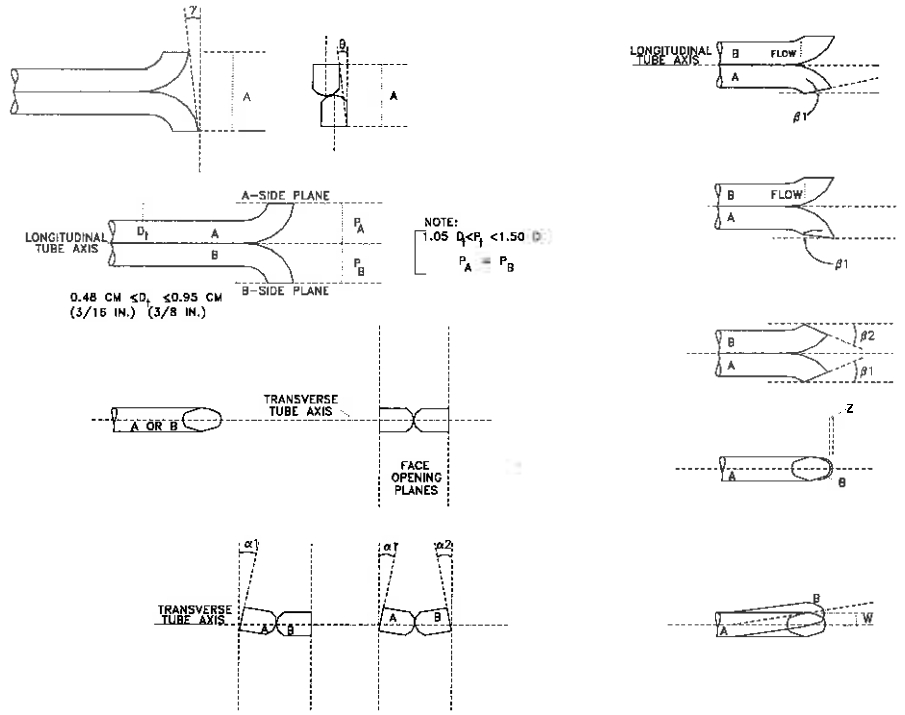
S TYPE PITOT TUBE INSPECTION WORKSHEET

Pitot Tube No: 235 Date: 11/8/2016 Inspector's Name: jdv

Type of Probe: (circle one) M2 M5 M17 Probe Length: 10 ft.



Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

a_1 = 0.5 ° (<10°), a_2 = 0.5 ° (<10°) z = A sin g = 0.008 (in.); (<0.125 in.)

b_1 = 2.5 ° (<5°), b_2 = 0.5 ° (<5°) w = A sin q = 0.008 (in.); (<0.03125 in.)

γ = 0.5 °, θ = 0.5 0.943 (in.) P_A = 0.472 (in.), P_B = 0.472 (in.), D_t = 0.375 (in.)

Calibration required? ____ yes x no

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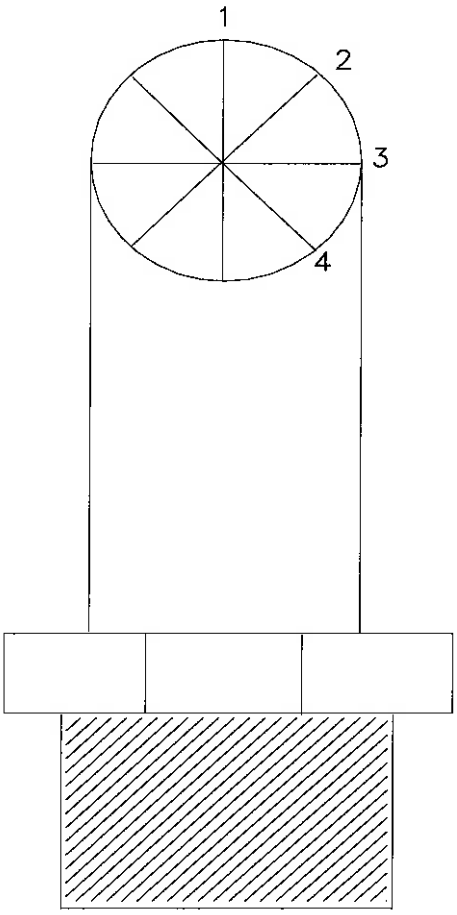
Nozzle Calibration

Date: 10/19/2016

Nozzle ID No.: 440

Analyst: ADT

Material/Type: Glass



0.502	1
0.502	2
0.502	3
0.502	4

Average
0.502

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Meter Box Calibration

Dry Gas Meter Calibration Data

Dry Gas Meter No.	CM3	Date:	August 1, 2016
Standard Meter No.	467454	Calibrated By:	JDV
Standard Meter (Y)	1.0060	Barometric Pressure:	29.50

Run Number		Orifice Setting in H_2O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final			95.968	108.535	77	82	81					
Initial			84.905	97.480	77	81	78					
Difference	1	0.20	11.063	11.055	77	82	80	81	38	48	1.013	1.400
Final			108.629	21.156	77	83	82					
Initial			96.123	8.675	77	81	81					
Difference	2	0.50	12.506	12.481	77	82	82	82	28	27	1.016	1.470
Final			22.799	35.286	78	83	82					
Initial			8.740	21.266	78	82	82					
Difference	3	0.70	14.059	14.020	78	83	82	82	27	37	1.015	1.538
Final			35.210	47.645	78	85	83					
Initial			22.978	35.450	78	84	82					
Difference	4	0.90	12.232	12.195	78	85	83	84	21	18	1.017	1.551
Final			47.944	60.297	79	85	84					
Initial			35.383	47.800	79	84	83					
Difference	5	1.20	12.561	12.497	79	85	84	84	19		1.017	1.565
Final			84.748	97.320	76	82	78					
Initial			74.550	87.259	77	80	77					
Difference	6	2.00	10.198	10.061	77	81	78	79	12	10	1.020	1.621
									Average		**1.016**	**1.524**

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Stack Temperature Sensor Calibration

Meter Box # : CM3 *Name :* JDV

Ambient Temperature : 81 °F *Date :* August 1, 2016

Calibrator Model # : CL23A

Serial # : T-249465

Date Of Certification : January 8, 2016

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (° F)	Test Thermometer Temperature (° F)	Difference %
0	0	0.0
250	250	0.0
600	598	0.2
1200	1200	0.0

Ref. Temp., °F + 460

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Meter Box Calibration

Dry Gas Meter Calibration Data

Dry Gas Meter No.	CM3	Date:	November 14, 2016
Standard Meter No.	15788714	Calibrated By:	jdv
Standard Meter (Y)	0.9972	Barometric Pressure:	29.26

Run Number		Orifice Setting in H_2O Chg (H)	Standard Meter Gas Volume vr	Dry Gas Meter Gas Volume vd	Standard Meter Temp. F° tr	Dry Gas Meter Inlet Temp. F° tdi	Dry Gas Meter Outlet Temp. F° tdo	Dry Gas Meter Avg. Temp. F° td	Time Min	Time Sec	Y	Chg (H)
Final			44.124	106.902	60	65	63					
Initial			36.350	98.954	60	62	61					
Difference	1	0.20	7.774	7.948	60	64	62	63	27	20	0.980	1.400
Final			56.722	19.739	64	69	65					
Initial			44.596	7.384	62	63	62					
Difference	2	0.50	12.126	12.355	63	66	64	65	27	10	0.981	1.432
Final			67.384	30.579	64	70	67					
Initial			57.098	20.112	64	69	65					
Difference	3	0.70	10.286	10.467	64	70	66	68	20	23	0.985	1.566
Final			74.011	37.335	64	71	67					
Initial			67.644	30.856	65	70	67					
Difference	4	0.90	6.367	6.479	65	71	67	69	11	12	0.986	1.586
Final			87.252	50.821	65	72	68					
Initial			74.181	37.522	65	71	68					
Difference	5	1.20	13.071	13.299	65	72	68	70	20	14	0.986	1.638
Final			36.140	98.754	60	63	61					
Initial			21.045	83.448	60	60	60					
Difference	6	2.00	15.095	15.306	60	62	61	61	18	15	0.980	1.661
									Average		**0.983**	**1.547**

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Stack Temperature Sensor Calibration

Meter Box # : CM3 *Name :* jdv

Ambient Temperature : 60 °F *Date :* November 14, 2016

Calibrator Model # : CL23A

Serial # : T-249465

Date Of Certification : January 8, 2016

Primary Standards Directly Traceable National Institute of Standards and Technology (NIST)

Reference Source Temperature (° F)	Test Thermometer Temperature (° F)	Temperature Difference %
0	1	0.2
250	251	0.1
600	599	0.1
1200	1201	0.1

$$\frac{(\text{Ref. Temp., °F} + 460) - (\text{Test Therm. Temp., °F} + 460)}{\text{Ref. Temp., °F} + 460} * 100 <= 1.5\ \%$$

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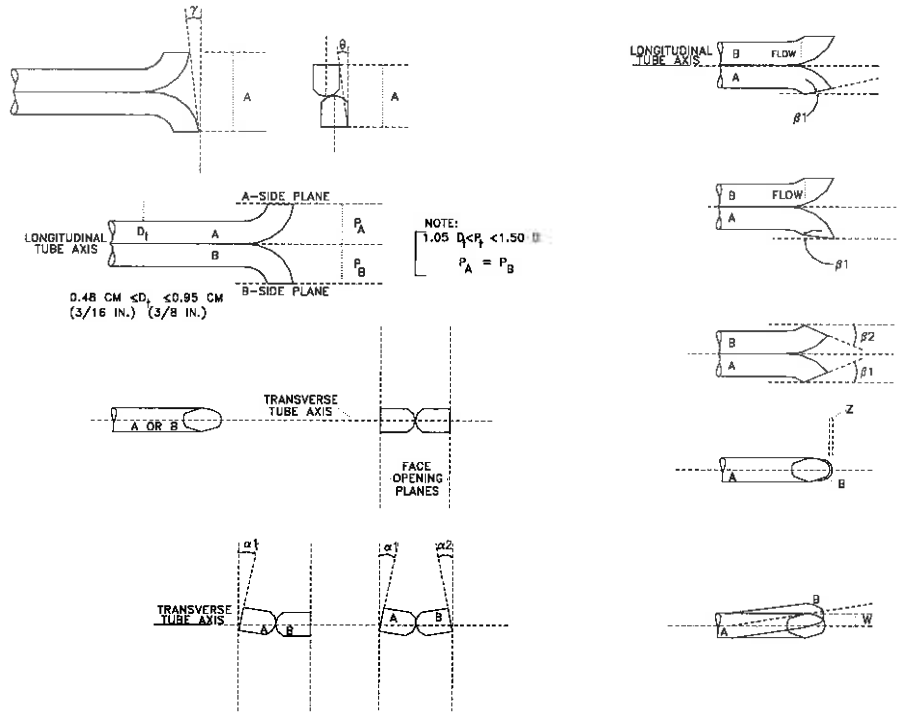
S TYPE PITOT TUBE INSPECTION WORKSHEET

Pitot Tube No: 123 Date: 9/6/2016 Inspector's Name: DL1

Type of Probe: (circle one) M2 M5 M17 Probe Length: 12 ft.



Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

a_1 = 8 ° (<10°), a_2 = 2 ° (<10°) z = A sin g = 0.049 (in.); (<0.125 in.)

b_1 = 0 ° (<5°), b_2 = 2 ° (<5°) w = A sin q = 0.025 (in.); (<0.03125 in.)

γ = 3 °, θ = 1.5 °, A = 0.936 (in.) P_A = 0.468 (in.), P_B = 0.468 (in.), D_t = 0.375 (in.)

Calibration required? ____ yes x no

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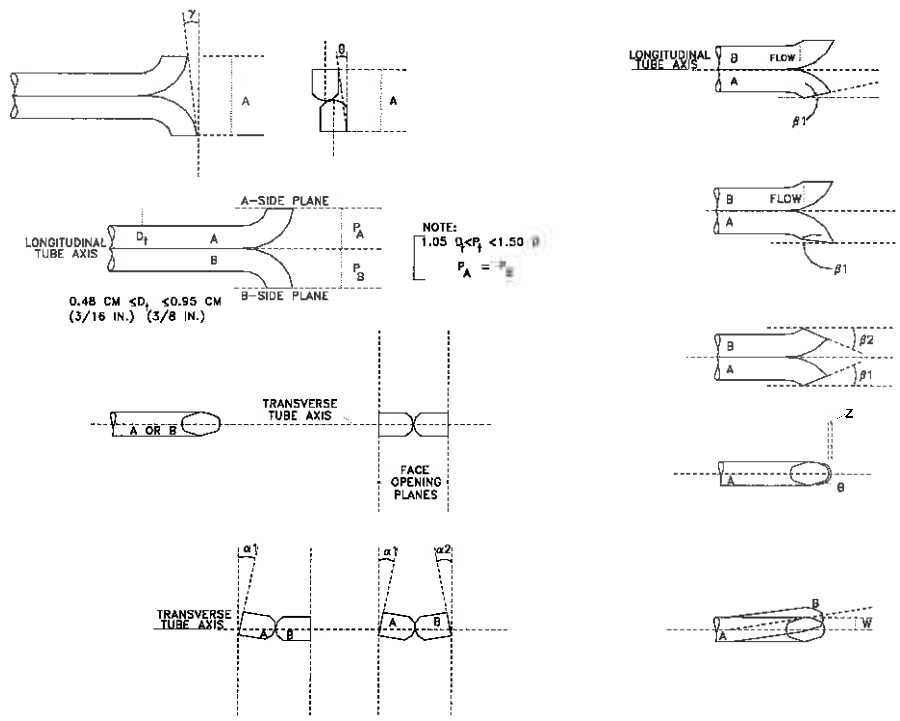
S TYPE PITOT TUBE INSPECTION WORKSHEET

Pitot Tube No: 123 Date: 10/21/2016 Inspector's Name: JJR

Type of Probe: (circle one) M2 M5 M17 Probe Length: 12 ft.



Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

a_1 = 0 ° (<10°), a_2 = 3 ° (<10°) z = A sin g = 0.033 (in.); (<0.125 in.)

b_1 = 2 ° (<5°), b_2 = 2 ° (<5°) w = A sin q = 0.016 (in.); (<0.03125 in.)

γ = 2 °, θ = 1 °, A = 0.933 (in.) P_A = 0.467 (in.), P_B = 0.467 (in.), D_t = 0.375 (in.)

Calibration required? ____ yes x no

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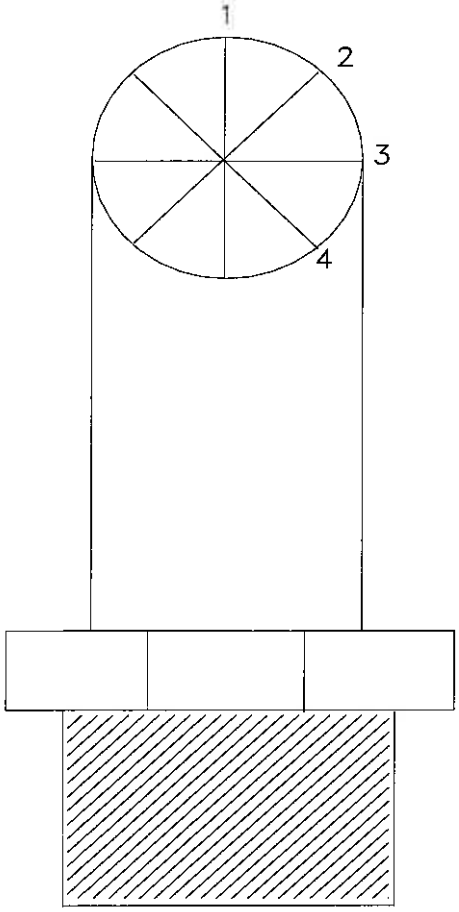
Nozzle Calibration

Date: 10/12/2016

Nozzle ID No.: 194

Analyst: ADT

Material/Type: Glass



0.318	1
0.318	2
0.318	3
0.318	4

Average
0.318

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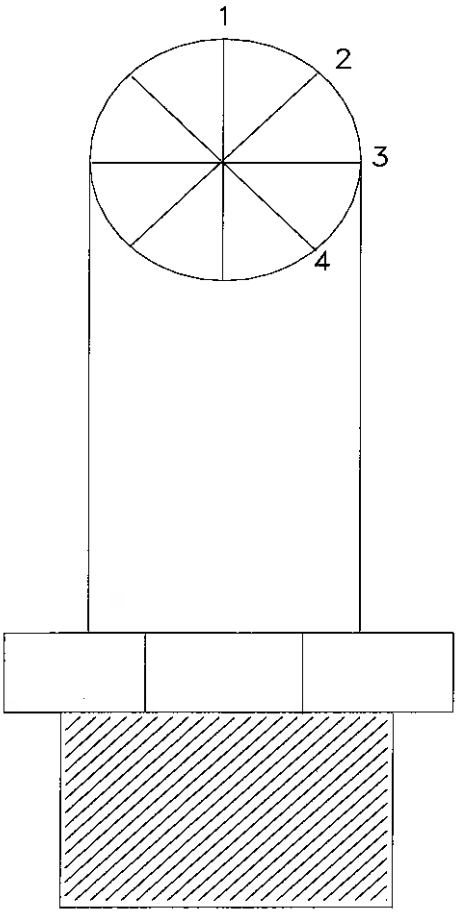
Nozzle Calibration

Date: 2/20/2015

Nozzle ID No.: 206

Analyst: KJC

Material/Type: Glass



0.435	1
0.435	2
0.435	3
0.435	4

Average
0.435

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Client:	ArcelorMittal	**Test Location:**	Coke Battery No. 2 Underfire Stack
Facility:	Burns Harbor, Indiana	**Date:**	9/14/16
Project #:	M162810	**Operator:**	Stuart Burton
Operating Condition:	Normal		

Probe Length:	12.0	**ft**	**Point Markings (including port**	
Probe Type:	Extractive		**Point #**	**Inches**
Sample Plane:	Horizontal		1	65.75
Port Length:	50.00	**in.**	2	97.24
Port Size (diameter):	6	**in.**	3	128.74
Port Type:	Flange			
Duct Shape:	Circular			
Diameter:	14.5	**ft**		
Duct Area:	165.13	**Sq. Ft.**		
Upstream Diameters:	> 0.5			
Downstream Diameters:	> 2.0			
Number of Ports Sampled:	1			
Number of Points per Port:	3			
Total Number of Traverse Points:	3			

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date
CO ppmvd	Zero		0	-0.10	0.11%	
	Mid	CC180967	49.36	49.50	-0.15%	12/7/2023
	High	CC4622	90.43	90.60	-0.19%	5/14/2021
CO2 % (dry)	Zero		0	0.01	-0.05%	
	Mid	CC265404	10.33	10.14	0.96%	7/1/2024
	High	EB0021818	19.74	19.83	-0.46%	6/22/2023
O2 % (dry)	Zero		0	0.05	-0.23%	
	Mid	CC337912	12.23	12.27	-0.18%	7/22/2024
	High	EB0064892	21.65	21.64	0.05%	8/7/2023

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/n	Analyzer Span	RM Gas Span
CO ppmvd	Thermo 48C	0405705657	100	90.43
CO2 % (dry)	Servomex 1440	01440D1/3791	20	19.74
O2 % (dry)	Servomex 1440	01440D1/3791	25	21.65
	Start		95% Response	Time (min)
Upscale				1.5
Downscale				1.5

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Fuel Type: Other
Fuel Factor: Enter Fuel Factor Here
Diluent: O2 %

Location: Coke Battery No. 2 Underfire Stack
Date: 9/14/16
Operator: Stuart Burton
Project #: M162810
Fuel Factor: by Standard

CO ppmvd Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	49.36	49.40	49.50	-0.50	-0.60	-0.55	49.45	48.00	47.9	0.00	0.11	0.55	-0.11
2	49.36	49.50	49.30	-0.60	-0.60	-0.60	49.40	50.30	50.2	0.22	-0.22	0.55	0.00
3	49.36	49.30	49.60	-0.60	-0.70	-0.65	49.45	49.10	49.0	-0.11	0.33	0.66	-0.11

CO2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.33	10.02	10.03	0.02	0.02	0.02	10.03	5.90	6.1	0.56	0.05	-0.05	0.00
2	10.33	10.03	10.00	0.02	0.01	0.02	10.02	6.06	6.2	0.71	-0.15	0.00	-0.05
3	10.33	10.00	10.39	0.01	0.00	0.01	10.20	6.06	6.1	-1.27	1.98	0.05	-0.05

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.23	12.17	12.17	0.08	0.03	0.06	12.17	9.00	9.0	0.46	0.00	0.09	-0.23
2	12.23	12.17	12.17	0.03	0.03	0.03	12.17	8.49	8.5	0.46	0.00	0.09	0.00
3	12.23	12.17	12.16	0.03	0.03	0.03	12.17	8.50	8.5	0.51	-0.05	0.09	0.00

Calibration Corrected Data

Run #	Run Date	Start Time	End Time	CO2 % (dry)	O2 % (dry)	CO ppmvd
1	9/14/16	10:00	11:00	6.1	9.0	47.9
2	9/14/16	11:13	12:13	6.2	8.5	50.2
3	9/14/16	12:41	13:41	6.1	8.5	49.0
Average Test 1				**6.1**	**8.7**	**49.0**

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/14/16

Linearity Cal/Pre 1 Cal

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
6:24	3.20		0.11		20.81	
6:25	3.40		0.49		19.98	
6:26	2.30		20.10		-0.04	
6:27	0.20		19.79		0.02	
6:28	0.10		19.88		0.02	
6:29	0.00		19.81		0.02	
6:30	-0.10	iz	19.83	ih	0.02	
6:31	0.00		3.73		17.42	
6:32	0.50		0.03		21.74	
6:33	0.50		0.03		21.66	
6:34	0.50		0.02		21.67	
6:35	0.40		0.02		21.66	
6:36	0.40		0.02		21.64	ih
6:37	27.20		0.02		5.22	
6:38	89.20		0.02		0.08	
6:39	90.50		0.02		0.07	
6:40	90.60		0.02		0.07	
6:41	90.60	ih	0.02		0.04	
6:42	64.10		6.14		0.06	
6:43	5.00		10.13		0.02	
6:44	-0.10		10.14	im	0.02	
6:45	-0.20		8.56		1.96	
6:46	0.00		0.03		12.26	
6:47	0.20		0.02		12.28	
6:48	0.20		0.02		12.27	im
6:49	19.70		0.02		0.26	
6:50	49.20		0.01		0.06	
6:51	49.30		0.01		0.06	
6:52	49.60		0.01		0.05	
6:53	49.60		0.01		0.05	
6:54	49.70		0.01		0.05	
6:55	49.50		0.01		0.05	
6:56	49.50		0.01		0.05	
6:57	49.50	im	0.01	iz	0.05	iz
6:58	48.80		0.01		0.05	
6:59	41.40		0.08		14.51	
7:00	5.90		0.12		20.90	
8:40	-0.40		10.01		0.08	
8:41	-0.50		10.01		0.08	
8:42	-0.60		10.01		0.08	
8:43	-0.50		10.01		0.06	
8:44	-0.50		10.01		0.07	
8:45	-0.50		10.02		0.07	
8:46	-0.50		10.02		0.07	
8:47	-0.50		10.01		0.07	
8:48	-0.50		10.02		0.08	
8:49	-0.50	z	10.02	m	0.08	z
8:50	-0.50		10.01		0.08	
8:51	-0.50		1.95		9.95	
8:52	-0.10		0.06		12.14	
8:53	-0.10		0.04		12.15	
8:54	-0.10		0.04		12.15	
8:55	-0.10		0.03		12.16	
8:56	-0.10		0.03		12.16	
8:57	-0.10		0.03		12.17	
8:58	-0.10		0.02		12.17	
8:59	-0.10		0.02		12.17	m
9:00	-0.10		0.02		11.43	
9:01	16.30		0.02		0.15	
9:02	43.70		0.02		0.11	
9:03	48.60		0.02		0.11	
9:04	49.30		0.02		0.10	
9:05	49.40	m	0.02	z	0.10	
9:06	49.40		0.03		0.12	

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/14/16

Post 1/Pre 2

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
11:01	53.00		6.35		8.01	
11:02	50.30		0.57		0.92	
11:03	49.40		0.02		0.08	
11:04	49.50	m	0.02	z	0.07	
11:05	40.20		0.97		0.10	
11:06	26.20		9.80		0.08	
11:07	-0.20		10.02		0.03	z
11:08	-0.60	z	10.03	m	0.06	
11:09	-0.60		3.73		7.71	
11:10	-0.30		0.04		12.16	
11:11	-0.20		0.03		12.17	m
11:12	7.00		4.02		9.46	

Post 2/Pre 3

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
12:28	48.00		6.34		7.90	
12:29	49.50		4.68		6.53	
12:30	49.50		0.03		0.05	
12:31	49.30	m	0.01	z	0.03	z
12:32	48.50		5.72		0.11	
12:33	6.70		9.97		0.09	
12:34	-0.60		10.00		0.09	
12:35	-0.60	z	10.00	m	0.09	
12:36	-0.70		4.71		6.50	
12:37	-0.40		0.04		12.16	
12:38	-0.20		0.02		12.17	m

Post 3

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
13:46	49.40		0.03		0.06	
13:47	49.10		0.01		0.03	
13:48	49.40		0.00		0.03	
13:49	49.60	m	0.00	z	0.03	z
13:50	42.60		8.16		0.10	
13:51	2.50		10.32		0.09	
13:52	-0.70		10.41		0.09	
13:53	-0.70	z	10.39	m	0.09	
13:54	-0.70		6.00		5.18	
13:55	-0.50		0.04		12.15	
13:56	-0.30		0.02		12.16	m

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)

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Client:	ArcelorMittal	**Test Location:**	Coke Battery No. 2 Underfire Stack
Facility:	Burns Harbor, Indiana	**Date:**	9/15/16
Project #:	M162810	**Operator:**	Stuart Burton
Operating Condition:	Normal		

Probe Length:	12.0	**ft**	**Point Markings (including port**	
Probe Type:	Extractive		**Point #**	**Inches**
Sample Plane:	Horizontal		1	65.75
Port Length:	50.00	**in.**	2	97.24
Port Size (diameter):	6	**in.**	3	128.74
Port Type:	Flange			
Duct Shape:	Circular			
Diameter:	14.5	**ft**		
Duct Area:	165.13	**Sq. Ft.**		
Upstream Diameters:	> 0.5			
Downstream Diameters:	> 2.0			
Number of Ports Sampled:	1			
Number of Points per Port:	3			
Total Number of Traverse Points:	3			

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date
CO ppmvd	Zero		0	-0.10	0.11%	
	Mid	CC180967	49.36	49.80	-0.49%	12/7/2023
	High	CC4622	90.43	90.60	-0.19%	5/14/2021
CO2 % (dry)	Zero		0	0.02	-0.10%	
	Mid	CC265404	10.33	10.12	1.06%	7/1/2024
	High	EB0021818	19.74	19.85	-0.56%	6/22/2023
O2 % (dry)	Zero		0	-0.09	0.42%	
	Mid	CC116816	12.15	12.17	-0.09%	7/22/2024
	High	EB0064892	21.65	21.66	-0.05%	8/7/2023

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/n	Analyzer Span	RM Gas Span
CO ppmvd	Thermo 48C	0405705657	100	90.43
CO2 % (dry)	Servomex 1440	01440D1/3791	20	19.74
O2 % (dry)	Servomex 1440	01440D1/3791	25	21.65
	Start		95% Response	Time (min)
Upscale				1.5
Downscale				1.5

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Fuel Type: Other
Fuel Factor: Enter Fuel Factor Here
Diluent: O2 %

Location: Coke Battery No. 2 Underfire Stack
Date: 9/15/16
Operator: Stuart Burton
Project #: M162810
Fuel Factor: by Standard

CO ppmvd Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	49.36	50.00	49.90	-0.40	-0.60	-0.50	49.95	41.90	41.5	-0.11	-0.11	0.55	-0.22
2	49.36	49.90	49.30	-0.60	-0.30	-0.45	49.60	41.20	41.1	0.55	-0.66	0.22	0.33
3	49.36	49.30	49.10	-0.30	-0.80	-0.55	49.20	40.70	40.9	0.77	-0.22	0.77	-0.55
4	49.36	49.10	49.10	-0.80	-0.30	-0.55	49.10	41.90	42.2	0.77	0.00	0.22	0.55
5	49.36	49.10	49.40	-0.30	-0.80	-0.55	49.25	41.70	41.9	0.44	0.33	0.77	-0.55
6	49.36	49.40	50.00	-0.80	-0.80	-0.80	49.70	43.20	43.0	-0.22	0.66	0.77	0.00

CO2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.33	10.20	10.18	0.04	0.02	0.03	10.19	6.09	6.2	-0.30	-0.10	0.00	-0.10
2	10.33	10.18	10.12	0.02	0.00	0.01	10.15	6.10	6.2	0.00	-0.30	0.10	-0.10
3	10.33	10.12	10.12	0.00	0.03	0.02	10.12	6.02	6.1	0.00	0.00	-0.05	0.15
4	10.33	10.12	10.13	0.03	0.02	0.03	10.13	6.07	6.2	-0.05	0.05	0.00	-0.05
5	10.33	10.13	10.13	0.02	0.02	0.02	10.13	6.01	6.1	-0.05	0.00	0.00	0.00
6	10.33	10.13	10.17	0.02	0.00	0.01	10.15	6.00	6.1	-0.25	0.20	0.10	-0.10

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.15	11.96	12.14	0.04	0.06	0.05	12.05	8.85	8.9	0.14	0.83	-0.69	0.09
2	12.15	12.14	12.12	0.06	0.08	0.07	12.13	8.67	8.7	0.23	-0.09	-0.79	0.09
3	12.15	12.12	12.06	0.08	0.08	0.08	12.09	8.72	8.7	0.51	-0.28	-0.79	0.00
4	12.15	12.06	12.04	0.08	0.06	0.07	12.05	8.67	8.7	0.60	-0.09	-0.69	-0.09
5	12.15	12.04	12.00	0.06	0.05	0.06	12.02	8.70	8.8	0.79	-0.18	-0.65	-0.05
6	12.15	12.00	12.00	0.05	0.05	0.05	12.00	8.71	8.8	0.79	0.00	-0.65	0.00

Calibration Corrected Data

Run #	Run Date	Start Time	End Time	CO2 % (dry)	O2 % (dry)	CO ppmvd
1	9/15/16	8:20	9:20	6.2	8.9	41.5
2	9/15/16	9:39	10:26	6.2	8.7	41.1
3	9/15/16	11:00	12:00	6.1	8.7	40.9
Average Test 2				**6.2**	**8.8**	**41.2**
4	9/15/16	13:14	14:14	6.2	8.7	42.2
5	9/15/16	14:29	15:28	6.1	8.8	41.9
6	9/15/16	15:57	16:55	6.1	8.8	43.0
Average Test 3				**6.1**	**8.8**	**42.4**

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16

Linearity Cal/Pre 1 Cal

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
5:47	2.90		0.08		21.08	
5:48	2.60		0.08		21.07	
5:49	1.30		0.05		21.58	
5:50	0.80		0.05		21.62	
5:51	0.60		0.04		21.66	ih
5:52	0.40		12.09		7.88	
5:53	0.40		19.92		-0.06	
5:54	0.80		19.86		-0.06	
5:55	0.70		19.85	ih	0.03	
5:56	0.60		19.72		0.11	
5:57	13.20		2.87		0.18	
5:58	82.30		0.03		0.17	
5:59	90.40		0.03		0.14	
6:00	90.60	ih	0.03		0.06	
6:01	89.50		0.03		6.26	
6:02	8.70		0.02		12.12	
6:03	0.90		0.02		12.16	
6:04	0.80		0.02	iz	12.17	im
6:05	0.50		9.54		1.17	
6:06	0.20		10.11		-0.07	
6:07	0.20		10.11		-0.07	
6:08	0.10		10.12		-0.08	
6:09	0.10		10.12		-0.08	
6:10	0.00		10.12		-0.08	
6:11	0.00		10.12		-0.08	
6:12	0.00		10.12		-0.08	
6:13	-0.10	iz	10.12	im	-0.09	iz
6:14	11.10		1.77		0.03	
6:15	49.70		0.03		0.04	
6:16	49.60		0.03		0.04	
6:17	49.80	im	0.03		0.04	
6:18	38.80		0.09		17.46	
7:33	0.10		0.10		20.97	
7:34	0.00		0.10		20.97	
7:35	0.10		0.99		19.13	
7:36	13.10		4.51		11.11	
7:37	12.60		9.63		0.27	
7:38	-0.30		10.15		0.05	
7:39	-0.40		10.19		0.04	
7:40	-0.40		10.20		0.04	
7:41	-0.40	z	10.20	m	0.04	z
7:42	-0.40		5.90		5.12	
7:43	-0.10		0.08		11.95	
7:44	0.00		0.05		11.96	
7:45	0.00		0.05		11.96	
7:46	0.00		0.04		11.96	m
7:47	0.40		0.04		9.21	
7:48	35.20		0.04		0.09	
7:49	50.30		0.04		0.08	
7:50	50.10		0.04	z	0.07	
7:51	50.00	m	2.00		2.55	

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16

Post 1/Pre 2

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
9:26	28.10		9.04		0.28	
9:27	-0.20		10.17		0.11	
9:28	-0.60	z	10.18	m	0.09	
9:29	-0.50		2.81		9.02	
9:30	-0.20		0.06		12.13	
9:31	-0.10		0.04		12.14	m
9:32	0.50		0.04		8.53	
9:33	36.60		0.03		0.08	
9:34	49.70		0.03		0.07	
9:35	49.80		0.03		0.06	
9:36	49.90	m	0.02	z	0.06	z
9:37	43.60		5.87		7.76	

Post 2/Pre 3

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
10:34	-0.70		10.12		0.09	
10:35	-0.70		10.12		0.09	
10:36	-0.70		10.12	m	0.08	z
10:37	-0.70		10.03		0.28	
10:38	-0.60		0.21		12.00	
10:39	-0.30		0.04		12.11	
10:40	-0.30		0.03		12.12	
10:41	-0.20		0.02		12.12	
10:42	-0.20		0.02		12.12	
10:43	-0.20		0.01		12.12	
10:44	-0.20		0.01		12.13	
10:45	-0.20		0.01		12.12	
10:46	-0.20		0.01		12.12	
10:47	-0.30		0.01		12.12	
10:48	-0.30		0.00		12.12	
10:49	-0.30		0.00		12.12	
10:50	-0.30	z	0.00	z	12.12	m
10:51	4.30		0.00		5.39	
10:52	44.70		0.00		0.10	
10:53	49.30		0.00		0.10	
10:54	49.30		0.00		0.10	
10:55	49.30	m	0.00		0.09	

Post 3/Pre 4

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
12:26	31.00		8.00		0.88	
12:27	0.10		9.98		0.19	
12:28	-0.80		10.05		0.12	
12:29	-0.80	z	10.12	m	0.08	z
12:30	-0.80		10.05		2.13	
12:31	-0.50		0.68		12.03	
12:32	-0.30		0.07		12.06	
12:33	-0.20		0.06		12.06	m
12:34	0.80		0.05		7.70	
12:35	37.80		0.04		0.13	
12:36	49.00		0.04		0.12	
12:37	49.10		0.04		0.11	
12:38	49.10	m	0.03	z	0.78	

Post 4

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
14:15	44.30		2.87		14.26	
14:16	8.20		9.45		0.23	
14:17	-0.50		10.13	m	0.08	
14:18	-0.80		9.45		1.00	
14:19	-0.60		0.10		12.01	
14:20	-0.30	z	0.04		12.04	m
14:21	-0.30		0.03		11.70	
14:22	20.80		0.03		0.11	
14:23	49.30		0.02		0.06	
14:24	49.40		0.02	z	0.06	z
14:25	49.10	m	0.54		0.82	

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/15/16

Post 5

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
15:40	-0.80		10.11		0.05	
15:41	-0.90		10.13		0.03	
15:42	-0.80	z	10.13	m	0.02	
15:43	-0.80		7.86		2.84	
15:44	-0.50		0.07		11.98	
15:45	-0.30		0.04		12.00	
15:46	-0.30		0.03		12.00	m
15:47	0.30		0.03		8.20	
15:48	35.90		0.02		0.07	
15:49	49.30		0.02		0.06	
15:50	49.40	h	0.02	z	0.06	z
15:51	48.40		4.15		5.32	

Post 6

Time	CO ppmvd		CO2 % (dry)		O2 % (dry)	
16:57	14.10		10.07		0.14	
16:58	-0.60		10.18		0.08	
16:59	-0.80	z	10.17	m	0.06	
17:00	-0.80		5.06		6.12	
17:01	-0.50		0.05		11.99	
17:02	-0.30		0.02		12.00	m
17:03	-0.30		0.01		9.98	
17:04	28.70		0.01		0.17	
17:05	49.70		0.00		0.06	
17:06	50.00	m	0.00	z	0.05	z
17:07	49.90		0.00		0.05	

Post 7

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)

Post 8

Time	CO ppmvd	CO2 % (dry)	O2 % (dry)

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Client:	ArcelorMittal	**Test Location:**	Coke Battery No. 2 Underfire Stack
Facility:	Burns Harbor, Indiana	**Date:**	9/7/16
Project #:	M162810	**Operator:**	Chris Eldridge
Operating Condition:	Normal		

Probe Length:	12.0	ft
Probe Type:	Extractive	
Sample Plane:	Horizontal	
Port Length:	50.00	in.
Port Size (diameter):	6	in.
Port Type:	Flange	
Duct Shape:	Circular	
Diameter:	14.5	ft
Duct Area:	165.13	Sq. Ft.
Upstream Diameters:	> 0.5	
Downstream Diameters:	> 2.0	
Number of Ports Sampled:	1	
Number of Points per Port:	3	
Total Number of Traverse Points:	3	

Point Markings (including port

Point #	Inches
1	65.75
2	97.24
3	128.74

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date
SO2 ppmvd	Zero		0	0.10	-0.01%	
	Mid	XC027226B	476.3	476.20	0.01%	4/30/2023
	High	CC142743	911.4	911.10	0.03%	2/11/2019
CO2 % (dry)	Zero		0	0.04	-0.20%	
	Mid	CC265404	10.33	10.13	1.01%	7/1/2024
	High	EB0021818	19.74	19.70	0.20%	6/22/2023
O2 % (dry)	Zero		0	0.00	0.00%	
	Mid	CC337912	12.23	12.40	-0.79%	7/22/2024
	High	EB0064892	21.65	21.28	1.71%	8/7/2023

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/n	Analyzer Span	RM Gas Span
SO2 ppmvd	Thermo 43C	43CHL-60846-328	1000	911.4
CO2 % (dry)	Servomex 1440	01440D1/3791	20	19.74
O2 % (dry)	Servomex 1440	01440D1/3791	25	22
	Start		95% Response	Time (min)
Upscale				1.5
Downscale				1.5

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Fuel Type: Other
Fuel Factor: Enter Fuel Factor Here
Diluent: O2 %

Location: Coke Battery No. 2 Underfire Stack
Date: 9/7/16
Operator: Chris Eldridge
Project #: M162810
Fuel Factor: by Standard

SO2 ppmvd Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	476.30	476.10	476.90	1.10	8.50	4.80	476.50	537.10	537.5	-0.08	0.09	-0.92	0.81
2	476.30	476.90	477.30	8.50	7.10	7.80	477.10	569.00	569.6	-0.12	0.04	-0.77	-0.15
3	476.30	477.30	476.20	7.10	8.20	7.65	476.75	571.10	572.1	0.00	-0.12	-0.89	0.12
4	476.30	476.20	476.90	8.20	8.60	8.40	476.55	554.80	555.9	-0.08	0.08	-0.93	0.04

CO2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.33	10.01	10.32	0.04	0.03	0.04	10.17	6.10	6.2	-0.96	1.57	0.05	-0.05
2	10.33	10.32	10.30	0.03	0.02	0.03	10.31	6.33	6.3	-0.86	-0.10	0.10	-0.05
3	10.33	10.30	10.32	0.02	0.02	0.02	10.31	6.36	6.4	-0.96	0.10	0.10	0.00
4	10.33	10.32	10.26	0.02	0.01	0.02	10.29	6.39	6.4	-0.88	-0.30	0.15	-0.05

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.23	12.20	12.18	0.04	0.04	0.04	12.19	8.29	8.3	1.02	-0.09	-0.18	0.00
2	12.23	12.18	12.15	0.04	0.04	0.04	12.17	8.35	8.4	1.15	-0.14	-0.18	0.00
3	12.23	12.15	12.10	0.04	0.05	0.05	12.13	8.19	8.2	1.39	-0.23	-0.23	0.05
4	12.23	12.10	12.08	0.05	0.03	0.04	12.09	8.14	8.2	1.48	-0.09	-0.14	-0.09

Calibration Corrected Data

Run #	Run Date	Start Time	End Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
1	9/7/16	9:07	10:07	537.5	6.2	8.3
2	9/7/16	10:30	11:30	569.6	6.3	8.4
Average				**553.6**	**6.3**	**8.4**
3	9/7/16	12:30	13:30	572.1	6.4	8.2
4	9/7/16	13:50	14:50	555.9	6.4	8.2
Average				**564.0**	**6.4**	**8.2**

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/7/16

Linearity Cal/Pre 1 Cal

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
6:11	0.10		0.09		21.10	
6:12	0.10		0.09		21.10	
6:13	0.10		0.09		21.10	
6:14	0.10		0.09		21.10	
6:15	0.10		0.09		21.10	
6:16	0.10		0.09		21.10	
6:17	0.10	iz	0.09		21.10	
6:18	0.10		0.09		21.10	
6:19	0.20		0.07		21.28	ih
6:20	0.30		0.03		22.06	
6:21	0.10		0.03		22.07	
6:22	0.10		0.03		22.08	
6:23	0.60		17.90		1.82	
6:24	0.10		20.19		-0.12	
6:25	0.10		19.90		-0.12	
6:26	0.10		19.70	ih	-0.11	
6:27	0.10		0.23		0.01	
6:28	0.10		0.04		0.00	iz
6:29	0.10		0.04		0.00	
6:30	0.10		0.04		-0.01	
6:31	0.10		0.04		-0.01	
6:32	0.10		0.04		-0.05	
6:33	0.10		0.04		-0.04	
6:34	0.10		0.04		-0.01	
6:35	0.10		0.04		-0.01	
6:36	0.10	ih	0.04	iz	-0.01	
6:37	180.70		0.04		13.68	
6:38	786.60		0.03		21.34	
6:39	851.40		0.03		21.36	
6:40	905.40		0.03		21.36	
6:41	910.30		0.03		21.36	
6:42	911.10	ih	0.03		21.36	
6:43	911.80	iz	0.03		21.36	
6:44	574.00		0.03		14.26	
6:45	10.00		0.03		12.28	
6:46	3.30		0.03		12.27	
6:47	2.10		0.03		12.27	
6:48	2.10		9.29		1.28	
6:49	1.10		10.05		-0.05	
6:50	1.10	im	10.11		-0.06	
6:51	1.10		10.13	im	-0.06	
6:52	184.00		1.88		17.19	
6:53	451.30		0.04		21.38	
6:54	475.90		0.04		21.38	
6:55	476.50		0.04		21.39	
6:56	476.20	im	0.03		9.09	
6:57	10.60		0.03		12.00	
6:58	1.60		0.03		12.70	
6:59	1.10		0.03		12.40	im
7:00	3.40		1.26		8.37	
7:00	3.40		1.26		8.37	
7:01	12.90		9.96		0.07	
7:02	5.20		10.01	m	0.04	
7:03	3.10		10.01		0.04	z
7:04	2.10		8.54		1.81	
7:05	1.40		0.10		12.17	
7:06	1.10	z	0.06		12.20	m
7:07	1.10		0.05		7.08	
7:08	1.10		0.04		0.10	
7:09	1.10	m	0.04		0.09	
7:10	1.10		0.04	z	0.09	
7:11	116.40		0.04		19.27	
7:12	399.20		0.04		21.21	
7:13	430.80		0.04		21.22	
7:14	470.40		0.04		21.22	
7:15	476.10	m	0.05		21.19	
7:16	476.60	z	0.08		21.11	

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/7/16

Post 1/Pre 2

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
10:08	562.10		5.71		7.48	
10:09	280.70		0.07		12.07	
10:10	29.00		0.04		12.17	
10:11	12.90		0.03		12.17	
10:12	8.50	z	0.03		12.18	m
10:13	6.80		4.49		6.29	
10:14	7.30		10.32	m	0.06	
10:15	6.30		10.45		0.04	z
10:16	5.40		5.06		0.07	
10:17	4.90		0.06		0.08	
10:18	4.10		0.04		0.08	
10:19	4.30		0.04		0.07	
10:20	8.50		0.03	z	6.91	
10:21	290.10		0.03		21.03	
10:22	428.30		0.03		21.15	
10:23	444.20		0.03		21.15	
10:24	466.90		0.03		21.16	
10:25	476.90	m	0.03		21.16	
10:26	477.00		0.02		21.16	

Post 2/Pre 3

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
11:31	533.20		2.50		11.18	
11:32	84.00		0.04		12.14	
11:33	20.00		0.03		12.15	m
11:34	11.60		0.02		12.15	
11:35	8.40		4.37		6.97	
11:36	8.80		10.30		0.05	
11:37	8.10		10.30	m	0.04	z
11:38	7.20		8.73		0.05	
11:39	7.10	z	0.08		0.07	
11:40	7.10		0.04		0.07	
11:41	7.70		0.03		0.07	
11:42	15.40		0.02		7.35	
11:43	339.90		0.02	z	21.04	
11:44	460.80		0.02		21.10	
11:45	472.80		0.02		21.10	
11:46	477.30	m	0.02		21.11	
11:47	477.30		0.01		21.11	

Post 3/Pre 4

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
13:32	88.00		0.05		12.10	
13:33	19.00		0.04		12.10	
13:34	11.80		0.03		12.10	m
13:35	8.50		5.38		5.62	
13:36	9.20		10.27		0.03	
13:37	8.50		10.32	m	0.02	
13:38	8.20	z	5.52		0.04	
13:39	8.20		0.06		0.05	z
13:40	8.20		0.04		0.05	
13:41	8.70		0.03		0.05	
13:42	44.20		0.03		11.69	
13:43	407.40		0.02	z	20.99	
13:44	470.50		0.02		21.01	
13:45	476.20	m	0.02		21.02	
13:46	476.80		0.02		21.02	

Post 4

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
14:53	26.00		0.02		12.07	
14:54	13.30		0.02		12.08	m
14:55	9.00		3.22		8.23	
14:56	9.80		10.14		0.04	
14:57	9.20		10.26	m	0.02	
14:58	8.60	z	7.89		0.03	z
14:59	8.20		0.06		0.06	
15:00	8.20		0.03		0.05	
15:01	8.40		0.02		0.05	
15:02	10.50		0.01		5.23	
15:03	297.50		0.01	z	20.87	
15:04	464.40		0.01		20.96	
15:05	476.90	m	0.01		20.97	
15:06	475.40		0.01		20.98	

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Client:	ArcelorMittal Burns Harbor LLC	**Test Location:**	Coke Battery No. 2 Underfire Stack
Facility:	Burns Harbor, Indiana	**Date:**	9/8/16
Project #:	M162810	**Operator:**	Chris Eldridge
Operating Condition:	Normal		

Probe Length:	12.0	ft	**Point Markings (including port**	
Probe Type:	Extractive		**Point #**	**Inches**
Sample Plane:	Horizontal		1	65.75
Port Length:	50.00	in.	2	97.24
Port Size (diameter):	6	in.	3	128.74
Port Type:	Flange			
Duct Shape:	Circular			
Diameter:	14.5	ft		
Duct Area:	165.13	Sq. Ft.		
Upstream Diameters:	> 0.5			
Downstream Diameters:	> 2.0			
Number of Ports Sampled:	1			
Number of Points per Port:	3			
Total Number of Traverse Points:	3			

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date
SO2 ppmvd	Zero		0	0.00	0.00%	
	Mid	XC027226B	476.3	476.40	-0.01%	4/30/2023
	High	CC142743	911.4	911.20	0.02%	2/11/2019
CO2 % (dry)	Zero		0	0.07	-0.35%	
	Mid	CC265404	10.33	10.35	-0.10%	7/1/2024
	High	EB0021818	19.74	19.74	0.00%	6/22/2023
O2 % (dry)	Zero		0	0.02	-0.09%	
	Mid	CC337912	12.23	12.19	0.18%	7/22/2024
	High	EB0064892	21.65	21.65	0.00%	8/7/2023

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/n	Analyzer Span	RM Gas Span
SO2 ppmvd	Thermo 43C	43CHL-60846-328	1000	911.4
CO2 % (dry)	Servomex 1440	01440D1/3791	20	19.74
O2 % (dry)	Servomex 1440	01440D1/3791	25	22
	Start		95% Response	Time (min)
Upscale				1.5
Downscale				1.5

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Fuel Type: Other
Fuel Factor: Enter Fuel Factor Here
Diluent: O2 %

Location: Coke Battery No. 2 Underfire Stack
Date: 9/8/16
Operator: Chris Eldridge
Project #: M162810
Fuel Factor: by Standard

SO2 ppmvd Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	476.30	476.20	476.50	2.00	6.60	4.30	476.35	540.40	540.9	-0.01	0.03	-0.72	0.50
2	476.30	476.50	476.70	6.60	6.60	6.60	476.60	539.60	540.1	-0.03	0.02	-0.72	0.00

CO2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.33	10.37	10.34	0.05	0.05	0.05	10.36	6.05	6.0	0.05	-0.15	0.10	0.00
2	10.33	10.34	10.32	0.05	0.02	0.04	10.33	6.12	6.1	0.15	-0.10	0.25	-0.15

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.23	12.21	12.20	0.09	0.09	0.09	12.21	8.90	8.9	-0.05	-0.05	-0.32	0.00
2	12.23	12.20	12.21	0.09	0.08	0.08	12.21	8.69	8.7	-0.09	0.05	-0.18	-0.14

Calibration Corrected Data

Run #	Run Date	Start Time	End Time	SO2 ppmvd	CO2 % (dry)	O2 % (dry)
1	9/8/16	8:30	9:30	540.9	6.0	8.9
2	9/8/16	9:51	10:51	540.1	6.1	8.7
Average				**540.5**	**6.1**	**8.8**

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/8/16

Linearity Cal/Pre 1 Cal

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
6:48	0.00		0.07		21.65	ih
6:49	0.00		0.07		21.66	
6:50	0.50		17.48		2.00	
6:51	0.00	iz	19.74	ih	-0.05	
6:52	0.00		18.84		-0.04	
6:53	0.00		0.12		0.02	iz
6:54	0.00		0.08		0.01	
6:55	0.00		0.07		0.01	
6:56	0.00		0.07		0.01	
6:57	0.00		0.07		0.01	
6:58	0.00		0.07		0.00	
6:59	358.80		0.07	iz	19.30	
7:00	879.20		0.07		20.95	
7:01	908.20		0.07		20.95	
7:02	911.20	ih	0.07		20.94	
7:03	910.80		0.06		20.94	
7:04	910.70		0.06		20.94	
7:05	809.60		0.06		16.35	
7:06	43.20		0.06		12.04	
7:07	2.90		0.06		12.04	
7:08	2.00		0.09		12.19	im
7:09	1.60		10.30		0.20	
7:10	1.00		10.35	im	-0.04	
7:11	1.00		0.52		0.00	
7:12	1.00		0.07		0.00	
7:13	1.00		0.06		0.00	
7:14	1.00		0.06		-0.01	
7:15	263.50		0.06		20.16	
7:16	476.90		0.06		21.27	
7:17	475.80		0.06		21.27	
7:18	476.40	im	0.06		21.28	
7:19	476.70		0.06		21.27	
7:20	235.20		0.09		16.12	
7:21	12.90		0.06		12.18	
7:22	3.40		0.06		12.20	
7:23	2.20		0.06		12.21	m
7:24	2.00	z	6.21		4.93	
7:25	2.00		10.36		0.07	
7:26	2.00		10.37	m	0.06	
7:27	2.00		4.42		0.09	z
7:28	1.20		0.09		0.10	
7:29	1.10		0.06		0.10	
7:30	1.10		0.06		0.10	
7:31	1.10		0.05		0.10	
7:32	23.40		0.05	z	11.03	
7:33	371.50		0.05		21.19	
7:34	443.00		0.05		21.21	
7:35	453.40		0.05		21.21	
7:36	476.00		0.05		21.21	
7:37	476.20	m	0.05		21.22	
7:38	476.20		0.06		21.18	

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/8/16

Post 1/Pre 2

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
9:31	518.80		2.74		11.14	
9:32	92.80		0.07		12.20	
9:33	19.50		0.06		12.20	
9:34	11.20		0.06		12.20	m
9:35	8.00		0.05		12.20	
9:36	6.60	z	6.05		5.01	
9:37	7.80		10.32		0.07	
9:38	7.10		10.34	m	0.06	
9:39	7.00		4.18		0.09	
9:40	6.10		0.08		0.09	z
9:41	6.10		0.06		0.09	
9:42	6.10		0.06		0.09	
9:43	42.80		0.05		12.10	
9:44	402.90		0.05	z	21.14	
9:45	461.90		0.05		21.16	
9:46	476.30		0.05		21.17	
9:47	476.50	m	0.04		21.17	

Post 2/Pre 3

Time	SO2 ppmvd		CO2 % (dry)		O2 % (dry)	
10:54	23.80		0.04		12.18	
10:55	11.70		0.03		12.20	
10:56	8.10		0.03		12.21	m
10:57	6.60	z	6.01		5.29	
10:58	7.40		10.30		0.05	
10:59	7.10		10.32	m	0.04	
11:00	6.40		4.68		0.06	z
11:01	6.10		0.06		0.07	
11:02	5.90		0.04		0.07	
11:03	5.50		0.03		0.07	
11:04	5.70		0.03		0.07	
11:05	39.80		0.03		11.96	
11:06	393.30		0.02	z	21.18	
11:07	456.70		0.02		21.20	
11:08	464.40		0.02		21.21	
11:09	476.60		0.02		21.21	
11:10	476.70	m	0.02		21.21	

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Client:	ArcelorMittal	**Test Location:**	Coke Battery No. 2 Underfire Stack
Facility:	Burns Harbor, Indiana	**Date:**	9/12/16
Project #:	M162810	**Operator:**	Stuart Burton
Operating Condition:	Normal		

Probe Length:	12.0	ft	**Point Markings (including port**	
Probe Type:	Extractive		**Point #**	**Inches**
Sample Plane:	Horizontal		1	65.75
Port Length:	50.00	in.	2	97.24
Port Size (diameter):	6	in.	3	128.74
Port Type:	Flange			
Duct Shape:	Circular			
Diameter:	14.5	ft		
Duct Area:	165.13	Sq. Ft.		
Upstream Diameters:	> 0.5			
Downstream Diameters:	> 2.0			
Number of Ports Sampled:	1			
Number of Points per Port:	3			
Total Number of Traverse Points:	3			

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date
CO2 % (dry)	Zero		0	0.06	-0.30%	
	Mid	CC265404	10.33	10.06	1.37%	7/1/2024
	High	EB0021818	19.74	19.83	-0.46%	6/22/2023
O2 % (dry)	Zero		0	0.04	-0.18%	
	Mid	CC337912	12.23	12.12	0.51%	7/22/2024
	High	EB0064892	21.65	21.70	-0.23%	8/7/2023

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/n	Analyzer Span	RM Gas Span
CO ppmvd	Thermo 48C	0405705657	100	90.43
CO2 % (dry)	Servomex 1440	01440D1/3791	20	19.74
O2 % (dry)	Servomex 1440	01440D1/3791	25	21.65
	Start		95% Response	Time (min)
Upscale				1.5
Downscale				1.5

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Fuel Type: Other
Fuel Factor: Enter Fuel Factor Here
Diluent: O2 %

Location: Coke Battery No. 2 Underfire Stack
Date: 9/12/16
Operator: Stuart Burton
Project #: M162810
Fuel Factor: by Standard

CO2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.33	10.13	10.05	0.05	0.02	0.04	10.09	6.24	6.4	0.05	-0.41	0.20	-0.15
2	10.33	10.05	10.08	0.02	0.01	0.02	10.07	6.45	6.6	-0.10	0.15	0.25	-0.05
3	10.33	10.08	10.01	0.01	0.00	0.01	10.05	6.26	6.4	0.25	-0.35	0.30	-0.05

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.23	12.11	12.07	0.08	0.00	0.03	12.09	8.28	8.4	0.23	-0.18	0.18	-0.28
2	12.23	12.07	12.08	0.00	0.04	0.02	12.08	7.92	8.0	0.18	0.05	0.00	0.18
3	12.23	12.08	12.06	0.04	0.04	0.04	12.07	8.19	8.3	0.28	-0.09	0.00	0.00

Calibration Corrected Data

Run #	Run Date	Start Time	End Time	CO2 % (dry)	O2 % (dry)
1	9/12/16	11:00	12:00	6.4	8.4
2	9/12/16	12:15	13:15	6.6	8.0
3	9/12/16	13:35	14:35	6.4	8.3
Average				**6.5**	**8.2**

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/12/16

Linearity Cal/Pre 1 Cal

Time	CO2 % (dry)		O2 % (dry)	
8:00	19.44		0.03	
8:01	19.80		0.03	
8:02	19.80		0.03	
8:03	19.81		0.02	
8:04	19.82		0.02	
8:05	19.83	ih	0.02	
8:06	13.65		6.92	
8:07	0.11		22.45	
8:08	0.10		22.47	
8:09	0.09		22.33	
8:10	0.07		21.70	
8:11	0.06		21.70	
8:12	0.06		21.70	
8:13	0.06		21.70	
8:14	0.06		21.70	
8:15	0.06		21.70	ih
8:16	0.06		1.13	
8:17	0.06		0.09	
8:18	0.06		0.08	
8:19	0.06	iz	0.08	
8:20	0.24		0.08	
8:21	10.40		0.05	
8:22	10.06		0.05	
8:23	10.06		0.04	
8:24	10.06		0.04	
8:25	10.06		0.04	
8:26	10.06		0.04	
8:27	10.06	im	0.04	iz
8:28	4.00		7.43	
8:29	0.06		12.12	
8:30	0.06		12.12	im
8:31	0.06		11.80	
8:32	0.06		0.11	
8:33	0.06		0.07	
8:34	0.06		0.07	
8:35	0.06		0.07	
8:36	0.06		0.07	
8:37	0.06		0.07	
8:38	0.06		0.07	
8:39	0.06		0.07	
8:40	0.08		9.02	
8:41	6.08		7.35	
8:42	10.03		0.06	
8:43	10.08		0.06	
8:44	10.11		0.06	
8:45	10.12		0.06	
8:46	10.13		0.06	
8:47	10.13		0.06	
8:48	10.13	m	0.06	z
8:49	6.17		4.92	
8:50	0.11		11.98	
8:51	0.07		12.08	
8:52	0.05		12.11	
8:53	0.05	z	12.11	m
8:54	0.04		6.34	
8:55	0.04		0.09	
8:56	0.04		0.07	
8:57	0.04		0.07	
8:58	0.04		0.07	
8:59	0.04		0.07	
9:00	0.04		0.07	
10:02	9.87		0.01	
10:03	10.00		0.00	
10:04	10.01		0.00	
10:05	10.01		0.00	
10:06	8.40		2.35	
10:07	0.09		12.06	
10:08	0.05		12.08	
10:09	0.04		12.08	
10:10	0.03		0.52	
10:11	0.03		0.04	
10:12	0.02		0.04	
10:13	0.02		0.03	
10:14	0.02		0.03	
10:15	1.96		4.98	
10:16	6.02		8.74	

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Client: ArcelorMittal
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/12/16

Post 1/Pre 2

Time	CO2 % (dry)		O2 % (dry)	
12:02	6.15		7.50	
12:03	0.07		0.11	
12:04	0.03		0.05	
12:05	0.02	z	0.04	
12:06	5.00		0.03	
12:07	10.00		0.01	
12:08	10.04		0.00	
12:09	10.05	m	0.00	z
12:10	4.14		7.06	
12:11	0.05		12.06	
12:12	0.04		12.07	m

Post 2/Pre 3

Time	CO2 % (dry)		O2 % (dry)	
13:21	9.83		0.02	
13:22	10.00		0.01	
13:23	10.08	m	0.04	z
13:24	3.44		8.05	
13:25	0.04		12.07	
13:26	0.03		12.08	m
13:27	0.02		5.88	
13:28	0.01		0.09	
13:29	0.01		0.08	
13:30	0.01	z	0.08	
13:31	3.00		3.29	

Post 3

Time	CO2 % (dry)		O2 % (dry)	
14:58	2.44		2.93	
14:59	0.00		0.09	
15:00	-0.01		0.08	
15:01	-0.02		0.08	
15:02	5.73		0.06	
15:03	9.98		0.04	
15:04	10.00		0.04	
15:05	10.01	m	0.04	z
15:06	4.30		6.85	
15:07	0.02		12.05	
15:08	0.00	z	12.06	m

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Client:	ArcelorMittal Burns Harbor LLC	**Test Location:**	Coke Battery No. 2 Underfire Stack
Facility:	Burns Harbor, Indiana	**Date:**	9/13/16
Project #:	M162810	**Operator:**	Stuart Burton
Operating Condition:	Normal		

Probe Length:	12.0	ft	**Point Markings (including port**	
Probe Type:	Extractive		**Point #**	**Inches**
Sample Plane:	Horizontal		1	65.75
Port Length:	50.00	in.	2	97.24
Port Size (diameter):	6	in.	3	128.74
Port Type:	Flange			
Duct Shape:	Circular			
Diameter:	14.5	ft		
Duct Area:	165.13	Sq. Ft.		
Upstream Diameters:	> 0.5			
Downstream Diameters:	> 2.0			
Number of Ports Sampled:	1			
Number of Points per Port:	3			
Total Number of Traverse Points:	3			

Type	Setting	Cylinder ID	Cylinder Value	Analyzer Response	Difference, % of Span	Expiration Date
CO2 % (dry)	Zero		0	0.02	-0.10%	
	Mid	CC265404	10.33	10.16	0.86%	7/1/2024
	High	EB0021818	19.74	19.84	-0.51%	6/22/2023
O2 % (dry)	Zero		0	0.03	-0.14%	
	Mid	CC337912	12.23	12.26	-0.14%	7/22/2024
	High	EB0064892	21.65	21.71	-0.28%	8/7/2023

Response Time Data

Type	RM Analyzer Make/Model	RM Analyzer s/n	Analyzer Span	RM Gas Span
CO2 % (dry)	Servomex 1440	01440D1/3791	20	19.74
O2 % (dry)	Servomex 1440	01440D1/3791	25	21.65
	Start		95% Response	Time (min)
Upscale				1.5
Downscale				1.5

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Fuel Type: Other
Fuel Factor: Enter Fuel Factor Here
Diluent: O2 %

Location: Coke Battery No. 2 Underfire Stack
Date: 9/13/16
Operator: Stuart Burton
Project #: M162810
Fuel Factor: by Standard

CO2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	10.33	10.16	10.31	0.02	0.03	0.03	10.24	6.41	6.5	-0.76	0.76	-0.05	0.05
2	10.33	10.31	10.26	0.03	0.02	0.03	10.29	6.15	6.2	-0.51	-0.25	0.00	-0.05
3	10.33	10.26	10.25	0.02	0.00	0.01	10.26	5.72	5.8	-0.46	-0.05	0.10	-0.10
4	10.33	10.25	10.23	0.00	0.01	0.01	10.24	6.41	6.5	-0.35	-0.10	0.05	0.05
5	10.33	10.23	10.19	0.01	-0.02	-0.01	10.21	6.42	6.5	-0.15	-0.20	0.20	-0.15
6	10.33	10.19	10.19	-0.02	-0.02	-0.02	10.19	6.39	6.5	-0.15	0.00	0.20	0.00

O2 % (dry) Correction Data

Run #	Cma	Precal	Postcal	Pre zero	Post zero	Co	Cm	C	Cgas	Span Bias	Span Drift	Zero Bias	Zero Drift
1	12.23	12.05	12.05	0.03	0.02	0.03	12.05	8.14	8.3	0.97	0.00	0.05	-0.05
2	12.23	12.05	12.04	0.02	0.02	0.02	12.05	8.59	8.7	1.02	-0.05	0.05	0.00
3	12.23	12.04	12.04	0.02	0.02	0.02	12.04	9.43	9.6	1.02	0.00	0.05	0.00
4	12.23	12.04	12.01	0.02	0.02	0.02	12.03	8.10	8.2	1.15	-0.14	0.05	0.00
5	12.23	12.01	12.00	0.02	0.02	0.02	12.01	8.06	8.2	1.20	-0.05	0.05	0.00
6	12.23	12.00	12.00	0.02	0.04	0.03	12.00	8.06	8.2	1.20	0.00	-0.05	0.09

Calibration Corrected Data

Run #	Run Date	Start Time	End Time	CO2 % (dry)	O2 % (dry)
1	9/13/16	8:35	9:35	6.5	8.3
2	9/13/16	9:57	10:57	6.2	8.7
3	9/13/16	11:10	12:10	5.8	9.6
Average				**6.2**	**8.9**
4	9/13/16	12:45	13:45	6.5	8.2
5	9/13/16	14:00	14:59	6.5	8.2
6	9/13/16	15:15	16:13	6.5	8.2
Average				**6.5**	**8.2**

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Project #: M162810
Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/13/16

Linearity Cal/Pre 1 Cal

Time	CO2 % (dry)		O2 % (dry)	
6:47	0.06		20.89	
6:48	0.06		20.88	
6:49	12.73		7.11	
6:50	19.83		0.05	
6:51	19.84	ih	0.05	
6:52	16.62		3.44	
6:53	0.04		21.94	
6:54	0.02		21.78	
6:55	0.02	iz	21.71	ih
6:56	0.02		20.95	
6:57	0.02		-0.04	
6:58	0.01		-0.07	
6:59	0.01		-0.07	
7:00	0.01		-0.07	
7:01	9.20		-0.08	
7:02	10.09		-0.05	
7:03	10.16		0.04	
7:04	10.16		0.04	
7:05	10.16	im	0.03	iz
7:06	3.34		8.33	
7:07	0.02		12.26	
7:08	0.02		12.26	
7:09	0.02		12.26	
7:10	0.02		12.26	
7:11	0.02		12.26	
7:12	0.02		12.26	
7:13	0.02		12.26	
7:14	0.02		12.26	
7:15	0.02		12.26	im
7:16	0.02		12.25	
7:17	0.02		1.56	
7:18	0.02		0.06	
7:19	0.02		0.06	
7:20	0.02		0.06	
7:21	0.02		0.06	
7:22	3.95		8.91	
7:23	10.11		0.04	
7:24	10.15		0.00	
7:25	10.16		0.05	
7:26	10.16	m	0.05	
7:27	2.47		9.17	
7:28	0.05		12.03	
7:29	0.04		12.04	
7:30	0.03		12.04	
7:31	0.03		12.04	
7:32	0.02	z	12.05	m
7:33	0.02		5.53	
7:34	0.02		0.07	
7:35	0.02		0.04	
7:36	0.02		0.03	
7:37	0.02		0.03	
7:38	0.02		0.03	
7:39	0.02		0.03	
7:40	0.02		0.03	z
7:41	0.02		0.03	
7:42	3.93		4.13	
8:10	8.28		1.58	
8:11	10.18		0.04	
8:12	10.18		0.03	
8:13	7.17		3.71	
8:14	0.08		12.06	
8:15	0.04		12.02	
8:16	0.04		0.19	
8:17	0.03		0.07	
8:18	0.03		0.07	

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/13/16

Post 1/Pre 2

Time	CO2 % (dry)		O2 % (dry)	
9:45	0.04		0.06	
9:46	0.03	z	0.06	
9:47	0.37		0.06	
9:48	10.07		0.02	
9:49	10.30		0.02	
9:50	10.31	m	0.02	z
9:51	3.87		7.40	
9:52	0.05		12.04	
9:53	0.03		12.05	m

Post 2/Pre 3

Time	CO2 % (dry)		O2 % (dry)	
10:58	6.54		7.85	
10:59	4.95		6.89	
11:00	0.04		0.08	
11:01	0.02	z	0.06	
11:02	6.08		0.04	
11:03	10.23		0.02	
11:04	10.25		0.02	
11:05	10.26	m	0.02	z
11:06	4.02		7.15	
11:07	0.05		12.03	
11:08	0.03		12.04	m

Post 3/Pre 4

Time	CO2 % (dry)		O2 % (dry)	
12:11	6.78		7.32	
12:12	1.28		2.17	
12:13	0.02		0.07	
12:14	0.01		0.06	
12:15	0.00	z	0.06	
12:16	6.34		0.04	
12:17	10.21		0.02	
12:18	10.23		0.02	
12:19	10.25	m	0.02	z
12:20	3.73		7.64	
12:21	0.03		12.03	
12:22	0.01		12.04	m

Post 4

Time	CO2 % (dry)		O2 % (dry)	
13:48	0.03		0.08	
13:49	0.01		0.06	
13:50	4.84		0.05	
13:51	10.20		0.02	
13:52	10.22		0.02	
13:53	10.23	m	0.02	z
13:54	4.57		6.73	
13:55	0.03		12.00	
13:56	0.01	z	12.01	m

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Client: ArcelorMittal Burns Harbor LLC
Facility: Burns Harbor, Indiana
Project #: M162810

Test Location: Coke Battery No. 2 Underfire Stack
Operating Condition: Normal
Date: 9/13/16

Post 5

Time	CO2 % (dry)		O2 % (dry)	
15:00	6.87		7.14	
15:01	3.32		4.37	
15:02	-0.01		0.08	
15:03	-0.02	z	0.07	
15:04	6.19		0.05	
15:05	10.16		0.03	
15:06	10.18		0.03	
15:07	10.19	m	0.02	z
15:08	9.08		1.37	
15:09	0.05		11.96	
15:10	-0.01		12.00	
15:11	-0.02		12.00	m

Post 6

Time	CO2 % (dry)		O2 % (dry)	
16:14	5.30		6.80	
16:15	0.01		0.10	
16:16	-0.02	z	0.08	
16:17	5.88		0.06	
16:18	10.16		0.04	
16:19	10.18		0.04	
16:20	10.19		0.04	
16:21	10.19	m	0.04	z
16:22	1.29		10.48	
16:23	0.01		12.00	
16:24	-0.01		12.00	m

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Appendix I - Gas Cylinder Certification

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Airgas.
an Air Liquide company

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Airgas Specialty Gases
Airgas USA, LLC
12722 South Wentworth Ave.
Chicago, IL 60628
773-785-3000 Fax: 773-785-1928
Airgas.com

Part Number:	E02NI88E15A3424	Reference Number:	54-124566672-1
Cylinder Number:	CC100707	Cylinder Volume:	145.4 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12016	Valve Outlet:	590
Gas Code:	O2,BALN	Certification Date:	Jul 22, 2016

Expiration Date: Jul 22, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	12.00 %	11.94 %	G1	+/- 1.0% NIST Traceable	07/22/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062016	CC367570	22.88 % OXYGEN/NITROGEN	+/- 0.2%	Apr 24, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jul 19, 2016

Triad Data Available Upon Request

Approved for Release

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Airgas

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI80E15ACMD7	Reference Number:	54-124500021-2
Cylinder Number:	EB0021818	Cylinder Volume:	156.5 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	580
Gas Code:	CO2,BALN	Certification Date:	Jun 22, 2015

Expiration Date: Jun 22, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.50 %	10.74 %	G1	+/-1.0% NIST Traceable	06/22/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06120402	CC184369	19.66 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 01, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Jun 12, 2015

Triad Data Available Upon Request

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Airgas
an Air Liquide company

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Airgas Specialty Gases
Airgas USA, LLC
12722 South Wentworth Ave.
Chicago, IL 60628
773-785-3000 Fax: 773-785-1928
Airgas.com

Part Number:	E02NI88E15A3424	Reference Number:	54-124566672-1
Cylinder Number:	CC337912	Cylinder Volume:	145.4 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12016	Valve Outlet:	590
Gas Code:	O2,BALN	Certification Date:	Jul 22, 2016

Expiration Date: Jul 22, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	12.00 %	12.23 %	G1	+/- 1.0% NIST Traceable	07/22/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062016	CC367570	22.88 % OXYGEN/NITROGEN	+/- 0.2%	Apr 24, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jul 19, 2016

Triad Data Available Upon Request

Approved for Release

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI78E15A0124	Reference Number:	54-124506970-1
Cylinder Number:	EB0064892	Cylinder Volume:	146.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	590
Gas Code:	O2,BALN	Certification Date:	Aug 07, 2015

Expiration Date: Aug 07, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	22.00 %	21.65 %	G1	+/- 1.0% NIST Traceable	08/07/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06120204	CC195893	20.90 % OXYGEN/NITROGEN	+/- 0.4%	Dec 01, 2015

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jul 31, 2015

Triad Data Available Upon Request

Signature on file

Approved for Release

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Airgas

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0080	Reference Number:	54-124547375-2
Cylinder Number:	CC203476	Cylinder Volume:	144.3 Cubic Feet
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12016	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Apr 05, 2016

Expiration Date: Apr 05, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	250.0 PPM	250.3 PPM	G1	+/- 0.5% NIST Traceable	04/05/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12060328	CC353961	249.3 PPM CARBON MONOXIDE/NITROGEN	+/- 0.4%	Oct 26, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO-2 HORIBA VIA-510 851174011	NDIR	Mar 19, 2016

Triad Data Available Upon Request

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Airgas

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0499	Reference Number:	54-124482882-1
Cylinder Number:	SG9114315BAL	Cylinder Volume:	144.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Mar 13, 2015

Expiration Date: Mar 13, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	450.0 PPM	455.1 PPM	G1	+/- 0.9% NIST Traceable	03/13/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062414	CC23505	487.1 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 22, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO-1 HORIBA VIA-510 TKPPF7FG	NDIR	Feb 27, 2015

Triad Data Available Upon Request

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Airgas

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
(773) 785-3000 Fax: (773) 785-1928
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0023	Reference Number:	54-124489793-1
Cylinder Number:	XC027226B	Cylinder Volume:	146.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	660
Gas Code:	SO2,BALA	Certification Date:	Apr 30, 2015

Expiration Date: Apr 30, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	480.0 PPM	476.3 PPM	G1	+/- 0.8% NIST Traceable	04/23/2015, 04/30/2015
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062904	CC407305	483.1 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.6%	Jul 18, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801332	FTIR	Apr 08, 2015

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CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0024	Reference Number:	54-124250841-2
Cylinder Number:	CC142743	Cylinder Volume:	146.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	NONPGVP	Valve Outlet:	660
Gas Code:	SO2,BALA	Certification Date:	Feb 11, 2011

Expiration Date: Feb 11, 2019

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
SULFUR DIOXIDE	900.0 PPM	911.4 PPM	G1	+/- 1% NIST Traceable	02/04/2011, 02/11/2011
AIR	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM/SO2	07120408	CC238053	993.4 PPM SULFUR DIOXIDE/		May 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801332	FTIR	Jan 31, 2011

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Notes:

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0302	Reference Number:	54-124527369-1
Cylinder Number:	CC180967	Cylinder Volume:	144.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Dec 07, 2015

Expiration Date: Dec 07, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	50.00 PPM	49.36 PPM	G1	+/- 1.0% NIST Traceable	12/07/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12060506	CC353898	49.53 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Dec 20, 2017

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO-1 HORIBA VIA-510 TKPPF7FG	NDIR	Nov 23, 2015

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CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0406	Reference Number:	54-124374005-4
Cylinder Number:	CC4622	Cylinder Volume:	144.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12013	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	May 14, 2013

Expiration Date: May 14, 2021

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	90.00 PPM	90.43 PPM	G1	+/- 0.8% NIST Traceable	05/14/2013
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
CO	12062234	CC365729	97.56 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	May 25, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nexus 470 AEP0000428	FTIR	May 01, 2013

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Notes:

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Airgas Specialty Gases
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Part Number:	E02NI88E15A3424	Reference Number:	54-124566672-1
Cylinder Number:	CC100707	Cylinder Volume:	145.4 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12016	Valve Outlet:	590
Gas Code:	O2,BALN	Certification Date:	Jul 22, 2016

Expiration Date: Jul 22, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	12.00 %	11.94 %	G1	+/- 1.0% NIST Traceable	07/22/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062016	CC367570	22.88 % OXYGEN/NITROGEN	+/- 0.2%	Apr 24, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jul 19, 2016

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CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI80E15ACMD7	Reference Number:	54-124500021-2
Cylinder Number:	EB0021818	Cylinder Volume:	156.5 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	580
Gas Code:	CO2,BALN	Certification Date:	Jun 22, 2015

Expiration Date: Jun 22, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	19.50 %	19.74 %	G1	+/- 1.0% NIST Traceable	06/22/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06120402	CC184369	19.66 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	May 01, 2016

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO2-1 HORIBA VIA-510 V1E3H7P5	NDIR	Jun 12, 2015

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Airgas Specialty Gases
Airgas USA, LLC
12722 South Wentworth Ave.
Chicago, IL 60628
773-785-3000 Fax: 773-785-1928
Airgas.com

Part Number:	E02NI88E15A3424	Reference Number:	54-124566672-1
Cylinder Number:	CC337912	Cylinder Volume:	145.4 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12016	Valve Outlet:	590
Gas Code:	O2,BALN	Certification Date:	Jul 22, 2016

Expiration Date: Jul 22, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	12.00 %	12.23 %	G1	+/- 1.0% NIST Traceable	07/22/2016
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062016	CC367570	22.88 % OXYGEN/NITROGEN	+/- 0.2%	Apr 24, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jul 19, 2016

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI78E15A0124	Reference Number:	54-124506970-1
Cylinder Number:	EB0064892	Cylinder Volume:	146.3 CF
Laboratory:	ASG - Chicago - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12015	Valve Outlet:	590
Gas Code:	O2,BALN	Certification Date:	Aug 07, 2015

Expiration Date: Aug 07, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

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ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	22.00 %	21.65 %	G1	+/- 1.0% NIST Traceable	08/07/2015
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06120204	CC195893	20.90 % OXYGEN/NITROGEN	+/- 0.4%	Dec 01, 2015

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jul 31, 2015

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