ACKNOWLEDGMENTS

I would like to thank Mr. Kevin Bort, Mr. Barry Smith and their associates for their cooperation, patience and input in the coordination of the testing program conducted at Steel Dynamics, Inc. Their knowledge and experience in process control and operation, and project development proved invaluable towards the completion of this project.

Fred H. Guenther
Project Manager

TABLE OF CONTENTS

ACKNOWLEDGMENTS ..... *I*

PREFACE ..... *iv*

1.0 INTRODUCTION 1

2.0 TEST RESULTS SUMMARY 5

3.0 FACILITY DESCRIPTION 8

4.0 TEST PROCEDURES 10

5.0 ANALYTICAL PROCEDURES 13

6.0 QUALITY ASSURANCE PROCEDURES 14

7.0 CONCLUSIONS 15

LIST OF TABLES

TABLE 1 - EPA METHOD 13B - FLUORIDES EMISSIONS TEST RESULTS - ELECTRIC ARC FURNACE BAGHOUSE STACK 6

TABLE 2 - EPA METHOD 101A - MERCURY EMISSIONS TEST RESULTS - ELECTRIC ARC FURNACE - BAGHOUSE STACK 7

LIST OF FIGURES

FIGURE 1 - MELTSHOP - BAGHOUSE /STACK CONFIGURATION 9

FIGURE 2 - MELTSHOP - STACK SAMPLING LOCATION 9

APPENDICES

APPENDIX A - FIELD TEST DATA
APPENDIX B - PROCESS OPERATING DATA
APPENDIX C - LABORATORY ANALYSIS AND CEM ANALYTICAL DATA
APPENDIX D - REAGENT CERTIFICATION AND MATERIAL SAFETY DATA

APPENDICES (CONTINUED)

APPENDIX E - CALIBRATION DATA
APPENDIX F - SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS
APPENDIX G - CORRESPONDENCE

PREFACE

I, Terry Shackelford, do hereby certify that the source emissions testing conducted at Steel Dynamics, Inc. Structural and Rail Division near Columbia City, Indiana was performed in accordance with the procedures set forth by the United States Environmental Protection Agency, and that the data and results submitted within this report are an exact representation of the testing.

Fred H. Guenther
Test Supervisor

I, Fred Guenther, do hereby attest that all work on this project was performed under my direct supervision, and that this report accurately and authentically presents the source emissions testing conducted at Steel Dynamics, Inc. Structural and Rail Division near Columbia City, Indiana.

Fred H. Guenther
Test Supervisor

SOURCE EMISSIONS COMPLIANCE TESTING
EPA Methods 1, 2, 3, 4, 13B and 101A
Performed on the
Electric Arc Furnace
Baghouse Outlet (Exhaust Stack)
at
Steel Dynamics, Inc.
Structural and Rail Division
Columbia City, Indiana

January 20,2004

Project No. 04-T-247

1.0 INTRODUCTION

This report presents the results of the source emissions compliance testing conducted by Guenther/Shackelford Associates (G/SA) for Steel Dynamics, Inc. (SDI), Structural and Rail Division near Columbia City, Indiana.

The primary purpose of this testing program was to obtain fluoride (F) and mercury samples from the effluent gas stream of the baghouse serving the Electric Arc Furnace (EAF). The results of this sampling was used to determine if the emissions discharged into the atmosphere from the facility meet the Indiana Department of Environmental Management (TDEM) source emission limits and the U.S. Environmental Protection Agency (EPA) standards of performance for steel plants utilizing an electric arc furnace (EAF).

G/SA's responsibility was to collect and analyze F and mercury samples and perform

methodologies and analytical procedures for F and Mercury emissions.

5. Fluoride emissions from the EAF Baghouse shall not exceed an average concentration of 0.68 lb/hr pursuant to IDEM Construction Permit #CP-183-10097-00030.

6. Mercury emissions from the EAF Baghouse Stack shall not exceed an average emission rate of 0.02 pounds per hour (lb/hr) pursuant to IDEM Construction Permit #CP-183-10097-00030.

The emissions testing program was supervised in part by G/SA, whose headquarters is in Crown Point, Indiana. G/SA also performed stack gas flow rate and moisture content determinations, carbon dioxide (CO_2), oxygen (O_2), the fluoride and mercury emissions testing on the EAF Baghouse Stack, overall emissions data review, pre- and post test equipment calibration and prepared the final report. The mercury and fluoride analyses were subcontracted to G/SA's analytical broker, Sampling and Analytical Management, Inc. (SAMI) who subcontracted the fluoride analyses to Galbraith Laboratories, Inc. of Knoxville, Tennessee and the mercury analyses to DataChem Laboratories, Inc. in Cincinnati, Ohio.

The emissions testing was performed in accordance with EPA Reference Methods 1, 2, 3, 4,, 13B (F), 101A (Mercury), Title 40 Code of Federal Regulations, Part 60, Appendix A, "Test Methods".

The testing program was approved by and/or coordinated with the following personnel:

Kevin J. Bort, Engineering Manager, SDI

Barry Smith, SDI

The emissions testing was performed by the following personnel:

Fred Guenther, Test Supervisor, G/SA

Brandon Peyton, Senior Test Technician, G/SA

Andrew Perdue, Senior Test Technician, G/SA

Desire'e Moore, Test Technician

The emissions testing was observed by the following personnel:

Jarrod Fisher, Environmental Scientist, Air Compliance Section, IDEM

2.0 TEST RESULTS SUMMARY

The source emissions testing was performed utilizing EPA Methods 1, 2, 3,4, 13B and 101A at the Electric Arc Furnace Baghouse Stack sampling location. A summary of the test results is given below:

Electric Arc Furnace Emissions Testing Results		
Run No.	**Fluoride (Lbs/Hr)**	**Mercury (Lbs/Hr)**
1	**0.449**	**0.016**
2	**0.719**	**0.021**
3	**0.541**	**0.009**
Average	**0.569**	**0.015**
Emissions Limit	**0.68**	**0.02**

A complete list of test parameters for each Method 13B (Fluoride), and 101A (Mercury) emissions test run performed at the stack sampling location can be found in Tables 1 through 2.

Sample calculations and examples of the equations used to generate the test results can be found in Appendix F.

TABLES

G/SA ..... ENVIRONMENTAL TESTING CONSULTANTS

P.O. Box 807, Crown Point, IN 46307 TEL (219) 663-5394 1FAX (219) 662-7037

TABLE 1

EPA METHOD 13B

FLUORIDE (F) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI PROJECT NO.: 04-T-247

SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET DATA INPUT BY: MMK

INPUT DATA			
Run Number	1	2	3
Date	20Jan-04	20Jan-04	20-Jan-04
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0900-1012	1050-1214	1250-1400
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	**162.0**	**160.3**	**188.5**
Stack Area (Ft^2)	312.20	312.20	312.20
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.979	0.979	0.979
Nozzle Area (Ft^2)	0.000309	0.000309	0.000309
Barometric Pressure (In. Hg)	29.41	29.41	29.41
Static Pressure (In. H2O)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	53.912	53.825	54.270
Average Dry Gas Meter Temperature (°F)	67.5	69.3	64.8
Average Orifice Meter Delta H (In. H20)	2.532	2.509	2.571
Volume Condensate Collected (Ml)	13.2	13.0	9.1
Average CO2 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.914	0.912	0.932
Average Stack Gas Temperature (°F)	139.8	142.9	146.4
F Mass Concentration (Milligrams, mg)	**0.20**	**0.32**	**0.24**

CALCULATED DATA			
Absolute Pressure (In. Hg)	29.39	29.39	29.39
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	52.267	52.007	52.891
Water Vapor Volume at Standard Conditions (SCF)	0.621	0.612	0.428
Moisture Fraction (Unitless)	0.012	0.012	0.008
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.71	28.75
Stack Gas Velocity (FPS)	55.4	55.4	56.7
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,037,112	1,037,100	1,061,779
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	886,415	881,855	900,895
Isokinetic Sampling (%)	99.4	99.4	99.0
F Emissions Concentration (Gr/DSCF)	0.00006	0.00009	0.00007
F Emissions Concentration (LbIDSCF)	8.44E-009	1.36E-008	1.00E-008
F Emissions Rate (Lb/Hr)	0.449	0.718	0.541

Average Stack Gas Flow Rate **at** Actual Conditions (ACFM)	**1,045,330**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**889,721**	
Average F Emissions Concentration **(Gr/DSCF)**	**0.00007**	Emission
Average F Emissions Concentration **(Lb/DSCF)**	**1.07E-008**	**Limit:**
Average F Emissions Rate **(Lb/Hr)**	**0.569**	**0.68 Lb/Hr**

Signature of Reviewer

G/SA ..... ENVIRONMENTAL TESTING CONSULTANTS

P.O. Box 807, Crown Point, IN 46307 TEL (219) 663-5394 / FAX (219) 662-7037

TABLE 2
EPA METHOD 101A
METALS (MERCURY, Hg) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 04-T-247

SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: MMK

INPUT DATA

Run Number	1	2	3
Date	20-Jan-04	20-Jan-04	20-Jan-04
Sampling Location	**Exhaust Stack**	**Exhaust Stack**	**Exhaust Stack**
Test Time, Start-Stop (24 Hour)	0850-1058	1212-1425	1430-1640
Sampling Time (Minutes)	120	120	120
Average Process Weight Rate (TPH)	**171.4**	**177.4**	**120.9**
Stack Area (Ft^2)	312.20	312.20	312.20
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0.979
Nozzle Area (Ft^2)	0.000259	0.000259	0.000259
Barometric Pressure (In. Hg)	29.41	29.41	29.41
Static Pressure (In. H2O)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	91.376	89.495	88.900
Average Dry Gas Meter Temperature (°F)	55	61	53
Average Orifice Meter Delta H (In. H2O)	1.649	1.526	1.723
Volume Condensate Collected (Ml)	25.1	25.7	25.6
Average CO2 Concentration (%)	0.0	0.0	0.0
Average O2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.969	0.938	0.909
Average Stack Gas Temperature (°F)	134.8	144.1	121.1
Hg Mass Concentration (Micrograms, µg)	**11.8**	**16.0**	**6.5**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.39	29.39	29.39
Dry Gas Meter Sample Volume at Standard Conditions (DSCF	92.203	89.238	88.445
Water Vapor Volume at Standard Conditions (SCF)	1.181	1.210	1.205
Moisture Fraction (Unitless)	0.013	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.70	28.69	28.69
Stack Gas Velocity (FPS)	58.5	57.0	54.2
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,094,991	1,068,103	1,014,894
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	942,756	904,799	893,693
Isokinetic Sampling (%)	98.2	99.1	99.4
Hg Emission Concentration (Gr/DSCF)	0.0000020	0.0000028	0.0000011
Hg Emission Concentration (Lb/DSCF)	2.82E-10	3.95E-10	1.62E-10
Hg Emission Rate (Lb/Hr)	0.016	0.021	0.009

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	1,059,329	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	913,749	
Average Hg Emission Concentration (Gr/DSCF)	0.0000020	**Emission**
Average Hg Emission Concentration (Lb/DSCF)	2.80E-10	**Limit:**
Average Hg Emission Rate (Lb/Hr)	0.015	**0.02 Lb/Hr**

Signature of Reviewer: Fred H Dimmick

3.0 FACILITY DESCRIPTION

Steel Dynamics, Inc. Structural and Rail Division facility manufactures steel products from scrap metal. The facility has a capacity to produce 200 tons of steel per hour.

SDI Structural and Rail Division is located at 2610 County Road 700 East near Columbia City, Indiana which is in Whitley County.

The SDI Structural and Rail Division facility consists basically of one (1) single shell Electric Arc Furnace (EAF) incorporating a jet-pulse, fabric filter baghouse with exhaust stack for particulate removal, one back-up single shell EAF, a ladle metallurgical station for refining, one (1) natural gas-fired reheat furnace (RF) with separate exhaust stack, continuous casting, hot roll milling and slag processing. The compliance emissions testing was performed on the EAF stack. See Figures 1 and 2.

During the emissions testing on January 20,2004, the Electric Arc Furnace steel processing tap rates averaged 162.0 tonslhr (Run 1), 160.3 tonslhr (Run 2), and 188.5 tonslhr (Run 3) for the fluoride emissions test runs and 171.4 tonslhr (Run 1), 177.4 tonslhr (Run 2), and 120.9 tonslhr (Run 3) for the mercury emissions test runs.

Process operating data recorded during the emissions testing can be found in Appendix B of this report.

FIGURES

FIGURES

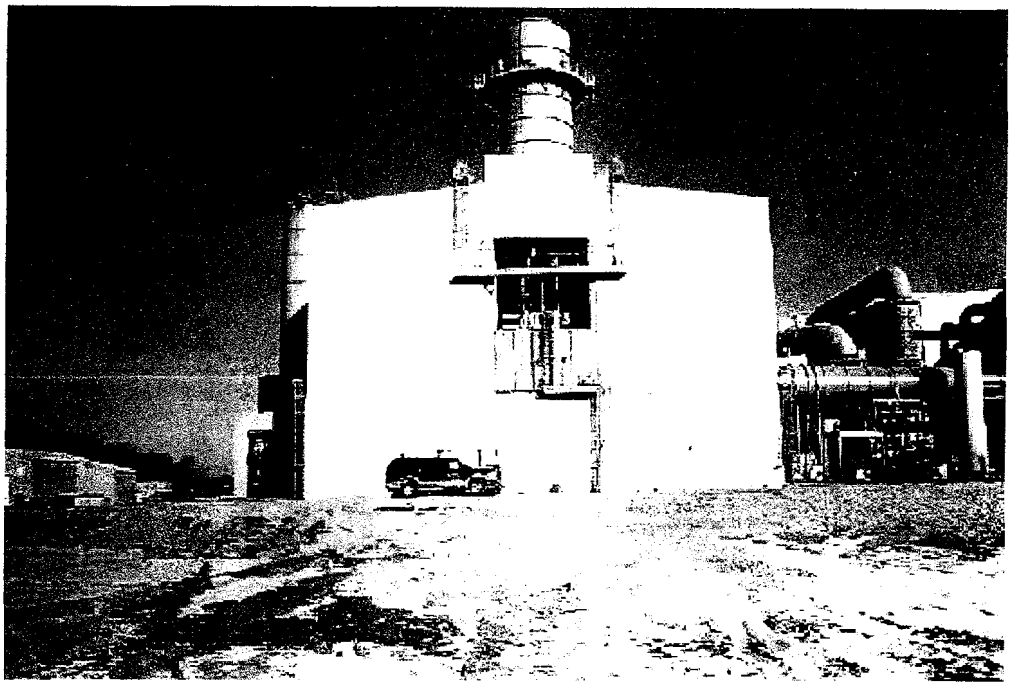


Figure 1 - Electric Arc Furnace - Baghouse/Stack Configuration



Figure 2 - Electric Arc Furnace - Stack Sampling Location

4.0 TEST PROCEDURES

G/SA, and G/SA's affiliates and subcontractors use all current EPA accepted testing methodologies in their Air Quality Programs as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A. For this testing program, the following specific methodologies were utilized:

EPA Method 1 - Sample and Velocity Traverses for Stationary Sources

EPA Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 3 - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources

EPA Method 4 - Determination of Moisture Content From Stack Gases

EPA Method 13B - Determination of Total Fluoride Emissions from Stationary Sources (Specific Ion Electrode Method)

EPA Method 101A - Determination of Particulate and Gaseous Mercury Emissions

EPA Methods 1, 2 13B and 101A were performed at the Electric Arc Furnace Baghouse Stack sampling location using one (1) Apex Instruments, Model 522, control unit and sampling train incorporating a 8′, effective length, stainless-steel probe with a heated, borosilicate glass liner, stainless-steel nozzle and Type S, stainless-steel pitot tube, ¼" O.D., stainless-steel static pressure/gas sampling tube and Type K (Chromel/Alumel) thermocouples; an aluminum filter oven and borosilicate glass filter holders with Teflon filter supportswith Viton-0-Rings, and 0.3 micron (99.9% retention), Whatman 8.5cm, Type 934-

AH, glass rnicrofiber filters; foam insulated, aluminum impinger units with two (2) Greenburg-Smith and two (2) modified Greenburg-Smith glass impinger bottles, and a stainless-steel umbilical adapter with Type K (Chromel/Alumel) gas exit thermocouple; and a 90' umbilical with various interconnecting fittings, plugs and connectors.

Sample pH levels were determined with EM colorpHast pH Strips with a 0 to *6* pH range. Impinger contents were purged with ambient air utilizing a Gast ¼ h.p. vacuum pump incorporating a Dwyer, Model RMA-23-SSV, Rate-Master Flowmeter (5-50 lpm range), and ¼" O.D. rubber tubing, regulators, interconnecting fittings and valves.

EPA Method 3A was performed using a Fuji, NDIR CO_2 Monitor and a California Analytical, Paramagnetic O_2 Monitor to determine stack gas concentrations of CO_2 and O_2, respectively.

U.S. EPA Method 3 was performed at the sampling location on January 20, 2004, only, during runs 1 - 3 of the Method 13B and Method 101A testing to determine exhaust gas concentrations of carbon dioxide (CO_2) and oxygen (O_2) using a Bacharach, Duplex Fyrite Kit, Gas Analyzer (Orsat) to extract and measure integrated gas samples collected in Calibrated Instruments, Inc. 10 liter, pillow type, Tedlar bags at the outlet of the stainless-steel probe's gas sampling tube

Calibration data, including an on-site dry gas meter calibration check, and pretest run and post-test run calibrations of the aforementioned instrumentation, and calibration span gas certifications can be found in Appendix E.

Cyclonic flow checks were omitted at the Electric Arc Furnace Baghouse Stack sampling location due to the acceptable stack and test port configurations based on Method 1 requirements, and relatively laminar flows noted during the preliminary traverse procedures conducted prior to the emissions testing a the sampling location.

No testing or sample recovery deviations or procedural errors occurred during the onsite sampling phase of the testing program.

Certifications and material safety data for the chemical reagents used in performing the fluoride and mercury testing are included in Appendix D

No significant process deviations or upsets occurred during the emissions testing periods.

The emissions test data collected during the field sampling can be found in Appendix A of this report. The particulate and gaseous emissions concentrations, rates and pertinent data are presented in the "Test Results Summary".

5.0 ANALYTICAL PROCEDURES

G/SA, and G/SA's affiliates and subcontractors utilize all current analytical procedures outlined in the following reference methods as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A:

EPA Method 1 - Sample and Velocity Traverses for Stationary Sources

EPA Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 3 - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources

EPA Method 4 - Determination of Moisture Content From Stack Gases

EPA Method 13B - Determination of Total Fluordie Emissions from Stationary Sources (Specific Ion Electrode Method)

EPA Method 101A - Determination of Particulate and Gaseous Mercury Emissions

An AND, Model EK-12004 Electronic Toploading Balance was used to weigh spent silica gel from the EPA Method 13B (Fluoride) and 101A (Mercury) testing to determine, in part, stack gas moisture content.

No analytical procedure errors occurred during the Fluoride and Mercury analyses phase of the testing program.

All pertinent laboratory analysis data can be found in Appendix C of this report.

6.0 QUALITY ASSURANCE PROCEDURES

Each reference method presented in the U.S. Code of Federal Regulations details the instrument calibration requirements, sample recovery and analysis, data reduction and verification, types of equipment required and the appropriate sampling and analytical procedures to assure maximum performance and accuracy. G/SA, and G/SA's affiliates and subcontractors adhere to the guidelines for quality control set forth by the United States Environmental Protection Agency. These procedures are outlined in the following documents:

Code of Federal Regulations, Title 40, Part 51

Code of Federal Regulations, Title 40, Part 60

Quality Assurance Handbook, Volume 1, EPA 600/9-76-005

Quality Assurance Handbook, Volume 2, EPA 600/4-77-027a

Quality Assurance Handbook, Volume 3, EPA 600/4-77-027b

7.0 CONCLUSIONS

The baghouse serving the Electric Arc Furnace demonstrated an average Fluoride emission rate of 0.57 lb/hr during the compliance testing, which is 83.8% of the required EPA PM emission concentration limit of 0.68 lb/hr. The exhaust from the Electric Arc Furnace Baghouse demonstrated an average Mercury emission rate of 0.02 lb/hr during the compliance testing, which is 100.0% of the required IDEM Mercury emission rate limit of 0.02 lb/hr.

The usefulness and/or significance of the emissions values presented in this document as they relate to the compliance status of the Electric Arc Furnace's operation based on process operating conditions shall be determined by others.

For additional information pertaining to the testing program see Appendix G at the end of this report.

APPENDICES

APPENDIX A

FIELD TEST DATA

EPA METHOD 1

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 1 – SITE DETERMINATION FIELD DATA SHEET

Client: Steel Dynamics - CCI
Source: EAF
Project No.: 03-T-[illegible]
Date: 1/15/08

Flue Data:

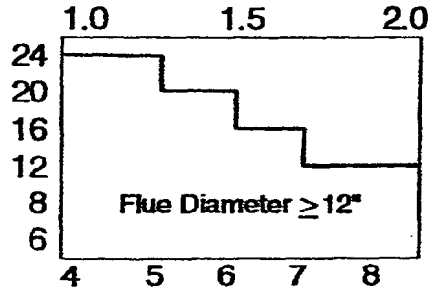
Distance from far inside wall to outside of port	246.5	in.	
Port length	60	in.	
I.D. or depth of flue	240	in.	
Width of flue (rect.)	N.A.	in.	
Area of flue	314.159	sq. ft.	
Equivalent dia., De = 2LW / (L+W)			De = 240 in.

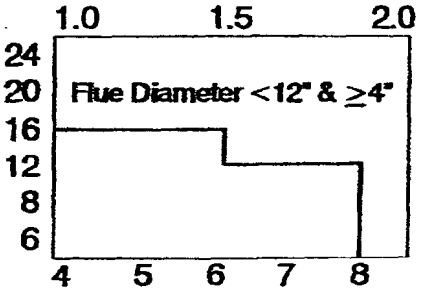
Distance from the nearest flow disturbance to the center line of the test ports:

Upstream (A)	Downstream (B)
120 in.	240 in.
Number of diameters 0.5 unitless	Number of diameters 2.5 unitless

Traverse Points Determination:

Diameters upstream from disturbance





Minimum number of traverse points

Diameters downstream *from* disturbance

Traverse Points Measurements:

Circular flue (Percentage of flue diameter) / Rectangular flue (Percentage of *flue* depth)

Point No.	2	4	6	8	10	(12)
1	14.6 / 25.0	6.7 / 125	4-4/83	3.2 / 6.3	2.6 / 5.0	21 / 4.2
2	85.4 / 75.0	25.0 / 37.5	14.6 / 25.0	10.5 / 18.8	8.2 / 15.0	6.7 / 12.5
3		75.0 / 625	29.6 / 41.7	19.4 / 31.3	14.6 / 25.0	11.8 / 20.8
4		93.3 / 87.5	70.4 / 58.3	32.3 / 43.8	22.6 / 35.0	17.7 / 29.2
5			85.4 / 75.0	67.7 / 56.3	34.2 / 45.0	25.0 / 37.5
(6)			95.6 / 91.7	80.6 / 68.8	65.8 / 55.0	35.6 / 45.8
7				89.5 / 81.3	77.4 / 65.0	64.4 / 54.2
8				96.8 / 93.8	85.4 / 75.0	75.0 / 62.5
9					91.8 / 85.0	82.3 / 70.8
10					97.4 / 95.0	88.2 / 79.2
11						93.3 / 87.5
12						97.9 / 95.8

Traverse Points Dimensions:

1	5.04 in.	7	in.
2	16.08 in.	8	in.
3	28.32 in.	9	in.
4	42.48 in.	10	in.
5	60.00 in.	11	in.
6	85.44 in.	12	in.

Sketch Of Flue

EPA METHOD 3

S.A.T. , LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA Method 3 - Gas Analysis Field Data Sheet

Client	[illegible]	Project # 03-T-247	Fo = 20.9-%O2
Process	EAF	Unit EAF	%CO2
Date	1/20/04	Fuel Type Nat Gas	Fo = 1.083 to
IGS Analyzer I.D. #	GA 1	Leak Check? No	1.230
Analyst	Fred H. Cline		(for bitum. coal)

Run Number	Location	Bag I.D. Number	Trial	Percent CO2	Percent CO2 + O2	Percent O2	Analytical Time
1	EAF B.O	IGJ #1	1	0.0	20%	20%	11:10
			2	0.0	20%	20%	
Fluoride			3	0.0	20%	20%	
			Average	0.0		20%	
2	EAF B.O	IGJ #2	1	0.0	20%	20%	11:45
			2	0.0	20%	20%	
			3	0.0	20%	20%	
			Average	0.0		20%	
3	EAF B.O	IGJ #3	1	0.0	20%	20%	12:50
			2	0.0	20%	20%	
			3	0.0	20%	20%	
			Average	0.0		20%	
			1				
			2				
			3				
			Average				
1	EAF B.O	IGJ #4	1	0.0	20%	20%	13:20
			2	0.0	20%	20%	
Manual			3	0.0	20%	20%	
			Average	0.0		20%	
2	EAF B.O	IGJ #5	1	0.0	20%	20%	15:55
			2	0.0	20%	20%	
			3	0.0	20%	20%	
			Average	0.0		20%	
3	EAF B.O	IGJ #6	1	0.0	20%	20%	16:00
			2	0.0	20%	20%	
			3	0.0	20%	20%	
			Average	0.0		20%	
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				

COMMENTS:

EPA METHOD 13B

S.A.T. , *LLC* Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 13B FIELD TEST DATA

Client	STEEL DYNAMICS, INC.			Project No	G/SA 04-T-247
Plant	Structural and Rail Division - Columbia C'ty, IN			Unit	Elecric Arc Furnace - BO (ES)
Date	01/20/2004			Ambient Temperature (°F)	20
Operator	A. Perdue			Barometeric Pressure (inches Hg)	29.41
Probe Operator(s)	D. Moore			Static Pressure (± inches H20)	-0.30
Control Unit No.	507123	Nozzle Diameter (in.)	0.238	%CO2 / %02	0.0 / 20.9
Pitot Cp	0.84	Filter No.	F-1 (Blank)	Condensate (milliliters)	3.6
Meter Y	0.979	Front-half No.	FH-1	Test Time (24 hour)	0900-1012
Run No.	**1**	Back-half No.	BH-1	Sample Time (minutes)	60.0

Stack Area (ft²) 312.20 — Silica Gel (grams) 9.6

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 628.900	Dry Gas Meter Temperature Tm (°F)	Notes
D	1	114	0.890	2730		61	
	2	119	0 730	2 240		63	Pretest Nozzle Cal
	3	120	0 760	2 310		61	A = 0.238"
	4	127	0.680	2040		61	B = 0238"
	5	140	0 790	2330		62	C = 0.238"
	6	147	0 800	2 330		62	Avg = 0.238"
C	1	158	0 730	2090		62	
	2	168	0.690	1 930		60	
	3	154	1.000	2 870		61	
	4	126	0 700	2.110		62	
	5	117	0.780	2 410		64	
	6	110	0 870	2 750		67	
B	1	132	0 980	3 010		69	
	2	134	0840	2 580		70	
	3	138	0 870	2660		70	
	4	145	0 850	2.570		71	
	5	153	0 860	2 630		77	
	6	162	0.780	2.340		76	
A	1	171	0 860	2 540		76	
	2	159	0.900	2 700		75	
	3	144	0 910	2 790		74	
	4	144	0.840	2 570		73	
	5	154	1100	3 290	Final Volume	72	
	6	118	0.930	2 950	682.812	71	
		Average	Avg Sqrt	Average	Volume Sampled	Average	
		139.8	**0.914**	**2.532**	**53.912**	**67.5**	

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EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.			Project No.	G/SA 04-T-247
Plant	Structural and Rail Division - Columbia City, IN			Unit	Elecric Arc Furnace - BO (ES)
Date	0112012004			Ambient Temperature (°F)	22
Operator	A. Perdue			Barometeric Pressure (inches Hg)	29.41
Probe Operator(s)	D. Moore			Static Pressure (± inches H20)	-0.30
Control Unit No.	507123	Nozzle Diameter (in.)	0.238	%CO2 1% 02	0.0 / 20.9
Pitot Cp	0.84	Filter No.	F-1 (Blank)	Condensate (milliliters)	4.2
Meter Y	0.979	Front-half No.	FH-1	Test Time (24 hour)	1050-1214
Run No.	2	Back-half No.	BH-2	Sample Time (minutes)	60.0

Stack Area (ft²) 312.20 — Silica Gel (grams) 8.8

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 683.500	Dry Gas Meter Temperature Tm (°F)	Notes
B	1	141	0.950	2.870		69	
	2	121	0.980	3.080		70	
	3	126	0.850	2.650		70	
	4	132	0.870	2.670		69	
	5	134	0.870	2.660		69	
	6	142	1.000	3.000		67	
C	1	147	1.000	2.960		66	
	2	158	0.960	2.790		66	
	3	171	0.920	2.630		67	
	4	193	0.900	2.500		68	
	5	194	0.810	2.240		68	
	6	193	0.850	2.370		69	
D	1	115	0.840	2.660		69	
	2	119	0.800	2.640		69	
	3	126	0.760	2.610		69	
	4	131	0.690	2.130		70	
	5	123	0.640	2.010		71	
	6	119	0.650	2.060		71	
A	1	139	0.750	2.290		70	
	2	129	0.980	2.350		71	
	3	132	0.730	2.260		71	
	4	142	0.700	2.130		71	
	5	146	0.770	2.330	Final Volume 737.325	71	
	6	157	0.780	2.320		71	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		142.9	0.912	2.509	53.825	69.3	

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EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.		Project No.	G/SA 04-T-247	
Plant	Structural and Rail Division - Columbia City, IN		Unit	Elecric Arc Furnace - BO (ES)	Stack Area (ft²) 312.20
Date	0112012004		Ambient Temperature (°F)	30	
Operator	A. Perdue		Barometeric Pressure (inches Hg)	29.41	
Probe Operator(s)	A. Perdue		Static Pressure (± inches H2O)	-0.30	
Control Unit No.	501123	Nozzle Diameter (in.) 0.238	%CO2 / %O2	0.0 / 1	20.9
Pitot Cp	0.84	Filter No. F-1 (Blank)	Condensate (milliliters)	0.1	Silica Gel (grams) 9.0
Meter Y	0.979	Front-half No. FH-1	Test Time (24 hour)	1250-1400	
Run No.	**3**	Back-half No. BH-3	Sample Time (minutes)	60.0	

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 739.800	Dry Gas Meter Temperature Tm (°F)	Notes
A	1	159	0.810	2.300		60	
	2	155	0.970	2.780		61	Post-Test Nozzle Cal:
	3	158	0.830	2.380		62	A = 0.239"
	4	151	0.880	2.560		63	B = 0.238"
	5	141	0.710	2.110		64	C = 0.238"
	6	128	0.795	2.410		64	Avg. = 0.238"
	1	143	0.830	2.480		67	
	2	134	0.780	2.370		67	
	3	124	0.810	2.510		68	
	4	122	0.850	2.650		68	
	5	132	0.870	2.660		68	
	6	147	1.000	2.980		68	
	1	143	0.940	2.790		65	
	2	148	0.880	2.590		65	
	3	150	0.900	2.640		65	
	4	159	0.790	2.290		65	
	5	166	0.850	2.430		65	
	6	173	0.875	2.480		65	
	1	178	0.850	2.390		65	
	2	180	0.830	2.320		65	
	3	147	0.800	2.350		64	
	4	132	1.000	3.010		64	
	5	126	1.100	3.350	Final Volume 794.070	64	
	6	118	0.930	2.870		63	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		146.4	**0.932**	**2.571**	**54.270**	**64.8**	

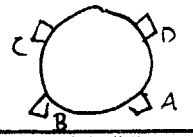
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EPA Method 13B (F) Testing - Field Data Sheet

Run # 1 **Sampling Location** EAF BAGHOUSE OUTLET

Client SDI	Project # 04-T-247	Ambient Temperature (°F) 20	Barometric Press. (in. Hg) 29.41
Plant Columbia City	Unit EAF BAGHOUSE	Assumed Moisture (%) 2	Calculated Moisture (%)
Date 01/20/04	Project Site Columbia City		
Meter Operator APERDUE		Nozzle # NS 238	Probe Length (ft.) 9
Probe Operator D. MOORE		Nozzle Diameter (in.) .238	Probe Liner Material GLASS
		Nozzle Material SS	Probe Heater Setting (°F) 250
		Probe # PM9	Oven Heater Setting (°F) NA

Schematic of Stack Cross Section



9

N

Control Unit # 507123	Meter Y (C Factor) 0979	First traverse point all the way	In ✓	Out	
Filter Oven # 1011	Meter Delta H@ 1.770	Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction	
Impinger Unit # GSA2	Meter K / Orifice Factor 3.134	Diameter 240	Dia. 4	In ___	
Pitot # PM9	Pitot Cp 0.84	L ✓ W	L 4	Out ✓	
Pitot Leak Check: Initial OK	Final OK	Filter Sample # FR1			
DGM Leak Rate Before: 0	CFM @ 15 in. Hg	FH / BH Sample #			
DGM Leak Rate After: 0	CFM @ 10 in. Hg	Initial DI H2O Volume (ml)			
Static Pressure (± in. H2O) [redacted]	-.30				

IGS Bag # R1		IGS Analyzer # GA1	
%CO2 0.0	%O2 20.9	Condensate (ml/g) 36	
Silica Gel (g) 9.6		Total Vic (ml) 132	
FH DI H2O Rinse (ml) 50		BH DI H2O Rinse (ml) [illegible]	
Start Time (24 Hour) [redacted] 9:00		Stop Time (24 Hour) 10:12	

Traverse Point Number		Stop-watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 628.906	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
D	1	2.5	114	.890	2.73	631.247	61	255	N/A	33	4.0	
	2	5.0	119	.730	2.24	633.352	63	257		47	3.5	
	3	7.5	120	.760	2.31	635.497	61	252		47	3.9	
	4	10.0	127	.680	2.04	637.523	61	258		47	3.1	
	5	12.5	140	.790	2.33	639.670	62	252		48	3.5	
	6	15.0	147	.800	2.33	641.834	62	255		49	3.5	
C	1	17.5	158	.730	2.09	643.872	62	257		44	3.2	
	2	20	168	.690	1.93	645.832	60	255		39	3.1	
	3	22.5	154	1.00	2.87	648.234	61	259		39	3.5	
	4	25	126	.700	2.11	650.280	62	258		38	3.7	
	5	27.5	117	.780	2.41	652.476	64	257		38	3.5	
	6	30.0	110	.870	2.75	654.826	67	255		38	3.8	
B	1	32.5	132	.980	3.01	657.270	69	260		40	4.9	
	2	35	134	.840	2.58	659.540	70	254		42	4.0	
	3	37.5	138	.870	2.66	661.840	70	255		43	4.0	
	4	90.0	145	.850	2.57	664.100	71	256		42	4.0	
	5	42.5	153	.860	2.63	666.392	77	255		45	4.1	
	6	45	142	.780	2.34	668.557	76	256		44	4.0	
A	1	47.5	171	.960	2.54	670.810	76	258		44	4.1	
	2	50	159	.900	2.70	673.134	75	255		44	4.5	
	3	52.5	144	.910	2.79	675.492	74	254		45	4.2	
	4	55	144	.840	2.57	677.750	73	256		46	4.1	
	5	57.5	154	1.10	3.29	680.310	72	254		47	5.1	
	6	60	118	.930	2.95	682.812	71	256				
Averages / Totals			139.75	0.879	2.53	53.912	67.5					

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EPA Method 13B (F) Testing - Field Data Sheet

Run # 2 **Sampling Location** Bag OUTLET

Client SDI	Project # 237-T	Schematic of Stack Cross Section	Ambient Temperature (°F) 22 / Barometric Press (in Hg) 29.41
Plant Columbia City	Unit EAF Baghouse		Assumed Moisture (%) 2 / Calculated Moisture (%)
Date 01/20/04	Project Site Columbia City		Nozzle # NS238 / Probe Length (ft) 9
Meter Operator A. PERDUE			Nozzle Diameter (in.) .238 / Probe Liner Material C,455
Probe Operator T. MOORE			Nozzle Material SS / Probe Heater Setting (°F) 255
Control Unit # 507123	Meter Y (C Factor) 0.979	First traverse point all the way In / Out	Probe # PM9 / Oven Heater Setting (°F)
Filter Oven # 1011	Meter Delta H@ 1.770	Inside Dimension(s) (in) / Port Dimen. (in) / Gas Flow Direction	IGS Bag # FR2 / IGS Analyzer #
Impinger Unit # GSA5	Meter K / Orifice Factor 3.134	Diameter 240 / Dia — / In —	%CO2 0.0 / %O2 20.5 / Condensate (ml/g) 42
Pitot # PM9	Pitot Cp 0.84	L W / L / Out	Silica Gel (g) 9.3 / Total Vic (ml) 13
Pitot Leak Check Initial OK	Final OK	Filter Sample # FR2	FH DI H20 Rinse (ml) 350 / BH DI H20 Rinse (ml) 85
DGM Leak Rate Before 0	CFM @ 15 in. Hg	FH / BH Sample #	
DGM Leak Rate After: 0	CFM @ 6 in Hg	Initial DI H20 Volume (ml)	Start Time (24 Hour) 10:50 / Stop Time (24 Hour) 12:14
Static Pressure (± in H20) -.30			

Traverse Point Number	Stop-watch Time Minutes / Sample Point 60/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 683.500	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
B 1	2.5	141	.950	2.87	685.856	69	254	N/A	39	4.5	
2	5.0	121	.980	3.08	688.392	70	253		39	5.1	
3	7.5	126	.850	2.65	690.634	70	253		42	4.1	
4	10.0	132	.870	2.67	692.987	69	256		43	4.2	
5	12.5	134	.870	2.66	695.287	69	258		43	4.5	
6	15.a	142	1.00	3.00	697.532	67	257		41	4.7	
C 1	17.5	147	1.00	2.96	700.163	66	254		35	4.0	
2	20.0	158	.96	2.79	702.520	66	254		37	4.0	
3	22.5	171	.92	2.63	704.810	67	255		38	4.0	
	25.0	193	.90	2.50	707.421	68	250		38	4.5	
5	27.5	194	.81	2.24	709.150	68	254		39	4.5	
6	30.0	193	.850	2.37	711.330	69	252		39	4.5	
D 1	32.5	115	.840	2.66	713.630	69	256		27	4.5	
	35.0	119	.800	2.64	715.900	69	251		36	5.0	
3	37.5	126	.760	2.61	718.200	69	254		36	4.1	
4	40.0	131	.690	2.13	720.260	70	253		36	4.0	
5	42.5	123	.640	2.01	722.650	71	252		36	4.0	
6	45.0	119	.650	2.06	724.510	71	252		36	4.0	
A 1	47.5	139	.750	2.29	726.450	70	256		40	3.9	
2	50.0	129	.980	3.05	728.920	71	255		44	3.9	
3	52.5	132	.730	2.26	731.040	71	255		44	3.9	
4	55.0	142	.700	2.13	733.065	71	255		45	3.5	
5	57.5	146	.770	2.33	735.200	71	255		46	3.5	
6	60.0	157	.780	2.32	737.325	71	255		47	3.5	
Averages / Totals		142.92	0.840	2.52	53.825	69.250					

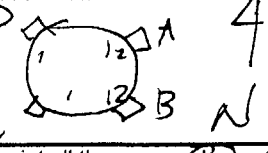
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EPA Method 13B (F) Testing - Field Data Sheet

Run # 3 Sampling Location FAF BAGHOUSE

Client SDI	Project # 09-T-247	Ambient Temperature (°F) 30	Barometric Press. (in. Hg) 29.41
Plant Columbia City	Unit EAF BAGHOUSE	Assumed Moisture (%) 2	Calculated Moisture (%)
Date 01/20/04	Project Site Columbia City		
Meter Operator A. PERDUE		Nozzle # NS238	Probe Length (ft.) 9
Probe Operator A. PERDUE		Nozzle Diameter (in.) .238	Probe Liner Material GLASS
		Nozzle Material SS	Probe Heater Setting (°F) 255
		Probe # PM 9	Oven Heater Setting (°F) N/A

Schematic of Stack Cross Section



Control Unit # 507123	Meter Y (C Factor) 0.979	First traverse point all the way (In) Out	
Filter Oven # 1011	Meter Delta H@ 1.770	Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Impinger Unit # GSA 4	Meter K / Orifice Factor 3.134	Diameter 240	Dia. 4	In ___
Pitot # PM 8	Pitot Cp 0.84	L — W —	L 6	Out ✓
Pitot Leak Check: Initial OK	Final OK	Filter Sample #	FR3	
DGM Leak Rate Before: 0	CFM @ 17 in. Hg	FH / BH Sample #		
DGM Leak Rate After: 0	CFM @ 7 in. Hg	Initial DI H2O Volume (ml)		
Static Pressure (± in. H2O) -.30				

IGS Bag # R3		IGS Analyzer # GX1	
%CO2 0.0	%O2 20.5	Condensate (ml/g) 0.1	
Silica Gel (g) 7.0		Total Vic (ml) 91	
FH DI H2O Rinse (ml) 50		BH DI H2O Rinse (ml) 150	
Start Time (24 Hour) 12:30		Stop Time (24 Hour) 14:00	

Traverse Point Number	Stop-watch Time Minutes / Sample Point 60/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 739.800	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
A 1	2.5	159	.810	2.30	741.942	60	258	N/A	45	3.5	
2	5.0	155	.970	2.78	744.300	61	258		46	4.0	
3	7.5	158	.830	2.38	746.472	62	258		45	3.9	
4	10.0	151	.880	2.56	748.732	63	255		51	4.0	
5	12.5	141	.710	2.11	750.782	64	257		49	3.9	
6	15	128	.795	2.41	752.982	64	256		50	4.0	
1	17.5	143	.830	2.48	755.200	67	255		52	4.0	
2	20	134	.780	2.37	757.382	67	252		52	4.0	
3	22.5	124	.810	2.51	759.610	68	255		53	4.2	
4	25.0	122	.850	2.65	761.913	68	257		54	4.2	
5	27.5	132	.870	2.66	764.220	68	255		54	4.3	
6	30.0	147	1.00	2.98	766.660	68	252		54	4.9	
1	32.5	143	.940	2.79	769.012	65	254		47	4.0	
2	35.0	148	.880	2.59	771.297	65	255		47	4.1	
3	37.5	150	.900	2.64	773.582	65	257		47	4.2	
4	40.0	159	.790	2.29	775.720	65	255		44	3.9	
5	42.5	166	.850	2.43	777.921	65	255		45	3.9	
6	45.0	173	.875	2.48	780.142	65	256		44	4.0	
1	47.7	178	.850	2.39	782.324	65	255		43	4.0	
2	50	180	.830	2.32	784.482	65	257		43	4.0	
3	52.5	147	.800	2.35	786.647	64	255		44	4.0	
4	55.0	132	1.00	3.01	789.092	64	257		44	4.7	
5	57.5	126	1.10	3.35	791.682	64	255		44	4.8	
6	60.0	118	.930	2.87	794.070	63	255		44	4.5	
Averages / Totals		146.42	0.89	2.56	54.270	64.79					

EPA METHOD 101A

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEUFAX (417) 282-6140

EPA METHOD 101A FIELD TEST DATA

Client	STEEL DYNAMICS. INC.			Project No.	G/SA 04-T-247
Plant	Structural and Rail Division - Columbia City, IN			Unit	Electric Arc Furnace - BO (ES)
Date	01/20/2004			Stack Area (ft²)	312.20
Operator	B. Peyton			Ambient Temperature ("F)	20
Probe Operator	A. Perdue			Barometeric Pressure (inches Hg)	29.41
Control Unit No.	609198	Nozzle Diameter (in.)	0.218	Static Pressure (± inches H2O)	4.30
Pitot Cp	0.84	Filter No.	M29-R1 (Blank)	%CO2 / %O2	0.0 / 20.9
Meter Y	0.997	Front-half No.	NIA	Condensate (milliliters)	9.0 Silica Gel (grams) 16.1
Run No.	**1**	Back-half No.	M29-R1	Test Time (24 hour)	0850-1058
				Sample Time (minutes)	120.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 601.624	Dry Gas Meter Temperature Tm (°F)	Notes
W-	1	120	0.950	1.630		50	
	2	127	0.980	1.670		51	Pretest Nozzle Cal:
	3	148	0.850	1.420		52	A = 0.218
	4	161	0.900	1.460		52	B = 0.219"
	5	162	0.950	1.540		52	C = 0.218
	6	162	0.960	1.560		54	Avg. = 0.218
N-	1	122	1.100	1.910		54	
	2	116	1.030	1.850		54	
	3	112	1.100	1.950		54	
	4	133	1.000	1.710		54	
	5	133	0.970	1.860		54	
	6	112	1.010	1.790		56	
E-	1	115	1.010	1.790		56	
	2	120	1.000	1.760		56	
	3	118	0.970	1.710		56	
	4	110	0.900	1.810		56	
	5	133	0.850	1.470		58	
	6	144	0.870	1.490		60	
S-	1	155	0.810	1.370		60	
	2	171	0.910	1.500		60	
	3	170	0.900	1.800		60	
	4	143	0.910	1.560		60	
	5	125	0.890	1.580	Final Volume	60	
	6	124	0.770	1.380	693.000	60	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		134.8	0.941 0.969	1.649	91.376	55	

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EPA METHOD 101A FIELD TEST DATA

Client	STEEL DYNAMICS, INC.			Project No.	G/SA 04-T-247
Plant	Structural and Rail Division - Columbia City. IN			Unit	Electric Arc Furnace - BO (ES)
Date	01/20/2004			Ambient Temperature (°F)	22
Operator	B. Peyton			Barometeric Pressure (inches Hg)	29.41
Probe Operator	A. Perdue			Static Pressure (± inches H20)	-0.30
Control Unit No	609198	Nozzle Diameter (in.)	0.218	%CO2 / %O2	0.0 / 20.9
Pitot Cp	0.84	Filter No.	M29-R2 (Blank)	Condensate (milliliters)	8.0
Meter Y	0.997	Front-half No.	N/A	Test Time (24 hour)	1212-1425
Run No.	**2**	Back-half No.	M29-R2	Sample Time (minutes)	120.0

Stack Area (ft²) 312.20 | Silica Gel (grams) 17.7

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 694.162	Dry Gas Meter Temperature Tm (°F)	Notes
C	1	167	0.980	1.640		63	
	2	160	1.050	1.760		61	
	3	127	1.010	1.800		62	
	4	138	0.880	1.580		63	
	5	147	0.750	1.300		63	
	6	151	0.750	1.290		63	
D	1	158	0.780	1.320		63	
	2	156	0.830	1.410		62	
	3	155	1.050	1.780		60	
	4	145	0.970	1.640		60	
	5	132	0.900	1.580		61	
	6	130	0.870	1.530		61	
A	1	139	0.850	1.480		61	
	2	145	0.830	1.430		61	
	3	152	0.800	1.360		61	
	4	155	0.810	1.370		61	
	5	147	0.890	1.530		61	
	6	132	0.960	1.690		62	
B	1	122	0.800	1.440		62	
	2	122	0.830	1.490		62	
	3	120	0.910	1.690		62	
	4	139	0.800	1.390		61	
	5	150	0.940	1.600	Final Volume 783.657	61	
	6	170	0.930	1.530		60	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		144.1	**0.882**	**0.938**	**1.526**	**89.495**	**61**

S.A.T. , *LLC* Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 101A FIELD TEST DATA

Client	STEEL DYNAMICS, INC.			Project No.	G/SA 03-T-201
Plant	Structural and Rail Division - Columbia City, IN			Unit	Electric Arc Furnace - BO (ES)
Date	01/20/2004			Stack Area (ft²)	312.20
Operator	A. Perdue			Ambient Temperature ("F)	32
Probe Operator	A. Perdue			Barometeric Pressure (inches Hg)	29.41
Control Unit No.	507123	Nozzle Diameter (in.)	0.218	Static Pressure (± inches H20)	-0.30
Pitot Cp	0.84	Filter No.	M29-R2 (Blank)	%CO2 / %02	0.0 / 20.9
Meter Y	0.979	Front-half No.	N/A	Condensate (milliliters)	7.9
Run No.	**3**	Back-half No.	M29-R3	Silica Gel (grams)	17.7
				Test Time (24 hour)	1430-1640
				Sample Time (minutes)	120.0

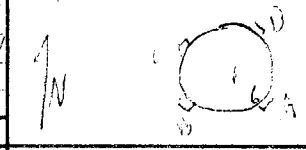
Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume	Dry Gas Meter Temperature Tm (°F)	Notes
					807.900		
A	1	132	0.930	1.910		55	
	2	107	1.050	2.260		57	Post-test Nozzle Cal:
	3	105	0.950	2.060		57	A = 0.218
	4	103	0.750	1.630		58	B = 0.21V'
	5	100	0.830	1.820		58	C = 0.218"
	6	99	0.870	1.910		58	Avg. = 0.218"
B	1	101	0.780	1.700		57	
	2	100	0.720	1.570		56	
	3	119	0.780	1.630		54	
	4	120	0.800	1.670		54	
	5	118	0.790	1.650		53	
	6	110	0.740	1.560		52	
C	1	140	0.820	1.630		51	
	2	150	0.700	1.370		51	
	3	162	0.870	1.670		51	
	4	160	0.850	1.660		55	
	5	121	0.780	1.600		51	
	6	127	0.870	1.770		51	
D	1	127	0.980	2.000		52	
	2	121	0.740	1.530		52	
	3	125	0.800	1.640		52	
	4	125	0.870	1.780		52	
	5	115	0.780	1.630	Final Volume	52	
	6	120	0.820	1.700	896.800	52	
		Average		Avg. Sqrt.	Average	Volume Sampled	Average
		121.1	**0.828**	**0.909**	**1.723**	**88.900**	**53**

EPA Method 101A (Mercury) Testing - Field Data Sheet

Run # 1 **Sampling Location** Baghouse Outlet

Client	SDI	Project #	04-T-247
Plant	Steel Mill	Unit	EAF
Date	1-20-04	Project Site	Columbus, IN
Meter Operator	B. Boyton		
Probe Operator	A. Pate		

Schematic of Stack Cross Section



Ambient Temperature (°F)	20	Barometric Press. (in. Hg)	29.1
Assumed Moisture (%)	2	Calculated Moisture (%)	

Nozzle #	N-218	Probe Length (ft.)	3
Nozzle Diameter (in.)	.214	Probe Liner Material	Glass
Nozzle Material	Glass	Probe Heater Setting (°F)	255
Probe #	P 8	Oven Heater Setting (°F)	

Control Unit #	CU 18	Meter Y (C Factor)	0.997
Filter Oven #	1011	Meter Delta H@	1.610
Impinger Unit #	GSA-6	Meter K / Orifice Factor	2.729
Pitot #	P 8	Pitot Cp	0.84
Pitot Leak Check: Initial	OK	Final	OK
DGM Leak Rate Before:	0.0	CFM @ 15	in. Hg
DGM Leak Rate After:	0.0	CFM @ 6.5	in. Hg
Static Pressure (± in. H2O)	-0.36		

First traverse point all the way (In) Out

Inside Dimension(s) (in.)		Port Dimen. (in.)		Gas Flow Direction
Diameter	240	Dia.	4	In ✓
L	W	L		Out

Filter Sample # N/A

5% HNO3/10% H2O2, ml (initial)

4% KmnO4/10% H2SO4, ml (initial)

IGS Bag #	Bag #1	%CO2	0.0 %O2 20.9
HNO3, g/ml		KMnO4, g/ml (final)	
Total Rinses (ml)	50/250	Condensate (ml/g)	9.2
Silica Gel (g)	16.1	Total Vlc (ml)	250
Acetone Wash? Yes (No)		Total Acetone Wash (ml)	
Start Time (24 Hour)	0957	Stop Time (24 Hour)	1553

Traverse Point Number	Stop-watch Time Minutes / Sample Point 120/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 601.624	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
A 1	5	120	0.95	1.63	605.486	50	257	N/A	33	4.2	
2	10	127	0.93	1.67	609.406	51	256		35	4.2	
3	15	149	0.55	1.42	613.618	52	255		34	4.2	
4	20	151	0.90	1.46	618.772	52	254		35	4.3	
5	25	163	0.95	1.54	620.416	52	251		37	4.5	
6	30	162	0.96	1.54	624.240	54	256		36	4.3	
B 1	35	122	1.00	1.91	628.432	54	257		36	4.3	
2	40	126	1.05	1.69	632.512	54	256		36	4.2	
3	45	146	1.05	1.85	636.615	54	257		36	4.3	
4	50	132	1.00	1.71	640.721	54	257		36	4.3	
5	55	133	1.07	1.81	644.845	54	257		37	4.3	
6	60	142	1.01	1.59	648.962	54	256		36	4.3	
C 1	65	115	1.01	1.39	652.162	56	251		37	4.3	
2	70	120	1.00	1.36	656.162	56	255		36	4.4	
3	75	114	0.97	1.71	660.468	56	254		37	4.5	
4	80	110	0.90	1.65	664.548	56	255		35	4.5	
5	85	133	0.85	1.47	668.246	58	256		36	4.5	
6	90	144	0.57	1.47	671.766	60	257		39	4.3	
D 1	95	155	0.41	1.37	675.416	60	256		41	4.3	
2	100	127	0.91	1.56	679.161	60	256		41	4.5	
3	105	170	0.90	1.48	682.713	60	257		41	4.3	
4	110	113	0.91	1.56	686.443	60	256		43	4.5	
5	115	125	0.97	1.55	690.319	60	256		43	4.5	
6	120	124	1.04	1.78	694.3	60	256		44	4.6	
Averages / Totals											

EPA Method 101A (Mercury) Testing - Field Data Sheet

Run # 2 **Sampling Location** Baghouse Outlet

Client	SDI	Project #	04-T-2917
Plant	Steel Mill	Unit	EAF
Date	11-20-04	Project Site	Columbia City, IN
Meter Operator	B. Pitman		
Probe Operator	A. Straub		

Schematic of Stack Cross Section: SCR #1

Ambient Temperature (°F)	32	Barometric Press. (in. Hg)	28.91
Assumed Moisture (%)	2	Calculated Moisture (%)	

Nozzle #	N-218	Probe Length (ft.)	3
Nozzle Diameter (in.)	0.218	Probe Liner Material	Glass
Nozzle Material	Glass	Probe Heater Setting (°F)	255
Probe #	3	Oven Heater Setting (°F)	NA

Control Unit #	607198	Meter Y (C Factor)	0.997
Filter Oven #	NA	Meter Delta H@	1.610
Impinger Unit #		Meter K / Orifice Factor	2.229
Pitot #	T-3	Pitot Cp	0.84
Pitot Leak Check: Initial	OK	Final	OK
DGM Leak Rate Before:	0.0	CFM @ 16	in. Hg
DGM Leak Rate After:	0.0	CFM @ 6.0	in. Hg
Static Pressure (± in. H2O)		-0.30	

First traverse point all the way (In) Out

Inside Dimension(s) (in.)		Port Dimen. (in.)	Gas Flow Direction
Diameter		Dia.	In
L	W	L	Out

Filter Sample #	NA		
5% HNO3/10% H2O2, ml (initial)			
4% KmnO4/10% H2SO4, ml (initial)			

IGS Bag #	IGS #2	%CO2	0.0 %O2
HNO3, g/ml	%O2	KMnO4, g/ml (final)	0.00
Total Rinses (ml)	50 / 200	Condensate (ml/g)	80
Silica Gel (g)	170	Total Vlc (ml)	250
Acetone Wash? Yes	No	Total Acetone Wash (ml)	—
Start Time (24 Hour)	13:12	Stop Time (24 Hour)	14:25

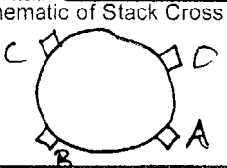
Traverse Point Number	Stop-watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
	120/24				624.162						
C 1	5	167	0.96	1.64	628.002	63	252	NA	27	2.3	
2	10	160	1.05	1.76	702.016	61	250		31	2.4	
3	15	127	1.01	1.80	709.142	62	251		35	2.2	
4	20	138	0.88	1.58	209.348	63	251		36	2.1	
5	25	147	0.75	1.30	213.382	63	252		36	2.5	
6	30	151	0.77	1.29	216.824	63	253		36	2.9	
D 1	35	154	0.78	1.32	220.615	63	252		36	2.4	
2	40	156	0.83	1.41	223.506	62	252		35	2.9	
3	45	155	1.05	1.78	727.906	60	253		36	2.5	
4	50	157	0.93	1.64	731.741	60	252		33	2.7	
5	55	132	0.90	1.58	735.561	61	253		33	2.5	
6	60	130	0.87	1.53	739.232	61	256		36	2.7	
A 1	65	139	0.85	1.48	742.915	61	255		34	2.6	
2	70	145	0.83	1.43	746.582	61	257		35	2.9	
3	75	152	0.80	1.36	750.624	61	256		35	2.7	
4	80	155	0.81	1.37	753.624	61	254		35	2.6	
5	85	147	0.80	1.53	757.362	61	255		36	2.5	
6	90	132	0.86	1.69	761.276	62	253		36	2.7	
B 1	95	123	0.80	1.44	764.941	62	252		36	2.8	
2	100	125	0.83	1.49	768.617	62	254		36	2.5	
3	105	120	0.81	1.64	772.502	62	256		36	2.9	
4	110	130	0.80	1.59	776.086	61	255		36	2.6	
5	115	126	0.79	1.46	779.705	61	254		37	2.6	
6	120	170	0.93	1.53	783.657	60	255		40	2.6	
Averages / Totals					80.475						

EPA Method 101A (Mercury) Testing - Field Data Sheet

Run # 3 **Sampling o c** 1

Client SDI	Project # 04-T-247		
Plant Columbia City	Unit EAF FURNACE		
Date 01/20/04	Project Site Columbia City		
Meter Operator A. PERDUE			
Probe Operator A. PERDUE			

Schematic of Stack Cross Section



Ambient Temperature (°F) 32	Barometric Press. (in. Hg) 29.41		
Assumed Moisture (%) 2	Calculated Moisture (%)		

Control Unit # 307123	Meter Y (C Factor) 0.979	Nozzle # N6 218	Probe Length (ft.) 9
Filter Oven # 1011	Meter Delta H@ 1.770	Nozzle Diameter (in.) .218	Probe Liner Material GLASS
Impinger Unit # 6SA	Meter K / Orifice Factor 3.134	Nozzle Material GLASS	Probe Heater Setting (°F) 255
Pitot # PM9	Pitot Cp 0.84	Probe # PM9	Oven Heater Setting (°F) N/A
Pitot Leak Check: Initial OK	Final OK		
DGM Leak Rate Before: 0	CFM @ 15 in. Hg		
DGM Leak Rate After: 0	CFM @ 5 in. Hg		
Static Pressure (± in. H2O) -.30			

First traverse point all the way (In) Out

Inside Dimension(s) (in.)		Port Dimen. (in.)		Gas Flow Direction
Diameter 240		Dia. 4		In
L	W	L 6		Out

Filter Sample # N/A	IGS Bag # R3	%CO2 0	%O2 20.5
5% HNO3/10% H2O2, ml (initial)	HNO3, g/ml %O2	KMnO4, g/ml (final) 10%	
4% KmnO4/10% H2SO4, ml (initial)	Total Rinses (ml) 50 / 250	Condensate (ml/g) 75	
	Silica Gel (g) 120	Total Vlc (ml) 256	
	Acetone Wash? Yes (No)	Total Acetone Wash (ml) —	
	Start Time (24 Hour) 14:30	Stop Time (24 Hour) 16:40	

Traverse Point Number		Stop-watch Time Minutes / Sample Point 120/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 807.900	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
A	1	5	132	.930	1.91	809.800	55	251	N/A	37	2.0	
	2	10	107	1.05	2.26	816.050	57	254		41	2.3	
	3	15	105	.950	2.06	820.100	57	252		42	2.3	
	4	20	103	.750	1.63	823.712	58	251		45	1.9	
	5	25	100	.830	1.82	827.521	58	253		44	2.0	
	6	30	99	.870	1.91	831.420	58	255		44	2.0	
B	1	35	101	.780	1.70	835.115	57	252		41	2.0	
	2	40	100	.720	1.57	838.642	56	257		40	2.0	
	3	45	119	.780	1.63	842.247	54	259		40	1.8	
	4	50	120	.800	1.67	845.890	54	253		41	1.8	
	5	55	118	.790	1.65	849.512	53	255		41	1.8	
	6	60	110	.740	1.56	853.040	52	257		41	1.8	
C	1	5	140	.820	1.63	856.642	51	259		41	1.8	
	2	10	150	.700	1.37	859.952	51	257		41	1.5	
	3	15	162	.870	1.67	863.607	51	258		41	1.8	
	4	20	160	.850	1.66	867.242	55	255		41	1.8	
	5	25	121	.780	1.60	870.820	51	257		40	1.8	
	6	30	127	.870	1.77	874.583	51	255		40	1.8	
D	1	35	127	.980	2.00	878.570	52	257		37	2.0	
	2	40	121	.740	1.53	882.050	52	255		36	1.9	
	3	45	125	.800	1.64	885.682	52	258		36	1.9	
	4	50	125	.870	1.78	889.450	52	257		38	2.0	
	5	55	115	.780	1.63	893.052	52	259		36	2.0	
	6	60	120	.820	1.70	896.800	52				2.0	
Averages / Totals			121.13	0.83	1.77	88.900	53.792					

APPENDIX B

PROCESS OPERATING DATA

EAF PROCESS DATA

Subject: RE: Hg, F Production data
Date: Sat, 28 Feb 2004 09:43:51 -0500
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: Hg, F Production data
Thread-Index: AcPp1UsyXmASn9+4QJ+ftLrQRep7DwUM+K8w
From: <barry.smith@stld.com>
To: <guenther@mail.icongrp.com>,
<gsa1@myvine.com>
X-Alligate-In: Passed - Adult: 0 (Req: 18) Spam: 10 (Req: 18) Tot: 10 (Req: 22)
X-Alligate-QueueFile: 006509141.dta

Fred,

I understand that Kevin Bort forwarded the 1/20/2004 EAF Heat Record logs for inclusion in the stack test report. Based on the EAF Heat Record logs, here is the production data specifically for each run. (Tons produced)

Fluoride

Run 1 8:58 - 10:12 162.0 Tonslhour
Run 2 10:50 - 12:12 160.3 Tonslhour
Run 3 12:50 - 14:00 188.5 Tonslhour
170.3 Tonslhour average

Mercury

Run 1 8:45 - 10:58 171.4 Tonslhour
Run 2 12:12 - 14:25 177.4 Tonslhour
Run 3 14:30 - 16:35 120.9 Tonslhour
156.6 Tonslhour average

Barry Smith
Environmental Engineer
Steel Dynamics, Inc.
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Butler, IN 46721
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barry.smith@stld.com

PROCESS INFORMATION - FIELD DATA SHEETS

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor Dave
Furnace N
1st Helper Raleigh

135.65

Heat #	B006611		Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	271 OW		832	844	TAP & Charge	
MHW 1st / Total		43770			Power	
Power On 1st/Total /Tap-Tap	35:30	46			Power Read	4
O2 (scf) 1st/Total		189560				
Inj C (lbs) 1st/Total		3606				
Charge C (lbs) 1293	1297				Start Baghouse Flouride Test	
Lime 1st/Total 5195	5210					
Olivine 1st/Total	-					
Dolo Lime 1st/Total 5748	5774					
Ladle Lime/MgO	500					
Tap C (wt%)	.a?/					
Tap O (ppm)	1077					
Tap Temp (degF)	3047					
Slag Rating (1-5) 1=liquid 5=thick foam						
Ladle tare wt (lbs)	75-3					
Tap wt actual (lbs)	116-5		11620			
Tap Time / Ladle #	9:19	5				
Patch FCE (Y/N)						

Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:
Chrome Ladle
5 # IVC
8:42 Mer. test
Flouride test Started @ Baghouse 8:57 Am

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew B
Supervisor C. Stapleton
Furnace #2 North
1st Helper Raleigh

142

Heat #	3006612		Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	270 ow					
MHW 1st / Total		41800	9:55	1800		5
Power On 1st/Total /Tap-Tap	30:18	41				
0 2 (scf) 1st/Total		147270				
Inj C (lbs) 1st/Total		2435				
Charge C (lbs) —	895					
Lime 1st/Total —	5215					
Olivine 1st/Total	-					
Dolo Lime 1st/Total ——	5791					
Ladle Lime/MgO	500					
Tap C (wt%)	.029					
Tap O (ppm)	1139					
Tap Temp (degF)	3041					
Slag Rating (1-5) 1=liquid 5=thick foam	3					
Ladle tare wt (lbs)	76.4					
Tap wt actual (lbs)	117.7		117.40			
Tap Time / Ladle #	10:33	1				
Patch FCE (Y/N)						
Area(s) Patched (12 o'clock = taphole)			Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used			A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used			B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used			C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Zircon ladle sand

SZ

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor [illegible]
Furnace B
1st Helper Jim Ralleigh

13655

Heat #	B006613		Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	270	100				
MHW 1st / Total		419420				
Power On 1st/Total /Tap-Tap	35:16	41				
O2 (scf) 1st/Total		149850				
Inj C (lbs) 1st/Total		2421				
Charge C (lbs) 895	897					
Lime 1st/Total 5215	5214					
Olivine 1st/Total	-					
Dolo Lime 1st/Total 5791	5800					
Ladle Lime/MgO	500					
Tap C (wt%)	.042					
Tap O (ppm)	719					
Tap Temp (degF)	3007					
Slag Rating (1-5) 1=liquid 5=thick foam	3					
Ladle tare wt (lbs)	72.9					
Tap wt actual (lbs)	132.4		133.10			
Tap Time / Ladle #	10:46	7				
Patch FCE (Y/N)						
Area(s) Patched (12 o'clock = taphole)			**Electrodes**		Total Minutes Misc Delays	
Gun #1 Lbs Used			A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used			B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used			C phase	Add/Slip	Total Minutes Scrap Charging	

Comments: C/H Rome Ladle Shed

42

Steel Dynamics

EAF Heat Record

Date 12-20-04
Crew A
Supervisor Dave
Furnace North
1st Helper Tim Raleigh

13:15

Heat #	B006614	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	270,000				
MHW 1st / Total	44850				
Power On 1st/Total /Tap-Tap	32:00 | 38				
O2 (scf) 1st/Total	152440				
Inj C (lbs) 1st/Total	2986				
Charge C (lbs) 1297	892				
Lime 1st/Total &	5159				
Olivine 1st/Total	—				
Dolo Lime 1st/Total 5774	5344				
Ladle Lime/MgO	500				
Tap C (wt%)	.041 -				
Tap O (ppm)	699 +				
Tap Temp (degF)	2987				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	73.8				
Tap wt actual (lbs)	129.0	129.50			
Tap Time / Ladle #	11:23 | 4				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:
chrome
Ladle sand

Finished first Floride Test 10:12 Am
Started second Floride Test 10:50 AM
memory stoped 10:56 AM JD

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor Chris
Furnace North
1st Helper Jim Raleigh

136

Heat #	B006615	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	270004	11:37	12:00	Power Bend	3
MHW 1st / Total	464410	11:40	11:44	Slip	4
Power On 1st/Total /Tap-Tap	38:19 | 52				
O2 (scf) 1st/Total	174340				
Inj C (lbs) 1st/Total	2764				
Charge C (lbs) 896	847				
Lime 1st/Total .5206	5125				
Olivine 1st/Total	—				
Dolo Lime 1st/Total .5361	5377				
Ladle Lime/MgO	5204				
Tap C (wt%)	.038				
Tap O (ppm)	844				
Tap Temp (degF)	3041				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	75.6				
Tap wt actual (lbs)	117.6	117			
Tap Time | Ladle #	12:17 | 5				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		**Electrodes**		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip 0	Total Minutes Add/Slip Electrodes	4
Gun#2 Lbs Used		B phase	Add/Slip 0	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip 0	Total Minutes Scrap Charging	

Comments: Zircon Ladle SAND
12:12 - Second Flovide Test END
12:11 pm Start Second Mercury Test

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor DAVE
Furnace North
1st Helper Jim Raleigh

1/2

Heat #	B00 6616	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	27,000	12:55	100	P.P.	5
MHW 1st / Total	43410				
Power On 1st/Total /Tap-Tap	36:26 47				
02 (scf) 1st/Total	182440				
Inj C (lbs) 1st/Total	1892				
Charge C (lbs)	1000				
Lime 1st/Total	5089				
Olivine 1st/Total	—				
Dolo Lime 1st/Total	5375				
Ladle Lime/MgO	500				
Tap C (wt%)	.030				
Tap O (ppm)	1054				
Tap Temp (degF)	3013				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	77.5				
Tap wt actual (lbs)	124.1	12330			
Tap Time / Ladle #	13:05 1				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments: Chrome Ladle 5 and 10

Starting third Florida Test 12:50 PP

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor V. St.
Furnace North
1st Helper Jim Reliesh

136.45

Heat #	B00 6617	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	27[illegible]0				
MHW 1st / Total	45470				
Power On 1st/Total /Tap-Tap	32:30 37				
O 2 (scf) 1st/Total	153170				
Inj C (lbs) 1st/Total	2455				
Charge C (lbs) 892	897				
Lime 1st/Total 5159	5075				
Olivine 1st/Total	-				
Dolo Lime 1st/Total 5344	5388				
Ladle Lime/MgO	500				
Tap C (wt%)	.047 -				
Tap O (ppm)	534 +				
Tap Temp (degF)	2924				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	73.3				
Tap wt actual (lbs)	125.8	125.50			
Tap Time / Ladle #	13:42 7				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:
ZIRCON LADLE SAND

13:30 - Shut off Gas burners in south combustion chamber & FCP

38

Steel Dynamics

EAF Heat Record

Date 1/20/04
Crew A
Supervisor D. St.
Furnace North
1st Helper Jim Raleigh

135.60

Heat #	B00 6618	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 135	27 0000				
MHW 1st / Total	4/350				
Power On 1st/Total /Tap-Tap	31.30 | 40				
0 2 (scf) 1st/Total	17435				
Inj C (lbs) 1st/Total	3475				
Charge C (lbs) 897	897				
Lime 1st/Total 5169	5200				
Olivine 1st/Total					
Dolo Lime 1st/Total 5328	5387				
Ladle Lime/MgO	~~540~~				
Tap C (wt%)	.038				
Tap O (ppm)	864				
Tap Temp (degF)	3050				
Slag Rating (1-5) 1=liquid 5=thick foam	2				
Ladle tare wt (lbs)	73.6				
Tap wt actual (lbs)	129.5	129			
Tap Time / Ladle #	14:23 | 4				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

ZIRCON

Third & Final Floride Test Done at 14:00

14:25 - Mercury Tested Ended

14:30 - STARTED LAST Mercury Test

Steel Dynamics

EAF Heat Record

Date 20-04
Crew A
Supervisor Dave
Furnace North
1st Helper J. R.

Heat #	8925 Boo 6619	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 535	27000			Lost 37 minute	37
MHW 1st / Total	43820			Roof Guides	
Power On 1st/Total /Tap-Tap	32:38 77				
O2 (scf) 1st/Total	205600				
Inj C (lbs) 1st/Total	2761				
Charge C (lbs) 897	900				
Lime 1st/Total 5099	5000				
Olivine 1st/Total	—				
Dolo Lime 1st/Total 5325	5500				
Ladle Lime/MgO	500				
Tap C (wt%)	.039 -				
Tap O (pprn)	795 +				
Tap Temp (degF)	3019				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	77.0				
Tap wt actual (lbs)	126.3	126.30			
Tap Time / Ladle #	15:47 1				
Patch FCE (YIN)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	6
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Zircon First Heat If one Bundle

28

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor D. St
Furnace North
1st Helper T. R.

135.70

Heat #	6620	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 136	222 000 / 50,200				
MHW 1st / Total	446300				
Power On 1st/Total /Tap-Tap	35:31 48				
0 2 (scf) 1st/Total	175200				
Inj C (lbs) 1st/Total	2201				
Charge C (lbs) 897	900				
Lime 1st/Total 5125	5086				
Olivine 1st/Total					
Dolo Lime 1st/Total 5377	5381				
Ladle Lime/MgO	500				
Tap C (wt%)	.039 -				
Tap O (ppm)	664 +				
Tap Temp (degF)	2				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	76.$				
Tap wt actual (lbs)	1t 4 2	123.80			
Tap Time / Ladle #	9 / 5				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	0

Comments:

Zircar

49

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor D. M.
Furnace NORTH
1st Helper T. R.

136.65

Heat #	B00 6621		Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs)	217308	70200				
MHW 1st / Total		45960			Add (A)	7
Power On 1st/Total /Tap-Tap	35:37	48				
0 2 (scf) 1st/Total		141700				
Inj C (lbs) 1st/Total		3883				
Charge C (lbs) 905	10000					
Lime 1st/Total 5063	50000					
Olivine 1st/Total	—					
Dolo Lime 1st/Total 5387	55000					
Ladle Lime/MgO	5000					
Tap C (wt%)	.038 -					
Tap O (ppm)	672 +					
Tap Temp (degF)	2911 +					
Slag Rating (1-5) 1=liquid 5=thick foam	3					
Ladle tare wt (lbs)	71.5					
Tap wt actual (lbs)	126.4		126			
Tap Time Ladle #	17:18	2				
Patch FCE (YIN)						
Area(s) Patched (12 o'clock = taphole)			Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used			A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used			B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used			C phase	Add/Slip	Total Minutes Scrap Charging	

Comments: CHROME ALL BAG House Testing DONE 16:35

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor V. Gf
Furnace North
1st Helper Tim R.

1:34:20

Heat #	Boo 6622	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 891	202000 / 80000				
MHW 1st / Total	430700				
Power On 1st/Total /Tap-Tap	32:14 / 40				
O2 (scf) 1st/Total	147510				
Inj C (lbs) 1st/Total	2262				
Charge C (lbs) 897	9000				
Lime 1st/Total 5035	5000				
Olivine 1st/Total	—				
Dolo Lime 1st/Total 5383	5500				
Ladle Lime/MgO	500				
Tap C (wt%)	.029				
Tap O (ppm)	993				
Tap Temp (degF)	2952				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	74.2				
Tap wt actual (lbs)	121.7	121.80			
Tap Time / Ladle #	17:59 / 4				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		**Electrodes**		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:
ZIRcon
LADle
SAND

Hyd A Motor/Pump #1
Low Pressure Fault
17:32 @ 18:02

No

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew A
Supervisor D. Gt
Furnace North
1st Helper Jim R.

134.65

Heat #	Bar 6623		Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 140425	210800	69700				
MHW 1st / Total	16800	41680				
Power On 1st/Total /Tap-Tap	35:09	42				
O2 (scf) 1st/Total		130 000				
Inj C (lbs) 1st/Total		2600				
Charge C (lbs) 900	1077					
Lime 1st/Total 5086	5000					
Olivine 1st/Total						
Dolo Lime 1st/Total 5391	5500					
Ladle Lime/MgO	500					
Tap C (wt%)	.031					
Tap O (ppm)	912					
Tap Temp (degF)	2954					
Slag Rating (1-5) 1=liquid 5=thick foam	3					
Ladle tare wt (lbs)	75.6					
Tap wt actual (lbs)	125.1		125.90			
Tap Time / Ladle #	18:42	ONE				
Patch FCF (Y/N)						
Area(s) Patched (12 o'clock = taphole)			**Electrodes**		Total Minutes Misc Delays	
Gun #1 Lbs Used			A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used			B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used			C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:
CHROME
9 SAND

42

Steel Dynamics

EAF Heat Record

Date 1-20-04
Crew 17
Supervisor D.H.
Furnace
1st Helper Tim R.

136.80

Heat #	B00 6624	Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 136	20~~2000~~ 70000			(Waiting on Charge Scrap Car Down)	8
MHW 1st / Total	46330				
Power On 1st/Total /Tap-Tap	35:29 47				
0 2 (scf) 1st/Total	127530				
Inj C (lbs) 1st/Total	2771				
Charge C (lbs) 1811	9000				
Lime 1st/Total 1012/3	57000				
Olivine 1st/Total					
Dolo Lime 1st/Total 5387	5500				
Ladle Lime/MgO	500				
Tap C (wt%)	.037				
Tap O (ppm)	635				
Tap Temp (degF)	2904				
Slag Rating (1-5) 1=liquid 5=thick foam	3				
Ladle tare wt (lbs)	76.3				
Tap wt actual (lbs)	124.0	124.3			
Tap Time / Ladle #	1929 5				
Patch FCE (YIN)					
Area(s) Patched (12 o'clock = taphole)		**Electrodes**		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Zircon

43

Steel Dynamics

EAF Heat Record

Date 1-20-04
crew A
Supervisor D. Ef.
Furnace North
1st Helper Jim R.

96

Heat #	B00 6625		Start	Finish	Operating Events	Minutes
Scrap wt 1st/2nd (lbs) 136	202000	70000				
MHW 1st / Total		49.8	1958	2000	Power	2
Power On 1st/Total /Tap-Tap	42	55				
O2 (scf) 1st/Total		184520				
Inj C (lbs) 1st/Total		4703				
Charge C (lbs) —	10000					
Lime 1st/Total	—	000				
Olivine 1st/Total	—					
Dolo Lime 1st/Total —	55000					
Ladle Lime/MgO	3000					
Trap C (wt%)	.029					
Trap O (ppm)	1173					
Tap Temp (degF)	3042					
Slag Rating (1-5) 1=liquid 5=thick foam	3					
Ladle tare wt (lbs)	737					
Trap wt actual (lbs)	132.1		1313			
Tap Time / Ladle #	2024	7				
Patch FCE (YIN)						
Area(s) Patched (12 o'clock = taphole)			**Electrodes**		Total Minutes Misc Delays	
Gun #1 Lbs Used			A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used			B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used			C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:
ZIRCON
SAND

56

Steel Dynamics

EAF Heat Record

Date 1-20-4
Crew B
Supervisor Gary
Furnace N
1st Helper Geyer

133.95

Heat #	B00 6626		Start	Finish	Operatrng Events	Minutes
Scrap wt 1st/2nd (lbs) 143,340			2024	2032	TAP & Charge	
MHW 1st / Total	15.0	49.8	2032	2045	Power	
Power On 1st/Total /Tap-Tap	1243	39 50	2045	2047	2nd	
O2 (scf) 1st/Total	957	36,650	2047		Power	
Inj C (lbs) 1st/Total	-	3396				
Charge C (lbs) 907	902					
Lime 1st/Total 5166	5,500					
Olivine 1st/Total	—					
Dolo Lime 1st/Total 5387	5,000					
Ladle Lime/MgO	—	500				
Tap C (wt%)	.036					
Tap O (ppm)	796					
Tap Temp (degF)	2976					
Slag Rating (1-5) 1=liquid 5=thick foam	3					
Ladle tare wt (lbs)	72					
Tap wt actual (lbs)	137.3		138.10			
Tap Time / Ladle #	27:14	2				
Patch FCE (Y/N)						
Area(s) Patched (12 o'clock = taphole)			Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used			A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun#2 Lbs Used			B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used			C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Zircon Drain #1 @ 2½ Ton
@ 10-12 Ton in Pits

5/

TIME_DATE	Fan1 Amps	Fan2 Amps	Fan3 Amps	Fan1 Damp	EAFB Press Cont	EAFA 4-Hole	EAFB 4-Hole	BH Diff Press
Units	Amps	Amps	Amps	% open	% open	W.C. Inches	W.C. Inches	W.C. Inches
1/20/04 18:12	222	226	222	75%	62%	0.0	-1.3	7.7
1/20/04 17:12	221	220	222	99%	68%	0.0	-1.1	9.4
1/20/04 16:12	222	224	222	73%	65%	0.0	-1.2	8.5
1/20/04 15:12	221	220	224	74%	62%	0.0	-1.2	8.2
1/20/04 14:12	223	220	222	99%	69%	0.0	-1.2	9.3
1/20/04 13:12	224	224	228	79%	63%	0.0	-1.3	8.5
1/20/04 12:12	225	226	224	91%	62%	0.0	-1.1	8
1/20/04 11:12	209	212	220	98%	78%	0.0	-1.3	9.6
1/20/04 10:12	221	220	222	75%	60%	0.0	-1.3	8.1
1/20/04 9:12	223	224	224	98%	70%	0.0	-1.2	9
1/20/04 8:12	222	220	224	82%	63%	0.0	-1.2	9
1/20/04 7:12	231	228	231	58%	25%	0.1	-0.1	7.4

APPENDIX C

LABORATORY ANALYSIS AND CEM ANALYTICAL DATA

FLUORIDES ANALYSIS

DATA CHEM LABORATORIES, INC.

TEST REPORT
Page 1 of 3
2/6/04

Submitted To: Michelle LaLiberty
SAMI
7314 Egypt Rd.
Medina, OH 44256

Reference Data:	**Mercury**
Client Sample No.:	SDI R1 Container#1,1A through SDI Blank Container #1,1A
P.O. No.:	04-T-247
Sample Location:	G/SA 04-T-247
Sample Type;	**Liquid**
Method Reference:	**EPA Method 101A**
DCL Set ID No.:	04-S-0309
DCL Sample LD No.:	04-01649 through 04-01652
Sample Receipt Date:	01/23/2004
Preparation Date:	02/02/2004
Analysis Date:	02/03/2004

Sample condition was acceptable upon receipt except where noted.

The samples were prepared and analyzed in accordance with EPA method 101A using a CETAC Mercury Analyzer M-6000A.

The results are provided in the enclosed data table. Results relate only to the items tested and *are* not blank corrected unless indicated in the data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Stephanie Wilcox
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 [illegible]

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9459

Results
Mercury

Client #	Sample	DCL #	µg/sample
SDX R1 Container#1	A1	04-01649 A1	4.0
SDI R2 Container#1	A1	04-01650 A1	16.
SDI R3 Container#1	A1	04-01651 A1	ND
SDI Blank Container#1	A1	04-01652 A1	ND
SDI R1 Container#1A	A2	04-01649 A2	16.
SDI R2 Container#1A	A2	04-01650 A2	ND
SDI R3 Container#1A	A2	04-01651 A2	13.
SDI Blank Container#1A	A2	04-01652 A2	ND
		Prep Blank	ND
% Recovery		LCS	97.
% Recovery		04-01649 A1 MS	124.
% Recovery		04-01649 A1 MSD	124.
RPL			2.0

ND = not detected at or above the reporting limit (RPL).
LCS = laboratory control sample.
MS/MSD = matrix spike/matrix spike duplicate.

Stephanie Wilcox
Analyst

Reviewer

04-S-0347

sami

SAMPLING & ANALYTICAL MANAGEMENT, INC.

318 North Harmony St.
Medina, Ohio 44256
(330) 723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Please Print. Instructions on reverse side correspond with circled numbers

Page 1 of 1

(1)
Company Name: SAMI
Report Address:
Billing Address:
City: State: Zip:
Phone: Fax:
Report Attention: Michelle
Project Name: GSA 04-T-247
P.O. #: 04-T-247
Indicate state where samples were collected: IN
Compliance ☒ Non-Compliance ☐ (3)

(2) (4) (5) (6)

| | | |

MERCURY ANALYSIS

GALBRAITH LABORATORIES, INC.

LABORATORY REPORT

Michelle Laliberte
SAMI

Report Date: 02/06/04
Lab I.D.: S-4620-4623

TECHNICAL INFORMATION:

Testing was performed according to EPA Method 138 as requested.

Authorized Release of Data

Jeffry L. Dillener, Technical Manager

JLD:yb

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2323 Sycamore Drive
Knoxville, TN 37921-1700
TOLL FREE 877.449.8797

P.O. Box 51610
Knoxville, TN 37950-1610
FAX 865.546.7209

GALBRAITH LABORATORIES, INC.

LABORATORY REPORT

Michelle Laliberte
SAMI
7314 Egypt Rd
Medina *OH* 44256

Report Date: 02/06/04

Purchase Order #: 04-T-247

Fax Number: 330-723-0645

SAMPLE ID	LAB ID	ANALYSIS	RESULT(S)	
SDI F R-1	S-4620	Fluorine	< 0.2	mg/L
SDI F R-2	S-4621	Fluorine	0.32	mg/L
SDI F R-3	S-4622	Fluorine	0.24	mg/L
SDI F Blank	S-4623	Fluorine	< 0.2	mg/L

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P.O. Box 51610
Knoxville, TN 37950-1610
FAX 865.546.7209

APPENDIX D

REAGENT AND GAS CERTIFICATIONS AND MATERIAL SAFETY DATA

D.I. WATER



H_2O F.W.18.0

Specifications

Ultraviolet Absorbance of
Largest Eluted peak (*) 0.001
Residue after Evaporation 1ppm

Certificate of Actual Lot **Analysis**
Available **Upon Request**

LOT NU, 981909

Dale Rec'd / / CAS 7732-18-5

This special product is packaged under conditions of extreme cleanliness. Because both chemical and bacteriological contamination can occur through normal handling and use, it is recommended that the user observe extreme cars in all opening, transfer, and closino operations

* Determined using a Waters Associates Model ALC 204 LC: Model 440 UV-VIS detector at 254 nm. 0.02 aufs, 25 cm x 4 6 mm i.d 7orbax ODS column. mobile phase, linear gradient from 100% water to 100% acetonitrile at a rate of 5% per minute; flow rate. 2.0 ml per minute.

FILTERED THROUGH A
0.1 MICRON FILTER

Fair Lawn. New Jersey 07410
Made in U.S.A. (201)796-7100

For laboratory and manufacturing use only, not for drug, food, or household use.

4 L

W5^{SK}-4

SaleCote®

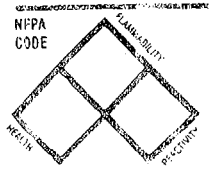
FL-05-0588

DO NOT TRANSFER TO AN UNMARKED CONTAINER

Water
HPLC GRADE

Fisher
ChemAlert®
Guide G

SAFETY CODE

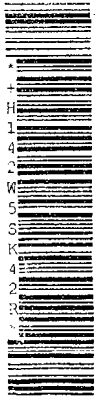


NO NFPA LISTING

FisherChemicals Fisher Scientific

Storage Code Gray

G



H_2O F.W. 18.0

Specifications

Ultraviolet Abscrbance of
Largest Eluted peak (*) 0 001
Residue after Fvaporation 1ppm

Certificate of Actual Lot Analysis
Available Uoon **Request**

LOT NO. 994256.

Dale Rec'd I / CAS 7732-18-5

This special product is packaged under conditions nl extreme cleanliness Because both chemical and bacteriological contamination can occur through normal handling and use, it is recommended that lhe user observe extreme care in alt opening, transfer, and closing operations

Determined usinq 'a Walers Associates Model ALC 204 LC: Model 440 UV-VIS detector at 254 nm 0 02 aufs 25 cm x 4.6 mm i d. Zorbax OOS column: mobile phase, linear oradienl lrom 100% waler lo 100% acetonitrile at a rale of 5% per minute; flow rate, 2.0 ml per minute

FILTERED THROUGH A
0.1 MICRON FILTER

Fair Lawn New Jetsey 07410
Made in U S A 12011796 7100

For laboratory and manufacturing use only, not for drug, food, or household use.

4 L

W5^{SK}-4

SaleCote®

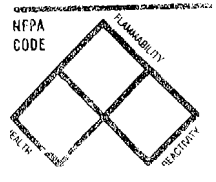
FL-05-0588

DO NOT TRANSFER TO AN UNMARKED CONTAINER

Water
HPLC GRADE

Fisher
ChemAlert®
Guide G

SAFETY CODE



NO NFPA LISTING

FisherChemicals Fisher Scientific

Storage Code Gray

G

SULFURIC ACID

**** MATERIAL SAFETY DATA SHEET ****

ulfuric Acid
50

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

S Name: Sulfuric Acid
alog Numbers:
S71211, S71211SC, S71826, S79200, S80211, S80213-1, A298 212, A298212, A300 212, A300 225LB, A300 500, A300 612GAL, A300 700LB, A300212, A300225LB A300500, A300612GAL, A300700LB, A300C 212, A300C212, A300C212001, A300C212002, A300C212003, A300C212004, A300C212005, A300C212006, A300C212007, A300C212008, A300C212009, A300C212010, A300C212LC, A300FP 500, A300FP500, A300J500, A300F 500, A300F500, A300S 212, A300S 500, A300S212, A300S212LC, A300S500, A300SI 212, A300SI212, A468-1, A468-250, A468-500, A4682, A484 212, A484212, AS10-212, AS10-500, AS10SK212, AC30005212002, MAR77018068, NC9466103, NC9488895, NC9758547, NC9825433, NC9826713, S71211MF, S71211MF*, S71211SCMF, S71211SCMF*, S79200MF, S79200MF* DHAZ, S79200MF*DHA2, S79200SCMF, SA174 212, SA174 4, SA174212, SA1744, SA176 4, SA1764, SA196 500, SA196500
onyms:
Hydrogen Sulfate; Oil of Vitriol; Vitriol Brown Oil; Matting Acid; Battery Acid; Sulphuric Acid.
pany Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
information, call: 201-796-7100
rgency Number: 201-796-7100
CHEMTREC assistance, call: 800-424-9300
International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7664-93-9	Sulfuric acid	95-98.0	231-639-5

Hazard Symbols: C
Risk Phrases: 35 8

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

earance: clear colorless - oily liquid.
ger! Strong oxidizer. Contact with other material may cause a e. Corrosive. Hygroscopic. May cause kidney damage. May cause al effects based upon animal studies. May cause lung damage. ses eye and skin burns. Cancer hazard. May be fatal if inhaled. cause severe respiratory tract irritation with possible burns. cause severe digestive tract irritation with possible burns. May se severe eye, skin and respiratory tract irritation with possible ns.
get Organs: Kidneys, heart, lungs, respiratory system, diovascular system, teeth, eyes.

ential Health Effects
Eye:
Causes severe eye burns. May cause irreversible eye injury. May cause conjunctivitis. May cause permanent corneal opacification.
Skin:
Causes skin burns. Continued contact can cause tissue necrosis. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion:
May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause systemic toxicity with acidosis.
Inhalation:
May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Causes corrosive action on the mucous membranes.
Chronic:
Prolonged or repeated inhalation may cause kidney and lung damage. Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. May cause fetal effects. May cause cancer in humans. Effects may be delayed. Laboratory experiments have resulted in mutagenic effects. May cause ischemic heart lesions.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician:
Monitor arterial blood gases, chest x-ray, and pulmonary function tests if respiratory tract irritation or respiratory depression is evident. Treat dermal irritation or burns with standard topical therapy. Effects may be delayed. Do NOT use sodium bicarbonate in an attempt to neutralize the acid.
Antidote:
Do NOT use oils or ointments in eye.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with combustible materials may cause a fire. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Will react with water to form toxic and corrosive fumes. Contact with water can cause violent liberation of heat and splattering of the material. Some oxidizers may react explosively with hydrocarbons(fuel). Contact with metals may evolve flammable hydrogen gas. May accelerate burning if involved in a fire. Containers may explode when heated or if contaminated with water. Runoff from fire control or dilution water may cause pollution.
Extinguishing Media:
Do NOT use water directly on fire. Use carbon dioxide or dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out.
NFPA Rating: (est.) Health: 3; Flammability: 0; Reactivity: 2

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation. Use water spray to reduce vapors, do not put water directly on leak, spill area or inside container. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Do not allow contact with water. Use only in a chemical fume hood. Discard contaminated shoes. Keep from contact with moist air and steam.
Storage:
Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from water. Corrosives area. Do not store near alkaline substances. Store protected from moisture.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs

ric acid	(1 mg/m3) ; (3 mg/m3) STEL	1 mg/m3 TWA 15 mg/m3 IDLH	1 mg/m3 TWA

HA Vacated PELs:
Sulfuric acid:
1 mg/m3 TWA

rsonal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

l State:	Liquid
nce:	clear colorless - oily liquid odorless 0.3 (1N Solution)
ressure:	1 mm Hg @ 145.8 C
ensity:	3.38
tion Rate:	Slower than ether.
ty:	21 mPas @ 25 C
Point:	340 deg C
g/Melting Point:	10.35 deg C
ition Temperature:	Not available.
oint:	Not available.
on Limits, lower:	Not available.
on Limits, upper:	Not available.
sition Temperature:	340 deg C
ity:	Soluble.
c Gravity/Density:	1.841
ar Formula:	H2SO4
ar Weight:	98.0716

**** SECTION 10 - STABILITY AND REACTIVITY ****

emical Stability:
Combines vigorously with water with the evolution of heat. Reported to have exploded when in a sealed container. This was most likely due to pressure of hydrogen by reduction of water.
onditions to Avoid:
Incompatible materials, ignition sources, metals, excess heat, combustible materials, organic materials, reducing agents, exposure to moist air or water, oxidizers, amines, bases.
ncompatibilities with Other Materials:
Bases, strong dehydrating agents, organic materials, finely powdered metals, moisture, carbides, chlorates, cyanides (e.g. potassium cyanide, sodium cyanide), azides, fulminates, picrates, nitrates, alkali halides, zinc, iodides, permanganates, hydrogen peroxides, perchlorates, nitromethane, phosphorus, nitrites, cyclopentadiene, cyclpentanone oxime, nitroaryl amines, lithium silicides, iron, mercuric nitride, benzene, potassium chlorates, steel, cesium acetylene carbide, trihydroxydiamino phosphate, phosphorus trioxide, reducing agents.
azardous Decomposition Products:
Oxides of sulfur, irritating and toxic fumes and gases.
azardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

TECS#:
CAS# 7664-93-9: WS5600000
D50/LC50:
CAS# 7664-93-9: Draize test, rabbit, eye: 250 ug Severe; Inhalation, mouse: LC50 = 320 mg/m3/2H; Inhalation, rat: LC50 = 510 mg/m3/2H; Oral, rat: LD50 = 2140 mg/kg.
arcinogenicity:
Sulfuric acid -
ACGIH: A2 - Suspected Human Carcinogen (contained in strong inorg
OSHA: Select carcinogen
IARC: Group 1 carcinogen
pidemiology:
No data available.
ratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fish: Bluegill/Sunfish: 49 mg/L; 48Hr; TLm (tap water @ 20C)Fish: Bluegill/Sunfish: 24.5 ppm; 48Hr; TLm (fresh water)

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: SULFURIC ACID
Hazard Class: 8
UN Number: UN1830
Packing Group: II
Canadian TDG
Shipping Name: SULFURIC ACID
Hazard Class: 8(9.2)
UN Number: UN1830

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7664-93-9 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 7664-93-9: final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
CAS# 7664-93-9: TPQ = 1000 pounds; RQ = 1000 pounds
SARA Codes
CAS # 7664-93-9: acute, chronic, reactive.
Section 313
This material contains Sulfuric acid (CAS# 7664-93-9, 95 98 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7664-93-9 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Sulfuric acid can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: C
Risk Phrases:
R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 30 Never add water to this product.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
(Water Danger/Protection)
CAS# 7664-93-9: 2
ed Kingdom Occupational Exposure Limits
CAS# 7664-93-9: OES-United Kingdom, TWA 1 mg/m3 TWA

ada
CAS# 7664-93-9 is listed on Canada's DSL List.
This product has a WHMIS classification of E, D1A.
CAS# 7664-93-9 is listed on Canada's Ingredient Disclosure List.
osure Limits
CAS# 7664-93-9: OEL-ARAB Republic of Egypt:TWA 1 mg/m3
OEL-AUSTRALIA:TWA 1 mg/m3
OEL-BELGIUM:TWA 1 mg/m3;STEL 3 mg/m3
OEL-CZECHOSLOVAKIA:TWA 1 mg/m3;STEL 2 mg/m3
OEL-DENMARK:TWA 1 mg/m3
OEL-FINLAND:TWA 1 mg/m3;STEL 3 mg/m3;Skin
OEL-FRANCE:TWA 1 mg/m3;STEL 3 mg/m3
OEL-GERMANY:TWA 1 mg/m3
OEL-HUNGARY:STEL 1 mg/m3
OEL-JAPAN:TWA 1 mg/m3
OEL-THE NETHERLANDS:TWA 1 mg/m3
OEL-THE PHILIPPINES:TWA 1 mg/m3
OEL-POLAND:TWA 1 mg/m3
OEL-RUSSIA:STEL 1 mg/m3;Skin
OEL-SWEDEN:TWA 1 mg/m3;STEL 3 mg/m3
OEL-SWITZERLAND:TWA 1 mg/m3;STEL 2 mg/m3
OEL-THAILAND:TWA 1 mg/m3
OEL-TURKEY:TWA 1 mg/m3
OEL-UNITED KINGDOM:TWA 1 mg/m3
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

SDS Creation Date: 4/22/1999 Revision #7 Date: 11/20/2000

he information above is believed to be accurate and represents the best nformation currently available to us. However, we make no warranty of erchantability or any other warranty, express or implied, with respect to uch information, and we assume no liability resulting from its use. Users hould make their own investigations to determine the suitability of the nformation for their particular purposes. In no way shall the company be iable for any claims, losses, or damages of any third party or for lost rofits or any special, indirect, incidental, consequential or exemplary amages, howsoever arising, even if the company has been advised of he possibility of such damages.

POTASSIUM PERMANGANATE

**** MATERIAL SAFETY DATA SHEET ****

assium Permanganate

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

ame: Potassium Permanganate
g Numbers:
C196750250, AC207740250, S71982-1, S77642, S77645, NC9556435, NC9648879,
C9567433, P279-212, P279-3, P279-500, P287-212, P287-500, S72224B,
XP27910KG, XXP28750KG
ms:
ermanganic Acid Potassium Salt; Purple Salt; Chameleon Mineral;
ermanganate of Potash.
y Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
formation, call: 201-796-7100
ncy Number: 201-796-7100
EMTREC assistance, call: 800-424-9300
ternational CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7722-64-7	Permanganic Acid (HMnO4), Potassium Salt	100	231-760-3

Hazard Symbols: XN O N
Risk Phrases: 22 8 50/53

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

ance: dark purple.
Strong oxidiser. Contact with other material may cause a
May be harmful if swallowed. May cause kidney damage. May cause
respiratory and digestive tract irritation with possible
May cause severe eye and skin irritation with possible burns.
Organs: Kidneys.

ial Health Effects
ye:
Contact with eyes may cause severe irritation, and possible eye burns.
kin:
Exposure may cause irritation and possible burns.
Skin contact can cause brown stains in the area, and possible hardening of the outer skin layer.

ngestion:
Harmful if swallowed. May cause kidney damage. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns.
nhalation:
Causes respiratory tract irritation.
hronic:
Prolonged or repeated skin contact may cause defatting and dermatitis.

**** SECTION 4 - FIRST AID MEASURES ****

yes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed.
kin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Wash exposed skin threughly with soap and water.
ngestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
nhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
otes to Physician:
Treat symptomatically and

**** ECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Strong oxidiser. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Some oxidisers may react explosively with hydrocarbons (fuels). May accelerate burning if involved in a fire. Containers may explode when heated.
Extinguishing Media:
Cool containers with flooding quantities of water until well after fire is out. For small fires, do NOT use dry chemicals, carbon dioxide, halon or foams. USE WATER ONLY. For large fires, flood fire area with water from a distance.
NFPA Rating: (est.) Health: 1; Flammability: 0; Reactivity: 3

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Do not get water inside containers. Do not use combustible materials such as paper towels to clean up spills.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Do not store near combustible materials.
Storage:
Keep away from sources of ignition. Do not store near combustible materials. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Permanganic Acid (HMnO4), Potassium Salt	0.2 mg/m3 TWA (listed under ** no name **).	as Mn: 1 mg/m3 TWA (listed under ** no name **);as Mn: 300 mg/m3 IDLH (listed under ** no name **).	C 5 mg/m3 (fume) (listed under ** no name **)

OSHA Vacated PELs:
Permanganic Acid (HMnO4), Potassium Salt:
fume, as Mn: 1 mg/m3 TWA (listed under ** no name **)compounds, as Mn: C 5 mg/m3 (listed under ** no name **)

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:
Wear appropriate gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Solid
Appearance: dark purple

	oderless.
	Not available.
Pressure:	Not available.
Density:	Not available.
ration Rate:	Not available.
sity:	Not available.
ng Point:	Not available.
ing/Melting Point:	464 deg F
gnition Temperature:	Not applicable.
Point:	Not applicable.
sion Limits, lower:	Not available.
sion Limits, upper:	Not available.
position Temperature:	Not available.
lity:	Moderately soluble in water.
fic Gravity/Density:	2.703
ular Formula:	KMnO4
ular Weight:	158.0339

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
High temperatures, incompatible materials, combustible materials, reducing agents.
Incompatibilities with Other Materials:
Explodes on contact with some acids such as acetic acid, concentrated hydrochloric acid, and formaldehyde, ammonium nitrate, dimethylformamide. Forms sensitive explosive mixtures with ammonium perchlorate, titanium, arsenic, phosphorus, slag wool, and sulfur. React with reducing agents.
Hazardous Decomposition Products:
Irritating and toxic fumes and gases, oxides of potassium.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7722-64-7: SD6475000
LD50/LC50:
CAS# 7722-64-7: Oral, mouse: LD50 = 2157 mg/kg; Oral, rat: LD50 = 1090 mg/kg.
Carcinogenicity:
Permanganic Acid (HMnO4), Potassium Salt -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No information available.
Teratogenicity:
No information available.
Reproductive Effects:
No information available.
Neurotoxicity:
No information available.
Mutagenicity:
No information available.
Other Studies:
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fish: Bluegill/Sunfish: 2.7-3.6 mg/lFish: Goldfish: 3.6mg/l; 96 HR.Fish: Channel catfish: 0.75 mg/l; 96 HR..

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

oal waste generators must determine whether a discarded chemical assified as a hazardous waste.
A guidelines for the classification determination are listed in R Parts 261.3. Additionally, waste generators must consult state ocal hazardous waste regulations to ensure complete and accurate ification.
P-Series: None listed.
U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: POTASSIUM PERMANGANATE
Hazard Class: 5.1
UN Number: 1490
Packing Group: II
Canadian TDG
Shipping Name: POTASSIUM PERMANGANATE
Hazard Class: 5.1(9.2)
UN Number: UN1490

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7722-64-7 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 7722-64-7: final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 7722-64-7: acute, flammable..
Section 313
This material contains Permanganic Acid (HMnO4), Potassium Salt (listed as ** undefined **), 100%, (CAS# 7722-64-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
CAS# 7722-64-7 listed as ** no name ** is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7722-64-7 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Permanganic Acid (HMnO4), Pota can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, (listed as ** no name **), Minnesota, (listed as ** no name **), Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN O N
Risk Phrases:
R 22 Harmful if swallowed.
R 8 Contact with combustible material may cause fire.
R 50/53 Very toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.
Safety Phrases:
S 60 This material and/or its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.
WGK (Water Danger/Protection)
CAS# 7722-64-7: 2
United Kingdom Occupational Exposure Limits
CAS# 7722-64-7: OES-United Kingdom, TWA (listed as ** undefined **): as Mn: 5 mg/m3 TWA
CAS# 7722-64-7: OES-United Kingdom, STEL (listed as ** undefined **): fume, as Mn: 3 mg/m3 STEL
Canada
CAS# 7722-64-7 is listed on Canada's DSL List.
This product has a WHMIS classification of C, E.
CAS# 7722-64-7 is listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 7722-64-7: OEL-AUSTRALIA:TWA 5 mg(Mn)/m3 JANUARY 1993
OEL-BELGIUM:TWA 5 mg(Mn)/m3 JANUARY 1993
OEL-CZECHOSLOVAKIA:TWA 2 mg(Mn)/m3;STEL 6 mg(Mn)/m3 JANUARY 1993
OEL-DENMARK:TWA 2.5 mg(Mn)/m3 JANUARY 1993
OEL-FINLAND:TWA 2.5 mg(Mn)/m3 JANUARY 1993
OEL-HUNGARY:TWA 0.3 mg(Mn)/m3;STEL 0.6 mg(Mn)/m3 JANUARY 1993
OEL-JAPAN:TWA 0.3 mg(Mn)/m3 JANUARY 1993
OEL-THE NETHERLANDS:TWA 1 mg(Mn)/m3 JANUARY 1993
OEL-POLAND:TWA 0.3 mg(Mn)/m3 JANUARY 1993
OEL-SWEDEN:TWA 1 mg(Mn)/m3;STEL 2.5 mg(Mn)/m3 (resp. dust)
OEL-SWEDEN:TWA 2.5 mg(Mn)/m3;STEL 5 mg(Mn)/m3 (total dust)
OEL-UNITED KINGDOM:TWA 5 mg(Mn)/m3 JANUARY 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 3/02/1999 Revision #3 Date: 10/06/2000

DATE: 11/20/01 ACCT: 4250250002
INDEX: B1223183Z CAT NO: 8279500 PO NBR: 01-X0105

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

30% HYDROGEN PEROXIDE

CONTACT HAZARD

REACTIVE

2.5 L

VW3690-5

Hydrogen Peroxide

30% Solution, Reagent, A.C.S. H_2O_2 FW 34.02

Hydrogen Peroxide CAS 7722-84-1; Water CAS 7732-18-5

NOTE: This container is designed to vent pressure and should be stored in an upright position in a cool place. The assay requirement applies to material stored properly for a reasonable time.

Maximum Impurities and Specifications

Contains less than 1 ppm Tin as a stabilizer.

Assay (H_2O_2)	29.0-32.0%	Iron	0.5 ppm
Ammonium	5 ppm	Nitrate	2 ppm
Chloride	3 ppm	Phosphate	2 ppm
Color (APHA)	10 max.	Residue After Evaporation	0.002%
Heavy Metals (as Pb)	1 ppm	Sulfate	5 ppm
		Titratable Acid	0.0006 meq/g

VWR CHEMICAL REAGENT

VWR Scientific

A VWR COMPANY

MEDIA, PA 19063

Packaged By: EM SCIENCE, Norwood, Ohio

10 52 21

DANGER!

[redacted]

TOXIC. [redacted] CAUSED. MAY CAUSE [redacted] PRESSURE.

Do not get in eyes, on skin, on clothing. Do not store near [redacted]. Do not breathe mist or vapor. Do not take internally. Explosion-proof refrigerator recommended for storage. For additional information, see Material Safety Data Sheet (MSDS) for this material. Absorb spill with inert material, then place in a chemical waste container. Flush residual spill area with water.FOR LABORATORY USE ONLY. NOT FOR DRUG USE. KEEP FROM CHILDREN. FIRST AID: Call A Physician. IF CONTACTED: Immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes get medical attention. IF SWALLOWED: Do not induce vomiting. Give cold water freely if patient is conscious.

Store In A Cool Place Less Than 72°F.

Printed in USA

+B351VW369051P

HYDROCHLORIC ACID

**** MATERIAL SAFETY DATA SHEET ****

ochloric Acid 37% Solution

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

ame: Hydrochloric Acid 37% Solution
g Numbers:
71942, S71943, S74853, S74853SC, SS0038, 144J212, A142-212, A142P-20,
144-20, A144-212, A144-500, A144-500LB, A144-512GAL, A1440212LC,
144500LB02, A144500LDLC, A1445212LC, A144512GAL, A144C-2.5, A144C-212,
1440212001, A144FP 500, A144FP500, A144P 500, A144P-1GA, A144P-1GAL,
144P-20, A144P-500, A144S-212, A144S-500, A144S212EA, A144SI-21,
144SI-212, A466-1, A466-2, A466-250, A466-500, A466250LC, A4662LC,
481-212, A481212LC, A482-200L, A482-20L, A482-212L, A482-500, A485-212,
485SAM1, A485SAM2, A485SAM3, A508-212, A508-500, A508212 001, A508212 002,
508212001, A508212002, A508212003, A508212004, A508212LC, A5084, A508SK212
RNA481 212, CRNA481212, NC9S28793, NC9S37181, NC9S11227, S71942SCMF,
71942SCND, S71943ND, SA431-500, SA48-1, SA48-20, SA48-4, SA48-500,
XA142200LI, XXA144STEST, XXA481NF212
ms:
uriatic acid; Chlorohydric acid; Hydrogen chloride; Spirits of salt
y Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
formation, call: 201-796-7100
ncy Number: 201-796-7100
MERGENCY assistance, call: 800-424-9300
ternational CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7647-01-0	Hydrogen chloride	36-38	231-595-7
7732-18-5	Water	62-64	231-791-2

Hazard Symbols: C
Risk Phrases: 34 37

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

ance: colorless to slight yellow.
: Corrosive. Hygroscopic. May be harmful if swallowed. May
fetal effects based upon animal studies. Causes eye and skin
May cause severe respiratory tract irritation with possible
May cause severe digestive tract irritation with possible
Possible sensitiser.
Organs: Teeth, circulatory system.

ial Health Effects
ye:
May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light.
kin:
May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Contact with liquid is corrosive and causes severe burns and ulceration.
ngestion:
May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract. May be harmful if swallowed.
nhalation:
May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Exposure to the mist and vapor may erode exposed teeth. Causes corrosive action on the mucous membranes.
hronic:
Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause fetal effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause conjunctivitis, photosensitisation, and possible blindness.

**** SECTION 4 - FIRST AID MEASURES ****

yes:
Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes). SPEEDY ACTION IS CRITICAL!

Skin:
Get medical aid immediately! Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Get medical aid immediately! Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician:
Do NOT use sodium bicarbonate in an attempt to neutralize the acid.
Antidote:
Do NOT use oils or ointments in eye.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Reaction with water may generate much heat which will increase the concentration of fumes in the air. Containers may explode when heated.
Extinguishing Media:
For large fires, use water spray, fog, or alcohol-resistant foam. Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers. Do NOT use straight streams of water. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out. For small fires, use carbon dioxide (except for cyanides), dry chemical, dry sand, and alcohol-resistant foam.
NFPA Rating: (est.) Health: 3; Flammability: 0; Reactivity: 1

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Large spills may be neutralized with dilute alkaline solutions of soda ash, or lime. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation. Do not get water inside containers. A vapor suppressing foam may be used to reduce vapors. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. Use caution when opening. Keep from contact with moist air and steam.
Storage:
Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Store protected from moisture. Do not store near flammable or oxidizing substances (especially nitric acid or chlorates).

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs

rogen chloride	C 5 ppm	50 ppm IDLH	C 5 ppm; C 7 mg/m3
er	none listed	none listed	none listed

OSHA Vacated PELs:
Hydrogen chloride:
C 5 ppm; C 7 mg/m3
Water:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear neoprene or polyvinyl chloride gloves to prevent exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

cal State:	Clear liquid
rance:	colorless to slight yellow
	strong, pungent
	0.01
Pressure:	5.7 mm Hg @ 0 deg C
Density:	1.26
ration Rate:	> 1.00 (N-butyl acetate)
ity:	Not available.
g Point:	81.5-110 deg C @ 760 mmHg
ing/Melting Point:	-74 deg C
mition Temperature:	Not applicable.
Point:	Not applicable.
ion Limits, lower:	Not available.
ion Limits, upper:	Not available.
position Temperature:	
lity:	Miscible.
ic Gravity/Density:	1.0-1.2
lar Formula:	HCl.H2O
lar Weight:	36.46

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Mechanical shock, incompatible materials, metals, excess heat, exposure to moist air or water, bases.
Incompatibilities with Other Materials:
Bases, acetic anhydride, alkali metals, aluminum, amines, copper, copper alloys, fluorine, iron, sodium hydroxide, steel, sulfuric acid, vinyl acetate, zinc, potassium permanganate, cesium acetylene carbide, rubidium acetylene carbide, rubidium carbide, sodium, chlorosulfonic acid, oleum, carbonates, perchloric acid, calcium phosphide, metal oxides, acetates, cesium carbide, beta-propiolactone, ethyleneimine, propylene oxide, lithium silicides, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, 1,1-difluoroethylene, ethylene diamine, magnesium boride, mercuric sulfate, silver perchlorate + carbon tetrachloride, uranium phosphide.
Hazardous Decomposition Products:
Hydrogen chloride, chlorine, carbon monoxide, carbon dioxide, hydrogen gas.
Hazardous Polymerization: Will not occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7647-01-0: MW4025000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7647-01-0: Inhalation, mouse: LC50 = 1108 ppm/1H; Inhalation, rat: LC50 = 3124 ppm/1H; Oral, rabbit: LD50 = 900 mg/kg.
CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg.
Carcinogenicity:
Hydrogen chloride -

IARC: Group 3 carcinogen
Water -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
Experimental reproductive effects have been reported.
Teratogenicity:
Embryo or Fetus: Stunted fetus, Inhalation, rat TCLo=450 mg/m3/1H
Specific Developmental Abnormalities: homeostatis, Inhalation, rat TCLo=450 mg/m3/1H (female 1 days pre-mating).
Reproductive Effects:
No information available.
Neurotoxicity:
No information available.
Mutagenicity:
Cytogenetic analysis: Hamster, lung = 30 mmol/L.; Cytogenetic analysis: Hamster, ovary = 6 mmol/L.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fish: Bluegill/sunfish: 3.6 mg/L; 48Hr; Lethal (unspecified)Fish: Bluegill/sunfish: LC50; 9.6 MPT pH 3.0-3.5

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN Number: UN1789
Packing Group: II
Canadian TDG
Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8(9.2)
UN Number: UN1789

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7647-01-0 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 7647-01-0: final RQ = 5000 pounds (2270 kg)
Section 302 (TPQ)
CAS# 7647-01-0: TPQ = 500 pounds; RQ = 5000 pounds (does not meet toxicity criteria but because of high production volume and recognized toxicity is considered a chemical of concern)
SARA Codes
CAS # 7647-01-0: acute.
Section 313
This material contains Hydrogen chloride (CAS# 7647-01-0, 36 38%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
CAS# 7647-01-0 is considered highly hazardous by OSHA.
STATE
Hydrogen chloride can be found on the following state right to know

lists: California, New Jersey, Florida, Pennsylvania, Minnesota,
assachusetts.
ater is not present on state lists from CA, PA, MN, MA, FL, or NJ.
alifornia No Significant Risk Level:
one of the chemicals in this product are listed.
ean/International Regulations
uropean Labeling in Accordance with EC Directives
    Hazard Symbols: C
    Risk Phrases:
                R 34 Causes burns.
                R 37 Irritating to respiratory system.
    Safety Phrases:
                S 26 In case of contact with eyes, rinse immediately
                with plenty of water and seek medical advice.
                S 45 In case of accident or if you feel unwell, seek
                medical advice immediately (show the label where
                possible).
 (Water Danger/Protection)
    CAS# 7647-01-0: 1
    CAS# 7732-18-5: No information available.
ted Kingdom Occupational Exposure Limits
    CAS# 7647-01-0: OES-United Kingdom, TWA 1 ppm TWA; 2 mg/m3 TWA
    CAS# 7647-01-0: OES-United Kingdom, STEL 5 ppm STEL; 8 mg/m3 STEL
    CAS# 7647-01-0: OES-United Kingdom, STEL 5 ppm STEL; 8 mg/m3 STEL

ada
    CAS# 7647-01-0 is listed on Canada's DSL List.
    CAS# 7732-18-5 is listed on Canada's DSL List.
    This product has a WHMIS classification of D2A, E.
    CAS# 7647-01-0 is listed on Canada's Ingredient Disclosure List.
    CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.
osure Limits
    CAS# 7647-01-0: OEL-AUSTRALIA:TWA 5 ppm (7 mg/m3)
    OEL-AUSTRIA:TWA 5 ppm (7 mg/m3)
    OEL-BELGIUM:STEL 5 ppm (7.7 mg/m3)
    OEL-DENMARK:STEL 5 ppm (7 mg/m3)
    OEL-FINLAND:STEL 5 ppm (7 mg/m3);Skin
    OEL-FRANCE:STEL 5 ppm (7.5 mg/m3)
    OEL-GERMANY:TWA 5 ppm (7 mg/m3)
    OEL-HUNGARY:STEL 5 mg/m3
    OEL-JAPAN:STEL 5 ppm (7.5 mg/m3)
    OEL-THE NETHERLANDS:TWA 5 ppm (7 mg/m3)
    OEL-THE PHILIPPINES:TWA 5 ppm (7 mg/m3)
    OEL-POLAND:TWA 5 mg/m3
    OEL-RUSSIA:STEL 5 ppm (5 mg/m3)
    OEL-SWEDEN:STEL 5 ppm (8 mg/m3)
    OEL-SWITZERLAND:TWA 5 ppm (7.5 mg/m3);STEL 10 ppm (15 mg/m3)
    OEL-THAILAND:TWA 5 ppm (7 mg/m3)
    OEL-TURKEY:TWA 5 ppm (7 mg/m3)
    OEL-UNITED KINGDOM:TWA 5 ppm (7 mg/m3);STEL 5 ppm (7 mg/m3)
    OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
    OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

            **** SECTION 16 - ADDITIONAL INFORMATION ****

SDS Creation Date: 7/06/1999 Revision #2 Date: 8/02/2000

he information above is believed to be accurate and represents the best
nformation currently available to us. However, we make no warranty of
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hould make their own investigations to determine the suitability of the
nformation for their particular purposes. In no way shall the company be
iable for any claims, losses, or damages of any third party or for lost
rofits or any special, indirect, incidental, consequential or exemplary
amages, howsoever arising, even if the company has been advised of
he possibility of such damages.

APPENDIX E

CALIBRATION DATA

CONTROL UNIT # 507123

Pretest Calibrations

APEX INSTRUMENTS METHOD 5 (MSCO-SET) ORIFICE SET CALIBRATION

Calibration Information	
Orifice Series	40-73
Serial Number	OM
Meter Gamma	0.99450

Calibration Conditions			
Date	Time	NOV. 24-03	2:24
Barometric Pressure		747.0	mm Hg
Theoretical Critical Vacuum[1]		352.6	mm Hg
Calibration Technician		LP	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K_1	0.386	K/mm Hg

[1]The Critical Orifice Coefficient, K', in English units, $(ft^3 °R^{1/2})/(in.Hg*min)$.
[2]The Critical Orifice Coefficient, K', in Metric units, $(m^3 K^{1/2})/(mmHg*min)$.

Calibration Data												Results		
			Reference Meter								Critical Orifice			
Run #	Orifice Number	Run Time Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Volume Total	Outlet Temp Initial	Outlet Temp Final	Amb Temp Initial	Amb Temp Final	Actual Vacuum	Coefficient Metric Units	Coefficient English Units	% Variation from Avg
		(Θ)	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	($t_{amb(i)}$)	($t_{amb(f)}$)		K'	K'	(<0.5%)
		min	mm H_2O	m^3	m^3	m^3	°C	°C	°C	°C		see above[1]	see above[2]	%
1	OM 40	10	6.80	330.8731	330.9610	0.0879						1.963E-04	0.2363	0.00
2	OM 40	10	6.80	330.9010	331.0488	0.0878	22				mm Hg	1.961E-04	0.2360	-0.11
3	OM 40	10	6.80	331.0488	331.1368	0.0000	22	22	22	22	384	1.966E-04	0.2366	0.11
								22	22	22	Average	1.963E-04	0.2363	
1	OM 48	10	16.00	331.1368	331.2664	0.1296	22	22	22	22	533	2.898E-04	0.3407	-0.26
2	OM 48	10	16.00	331.2664	331.3985	0.1301	22	22	22	22	533	2.909E-04	0.3501	0.13
3	OM 48	10	16.00	331.3965	331.5266	0.1301	22	22	22	22	533	2.909E-04	0.3501	0.13
											Average	2.905E-04	0.3496	
1	OM 55	10	30.00	331.5266	331.6952	0.1686	22	22	22	22	495	3.775E-04	0.4543	-0.08
2	OM 55	10	30.00	331.6952	331.8638	0.1686	22	22	22	22	495	3.775E-04	0.4543	-0.08
3	OM 55	10	30.00	331.8638	332.0328	0.1690	22	22	22	22	495	3.784E-04	0.4553	0.16
											Average	3.778E-04	0.4546	
1	OM 63	11	46.00	332.0328	332.2691	0.2363	22	22	22	22	445	4.817E-04	0.5797	-0.09
2	OM 63	10	46.00	332.2691	332.4842	0.2151	22	22	22	22	445	4.823E-04	0.5805	0.05
3	OM 63	10	46.00	332.4842	332.7206	0.2366	22	22	22	22	445	4.823E-04	0.5804	0.04
											Average	4.821E-04	0.5802	
1	OM 73	10	84.00	332.7208	333.0080	0.2872	22	22	22	22	381	6.464E-04	0.7779	-0.03
2	OM 73	10	84.00	333.0080	333.2958	0.2878	22	23	22	23	381	6.472E-04	0.7789	0.09
3	OM 73	10	84.00	333.2958	333.5834	0.2876	23	23	23	23	381	6.462E-04	0.7777	-0.06
											Average	6.466E-04	0.7782	

I certify that the above Orifice Set was calibrated in accordance with USEPA Methods, CFR 40 Part 60, Appendix A. Method 5, Item 7.2.2

Signature L PERKINS Date NOV 24 2003

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRE-TEST DRY GAS METER CALIBRATION

Client	Steel Dynamics, Inc.	Date Calibrated	12-01-03
Location	Butler, IN	Control Unit ID No.	507123
Project No.	04-T-247	Critical Orifice ID No.	OM40
Technician	T. Shackelford	Critical Orifice K' Factor	0.2363

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	420.658	422.360	424.360
Initial Reading	CF	419.100	420.800	422.800
Difference (Vm)	CF	1.558	1.560	1.560
Average Meter Temperature				
Initial	°F	70.0	71.0	72.0
Final	°F	71.0	71.0	72.0
Average (Tm)	°F	70.5	71.0	72.0
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H2O	0.28	0.28	0.28
Barometric Pressure (Pbar)	In. Hg	29.47	29.47	29.47
Ambient Temperature (Tamb)	°F	80.0	74.0	75.0
Pump Vacuum	In. Hg	16.1	16.0	16.1

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	1.529	1.529	1.526

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	1.498	1.507	1.505

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y, avg < 1.02Y$

=	0.980	0.985	0.986
Trial 1 -	0.96	0.98	1.00
Trial 2 -	0.97	0.98	1.01
Trial 3 -	0.97	0.98	1.01

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.729	1.708	1.708

RESULTS

Average DGM Y Factor	Unitless	0.984
Average DGM dH@	In. H2O	1.715
Average DGM K Factor	Unitless	2.942

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PRE-TEST DRY GAS METER CALIBRATION

Client	Steel Dynamics, Inc.	Date Calibrated	12-01-03
Location	Butler, IN	Control Unit ID No.	507123
Project No.	04-T-247	Critical Orifice ID No.	OM48
Technician	T. Shackelford	Critical Orifice K' Factor	0.3496

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	427.627	430.626	434.026
Initial Reading	CF	425.300	428.300	431.700
Difference (Vm)	CF	2.327	2.326	2.326
Average Meter Temperature				
Initial	°F	73.0	73.0	74.0
Final	°F	73.0	74.0	74.0
Average (Tm)	°F	73.0	73.5	74.0
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.65	0.65	0.65
Barometric Pressure (Pbar)	In. Hg	29.44	29.44	29.44
Ambient Temperature (Tamb)	°F	75.0	72.0	79.0
Pump Vacuum	In. Hg	16.0	15.9	16.5

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	1	2	3
	2.272	2.269	2.267

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	1	2	3
	2.225	2.231	2.217

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

=	1	2	3
	0.979	0.983	0.978
Trial 1 -	0.96	0.98	1.00
Trial 2 -	0.96	0.98	1.00
Trial 3 -	0.96	0.98	1.00

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times \Theta^2}{Pbar \times (Y \times Vm)^2}$$

=	1	2	3
	1.813	1.802	1.824

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Average DGM Y Factor	Unitless	0.980
Average DGM dH@	In. H20	1.813
Average DGM K Factor	Unitless	3.287

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PRE-TEST DRY GAS METER CALIBRATION

Client	Steel Dynamics, Inc.	Date Calibrated	12-01-03
Location	Butler. IN	Control Unit ID No.	507123
Project No.	04-T-247	Critical Orifice ID No.	OM55
Technician	T. Shackelford	Critical Orifice K' Factor	0.4546

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	438.648	442.048	445.346
Initial Reading	CF	435.600	439.000	442.300
Difference (Vm)	CF	3.048	3.048	3.046
Average Meter Temperature				
Initial	°F	74.0	75.0	75.0
Final	°F	75.0	75.0	75.0
Average (Tm)	°F	74.5	75.0	75.0
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	1.08	1.08	1.08
Barometric Pressure (Pbar)	In. Hg	29.44	29.44	29.44
Ambient Temperature (Tamb)	°F	74.0	75.0	78.0
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

	1	2	3
=	2.971	2.968	2.966

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

	1	2	3
=	2.896	2.893	2.885

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

	1	2	3
=	0.975	0.975	0.973
Trial 1 -	0.96	0.97	0.99
Trial 2 -	0.96	0.97	0.99
Trial 3 -	0.95	0.97	0.99

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

	1	2	3
=	1.777	1.779	1.789

RESULTS

Average DGM Y Factor	Unitless	0.974
Average DGM dH@	In. H20	1.782
Average DGM K Factor	Unitless	3.175

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PRETEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dynamics, Inc.	Control Unit ID No.	507123
Location	Butler, IN	Umbilical ID No.	EU-9
Project No.	04-T-247	Sample Probe ID No.	P8-2
Date	11-26-03	Filter Oven ID No.	1011
Auditor	B. Peyton	Filter Holder OTS ID No.	FH-1
Checked By	T. Shackelford	Impinger OTS ID No.	1-4

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
69	30	70	69	29	67	31

* Ice Bath

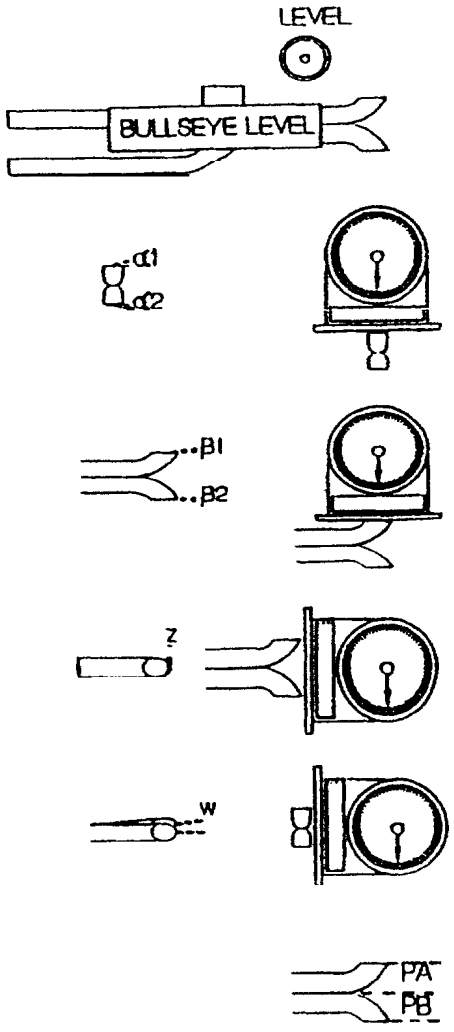
Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	0	0	0	-4	0
100 °F	97	96	98	95	97
200 °F	200	199	200	195	
300 °F	298	299	298	296	
400 °F	396	395	396	396	
500 °F	495				
600 °F	598				
700 °F	698				
800 °F	799				
900 °F	8971				
1000 °F	997				
1100 °F	1097				
1200 °F	1195				
1300 °F	1294				
1400 °F	1394				
1500 °F	1495				
1600 °F	1597				
1700 °F	1695				
1800 °F	1795				
1900 °F	1895				
2000 °F	1997				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot inspection Form



Pretest

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0.3°
$-10° < \alpha 2 < +10°$	0°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	0.4°
$\gamma =$	0.2°
$\theta =$	2.1°
$A =$	0.766"
$Z = A \sin \gamma \leq \frac{1}{8}"$	0.003"
$W = A \sin \theta \leq \frac{1}{32}"$	0.031"
$PA =$	0.384"
$PB =$	0.382"
Tube Dia. $(D_T) =$	0.375"
$P_A = P_B +/- (.083)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number P8-2 meets or exceeds dl specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calbration fector of 0.84. See 40 CFR *60*, Vol. 42, No. 160, EPA Method 2

Signature: [signature]

Date: 12-2-03

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Remarks
From Nozzle Opening, >0.75"	(Yes) / No	
Gas Line & *Stack* T/C, >0.75"	(Yes) / No	
"Z" Clear, Side to T/C, *2.0"*	(Yes) / No	
"W" Clear, Rear to T/C, 2.0"	(Yes) / No	
"Y" Clear to Union, *3.0"*	(Yes) / No	

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: Altek Industries Corp. Recommend Recalibration: Annually

Model Number K7100F Factory Calibration Date 9May00

Calibration Due _____ Calibration Technician _____

Serial N 10184805 In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The above signature for Altek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 USA
Declares that the equipment specified complies with standards EN50081-1 and EN50082-1.
The product complies with the essential requirements of the EMC Directive 89/336/EEC

916000-005 REV:A

Field Calibrations

996

G/SA , LTD. P.O. Box 807, Crown Point, IN 46308 Tel/Fax (219) 662-7037

METER ORIFICE CHECK, Yc

Client SDI
Project No. 04-T-247
Facility EAF BAGHOUSE
Project Site Columbia City, IN

Date 01/20/04
Control Unit ID No. 507123
Checked By A. PERDUE
Observed By

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	623.31		
Initial Reading	CF	615.70		
Difference (Vm)	CF	7.61		
Average Meter Temperature				
Initial	°F	57		
Final	°F	58		
Average (Tm)	°F	57.5		
Run Time	Minutes	10	10	10
Barometric Pressure (Pbar)	**In. Hg**	29.412		
DGM Y Factor	**Dimensionless**	0.979		
DGM Delta H@	In. H20	1.776		

CALCULATIONS

Trial 1 Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½
Yc = 10 / 7.61 [0.0319 (57.5 +460) / 29.412]½
Yc = 1.34 0.749

Where: 0.97Y < Yc < 1.03Y = 0.950 < 0.984 < 1.008

Trial 2 Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½
Yc = 10 / _____ [0.0319 (_____ +460) / _____]½
Yc =

Where: 0.97Y < Yc < 1.03Y = _____ < _____ < _____

Trial 3 Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½
Yc = 10 / _____ [0.0319 (_____ +460) / _____]½
Yc =

Where: 0.97Y < Yc < 1.03Y = _____ < _____ < _____

//Comments: *See* **Section** 4.4.1, Method 5, ***Appendix*** **A,** 40 CFR 60

Post-Test Calibrations

Post-Test Dry Gas Meter Calibration

Client:	STEEL DYNAMICS, INC.	Operator:	A. PERDUE	Calibrated By:	T. Shackelford
Project #:	G/SA 04-T-247	DGM #:	507123	DGM C Factor. Y:	0.979
Date(s) Used:	01/20/2004	Date Calibrated:	12/02/2003	DGM Delta H@:	1.77

Trial ##1

O, Total (Minutes):	60.0	DGM Sample Volume, Total (Ft³):	53.912
DGM Temperature, Average (°F):	67.5	Pbar (" Hg):	29.41
Delta H, Average (" H2O):	2.532	SGMW, Dry (Lb/Lb-Mole):	28.84

DGM Yqa* = **1.006**

Trial #2

O, Total (Minutes):	**60.0**	DGM Sample Volume, Total (FP):	53.825
DGM Temperature, Average (°F):	69.3	Pbar (" Hg):	29.41
Delta H, Average (" H2O):	2.509	SGMW, Dry (Lb/Lb-Mole):	28.84

DGM Yqa* = **1.005**

Trial #3

O, Total (Minutes):	60.0	DGM Sample Volume, Total (FF'):	54.270
DGM Temperature, Average (°F):	64.8	Pbar (" Hg):	29.41
Delta H, Average (" H2O):	2.571	SGMW, Dry (Lb/Lb-Mole):	28.84

DGM Yqa* = **1.005**

DGM Yqa, Average* = **1.006**

where:	**0.95Y**	<	**Yqa,** Avg.	<	**1.05Y**
inereiore:	**0.930**	<	**1.006**	<	**1.028**

'See EMTIC GD-026, Alternative Method 5 Post-Test Calibration

ALTERNATIVE METHOD 5 POST-TEST CALIBRATION

INTRODUCTION AND BACKGROUND

EPA Method 5 requires the calibration of the metering system after each field use. Because the post-test calibration requires the use of a spirometer or wet test meter, the calibration is often conducted in the laboratory. However, a field calibration procedure is highly desirable for two reasons: (1) it eliminates questions about the possibility of the damage to the metering system occurring during transport and (2) it eliminates travel costs for a retest if the metering system fails the post-test calibration.

The alternative post-test calibration procedure described below is based on the principles of the optional pretest orifice meter coefficient check in Section 4.4.1 of Method 5. Since the orifice meter coefficient check will not detect leakages between the inlet of the metering system and the dry gas meter, the alternative procedure includes two additional steps: (1) a leak check from either the inlet of the sampling train or the inlet of the metering system and (2) a leak check of that portion of the sampling train from the pump to the orifice meter.

PROCEDURE

The alternative to the post-test calibration in Section 5.3.2 of Method 5 is as follows:

After each test run, do the following:

1. Ensure that the metering system has passed the post-test leak-check. If not, conduct a leak-check of the metering system from its inlet,

2. Conduct the leak-check of that portion of the train from the pump to the orifice meter as described in Section 5.6 of Method 5.

3. Calculate Y_{qa} for each test run using the following equation:

$$Y_{qa} = \frac{\theta}{V_m}\sqrt{\frac{0.0319 T_m}{\Delta H_@ (P_b + \Delta \frac{H_{avg}}{13.6})}\frac{29}{M_d}}\ (\sqrt{\Delta H})_{avg}$$

where:

Y_{qa} = dry gas meter calibration check value, dimensionless.
θ = total run time, min.
V_m = total sample volume measured by dry gas meter, dcf.
T_m = absolute average dry gas meter temp., °R.
P_b = barometric pressure, in. Hg.
0.0319 = $(29.92/528)(0.75)^2$ (in. Hg/°/R) cfm^2.
Δh_{avg} = average orifice meter differential, in. H_2O.
$\Delta H@$ = orifice meter calibration coefficient, in. H_2O.
M_d = dry molecular weight of stack gas, lb/lb-mole.
29 = dry molecular weight of air, lb/lb-mole.
13.6 = specific gravity of mercury.

After each test run series, do the following:

4. Average the three or more Y_{qa}'s obtained from the test run series and compare this average Y_{qa} with the dry gas meter calibration factor, Y. The average Y_{qa} must be within 5 percent of Y.

5. If the average Y_{qa} does not meet the ±5 percent criterion, recalibrate the meter over the full range of orifice settings, as detailed in section 5.3.1 of Method 5. Then follow the procedure in Section 5.3.3 of Method 5.

REFERENCE

1. Roger T. Shigehara, P.G. Royals, and E.W. Steward, "Alternative Method 5 Post-Test Calibration", Entropy, Inc, contained in the EMTIC TSAR Library.

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

POST-TEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dynamics, Inc.	Control Unit ID No.	507123
Location	Butler, IN	Umbilical ID No.	U90-1
Project No.	04-T-247	Sample Probe ID No.	P8-2
Date	01-28-04	Filter Oven ID No.	1011
Auditor	B. Peyton	Filter Holder OTS ID No.	FH-I
Checked By	T. Shackelford	Impinger OTS ID No.	14

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
69	30	68	69	29	67	31

* Ice Bath

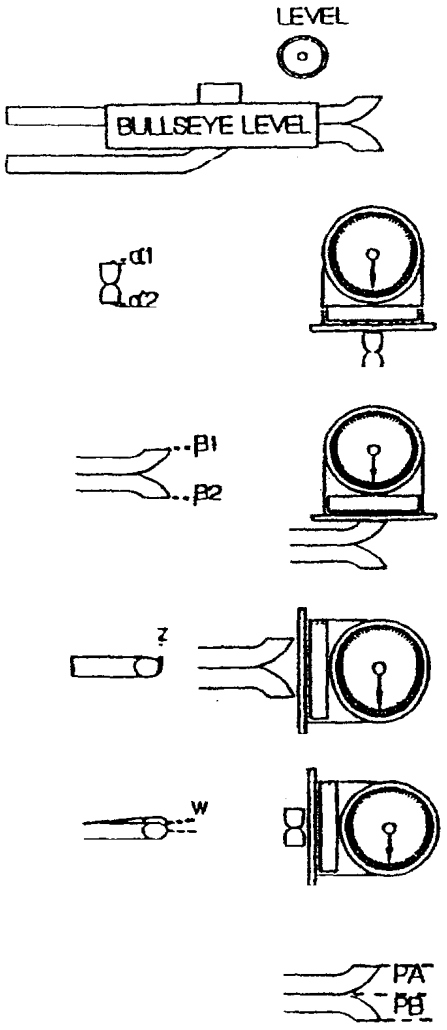
Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	0	0	0	-4	0
100 °F	97	98	97	95	97
200 °F	200	199	200	195	
300 °F	298	299	298	296	
400 °F	397	395	395	396	
500 °F	495				
600 °F	598				
700 °F	698				
800 °F	799				
900 °F	898				
1000 °F	998				
1100 °F	1098				
1200 °F	1195				
1300 °F	1297				
1400 °F	1393				
1500 °F	1495				
1600 °F	1597				
1700 °F	1695				
1800 °F	1794				
1900 °F	1895				
2000 °F	1997				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	k5.4 °F
Exit	±2.0 °F

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Post-test

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0.2°
$-10° < \alpha 2 < +10°$	-0.1°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	0.5°
$\gamma =$	0.2°
$\theta =$	0°
$A =$	0.765"
$Z = A \sin \gamma \leq \frac{1}{8}"$	0.002"
$W = A \sin \theta \leq \frac{1}{32}"$	0"
PA =	0.324"
PB =	0.326"
Tube Dia. (D_T) =	0.375"
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that **pitot tube/probe** number P8-2 **meets** or **exceeds specifications,** criteria and/or applicable design features and is hereby **assigned** a pitot tuba **calibration** factor of 0.84, See 40 CFR 60, Vol. 42, No. 160, EPA **Method** 2

Signature: [signature]

Date: 8-27-04

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Remarks
From Nozzle Opening, >0.75"	(Yes) / No	
Gas Line & Stack T/C, >0.75"	Yes / (No)	0.748"
"Z" Clear, Side to TIC, 2.0"	(Yes) / No	
"W" Clear, Rear to T/C, 2.V	(Yes) / No	
"Y" Clear to Union, 3.0"	(Yes) / No	

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: Altek Industries Corp. Recommend Recalibration: Annually

Model Number K7100F Factory Calibration Date 9 May 00

Calibration Due _____ Calibration Technician _____



Serial N 10184805 In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The above signature for Altek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 USA
Declares that the equipment specified complies with standards EN50081-1 and EN50082-1.
The product complies with the essential requirements of the EMC Directive 89/336/EEC

916000-005 REV:A

CONTROL UNIT #609198

Pretest Calibrations

APEX INSTRUMENTS METHOD 5 (M5CO-SET) ORIFICE SET CALIBRATION

Calibration Information	
Orifice Series	40-73
Serial Number	OM
Meter Gamma	0.99450

Calibration Conditions			
Date	Time	NOV. 24-03	2:24
Barometric Pressure		747.0	mm Hg
Theoretical Critical Vacuum[1]		352.6	mm Hg
Calibration Technician		LP	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
	0.386	K/mm Hg

[1]The Critical Orifice Coefficient, K', in English units, $(ft^3*°R^{1/2})/(in.Hg*min)$.
[2]The Critical Orifice Coefficient, K', in Metric units, $(m^3*K^{1/2})/(mmHg*min)$.

Calibration Data													Results		
			Reference Meter						Critical Orifice						
Run #	Orifice Number	Run Time Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Volume Total	Outlet Temp Initial	Outlet Temp Final	Amb Temp Initial	Amb Temp Final	Actual Vacuum	Coefficient Metric Units	Coefficient English Units	% Variation from Avg
		(Θ)	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	($t_{amb(i)}$)	($t_{amb(f)}$)		K'	K'	(<0.5%)
		min	mm H_2O	m^3	m^3	m^3	°C	°C	°C	°C	mm Hg	see above[1]	see above[2]	%
1	OM 40	10	6.80	330.8731	330.9610	0.0879	22	22	22	22	584	1.963E-04	0.2363	0.00
2	OM 40	10	6.80	330.9610	331.0488	0.0878	22	22	22	22	584	1.961E-04	0.2360	-0.11
3	OM 40	10	6.80	331.0488	331.1368	0.0880	22	22	22	22	3584	1.966E-04	0.2366	0.11
											Average	1.963E-04	0.2363	
1	OM 48	10	16.00	331.1368	331.2664	0.1296	22	22	22	22	533	2.898E-04	0.3487	-0.26
2	OM 48	10	16.00	331.2664	331.3965	0.1301	22	22	22	22	533	2.909E-04	0.3501	0.13
3	OM 48	10	16.00	331.3965	331.5266	0.1301	22	22	22	22	533	2.909E-04	0.3501	0.13
											Average	2.905E-04	0.3496	
1	OM 55	10	30.00	331.5266	331.6952	0.1686	22	22	22	22	495	3.775E-04	0.4543	-0.08
2	OM 55	10	30.00	331.6952	331.8638	0.1686	22	22	22	22	495	3.775E-04	0.4543	-0.08
3	OM 55	10	30.00	331.8638	332.0328	0.1690	22	22	22	22	495	3.784E-04	0.4553	0.16
											Average	3.778E-04	0.4546	
1	OM 63	11	46.00	332.0328	332.2691	0.2363	22	22	22	22	445	4.817E-04	0.5797	-0.09
2	OM 63	10	46.00	332.2691	332.4842	0.2151	22	22	22	22	445	4.823E-04	0.5805	0.05
3	OM 63	11	46.00	332.4842	332.7208	0.2366	22	22	22	22	445	4.823E-04	0.5804	0.04
											Average	4.821E-04	0.5802	
1	OM 73	10	84.00	332.7208	333.0080	0.2872	22	22	22	22	381	6.464E-04	0.7779	-0.03
2	OM 73	10	84.00	333.0080	333.2958	0.2878	22	23	22	23	381	6.472E-04	0.7789	0.09
3	OM 73	10	84.00	333.2958	333.5834	0.2876	23	23	23	23	381	6.462E-04	0.7777	-0.06
											Average	6.466E-04	0.7782	

I certify that the above Orifices Set was calibrated in accordance with USEPA Methods, CFR 40 Part 60, Appendix A, Method 5, Item 7.2.2

Signature L PERKINS Date NOV. 24 2003

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	Steel Dynamics, Inc.	Date Calibrated	01-08-04
Location	Butler. IN	Control Unit ID No.	609198
Project No.	04-T-247	Critical Orifice ID No.	OM40
Technician	A. Perdue	Critical Orifice K' Factor	0.2363

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	153.420	155.225	157.030
Initial Reading	CF	151.900	153.700	155.500
Difference (Vm)	CF	1.520	1.525	1.530
Average Meter Temperature				
Initial	°F	65.0	67.0	68.0
Final	°F	67.0	68.0	68.0
Average (Trn)	°F	66.0	67.5	68.0
Run Time **(O)**	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.25	0.25	0.25
Barometric Pressure (Pbar)	In. Hg	29.50	29.50	29.50
Ambient Temperature (Tamb)	°F	73.0	70.0	69.0
Pump Vacuum	In. Hg	15.8	15.8	15.8

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Trn + 460)}$$

=	1	2	3
	1.506	1.506	1.510

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	1	2	3
	1.510	1.514	1.515

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

	1	2	3
–	1.003	1.005	1.004
Trial 1 -	0.98	1.00	1.02
Trial 2 -	0.99	1.00	1.03
Trial 3 -	0.98	1.00	1.02

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1	2	3
	1.504	1.492	1.487

RESULTS

Average DGM Y Factor	Unitless	1.004
Average DGM dH@	In. H20	1.494
Average DGM K Factor	Unitless	2.233

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	Steel Dynamics, Inc.	Date Calibrated	01-08-04
Location	Butler, IN	Control Unit ID No.	609198
Project No.	04-T-247	Critical Orifice ID No.	OM48
Technician	A. Perdue	Critical Orifice K' Factor	0.3496

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	160.788	164.185	166.687
Initial Reading	CF	158.500	161.900	164.400
Difference (Vm)	CF	2.288	2.285	2.287
Average Meter Temperature				
Initial	°F	69.0	69.0	70.0
Final	°F	69.0	70.0	70.0
Average (Trn)	°F	69.0	69.5	70.0
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.57	0.57	0.57
Barometric Pressure (Pbar)	In. Hg	29.50	29.50	29.50
Ambient Temperature (Tarnb)	°F	69.0	69.0	68.0
Pump Vacuum	In. Hg	16.1	16.1	16.1

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	2.255	2.250	2.250

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	2.242	2.242	2.244

$$Y = \frac{Vcr.\ std}{Vm,\ std}$$

Where: $0.98Y < Y, avg < 1.02Y$

=	0.994	0.996	0.997
Trial 1 -	0.97	1.00	1.01
Trial 2 -	0.98	1.00	1.02
Trial 3 -	0.98	1.00	1.02

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times \Delta^2}{Pbar \times (Y \times Vm)^2}$$

=	1.580	1.579	1.574

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Average DGM Y Factor	Unitless	0.996
Average DGM dH@	In H20	1.578
Average DGM K Factor	Unitless	2.490

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PRETEST DRY GAS METER CALIBRATION

Client	Steel Dynamics, Inc.	Date Calibrated	01-08-04
Location	Butler, IN	Control Unit ID No.	609198
Project No.	04-T-247	Critical Orifice ID No.	OM55
Technician	A. Perdue	Critical Orifice K' Factor	0.4546

INPUT DATA

Dry Gas **Meter Parameters**	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	170.475	173.755	177.665
Initial Reading	CF	167.500	170.800	174.700
Difference (Vm)	CF	2.975	2.955	2.965
Average Meter Temperature				
Initial	°F	70.0	70.0	71.0
Final	°F	70.0	70.0	72.0
Average (Tm)	°F	70.0	70.0	71.5
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.98	0.98	0.98
Barometric Pressure (Pbar)	In. Hg	29.50	29.50	29.50
Ambient Temperature (Tamb)	°F	67.0	69.0	69.0
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	2.930	2.910	2.912

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)1/2}$$

=	2.921	2.915	2.915

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y, avg < 1.02Y$

=	0.997	1.002	1.001
Trial 1 -	0.98	1.00	1.02
Trial 2 -	0.98	1.00	1.02
Trial 3 -	0.98	1.00	1.02

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.601	1.607	1.603

RESULTS

Average DGM Y Factor	Unitless	1.000
Average DGM dH@	In. H20	1.604
Average DGM K Factor	Unitless	2.572

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dynamics, Inc.	Control Unit ID No.	609198
Location	Butler, IN	Umbilical ID No.	U-90-1
Project No.	04-T-247	Sample Probe ID No.	P8-1
Date	11-26-03	Filter Oven ID No.	1011
Auditor	F. Guenther	Filter Holder OTS ID No.	FH-1
Checked By	T. Shackelford	Impinger OTS ID No.	1-4

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
71	33	69	70	32	71	33

* Ice Bath

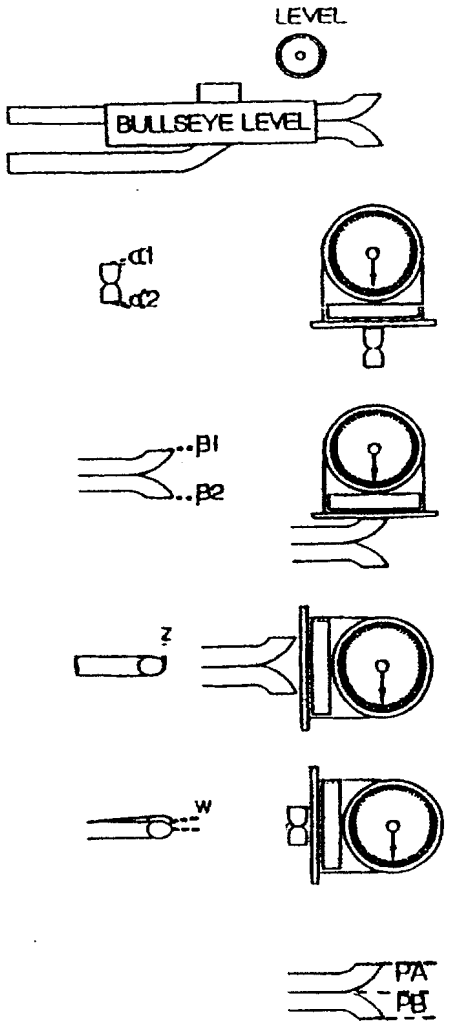
Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	1 °F	1	0	1	1
100 °F	98	99	98	98	98
200 °F	200	200	200	201	
300 °F	299	299	299	299	
400 °F	396	397	395	396	
500 °F	497				
600 °F	597				
700 °F	697				
800 °F	798				
900 °F	898				
1000 °F	997				
1100 °F	1096				
1200 °F	1197				
1300 °F	1294				
1400 °F	1395				
1500 °F	1492				
1600 °F	1592				
1700 °F	1693				
1800 °F	1790				
1900 °F	1891				
2000 °F	1993				
2100 °F	N.A.				

Tolerance Range

Stack	k1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	k5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot inspection Form



Pre test

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0.2°
$-10° < \alpha 2 < +10°$	0°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	1.3°
$\gamma =$	-0.5°
$\theta =$	0.1°
A=	0.[illegible]"
$Z = A \sin \gamma \leq \frac{1}{8}$"	0.
$W = A \sin \theta \leq \frac{1}{32}$"	0.001"
PA=	0.372"
PB=	0.374"
Tube Dia. (D_T) =	0.375"
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number P8-1 meats or **exceeds** all **specifications, criteria and/or applicable design features and is** hereby **assigned a pitot tube calbration factor** of 0.84. See 40 **CFR** *60,* **Vol. 42,** No. **160, EPA Method** 2

Signature: T. Blackford

Date: 12-2-03

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Remarks
From **Nozzle** Opening, >0.75"	(Yes) / No	
Gas Line & Stack T/C, >0.75"	(Yes) / No	
"Z" Clear, *Side* to T/C, *2.0"*	(Yes) / No	
"W" Clear, Rear to T/C, 2.0"	(Yes) / No	
"Y" Clear to Union. 3.W	No	

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: Altek Industries Corp. Recommend Recalibration: Annually

Model Number K2100F Factory Calibration Date 9May00

Calibration Due _____ Calibration Technician _____

Serial N 10184805 In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The abwe signature for Altek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 USA Declares that the equipment specified complies with standards EN50081-1 and EN50082-1. The product complies with the essential requirements of the EMC Directive 89/336/EEC

916000-005 REV:A

Field Calibrations

G/SA , LTD. P.O. Box 807, Crown Point, IN 46308 Tel/Fax (219) 662-7037

METER ORIFICE CHECK, Yc

Client	SDI	Date	1-20-04
Project No.	04-T-247	Control Unit ID No.	609198
Facility	EAF BAGHOUSE	Checked By	B. Ryton
Project Site	Columbia City, IN	Observed By	

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	576.12		
Initial Reading	CF	568.50		
Difference (Vm)	CF	7.62		
Average Meter Temperature				
Initial	°F	42		
Final	°F	43		
Average (Tm)	°F	42.5		
Run Time	Minutes	10	10	10
Barometric Pressure (Pbar)	In. Hg	29.412		
DGM Y Factor	Dimensionless	~~2.729~~ 0.996		
DGM Delta H@	In- H20	1.610		

CALCULATIONS

Trial 1 Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 101 7.62 [0.0319 (42.5 +460) / 29.412]½

Yc = 0.738

Where: 0.97Y < Yc < 1.03Y = .966 < .971 < 1.026

Trial 2 Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 101 _____ [0.0319 (_____ +460) / _____]½

Yc =

Where: 0.97Y < Yc < 1.03Y = _____ < _____ < _____

Trial 3 Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 10 / _____ [0.0319 (_____ +460) / _____]½

Yc =

Where: 0.97Y < Yc < 1.03Y = _____ < _____ < _____

comments: See Section 4.4.1, Method 5, Appendix A, 40 CFR 60

Post-Test Calibrations

Post-Test Dry Gas Meter Calibration

Client:	STEEL DYNAMICS, INC.	Operator:	A. Perdue	Calibrated By:	I. Shackeriord
Project #:	G/SA 04-T-247	DGM #:	609198	DGM C Factor, Y:	0.997
Date(s) Used:	01/20/2004	Date Calibrated:	01/08/04	DGM Delta H@:	1.6

Trial #1

O, Total (Minutes):	120.0	DGM Sample Volume, Total (Ft³):	91.376
DGM Temperature. Average ("F):	55.0	Pbar (" Hg):	29.41
Delta H, Average (" H2O):	1.649	SGMW, Dry (Lb/Lb-Mole):	28.90

DGM Yqa* = **0.996**

Trial #2

O, Total (Minutes):	120.0	DGM Sample Volume. Total (Ft'):	89.495
DGM Temperature, Average ("F):	61.0	Pbar (" Hg):	29.41
Delta H, Average (" H2O):	1.526	SGMW, Dry (Lb/Lb-Mole):	28.90

DGM Yqa* = **0.984**

Trial #3

O, Total (Minutes):	N.A.	DGM Sample Volume, Total (Ft³):	N.A.
DGM Temperature, Average ("F):	N.A.	Pbar (" Hg):	N.A.
Delta H, Average (" H2O):	N.A.	SGMW, Dry (Lb/Lb-Mole):	N.A.

DGM Yqa* = **ERR**

DGM Yqa, Average* = **0.990**

where:	**0.95Y**	<	Yqa, **Avg.**	<	**1.05Y**
inereiore:	***0.947***	<	**0.990**	<	**ï.ûâ7**

'See EMTIC GD-026, Alternative Method 5 Post-Test Calibration

ALTERNATIVE METHOD 5 POST-TEST CALIBRATION

INTRODUCTION AND BACKGROUND

EPA Method 5 requires the calibration of the metering system after each field use. Because the post-test calibration requires the use of a spirometer or wet test meter, the calibration is often conducted in the laboratory. However, a field calibration procedure is highly desirable for two reasons: (1) it eliminates questions about the possibility of the damage to the metering system occurring during transport and (2) it eliminates travel costs for a retest if the metering system fails the post-test calibration.

The alternative post-test calibration procedure described below is based on the principles of the optional pretest orifice meter coefficient check in Section 4.4.1 of Method 5. Since the orifice meter coefficient check will not detect leakages between the inlet of the metering system and the dry gas meter, the alternative procedure includes two additional steps: (1) a leak check from either the inlet of the sampling train or the inlet of the metering system and (2) a leak check of that portion of the sampling train from the pump to the orifice meter.

PROCEDURE

The alternative to the post-test calibration in Section 5.3.2 of Method 5 is as follows:

After each test run, do the following:

1. Ensure that the metering system has passed the post-test leak-check. If not, conduct a leak-check of the metering system from its inlet.

2. Conduct the leak-check of that portion of the train from the pump to the orifice meter as described in Section 5.6 of Method 5.

3. Calculate Y_{qa} for each test run using the following equation:

$$Y_{qa} = \frac{\theta}{V_m}\sqrt{\frac{0.0319 T_m}{\Delta H_@ (P_b + \Delta \frac{H_{avg}}{13.6})}\frac{29}{M_d}}\ (\sqrt{\Delta H})_{avg}$$

where:

Y_{qa} = dry gas meter calibration check value, dimensionless.
θ = total run time, min.
V_m = total sample volume measured by dry gas meter, dcf.
T_m = absolute average dry gas meter temp., °R.
P_b = barometric pressure, in. Hg.
0.0319 = $(29.92/528)(0.75)^2$ (in. Hg/°R) cfm^2.
ΔH_{avg} = average orifice meter differential, in. H_2O.
$\Delta H@$ = orifice meter calibration coefficient, in. H_2O.
M_d = dry molecular weight of stack gas, lb/lb-mole.
29 = dry molecular weight of air, lb/lb-mole.
13.6 = specific gravity of mercury.

After each test run series, do the following:

4. Average the three or more Y_{qa}'s obtained from the test run series and compare this average Y_{qa} with the dry gas meter calibration factor, Y. The average Y_{qa} must be within 5 percent of Y.

5. If the average Y_{qa} does not meet the ±5 percent criterion, recalibrate the meter over the full range of orifice settings, as detailed in Section 5.3.1 of Method 5. Then follow the procedure in Section 5.3.3 of Method 5.

REFERENCE

1. Roger T. Shigehara, P.G. Royals, and E.W. Steward, "Alternative Method 5 Post-Test Calibration", Entropy, Inc, contained in the EMTIC TSAR Library.

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

POST-TEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dynamics, Inc.	Control Unit ID No.	609198
Location	Butler, IN	Umbilical ID No.	EU-90
Project No.	04-T-247	Sample Probe ID No.	P8-1
Date	01-28-04	Filter Oven ID No.	1011
Auditor	B. Peyton	Filter Holder OTS ID No.	FH-1
Checked By	F. Guenther	Impinger OTS ID No.	1-4

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
69	32	67	68	32	69	32

• Ice Bath

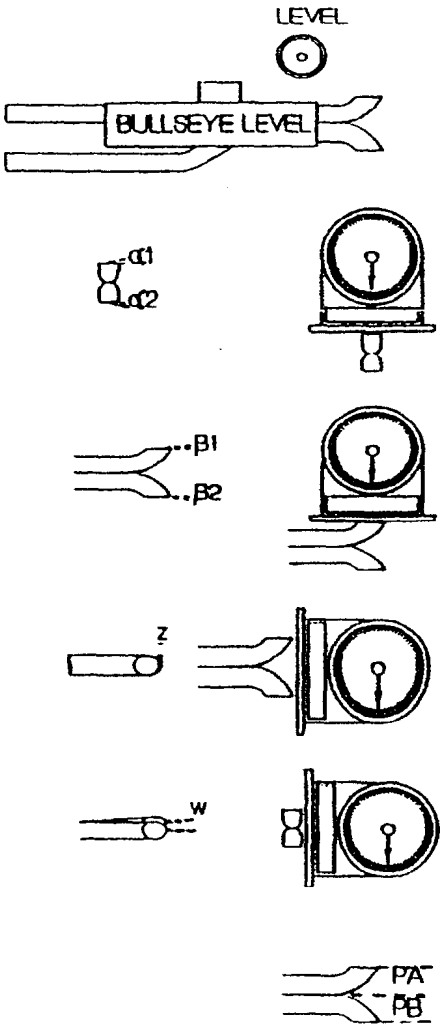
Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	-1	-1	-1	0	0
100 °F	100	99	97	97	97
200 °F	199	199	199	200	
300 °F	298	298	298	299	
400 °F	396	396	395	396	
500 °F	498				
600 °F	599				
700 °F	698				
800 °F	800				
900 °F	897				
1000 °F	999				
1100 °F	1101				
1200 °F	1197				
1300 °F	1298				
1400 °F	1396				
1500 °F	1498				
1600 °F	1599				
1700 °F	1698				
1800 °F	1798				
1900 °F	1900				
2000 °F	1999				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5 % Absolute
Probe	k5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

/INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Post-Test

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0°
$-10° < \alpha 2 < +10°$	0°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	1.5°
$\gamma =$	-0.5°
$\theta =$	0°
$A =$	0.750"
$Z = A \sin \gamma \leq \frac{1"}{8}$	0.007"
$W = A \sin \theta \leq \frac{1"}{32}$	0"
PA =	0.370"
PB =	0.380"
Tube Dia. (D_T) =	0.251"
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number PP-1 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84. See 40 CFR *60*, Vol. 42, No. 160, EPA Method *2*

Signature: T. Edmondson

Date: 4-27-04

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Remarks
From Nozzle Opening, >0.75"	(Yes) / No	
Gas tine & Stack T/C, >0.75"	(Yes) / No	
"Z" Clear, Side to T/C, 2.0"	(Yes) / No	
"W" Clear, Rear to T/C, 2.0"	(Yes) / No	
"Y" Clear to Union, 3.W	(Yes) / No	

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by. Altek Industries Corp. Recommend Recalibration: Annually

Model Number K 2100F Factory Calibration Date 9 May 00

Calibration Due _____ Calibration Technician _____

Serial N 10184805 In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The above signature for Altek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 U S A Declares that the equipment specified complies with standards EN50081-1 and EN50082-1. The product complies with the essential requirements of the EMC Directive 89/336/EEC

916000-005 REV:A

APPENDIX F

SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS

SAMPLE CALCULATIONS

EPA METHOD 13B

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 51202 (PM/CPM).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round-off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: STEEL DYNAMICS, INC. Project #: G/SA 04-T-247

Location: Electric Arc Furnace

Run #: 1

Total Sampling Time, min (Ø)	60.0
Average Process Charge Rate, TPH (Rp)	162.0
Stack Area, ft² (A)	312.2
Barometric Pressure, in. Hg (Pbar)	29.41
Static Pressure, in. H20 (Ps)	-0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.979
Nozzle Area, ft² (An)	0.000309
Metered Gas Volume, ft³ (Vm)	53.912
Average Meter Temperature, °F (Tm)	67.5
Stack Gas Temperature, °F (Ts)	139.8
Meter Orifice Pressure, in. H20 (dH)	2.532
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.914
Volume of H2O Collected, ml (Vlc)	13.2
% Carbon Dioxide (%CO2)	0.0
% Oxygen (%O2)	20.9
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Analyte Concentration, g (Mn)	0.2000
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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EPA Method 13B (Fluoride) Sample Calculations

Location:	Electric Arc Furnace	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 04-T-247

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 29.41 + (-0.3 ÷ 13.6)

Pa = 29.39

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 × Vlc

Vw, std = 0.04707 x 13.2

Vw, std = 0.621

Volume of Dry Metered Gas, Standard Conditions (DSCF):

Vm, std = (17.65 × Vm × Y × [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$\text{Vm, std} = \frac{\{17.65 \times 53.91 \times 0.979 \times [\,29.41 + (\,2.532 \div 13.6\,)\,]\}}{(\,67.5 + 460\,)}$$

Vm, std = 52.267

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 0.621 ÷ (52.27 + 0.621)

Bws = 0.012

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 × %CO2 + 0.32 × %02 + [0.28 × (%CO + %N2)]

Md = 0.44 × 0 + 0.32 × 20.9 + [0.28 × (0.0 + 79)]

Md = 28.84

EPA Method 13B (Fluoride) Sample Calculations

Location:	Electric Arc Furnace	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 04-T-247

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 × Bws + [Md × (1 - Bws)]

Ms = 18 × 0.01175 + [28.84 × (1 - 0.012)]

Ms = 28.71

Velocity of Stack Gas (FPS):

Vs = 85.49 × Cp × sqrt dP × sqrt [(Ts + 460) ÷ (Ms × Pa)]

$$Vs = 85.49 \times 0.84 \times 0.914 \times \sqrt{\left[\frac{(139.8 + 460)}{28.71 \times 29.39}\right]}$$

Vs = 55.3

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A × Vs × 60

Qa = 312.2 × 55.3 × 60

Qa = 1,036,661

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 × Qa × Pa × (1 - Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 1036661 \times 29.39 \times (1 - 0.012)]}{(139.8 + 460)}$$

Qstd = 885,956

Isokinetic Sampling (%):

%I = [0.0945 × Vm, std × (Ts + 460)] ÷ [Ø × Vs × Pa × An × (1 - Bws)]

$$\%I = \frac{[0.0945 \times 52.27 \times (139.8 + 460)]}{[60 \times 55.3 \times 29.4 \times 0.0003 \times (1 - 0.012)]}$$

%I = 99.4

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EPA Method 13B (Fluoride) Sample Calculations

Location:	Electric Arc Furnace	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 04-T-247

F Emissions Concentration (Gr/DSCF):

Gr/DSCF = .015435 × Mn ÷ Vm, std

Gr/DSCF = 1.5435E-002 × 0.2000 ÷ 52.27

Gr/DSCF = 0.00006

F Emissions Concentration (Lb/DSCF):

Lb/DSCF = Gr/DSCF ÷ 7000

Lb/DSCF = 0.0001 ÷ 7000

Lb/DSCF = 8.44E-009

F Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF × Qstd × 60

Lb/Hr = 8.44E-009 × 885956 × 60

Lb/Hr = 0.449

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 51202 (PM/CPM).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round-off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: STEEL DYNAMICS, INC. Project #: GISA 03-T-247

Location: Electric Arc Furnace

Run #: 1

Total Sampling Time, min (Ø)	120.0
Average Process Charge Rate, TPH (Rp)	171.4
Stack Area, ft² (A)	314.2
Barometric Pressure, in. Hg (Pbar)	29.41
Static Pressure, in. H20 (Ps)	-0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.997
Nozzle Area, ft² (An)	0.000259
Metered Gas Volume, ft³ (Vm)	91.376
Average Meter Temperature, °F (Tm)	55.0
Stack Gas Temperature, °F (Ts)	134.8
Meter Orifice Pressure, in. H20 (dH)	1.649
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.969
Volume of H2O Collected, ml (Vlc)	25.1
% Carbon Dioxide (%CO2)	0.5
% Oxygen (%O2)	20.4
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Analyte Concentration, g (Mn)	20.0000
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

EPA Method 101A (Mercury) Sample Calculations

Location:	Electric Arc Furnace	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 03-T-247

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 29.41 + (-0.3 ÷ 13.6)

Pa = 29.39

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 × Vlc

Vw, std = 0.04707 x 25.1

Vw, std = 1.181

Volume of Dry Metered Gas, Standard Conditions (DSCF):

Vm, std = (17.65 × Vm × Y × [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$\text{Vm, std} = \frac{\{17.65 \times 91.38 \times 0.997 \times [\,29.41 + (\,1.649 \div 13.6\,)\,]\}}{(\,55.0 + 460\,)}$$

Vm, std = 92.203

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 1.181 ÷ (92.20 + 1.181)

Bws = 0.013

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 × %CO2 + 0.32 × %O2 + [0.28 × (%CO + %N2)]

Md = 0.44 × 0.5 + 0.32 × 20.4 + [0.28 × (0.0 + 79)]

Md = 28.90

EPA Method 101A (Mercury) Sample Calculations

Location:	Electric Arc Furnace	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 03-T-247

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 × Bws + [Md × (1 - Bws)]

Ms = 18 × 0.01265 + [28.90 × (1 - 0.013)]

Ms = 28.76

Velocity of Stack Gas (FPS):

Vs = 85.49 × Cp × sqrt dP × sqrt [(Ts + 460) ÷ (Ms × Pa)]

$$Vs = 85.49 \times 0.84 \times 0.969 \times \sqrt{\left[\frac{(134.8 + 460)}{28.76 \times 29.39}\right]}$$

Vs = 58.4

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A × Vs × 60

Qa = 314.159 × 58.4 × 60

Qa = 1,100,372

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 × Qa × Pa × (1 - Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 1100372 \times 29.39 \times (1 - 0.013)]}{(134.8 + 460)}$$

Qstd = 947,443

Isokinetic Sampling (A):

%I = [0.0945 × Vm, std × (Ts + 460)] ÷ [Ø × Vs × Pa × An × (1 - Bws)]

$$\%I = \frac{[0.0945 \times 92.20 \times (134.8 + 460)]}{[120 \times 58.4 \times 29.4 \times 0.0003 \times (1 - 0.013)]}$$

%I = 98.4

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EPA Method 101A (Mercury) Sample Calculations

Location:	Electric Arc Furnace	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 03-T-247

Hg Emissions Concentration (Gr/DSCF):

Gr/DSCF = 1.5435E-005 × Mn ÷ Vm, std

GrlDSCF = 1.5435E-005 × 20.0000 ÷ 92.20

GrlDSCF = 0.0000033

Hg Emissions Concentration (Lb/DSCF):

LblDSCF = Gr/DSCF ÷ 7000

Lb/DSCF = 0.0000 ÷ 7000

LblDSCF = 4.78E-010

Hg Emissions Rate (Lb/Hr):

Lb/Hr = LblDSCF × Qstd × 60

Lb/Hr = 4.78E-010 × 947443 × 60

Lb/Hr = 0.027

NOMENCLATURE

NOMENCLATURE

acf	= actual cubic feet
acfm	= actual cubic feet per minute
A	= inside cross-sectional area of stack or duct (ft^2)
A_n	= inside cross-sectional area of sampling nozzle (ft^2)
%AM	= percent ash moisture content
Btu	= British thermal units
B_{ws}	= water vapor (moisture) in gas stream, proportion by volume
C	= mass conentration of effluent
C_a	= concentration of gaseous analyte (ppmv or %)
C_m	= average of initial and final bias check responses for upscale cal gases
C_{ma}	= actual concentration of upscale cal gases
C_o	= average of initial and final bias check responses for zero or low level cal gases
C_{oa}	= actual concentration of low level cal gases
C_p	= pitot tube coefficient (unitless)
C_s	= sample concentration
C_{s7}	= sample concentration corrected to 7% O_2
C_{s12}	= sample concentration corrected to 12% CO,
C_{s50}	= sample concentration corrected to *50%* excess air
$C_{s50/rga}$	= sample concentration corrected to *50%* excess air per raw gas analysis
CEM	= continuous emission monitor
$C_{(1+2)}$	= corrected TGNMO concentration for 1 trap and 2 tanks
%C	= percent carbon by weight, dry basis
%CO	= percent carbon monoxide by volume, dry basis
$\%CO_2$	= percent carbon dioxide by volume, dry basis
dcf	= dry cubic feet
dscf	= dry standard cubic feet
dscfm	= dry standard cubic feet per minute
dsm^3	= dry standard cubic meters
%EA	= percent excess air
F_d	= ratio factor of dry gas volume to heat value of combusted fuel (dscf/mmBtu)
fps	= feet per second
ft^2	= square feet
ft^3	= cubic feet
°F	= degrees Fahrenheit
G_{mfr}	= mass flow rate of stack gas (lb/hr)
gr	= grains
g	= grams
H_c	= heat of combustion, dry basis (Btu/lb)
hr	= hour
ΔH	= average orifice meter pressure differential (in. H_2O)
$\Delta H_@$	= orifice meter calibration factor (in. H_2O)

NOMENCLATURE, Continued

%H = percent hydrogen by weight, dry basis
%I = percent of isokinetic sampling
in. Hg = inches of mercury
in. H_2O = inches of water
lb = pounds
lbllb-mole = pound per pound-mole
m = thousand
mm = million
M_b = mass concentration of media blank
M_c = mass concentration of target analyte collected (mg, µg, ng or ppmC)
M_n = mass concentration of PM collected (g)
Mg = megagrams
Mg C = megagram of charge
Mg P = megagram of pour
µg = micrograms
meq = milliequivalents
mg = milligrams
ml = milliliters
MW = molecular weight of analyte (lb/lb-mole)
M_d = molecular weight of stack gas, dry basis (lbllb-mole)
M_s = molecular weight of stack gas, wet basis (lbllb-mole)
ng = nanograms
N = normality of barium perchlorate titrant (meq/ml)
%N = percent nitrogen by weight, dry basis
$%N_2$ = percent nitrogen by difference, dry basis
%O = percent oxygen by weight, dry basis
$%O_2$ = percent oxygen by volume, dry basis
pg = picograms
PW = process weight
ppmC = parts per million concentration equivalent
ppmv = parts per million by volume
P_l = particulate loading per heat input in lb/mmBtu per F_d constant
P_r = particulate loading per heat input in lb/mmBtu per F_d calculated
P_a = absolute stack gas pressure (in. Hg)
P_{bar} = barometric pressure at sampling site (in. Hg)
P_s = static stack gas pressure (in. H_2O)
ΔP = stack gas velocity head (in. H_2O)
$J\Delta P$ = average square root of stack gas velocity head (in. H_2O)
Q_a = volumetric stack gas flow rate at actual conditions (acfm)
Q_{std} = volumetric stack gas flow rate corrected to dry standard conditions (dscfm)
R_{gu} = natural or propane gas usage rate (mscfh)

NOMENCLATURE, Continued

R_{ho}	= stack gas density (lb/ft^3)
R_p	= process rate (tph)
std	= standard conditions at 29.92 in. Hg and 68°F
scf	= standard cubic feet
scfh	= standard cubic feet per hour
%S	= percent sulfur by weight, dry basis
T_m	= average dry gas meter temperature (°F)
T_s	= average stack gas temperature (°F)
TC	= ton of charge
TEQ	= toxicity equivalent
TGNMO	= total gaseous nonmethane organic
TP	= ton of pour
TPH	= tons per hour
TPW	= ton of process weight
V_a	= volume of sample aliquot titrated (ml)
V_{lc}	= total volume of liquid condensed in impingers and collected in silica gel (ml)
V_m	= total volume of dry metered gas (dcf)
$V_{m, std}$	= volume of dry metered gas corrected to standard conditions (scf)
V_s	= stack gas velocity (fps)
V_{soln}	= total volume of sample solution (ml)
V_t	= average volume of titrant used for sample titration (ml)
V_{tb}	= average volume of titrant used for blank titration (ml)
$V_{w, std}$	= volume of water vapor in sampled gas corrected to standard conditions (scf)
Y	= dry gas meter calibration (correction) factor (unitless)
θ	= total sampling time (minutes)

EQUATIONS

EQUATIONS

1) Absolute Stack Gas Pressure (in. Hg):

$$P_a = P_{bar} + (\pm P_s \div 13.6)$$

2) Volume of Water Vapor in Sampled Gas, Standard Conditions (scf):

$$V_{w,\,std} = 0.04707 \times V_{lc}$$

3) Volume of Dry Metered Gas, Standard Conditions (scf):

$$V_{m.\,std} = \{17.65 \times V_m \times Y \times [P_{bar} + (\Delta H \div 13.6)]\} \div (T_m + 460)$$

4) Moisture Fraction (unitless):

$$B_{ws} = V_{w.\,std} \div (V_{m,\,std} + V_{w,\,std})$$

5) Molecular Weight of Stack Gas, Dry Basis (lb/lb-mole):

$$M_d = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + [0.28 \times (\%CO + \%N_2)]$$

6) Molecular Weight of Stack Gas, Wet Basis (lb/lb-mole):

$$M_s = 18 \times B_{ws} + [M_d \times (1 - B_{ws})]$$

7) Velocity of Stack Gas (fps):

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P} \times \sqrt{[(T_s + 460) \div (M_s \times P_a)]}$$

8) Volumetric Stack Gas Flow Rate, Actual Conditions (acfm):

$$Q_a = A \times V_s \times 60$$

9) Volumetric Stack Gas Flow Rate, Dry Standard Conditions (dscfm):

$$Q_{std} = [17.65 \times Q_a \times P_a \times (1 - B_{ws})] \div (T_s + 460)$$

10) Isokinetic Sampling (%):

$$\%I = [0.0945 \times V_{m.\,std} \times (T_s + 460)] \div [\theta \times V_s \times P_a \times A, \times (1 - B_{ws})]$$

EQUATIONS, Continued

11) PM Concentrations:

$gr/dscf = 15.435 \times M_n \div V_{m,\,std}$

$lb/dscf = gr/dscf \div 7000$

$lb/hr = lb/dscf \times Q_{std} \times 60$

$lb/mmscf = lb/hr \div (R_{gu} \times 1E\text{-}03)$

$lb/tpw = lb/hr \div R_p$

$\mu g/Mg\ pw = lb/tpw \times 5.0E+08$

$lb/mmBtu = 20.9 \times lb/dscf \times F_d \div (20.9 - \%O_2)$

12) Flue Gas Density (lb/A^3):

$R_{ho} = 0.0458 \times M_s \times P_a \div (T_s + 460)$

13) Gas Mass Flow Rate (lb/hr):

$G_{mfr} = R_{ho} \times acfm \times 60$

14) Excess Combustion Air Per Raw Gas Analysis (%):

$$\%EA = \frac{[\%O_2 - (0.5 \times \%CO)]}{\{0.264 \times \%N_2 - [\%O_2 - (0.5 \times \%CO)]\}} \times 100$$

15) Ash Moisture Content (%):

$\%AM$ = (net loss after heating) × 100 ÷ (net loss after dying)

16) Target Analyte Concentrations:

$lb/dscf = mg \times 2.205E\text{-}06 \div V_{m,\,std}$

" $= \mu g \times 2.205E\text{-}09 \div V_{m,\,std}$

" $= ng \times 2.205E\text{-}12 \div V_{m,\,std}$

" $= pg \times 2.205E\text{-}15 \div V_{m.\,std}$

EQUATIONS, Continued

" $= ppmC \times V_{soln} \times 2.205E\text{-}09 \div V_{m,\,std}$

lb/hr $= lb/dscf \times Q_{std} \times 60$

17) TGNMO Concentrations:

$lb/dscf = mg\ C/dsm^3 \times 6.243E\text{-}08$

lb/hr $= lb/dscf \times Q_{std} \times 60$

18) TGNMO Concentration Correction for 1 Trap and 2 Tanks:

$$C_{(1+2)} = \frac{[conc.\ (1) \times \textbf{vol. sampled (1)}] + [conc.\ (2) \times \textbf{vol. sampled (2)}]}{[vol.\ \textbf{sampled (1) + vol. sampled} (2)]}$$

19) Collection Vessel/CEM Gaseous Analyte Concentrations:

$$lb/dscf = ppmv \times \frac{\textbf{Molecular Weight of Analyte.}\ lb/lb\text{-}mole}{\textbf{385.3}\ dscf/lb\text{-}mole \times 10^6}$$

lb/hr $= lb/dscf \times Q_{std} \times 60$

20) Sample Concentration Corrections:

12% CO_2 (lb/ft^3) -

$C_{s12} = C_s \times 12 \div \%CO_2$

7% O_2 (lb/ft^3) -

$C_{s7} = C_s \times (20.9 - 7) \div (20.9 - \%O_2)$

*50% **excess air** (lb/ft^3) -*

$C_{s50} = C_s \times (100 + \%EA) \div 150$

*50% **excess air per raw gas analysis** (lb/ft^3) -*

$C_{s50/rga} = C_s \div \{\mathbf{I - ((1.5 \times \%CO_2) - (0.13 \times \%N_2)} - (0.75 \times \%CO)] \div 20.9\}$

EQUATIONS, Continued

21) Weighted Analyte Concentrations Per Two Ducts:

$lb/dscf_{avg}$ = *(lb/dscf, duct 1 + lb/dscf, duct 2)* ÷ *2*

lb/hr_{total} = *lb/hr, duct 1 + lb/hr, duct 2*

$lb/mmbtu_{avg}$ = *(lb/mmbtu, duct 1 + lb/mmbtu, duct 2)* ÷ *2*

APPENDIX G

CORRESPONDENCE

ANALYTICAL DATA TRANSMITTAL

DATA CHEM LABORATORIES, INC.

AMENDED

Submitted To: Michelle LaLiberty
SAMI
7314 Egypt Rd.
Medina, OH 44256

Reference Data:	Mercury
Client Sample No.:	SDI Rl Container#1,1A through SDI Blank Container #1,1A
P.O. No.:	04-T-247
Sample Location:	G/SA 04-T-247
Sample Type:	Liquid
Method Reference:	EPA Method 101A
DCL Set ID No.:	04-S-0309
DCL Sample ID No.:	04-01649 through 04-01652
Sample Receipt Date:	01/23/2004
Preparation Date:	02/02/2004
Analysis Date:	02/03/2004

Sample condition was acceptable upon receipt except where noted.

The samples were prepared and analyzed in accordance with EPA method 101A using a CETAC Mercury Analyzer M-6000A.

The results are provided in the enclosed data table. Results relate only to the items tested and are not blank corrected unless indicated in the data table.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Stephanie Wilcox
Analyst

Reviewer

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Results
Mercury

AMENDED

Client #	Sample	DCL #	Volume (L)	µg/sample
SDI R1 Container#1	A1	04-01649 A1	0.600	4.0
SDI R2 Container#1	A1	04-01650 A1	0.575	16.
SDI R3 Container#1	A1	04-01651 A1	0.625	ND
SDI Blank Container#1	A1	04-01652 A1	0.600	ND
SDI R1 Container#1A	A2	04-01649 A2	0.225	7.8
SDI R2 Container#1A	A2	04-01650 A2	0.220	ND
SDI R3 Container#1A	A2	04-01651 A2	0.225	6.5
SDI Blank Container#1A	A2	04-01652 A2	0.225	ND
		Prep Blank		ND
% Recovery		LCS		97.
% Recovery		04-01649 A1 MS		124.
% Recovery		04-01649 A1 MSD		124.
RPL				2.0

ND = not detected at or above the reporting limit (RPL).
LCS = laboratory control sample.
MS/MSD = matrix spike/matrix spike duplicate.

Stephanie Wilcox
Analyst

Reviewer

04-S-0347

sami
SAMPLING & ANALYTICAL MANAGEMENT, INC.

318 North Harmony St.
Medina, Ohio 44256
(330) 723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Please Print. Instructions on reverse side correspond with circled numbers

Company Name: SAMI
Report Address:
Billing Address:
City: State: Zip:
Phone: Fax:
Report Attention: Michelle
Project Name: GSA 04-T-247
P.O. #: 04-T-247
Indicate state where samples were collected: IN
Compliance ☒ Non-Compliance ☐ (3)

(2) (4) (5) (6)

| | | |

GALBRAITH LABORATORIES, INC.

LABORATORY REPORT

Michelle Laliberte
SAMI

Report Date: 02/06/04
Lab I.D.: S-4620-4623

TECHNICAL INFORMATION:

Testing was performed according to EPA Method 136 as requested.

Authorized Release of Data

Jeffry L. Dillener, Technical Manager

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2323 Sycamore Drive
Knoxville, TN 37921-1750
TOLL FREE 877.449.8797

P.O. Box 51610
Knoxville, TN 37950-1610
FAX 865.546.7209

GALBRAITH LABORATORIES, INC.

LABORATORY REPORT

Michelle Laliberte
SAMI
7314 Egypt Rd
Medina OH 44256

Report Date: 02/06/04

Purchase Order #: 04-T-247

Fax Number 330-723-0645

SAMPLE ID	LAB ID	ANALYSIS	RESULT(S)	
SDI F R-1	S-4620	Fluorine	< 0.2	mg/L
SDI F R-2	S-4621	Fluorine	0.32	mg/L
SDI F R-3	S-4622	Fluorine	0.24	mg/L
SDI F Blank	S-4623	Fluorine	< 0.2	mg/L

H1

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Knoxville, TN 37921-1700
TOLL FREE 877.449.8797

P.O. Box 51610
Knoxville, TN 37950-1610
FAX 865.546.7209

TRANSMITTAL OF PROCESS DATA

Steel Dynamics, Inc.

Structural and Rail Division
2601 S. County Road 700 East
Columbia City, IN 46725

Ph. (260)625-8100
FAX (260)625-8950

January 22,2004

Guenther & Shackleford Associates
3915 West 106th Lane
Crown Point, IN 46307

Dear Fred:

Here are the heat sheets and baghouse data that you requested. Let me know if you need any more information.

Sincerely,

Kevin J. Bort
Engineering Manager

Subject: RE: Hg, F Production data
Date: Sat, 28 Feb 2004 09:43:51 -0500
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: Hg, F Production data
Thread-Index: AcPp1UsyXmASn9+4QJ+ftLrQRep7DwUM+K8w
From: <barry.smith@stld.com>
To: <guenther@mail.icongrp.com>,
<gsa1@myvine.com>
X-Alligate-In: Passed -Adult: 0 (Req: 18) Spam: 10 (Req: 18) Tot: 10 (Req: 22)
X-Alligate-QueueFile: 006509141.dta

Fred,

I understand that Kevin Bort forwarded the 1/20/2004 EAF Heat Record logs for inclusion in the stack test report. Based on the EAF Heat Record logs, here is the production data specifically for each run. (Tons produced)

Fluoride
Run 1 8:58 - 10:12 162.0 Tonslhour
Run 2 10:50 - 12:12 160.3 Tonslhour
Run 3 12:50 - 14:00 188.5 Tons/hour
170.3 Tonslhour average

Mercury
Run 1 8:45 - 10:58 171.4 Tonslhour
Run 2 12:12 - 14:25 177.4 Tonslhour
Run 3 14:30 - 16:35 120.9 Tonslhour
156.6 Tonslhour average

Barry Smith
Environmental Engineer
Steel Dynamics, Inc
4500 CR 59
Butler, IN 46721
(260) 868-8185
(260) 868-8058 fax
barry.smith@stld.com

EMISSIONS TEST PROTOCOL

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	Barry Smith
organization:	Steel Dynamics, Inc.
fax/phone:	(260) 868-8953 / (260) 868-8185
from:	Fred Guenther
date/time:	Thursday, December 18, 2003, 9:00 P.M. EST
subject:	Emissions Test Protocol - Steel Dynamics, Inc.
pages:	5 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTIAL ☐ PLEASE REPLY ASAP
comments:	Attached is the protocol documentation sent to IDEM today. This documentation does not include the RATA testing but can be added at a reasonable later date. Let me know at your earliest opportunity regarding the RATA testing. Please feel free to contact us regarding any questions that you may have on this submission.

If there is any difficulty with this transmission, please call the number below.

P.O. Box 807 • Crown Point, IN 46308-0807

TEL: (219) 661-9900

FAX: (219) 661-9902

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	David Cline
organization:	Indiana Department of Environmental Management
faxlphone:	(317) 233-5967 / (317) 233-5668
from:	Fred Guenther
date/time:	Thursday, December 18, 2003, 9:00 P.M. EST
subject:	Emissions Test Protocol - Steel Dynamics, Inc.
pages:	4 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTIAL ☐ PLEASE REPLY ASAP
comments:	Attached please find an emissions test protocol for the testing of the EAF at Steel Dynamics, Inc.'s plant in Columbia City, Indiana. The testing has been scheduled for request to extend the time to submit the final report for January 20, 2004. Please feel free to contact us regarding any questions that you may have on this submission.

If there is any difficulty with this transmission, please call the number below.

P.O. Box 807 • Crown Point. IN 46308-0807

TEL: (219) 661-9900

FAX: (219) 661-9902

GUENTHER / SHACKELFORD ASSOCIATES
ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS
P. O. Box 807 * Crown Point, Indiana 46307 * (219) 662-7037 / FAX (219) 662-7037

December 18,2003

Mr. David Cline
Compliance Data Section
Compliance Branch
Office of Air Management
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, IN 46206

RE: **TRANSMITTAL OF EMISSIONS TEST PROTOCOL**
Steel Dynamics, Inc.
Columbia City, IN
CP 183-10097 / Plt. ID 183-00030

Dear Mr. Cline:

On behalf of Steel Dynamics, Inc., we are providing a revised protocol for the emissions testing of the baghouse outlet on the Electric Arc Furnace (EAF) located in Columbia City, Indiana. This protocol a5s submitted in response to our discussion of this date. The testing has been scheduled for the period August 1,2003.

Please note the following regarding the RATA testing. The RATA testing is proposed to be performed on one capacity condition, i.e., maximum capacity since this emissions facility is not expected to be regularly operated under any kind of reduced capacity conditions.

Should you have any questions pertaining to the attached protocol, please feel free to contact me at (219) 663-5394.

Sincerely,
Guenther/Shackelford Associates

Fred H. Guenther

Attachments:
RATA Notification Protocol One Page

Compliance Test Protocol
Indiana Department of Environmental Management
Office of Air Management/Compliance Data Section
100 N Senate, POB 6015
Indianapolis, IN 46206-6015
Phone: 317/232-8338 Fax: 317/233-6865

Date Prepared: 12/18/03 Proposed Test Date: 08120104 Plant Address: 2601 S. County Road 700 E. Plant Locntion: Columbia City, IN 46725

1. Source Info ID. No.: 183-00030 Permit No.: CP183-10097

Company: Steel Dynamics, Inc.

Mail Address: 2601 S. County Rd 700 E Mail City: Columbia City, IN 46725

Company Contact: Brad Brown Phone: (260) 625-8852

Check applicable program:

FESOP: _____ Title V: _____ SSOA: _____

Other: Construction Permit

AGENCY USE ONLY Date Received: _____

Inspector: _____ Reviewer _____ Approval Date. _____

Other permit conditions: (use back if needed)

2. Tester Information

Name: Guenther/Shackelford Associates

Address: P.O. Box 807, Crown Point, IN 46308

Contact: Fred H. Guenther Phone: (219) 663-5394

5. a. Describe any deviations from standard test method. None

b. Describe method used to determine operating level. Furnace Charge

6. SAMPLE SITE LOCATION

Number of sample points for M5: 24

Diameter at sample site: 20 height: 135 Ft.

Does Sample port location meet 40 CFR 60, Appx. A, Method 1, Sec 1.2 requirements: Y_x__ N ___ If no, explain.

Appx. Stack gas flow (ACFM):	850.000
Appx. Stack gas temp (deg. F):	200
Appx Stack gas moisture (%):	– 1%

3. Process Information (List each piece of equipment to be tested on separate form.)

Unit to Test. Electric Arc Furnace

Max. Rated Capacity: 200 T/Hr. (2 Furnace Total)

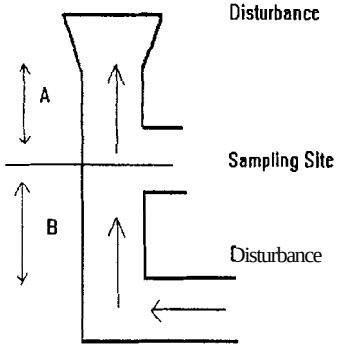
Proposed Operating Speed: Maximum Capacity

Poll Control Equipment: Baghouse (PM), DSE (CO) Low NOx Burner (NOx)

Process Description: The EAF is composed of one twin shell furnaces with a combined rated capacity of 400 tons per hour. The furnaces produce molten metal using scrap metal and an electric arc.

Fuel Type: /A

To Be Determined



Distance A _____

Distance B _____

4. Test Information: (Use back if needed)	No. Runs	Time/Run
Method 1-4:	3	2 Hr.
Method 29:		
Method 101A :Hg	3	2 Hr.
Method 29 :		
Method 13B: F	3	1 Hr.
Other :		

Reason for Test
Operating Permit: Yes No X
Construction Permit: Yes X No
State Agreed Order : Yes No X
Compliance w/326 IAC NSPS 40 CFR 60 Subpart__AAa___Other
Title V: Yes No
Other (i.e. EPA, CD, State, 114): _____

326 IAC 3-2.1 requires this completed form to be submitted 35 days prior to proposed test date to above address. 326 IAC 2-1-7 (a)(b) requires any test fee to be submitted with the protocol. (F NOT APPLICABLE IF PROGRAM IS FESOP. TITLE V OR TESTING VE's ONL

EPA METHOD 101A

✓ 40.2

Indiana Air Permit Compliance Testing

Steel Dynamics, Inc.

Columbia City, Indiana

Report on:
Lead

Performed by:

ΔAir Analysis, Inc.
Project Number: 319
June 13,2005

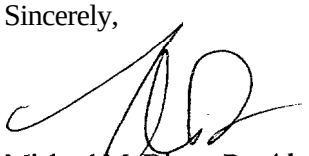
ΔAir Analysis, Inc.
3904 Clarks **Creek** Road ▪ Plainfield, Indiana • 46168
317.837.8514
877.683.TEST

ΔAir Analysis, Inc.
3904 Clarks Creek Road • Plainfield, Indiana 46168
Tel. 317 837-8514 Fax. 317 837-8518

Certification Page

Air Analysis, Inc. represents that the information provided in this report is true and accurate. We at Air Analysis, Inc. strive to remain true to our mission, that the people involved are people of integrity, the data accurate, and the reporting timely.

Sincerely,



Michael M. Dicen, President
Air Analysis, Inc.

Date: 7-6-05

TABLE OF CONTENTS

1. Executive Summary (Page **3)**
Test Summary, Table 1

2. Results (Page **4)**
Lead Emissions, Table 2

3. Description of Processes and Field Notes (Page 5)

4. Methodology (Page 6)
Summary of Sampling Procedures
Description of Sampling Methods

APPENDIX

SAMPLE CALCULATIONS	I
FIELD DATA PRINTOUTS	II
FIELD DATA	III
LABORATORY DATA	IV
CHAIN OF CUSTODY	V
CALIBRATION DATA	VI
SUBMITTED PROTOCOL	VII
PRODUCTION DATA	VIII

△Air Analysis, Inc.

Steel Dynamics Structural & Rail Division
Project Number: 319

Executive Summary

Air Analysis, Inc. was contracted by Steel Dynamics Inc. - Structural and Rail Division to perform air emissions sampling of the Electric Arc Furnace baghouse exhaust stack during steel production in Columbia City, Indiana on June 13, 2005. The objective of the test program was to determine compliance with Indiana air permit requirements. Sampling was performed for lead. The following personnel were involved with the testing program:

Air Analysis	Mike Dicen
Air Analysis	Marcus Allen
IDEM	Doug VanDeMark
SDI	Bill Bougher

The testing program was performed utilizing US EPA Method 12. Three sets of two-hour test runs were performed on June 13, 2005 and the average of the three runs is listed below.

Test Summary

Table I

Date	Source	Time	Pollutants	Mass Emissions	
06/13/05	EAF Baghouse Exhaust Stack	7:16 – 14:32	Lead	0.016 (lbs/hr)	

* Indiana Air Permit Lead Limit: 0.144 lbs/hr

Results

Lead Test Conditions

Table 2

Gas Conditions		1	2	3	Avg
Ts	Stack Temperature	174	194	191	186
Bwo	Moisture (volume %)	1.3	1.1	0.9	1.1
0 2	Oxygen (dry volume %)	21	21	21	21
C02	Carbon Dioxide (dry volume %)	0	0	0	0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1,007, 899	1,005,698	931,732	981,776
Qstd	Standard Conditions (dscfm)	826, 874	802,104	747,522	792, 167
Pollutant Results					
Ec E(me)	Emission Rate, (gr/dscf) Emission Rate, (lbs/hr) Lead	2.807E-06 0.020	2.322E-06 0.016	1 903E-06 0.012	2.344E-06 0.016

Description of Source Processes and Field Notes

Steel Dynamics, Inc. operates a mini-steel mill in Columbia City, Indiana.

Electric Arc Furnace Description

Steel Dynamics, Inc. operates an electric arc furnace with a nominally rated capacity of 200 tons of scrap steel per hour and utilize a direct-shell evacuation control (DEC) system, an overhead roof exhaust system consisting of a capture system consisting of a segmented canopy hood, scavenger duct, and cross-draft partitions.

Methodology

The sampling procedures used by Air Analysis, Inc. are as follows:
Title 40 CFR Part 60 Appendix A
Method 1 "Sampling of Velocity Traverses for Stationary Sources"
Method 2 "Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3 "Gas Analysis for the Determination of Molecular Weight"
Method 4 "Determination of Moisture Content in Stack Gas"
Method 12 "Determining of Lead"

SAMPLE POINT DETERMINATION-EPA METHOD 1
Sampling point locations were determined according to EPA Reference Method 1.

Sampling Points

Locations	Dimensions	Ports	Points Per Port	Total Points
EAF	239.26" ID	4	6	24

** Exact measure points and distances to disturbances are listed in Appendix-? Field Data

VELOCITY AND VOLUMETRIC FLOW RATE – EPA METHOD 2
EPA Method 2 was used to determine the gas velocity and flow rate at the stack. Figure 4-2 includes the components of the EPA Method 2 sampling apparatus. Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the Method 1 determined traverse points. The velocity pressures were measures with a Type S pitot tube. Gas temperature measurements made with a Type K thermocouple and digital pyrometer.

GAS COMPOSITION AND MOLECULAR WEIGHT – EPA METHOD 3
In order to determine the oxygen and carbon dioxide concentrations, a sample of gas was obtained and analyzed in accordance with EPA Method 3. The gas sample was collected using a Fyrite analyzer. The results were used to determine gas molecular weight.

MOISTURE CONTENT – EPA METHOD 4
The flue gas moisture content at the testing locations was determined in accordance with EPA Method 4. Figure 4-2 includes the Method 4 sampling components. The gas moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorption. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

LEAD DETERMINATION – EPA METHOD 12
Stack gas is withdrawn isokinetically and particulatellead matter is collected on the nozzle, probe and filter and a 0.1 N nitric acid solution. The probe temperature and filter are maintained at temperatures of 248 degrees F (+/- 25 deg. F). The impinger temperature and exit gas is maintained at temperatures at or below 68 degrees F. The nozzle, probe and glass filter containers along with the nitric acid solutions in the impinger sets are rinsed with nitric acid is stored in a sealed glass container.

APPENDIX I SAMPLE CALCULATIONS

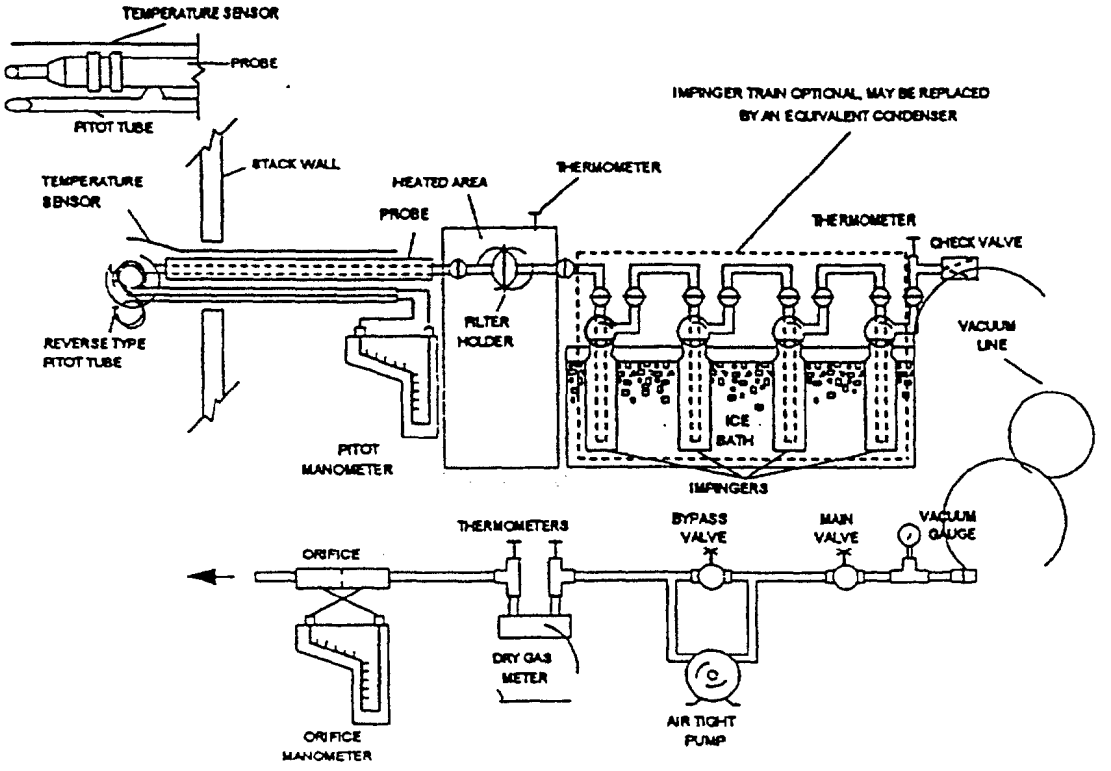


Figure 51. Metals & Particulate Sampling Train

SAMPLE CALCULATIONS

The tables presenting the results are generated electronically from n w data. It may *not* be possible *to* exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

1. Volume of water collected (wscf)

$$V_{wstd} = (0.04707)(V_{lc})$$

Where:

V_{lc}	total volume of liquid collected in impingers and silica gel (ml)
V_{wstd}	volume of water collected at standard conditions (ft^3)
0.04707	conversion factor (ft^3/ml)

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd} = \frac{(17.64)(V_m)(P_{baro} + \frac{\Delta H}{13.6})(\gamma_d)}{(460 + T_m)}$$

Where:

P_{baro}	barometric pressure (in Hg)
T_m	average dry gas meter temperature ("F)
V_m	volume of gas sample through dry gas meter at meter conditions (ft^3)
V_{mstd}	volume of gas sample through dry gas meter at standard conditions (ft^3)
Y_d	gas meter correction factor (dimensionless)
DH	average pressure drop across meter box orifice (in H_2O)
17.64	conversion factor (°R/in Hg)
13.6	conversion factor (in H_2O/in Hg)
460	°F to °R conversion constant

3. Sample gas pressure (in Hg)

$$P_s = P_{baro} + (\frac{P_g}{13.6})$$

Where:

P_{barm}	barometric pressure (in Hg)
P_g	sample gas static pressure (in H_2O)
P_s	absolute sample gas pressure (in H_2O)
13.6	conversion Factor (in H_2O/in Hg)

4. Actual vapor pressure (in Hg)

$$P_v = P_s$$

Where:

P_v	vapor pressure, actual (in Hg)
P_s	absolute sample gas pressure (in Hg)

5. Moisture Content (%)

$$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
V_{wstd}	volume of water collected at standard conditions (ft^3)

6. Saturated moisture content (%)

$$B_{ws} = \frac{(P_v)}{(P_s)}$$

Where:

B_{ws}	proportion of water vapor in gas stream by volume at saturated conditions (%)
P_v	vapor pressure, actual (in Hg)
P_s	absolute sample gas pressure (in Hg)

7. Molecular weight of dry gas stream (lb/lb-mole)

$$M_d = M_{CO2}\frac{(CO2)}{(100)} + M_{O2}\frac{(O2)}{(100)} + M_{CO+N2}\frac{(CO+N2)}{(100)}$$

Where:

Md	dry molecular weight of sample gas (lb/lb-mole)
M_{CO2}	molecular weight of carbon dioxide (lb/lb-mole)
M_{O2}	molecular weight of oxygen (lb/lb-mole)
M_{CO+N2}	molecular weight of carbon monoxide and nitrogen (lb/lb-mole)
CO_2	proportion of carbon dioxide in the gas stream by volume (%)
O_2	proportion of oxygen in the gas stream by volume (%)
CO + N,	proportion of carbon monoxide and nitrogen in gas stream by volume (%)
100	conversion factor, %

8. Molecular weight of sample gas (lb/lb-mole)

$$M_s = (M_d)(1 - B_{ws}) + (M_{H_2O})(B_{ws})$$

Where:

Md	dry molecular weight of sample gas (lb/lb-mole)
B_{ws}	proportion of water vapor in the gas stream by volume
M_{H2O}	molecular weight of water (lb/lb-mole)
Ms	molecular weight of sample gas, wet basis (lb/lb-mole)

9. Velocity of sample gas (ft/sec)

$$V_s = (K_p)(C_p)(\sqrt{\Delta p})\sqrt{\frac{(t_s + 460)}{(M_s)(P_s)}}$$

Where:

Kp	velocity pressure coefficient (dimensionless)
Cp	pitot tube constant
Ms	molecular weight of sample gas, wet basis (lb/lb-mole)
Ps	absolute sample gas pressure (in. Hg)
t_s	average sample gas temperature (°F)
Vs	average sample gas velocity (ft/sec)
460	°F to °R conversion factor

10. Total flow of sample gas (acfm)

$$Q_s = (60)(A_s)(V_s)$$

Where:

As	cross section area of sampling location (ft^2)
Qs	volumetric flow rate at actual conditions (acfm)
VS	sample gas velocity (ft/sec)
60	conversion factor, seconds to minutes

11. Total flow of sample gas (dscfm)

$$Q_{std} = \frac{(Q_a)(P_s)(17.64)(1 - B_{wo})}{(t_s + 460)}$$

Where:

Bwo	proportion of water vapor in the gas stream by volume
Ps	absolute sample gas pressure (in. Hg)
Qa	volumetric flow rate at actual conditions (acfm)
Qstd	volumetric flow rate at standard conditions (dscfm)
t_s	average sample gas temperature (°F)
17.64	conversion factor, (°R/in.Hg)
460	°F to °R conversion Factor

12. Total flow of sample gas (dscfh)

$$Q_{std/hr} = [\frac{(Q_a)(P_s)(17.64)(1 - B_{wo})}{(t_s + 460)}](60)$$

Where:

Bwo	proportion of water vapor in the gas stream by volume
Ps	absolute sample gas pressure (in. Hg)
Qa	volumetric flow rate at actual conditions (acfm)
Qstd/hr	volumetric flow rate at standard conditions (dscfmx60)
t_s	average sample gas temperature ("F)
17.64	conversion factor, (°R/in.Hg)
460	°F to °R conversion factor

13. Percent Isokinetic (%)

$$I = \frac{(0.09450)(T_s)(V_{mstd})}{(P_s)(V_s)\left(\frac{(D_n)^2(\pi)}{(144)(4)}\right)(\theta)(1-B_{wo})}$$

Where:

Dn	diameter of nozzle, inches
Bwo	proportion of water vapor int he gas stream by volume
I	percent of isokinetic sampling (%)
Ps	absolute sample gas pressure (in. Hg)
T_s	average sample gas temperature (°R)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
v s	average sample gas velocity (ft/sec)
9	total sample time, minutes
0.09450	constant

14. Pollutant concentration (gr/dscf)

$$C_{gr/dscf} = \frac{(15.43)(m_n)}{V_{mstd}}$$

Where:

$C_{gr/dscf}$	measured concentration in gas stream, gr/dscf
Mn	pollutant collected, corrected for reagent blank, grams
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
15.43	conversion factor, grams to grains

15. Pollutant Emissions, Mass Emissions Rate lbs/hr

$$E_{lbs/hr} = \frac{(\mu g_{HCl})(2.2046e-9)(Q_{std})(60)}{(V_{std})}$$

Where:

$E_{lbs/hr}$	Mass emissions rate, pounds per hour
µg pollutant	micrograms of pollutant emissions
Q_{std}	volumetric flow rate at standard conditions, dry basis (dscfm)
V_{std}	Volume Standard conditions
2.2046e-9	conversion factor, pounds per microgram
60	conversion factor, minutes per hour

16. Dioxin/Furan Emission Rate, lb/ton *(Compliance Determination)*

$$E_{lb/ton} = \frac{(C_{gr/dscf} X Q_{std/hr} X K_1)}{(P_{ton/hr})}$$

Where:

$E_{lbs/ton}$	Mass emissions rate, pounds per ton
$C_{gr/dscf}$	grain concentration of pollutant emissions
Qstd/hr	volumetric flow rate at standard conditions, dry basis (dscfh)
K_1	conversion factor, 1 lb/7000 grains
$P_{ton/hr}$	production rate tons per hour

17. Dioxin/Furan Emission Rate, µg/Mg *(Compliance Determination)*

$$E_{\mu g/Mg} = \frac{(E_{lbs/ton})(0.4536)(10^9)}{(0.907)}$$

Where:

$E_{\mu g/Mg}$	Mass emissions rate, microgram per megagram
$E_{lbs/ton}$	Mass emissions rate, pounds per ton
0.4536	conversion factor, kilograms per pound
10^9	conversion factor, micrograms per kilogram
0.907	conversion factor, tons per megagram

APPENDIX II FIELD DATA PRINTOUTS

STACK EMISSION SUMMARY

SOURCE TESTED: EAF Stack
COMPANY NAME: Steel Dynamics Structural/Rail Div.
DATE OF TEST: 06/13/05

Lead Emissions	Run 1	Run 2	Run 3	Average
Filterable (gr/dscf)	2.80739806	2.3223E-06	1.90267E-06	2.34412E-06
Fitterable (lbs/hr)	0.020	0.016	0.012	0.010
Avg. Stack Vol. Flow Rate				
ACFM	10078991	1005698	931732	981776
DSCFM	8268741	8021041	747523	792167
Avg. Stack Temp.	174	194	191	186
Stack Gas Velocity	54	54	50	52
Avg. Velocity Head	0.761	0.73	0.631	0.71
Avg. Sq. Rt of Delta P	0.871	0.86	0.791	0.84
	ISOKINETIC TESTING SUMMARY			
%Isokinetics:	101	1021	1031	102
Allowable isokinetic 90-110%				
% Moisture of Stack Gas	1.33%	1.10%	0.93%	1.12%
Sample Volume	62	61	57	60

Lead Limit : 0.144 lbs/hr

COMPANY NAME: Steel mi
LOCATION: Columbia Cit
SOURCE TESTED: EAF
DATE OF TEST: 06113105
RUN No.: 1
lead

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	0
%02	21
Md	28.84

Volume of Water Vapor Collected @ STD. COND., Vwv

Vlc	17.8
Vw(std)	0.837

Volume of Dry Gas *Collected* @ STD. COND., Vm(std)

Tm(F)	77.938
Vm	55.737
Pb(inches Hg)	29.800
delta H	0.845
gamma	0.961
Vm(std)	62 107

Moisture Content of Stack Gas, Bwo

Bwo	1.33%
1-Bwo	98.67%

Molecular Weight of Stack Gas, Ms

Ms	28.70

Area of Stack (enter diameter in inches). As

Depth-in	o
Width-in	0
diameter	239.26
No. of Stacks	1
As(L*W)	0
As(dia.)	312.2246729

Static Pressure, Ps

Static	(0.500)
Ps	29.76

Stack Gas Velocity, Vs, fps

Cp	0.64
sqr(delta p)	0.870
Ts	173 958
Vs	53.802

Stack Gas Flowrate, Qs, acfm

As	312.2246729
Qs	1007899

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd.

Qstd.	826873.87

Velocity at the Nozzle, Vn

Dia. of Nozzle	0.18S	An(nozzle):	0.000193
Time of Run	120		
Vn	54.56		

% Isokinetic, %I

%I	101.41

% Isokinetic measured from intermediate values

%I	101.80

Pollutant Mass Emission Rate, PMR, lbs./hr.

Mn	0.0000113
PMR	0.0199

Filterable

Grains per a d

gr/acf	=	0.0000

Grains per dscf

gr/dscf	=	0.0000

FIELD DATA

K - Factor = 1.10

Start Time	7:16
Stop Time	9:27

Run 1	Delta P	Square Delta P	Volume	Delta H	Stack Temp	DGM	DGM
1	1.100	1.049		**1.210**	159	80	78
2	1.000	1.000		**1.100**	162	81	78
3	0.600	0.775		**0.660**	167	80	78
4	0.600	0.775		**0.660**	187	80	78
5	0.630	0.794		**0.693**	207	80	78
6	0.590	0.768		**0.649**	224	80	77
7	0.580	0.762		**0.638**	220	78	77
8	0.600	0.775		**0.660**	156	78	77
9	1.000	1.000		**1.100**	154	79	77
10	0.950	0.975		**1.045**	154	78	76
11	0.660	0.812		**0.726**	161	78	76
12	0.560	0.748		**0.616**	170	78	76
13	0.580	0.762		**0.638**	206	77	75
14	0.500	0.707		**0.550**	227	76	78
15	0.550	0.742		**0.605**	220	78	75
16	0.820	0.906		**0.902**	209	80	75
17	1.000	1.000		**1.100**	174	80	76
18	1.000	1.000		**1.100**	169	80	77
19	1.000	1.000		**1.100**	140	78	76
20	1.000	1.000		**1.100**	140	80	76
21	0.800	0.894		**0.880**	135	80	77
22	0.850	0.922	463.000	**0.935**	133	80	77
23	0.850	0.922	397.263	**0.935**	146	80	77
24	0.620	0.787		**0.682**	155.000	80	77

Avg. Dp	Avg. Sq. Dp	Volume	Delta H	Avg. Ts(F)		Avg. Meter T(F)
0.768	0.870	65.737	0.845	173.958		77.938

COMPANY NAME: Steel **Dynamics**
LOCATION: Columbia City
SOURCE **TESTED:** EAF
DATE OF TEST: 06/13/05
RUN NO.: **2**
POLLUTANT: lead

Enter Data

Molecular **Weight** of **Stack** Gas, Dry **Basis,** Md
%CO2 0
%02 21
Md 28.84

Volume of Water Vapor **Collected @ STD.** CONO., **Vwv**
Vlc 14.4
Vw(std) 0.677

Volume of **Dry** Gas Collected @ STD. COND. **Vm(std)**
Tm(F) 83.792
Vm 65.125
Pb(inches Hg) 23 800
delta H 0.813
gamma 0 961
Vm(std) 60.862

Moisture **Content** of Stack Gas, Bwo
Bwo 1.10%
1-Bwo 68.90%

Molecular **Weight** of **Stack Gas, Ms**
Ms 28.72

Area of Stack (enter **diameter** in **inches), *As***
Depth-in 0
Width-in 0
diameter 239 26
No. of Stacks 1
As(L*W) 0
As(dia.) 3122246729

Static **Pressure,** Ps
Static (0.500)
Ps 29.76

Stack Gas Velocity, Vs, fps
Cp 0 84
sqr(delta p) 0.855
Ts 193.625
Vs 53.685

Stack Gas **Flowrate, Qs, acfm**
As 312.2246729
Qs 1005698

Stack Gas Flowrate @ STD. CONO.. **Dry** Basis, **Qstd.**
Qstd 802103 95

Velocity at **the** Nonk, Vn
Oia. of Nozzle 0 188 An(nozzle) 0.000193
Time of Run 120
Vn 55 00

% Isokinetic, %I
%I **102.45**

% Isokinetic measured from Intermediate values
%I 102.84

Pollutant Mass Emission **Rate, PMR,** lbs/hr.
Mn 0.00000916
PMR 0.0160
Filterable

Grains per **acf**
gr/acf = 0.0000

Grains per dscf
gr/dscf = 0.0000

FIELD DATA

K - Factor = 1.10

Start Time	9 48
Stop Time	11 58

Run 2	Delta P	Square Delta P	Volume	Delta H2	Stack Temp	DGM	DGM
1	0.950	0.975		**1.045**	197	78	77
2	0.990	0.995		**1.089**	162	81	77
3	0.920	0.959		**1.012**	172	81	77
4	0.680	0.825		**0.748**	179	81	77
5	0.600	0.775		**0.660**	190	81	77
6	0.650	0.806		**0.715**	203	81	78
7	0.680	0.825		**0.748**	233	82	79
8	0.560	0.748		**0.616**	245	84	79
9	0.540	0.735		**0.594**	253	84	79
10	0.600	0.775		**0.660**	230	84	80
11	1.000	1.000		**1.100**	171	86	81
12	0.960	0.980		**1.056**	168	87	82
13	0.670	0.819		**0.737**	177	86	83
14	0.650	0.806		**0.715**	186	86	83
15	0.700	0.837		**0.770**	199	87	84
16	0.750	0.866		**0.825**	197	89	84
17	0.600	0.775		**0.660**	201	90	86
18	0.600	0.775		**0.660**	220	90	86
19	1.100	1.049		**1.210**	161	87	87
20	0.880	0.938		**0.968**	167	89	87
21	0.730	0.854		**0.803**	174	90	87
22	0.650	0.806	528.640	**0.715**	181	90	81
23	0.630	0.794	463.515	**0.693**	198	90	89
24	0 650	0.806		**0.715**	183	90	88

Avg. Qs	Avg. Sq. Qs	Volume	Delta H	Avg. Ts (F)		Avg. Temp. (F)
0.739	0.855	65.125	0.813	193.625		83.792

COMPANY NAME Steel Dynamics
LOCATION Columbia City
SOURCE **TESTED:** EAF
DATE OF ***TEST.*** 06/*13105*
RUN NO.: *3*
POLLUTANT: **lead**

Enter Data

Molecular Weight of Slack Gas. Dry **Basis,** Md
%CO2 *0*
%02 21
Md 28 84

Volume of Water Vapor **Collected @ STD. COND.. Vwv**
Vlc 11 4
Vw(std) 0.536

Volume of Dry Gaa Collected **@ STD. WND.. Vm(std)**
Tm(F) 91.792
Vm 61.825
Pb(inches Hg) 29.800
delta ti 0.741
gamma 0.961
Vm(std) 56.930

Moisture Content **of Stack** Gaa. **Bwo**
Bwo 0 93%
1-Bwo 99.07%

Molecular Weight **of** Stack Gas. **Ms**
Ms 28.74

Area of Stack (enter diameter **in** inches), As
Depth-in 0
Width-in 0
diameter 239.26
No. of Slacks
As(L*W) 0
As(dia.) 312 2146729

Static Pressure. **Ps**
Static (0.600)
Ps 29.76

Stack Gas **Velocity,** Vs, **fps**
Cp 0 84
sqr(delta p) 0.794
Ts 190.706
Vs 49.738

Stack Gas Flowrate, Qs, acfm
As 312.2246729
Qs 931732

Stack Gas Flowrate @ STD. COND.. **Dry Basis, Qstd.**
Qstd. 747522 53

Velocity *at* **the Nozzle, Vn**
Dia. of Nozzle 0.188 An(nozzle) 0.000193
Time of Run 120
Vn 51.14

% Isokinetic, %I
%I 102.82

% Isokinetic measured from intermediate **values**
%I 103.22

Pollutant **Mass Emission** Rate, PMR, **lbs./hr.**
Mn 0 00000702
PMR 0.0122
Filterable

Grains per acf
gr/acf = 0.0000

Gralna per **dscf**
gr/dscf = 0.0000

FIELD DATA

K - Factor = 1.05

Start Time	12 22
Stop Time	2 32

Run 3	Delta P	Square Delta P	Volume	Delta H2	Stack Temp	DGM	DGM
1	0.580	0.762		0.609	211	90	89
2	0.680	0.825		0.714	221	90	89
3	1.100	1.049		1.155	180	90	90
4	0.950	0.975		0.998	169	92	89
5	0.680	0.825		0.714	173	91	90
6	0.630	0.794		0.662	181	92	90
7	0.590	0.768		0.620	193	93	90
8	0.550	0.742		0.578	230	93	90
9	0.570	0.000		0.599	246	93	90
10	0.770	0.877		0.809	228	92	90
11	0.980	0.990		1.029	184	92	90
12	0.850	0.922		0.893	163	91	90
13	0.900	0.949		0.945	173	91	89
14	0.060	0.245		0.063	190	93	90
15	0.590	0.768		0.620	203	93	90
16	0.550	0.742		0.578	226	93	90
17	0.500	0.707		0.525	242	94	90
18	0.440	0.663		0.462	212	94	91
19	0.870	0.933		0.914	177	96	92
20	0.900	0.949		0.945	166	96	92
21	0.850	0.922		0.893	160	96	92
22	0.820	0.906	590.671	0.861	151	96	92
23	0.700	0.837	528.846	0.735	150	97	93
24	0.830	0.911		0.872	148	96	94

Avg. Dp	Avg. Sq. Dp	Volume	Delta H	Avg. Ts(F)		Avg. Meter T(F)
0.706	0.794	61.825	0.741	190.708		91.792

APPENDIX III FIELD DATA

AIR ANALYSIS, 1...3

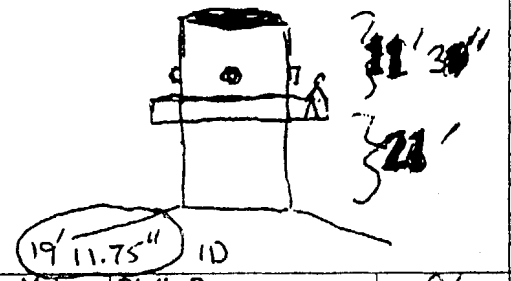
UN NUMBER 1 POLLUTANT TESTED Lead EPA METHOD 12

Start Time: 7:16

End Time: 9:27

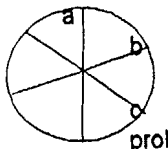
Company: Steel Dynamics
Location: Columbia City IN
Unit Tested: EAF
Meter Operator: M. Dicus
Probe Operator: M. Allen
Client Contact: Bill Boylan
Agency Contact: Doug VanDeWalle
C.E. Reader:
AI Project: Date: 6-13-05
Barometric Pressure: 29.8
Ambient Temperature: 71

Diagram of Test Location



CO2		O2	
1	0	1	21
2	0	2	21
3	0	3	21
Avg.	0	Avg.	21
Silica ID			#5
Silica wt.			17.8 grams
Impingers			0 mls
Moisture Total			17.8 mls
Pretest Pitot Ch.			pass / fail
Postest Pitot Ch.			pass / fail

Nozzle size measurement
a 0.188
b 0.188
c 0.188
Avg. 0.186
nozzle (quartz, glass, SS)
probe (quartz, glass, SS, Ti)



Meter Y 0.961
Meter DeltaH@ 1.88
Pretest Leak Ch. 0.00 cfm@ 10
Post test Leak Ch. 0 cfm@ 10

Static Pressure −0.6

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				397.263								
1	5	1.1	1.375	401.0	159	223	210	72	80	78	3	K = 1.2
2	10	1.0	1.2	405.9	162	248	267	71	81	78	3	
3	15	0.60	0.72	410.2	167	265	267	70	80	78	2	
4	20	0.60	0.72	414.5	187	266	267	71	80	78	2	
5	25	0.63	0.76	419.0	207	266	265	70	80	78	2	X Fully iced
6	30	0.59	0.71	423.1	224	267	267	68	80	77	2	
7	35	0.58	0.64	427.3	220	263	258	68	78	77	2	Added Water
8	40	0.60	0.66	431.5	156	264	272	68	78	77		K = 1.1
9	45	1.0	1.1	436.1	154	264	254	68	76	77		
10	50	0.95	1.05	440.8	154	263	272	68	78	76		
11	55	0.66	0.73	445.5	161	270	270	69	78	76		
12	60	0.56	0.62	450.03	170	267	252	70	78	76		
13	65	0.58	0.64	454.1	206	267	273	69	77	75		
14	70	0.50	0.55	458.7	227	261	261	70	76	78		
15	75	0.55	0.61	463.8	220	265	260	68	78	75		
16	80	0.82	0.90	469.5	209	269	261	68	80	75		
17	85	1.0	1.1	474.5	174	268	261	69	80	76		
18	90	1.0	1.1	479.8	169	261	261	68	81	77		
19	95	1.0	1.1	484.5	140	269	272	75	78	76		
20	100	1.0	1.1	489.9	140	269	263	72	80	76		Filter Number: R1
21	105	0.80	0.88	494.6	135	260	269	69	80	77		Filter preweight:
22	110	0.85	0.94	499.3	133	267	263	68	80	77		Filter postweight:
23	115	0.85	0.94	504.5	146	269	267	69	80	77		Total:
24	120	0.62	0.68	509.0	155	267	262	70	80	77		Beaker ID:
25												Beaker preweight:
26												Beaker postweight:
27												Total:
28												
29												
30												

R1
R2
R3

AIR ANALYSIS, INC

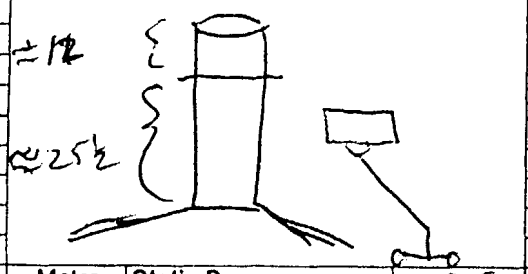
RUN NUMBER 2 POLLUTANT TESTED Lead EPA METHOD 12 Fyrite

Start Time: 9:48

End Time: 11:58

Company:	SDI
Location:	Columbia City
Unit Tested:	EAF
Meter Operator:	M. Dicus
Probe Operator:	M. Allen
Client Contact:	Bill Bowlus
Agency Contact:	Doug VD
V.E. Reader:	
AAI Project:	Date: 6-13 DS
Barometric Pressure:	29.8
Ambient Temperature:	80

Diagram of Test Location



CO2		O2	
1	0	1	20
2	0	2	20
3	0	3	20
Avg.	0	Avg.	20
Silica ID		#6	
Silica wt.		14.4	grams
Impingers		0	mls
Moisture Total		14.4	mls
Pretest Pitot Ch.		pass / fail	
Postest Pitot Ch.		pass / fail	

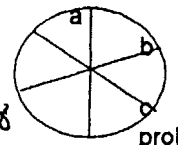
Nozzle size measurement

a nozzle (quartz, glass, SS)

b

c

Avg. 0.188



probe (quartz, glass, SS, Ti)

Meter Y		0.96	
Meter DeltaH@		1.68	
Pretest Leak Ch.	0	cfm@	1.0
Post test Leak Ch.	0	cfm@	8

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Static Pressure Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				463.515			-0.5					
1	5	0.95	1.14	466.8	197	265	265	83	78	77	3	
2	10	0.99	1.18	470.0	167	266	263	Fiberglass				
3	15	0.92	1.1	473.0	172	260	268	76	81	77	3	
4	20	0.68	0.75	476.9	174	270	270	71	80	77	3	
5	25	0.60	0.66	478.2	190	260	268	70	81	77	2	
6	30	0.65	0.72	480.725	203	269	267	70	81	78	2	
7	35	0.68	0.75	483.2	233	269	269	78	82	79	2	Fully Iced
8	40	0.56	0.62	485.5	245	269	262	70	84	79	2	
9	45	0.54	0.59	487.9	253	260	259	Wind 74	84	79	2	X
10	50	0.60	0.666	490.3	220	272	264	blow 75	89	80	2	
11	55	1.0	1.1	493.3	171	268	266	direction 74	86	81	2	
12	60	0.96	1.06	496.7	168	267	263	Still 63	87	82	2	
13	65	0.67	0.74	499.3	177	268	270	68	86	83	2	
14	70	0.65	0.72	501.6	186	265	261	65	86	83	2	
15	75	0.70	0.77	504.2	189	265	255	66	87	84	2	
16	80	0.75	0.83	506.9	197	268	260	66	89	84	2	
17	85	0.60	0.66	509.4	201	267	260	67	90	86	2	
18	90	0.60	0.66	512.0	220	269	263	68	90	86	2	
19	95	1.1	1.2	515.3	161	268	261	73	87	87	3	
20	100	0.88	0.97	518.0	167	265	260	66	89	87	3	Filter Number:
21	105	0.73	0.80	520.9	174	261	264	66	87	90	3	Filter preweight:
22	110	0.65	0.72	523.4	181	266	260	68	90	87	3	Filter postweight:
23	115	0.63	0.70	526.1	198	261	268	68	90	89	2	Total:
24	120	0.65	0.72	528.64	183	266	261	70	90	88	2	Beaker ID:
25												Beaker preweig
26												Beaker postwe
27												Total:
28												
29												
30												

R1 = 22 mls
- no breakthru

AIR ANALYSIS, [illegible]

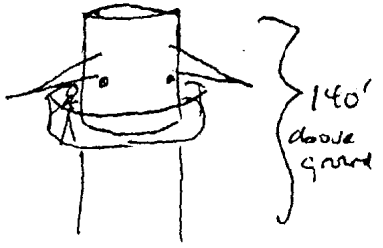
RUN NUMBER 3 POLLUTANT TESTED LEAD EPA METHOD 12

Start Time: 12:22

End Time: 2:32

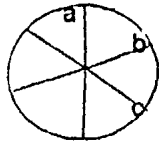
Company:	SDI
Location:	Columbia Co
Unit Tested:	EAF
Meter Operator:	MD
Probe Operator:	MA
Client Contact:	BB
Agency Contact:	DV
E.E. Reader:	—
AJ Project:	Date: 6-13-05
Barometric Pressure:	29.8
Ambient Temperature:	80

Diagram of Test Location



CO2		O2	
1	0	1	21
2	0	2	21
3	0	3	20
Avg.	0	Avg.	20
Silica ID		#8	
Silica wt.		11.4	grams
Impingers		0	mls
Moisture Total		11.4	mls
Pretest Pitot Ch.		pass / fail	
Postest Pitot Ch.		pass / fail	

Nozzle size measurement



a
b
c
Avg.

Meter Y	0.961
Meter DeltaH@	1.88
Pretest Leak Ch.	0 cfm@ 6
Post test Leak Ch.	0 cfm@ 6

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Static Pressure Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				528.846			−0.5					
1	5	0.58	0.58	531.6	211	230	231	77	90	86	1	
2	10	0.68	0.68	533.6	221	255	246	72	90	89	2	
3	15	1.1	1.1	536.6	180	254	244	71	90	88	3	
4	20	0.95	0.95	540.3	169	250	256	72	92	89	3	
5	25	0.68	0.68	542.4	173	254	264	68	91	90	2	K
6	30	0.63	0.63	544.5	181	256	267	66	92	90	2	
7	35	0.59	0.59	547.0	193	253	260	66	93	90	2	
8	40	0.55	0.55	549.5	230	255	257	65	93	90	2	
9	45	0.57	0.57	551.6	246	250	265	66	93	90	2	
10	50	0.77	0.77	554.1	228	257	261	66	92	90	2	
11	55	0.94	0.94	557.1	194	253	264	68	92	90	3	
12	60	0.86	0.65	559.8	163	253	264	70	91	90	2	
13	65	0.90	0.90	562.7	174	253	268	78	91	89	2	
14	70	0.60	0.60	565.1	190	258	248	69	93	90	2	
15	75	0.59	0.59	567.5	203	258	248	71	93	90	2	
16	80	0.55	0.55	570.1	226	258	247	68	93	90	2	
17	85	0.50	0.50	572.5	242	257	247	68	94	90	1.5	
18	90	0.44	0.44	574.5	212	258	250	70	94	91	1.5	
19	95	0.87	0.87	576.8	177	260	249	70	96	92	2.5	
20	100	0.90	0.90	579.6	166	257	246	68	96	92	2.5	Filter Number:
21	105	0.85	0.85	582.4	160	257	246	69	96	92	2	Filter preweight:
22	110	0.82	0.82	585.2	151	258	249	68	96	92	2	Filter postweight:
23	115	0.70	0.70	587.9	150	257	254	69	97	93	2	Total:
24	120	0.43	0.43	590.671	148	257	250	69	96	94	2	Beaker ID:
25												Beaker preweight:
26												Beaker postweig ..
27												Total:
28												
29												
30												

APPENDIX IV LABORATORY DATA

Air Analysis, Inc.

3904 Clarks Creek Road
Plainfield, IN 46168

Project - SDI

Lead

EPA Methods 12 Analysis

Analytical Report
5343

el1

Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX:910-792-6853 e1lab@e1lab.com

The following data for Analytical Report 5343
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Quality Assurance Review by:

Daphne Woodman

Daphne Woodman, Chemist
June 29,2005

Report Reviewed and Finalized By:

Ken Smith

Ken Smith, Laboratory Director
June 29,2005

el1

SUMMARY OF RESULTS

el1

SUMMARY OF RESULTS

Summary of Lead Analysis

Element	Run 1 Total µg	Run 2 Total µg	Run 3 Total µg	Blank Total µg	Run 3 Spike Recovery
Lead, Average	11.3	9.16	7.02	< 0.3	101%
Triplicate RSD	0.004	0.008	0.006	0.046	

ANALYTICAL NARRATIVE

el$_1$

Element One Analytical Narrative

Client	Air Analysis, Inc	Element One #:	5343
Client ID:	SDI	Analyst:	DBW
Method:	12	Dates Received	06/16/05
Analytes	Lead	Dates Analyzed	06/29/05

Summary of Analysis

The Method 12 samples were prepared and analyzed according to the method protocol. After digestion the samples were brought to volume of 100 ml. The digested samples were analyzed for lead on a PerkinElmer ELAN 6100 ICP-MS.

Detection Limits

The ICP-MS instrument reporting limit was 2.5 µg/L for lead.

Analysis QA/QC

The spike recovery data and triplicate analyses relative standard deviations are summarized with the results. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. Nothing unusual was noticed with any of the samples or analyses.

ANALYTICAL DATA

el$_1$

elementOne

METHOD 12 LEAD WORKSHEET

Lab ID # e 5343

Customer: Air Analysis		Date Started: 6-28-05	Page: 1 of 1
		Date Finished: 6-29-05	Analyst: DW
Spiking Solutions Lot#: F 021405-A		QA checked:	by: DW
Volume Marked Y / (N)	Loss Y / N | pH < 2.0 (Y) / N	Data File:	Ref. Method:
HNO_3 Lot: 1104050	HF Lot:	HCl Lot:	ID/PO#:

Sample ID	# Filters submitted	Beginning Vol., ml	Final Vol., ml	Spike ug	*Dilution Aliquot*	*Dilution Final Volume*	
Blank (LRB)	0	50	~~50~~ 100				
Blank Spike (LFB)	0	50	~~50~~ 100	5 µg = .2 ml of 25 µg/ml			
5343-1	1	310	↓				
-2	1	330					
-3	1	330					
-4	1	210					
				5 µg = .2 ml of 25 µg/ml	Spiking Soln Lot# 021405-A		

Notes:

One AIR TESTING SAMPLE SUBMISSION FORM Lab ID # **5343**

Project ID: SDI DUE DATE: **6.30.05**

Client: Air Analysis	Date Rec 6.16.05	Time Rec 1105

Client Instructions:

	Sample Identification		Sample Identification
1	Run1		
2	Run 2		
3	Run3		
4	Blank		

Analyses Requested: Pb Spike Run 3

HNO_3 Lot: 1N4032	HF Lot:	HCl Lot:	**Reference Method**
Volume Marked Y / (N)	Volume Loss Y / N / (?)	pH < 2.0 (Y) / N	**Method 12**

SAMPLE	BV	FV	Spike	Comments
LRB				
LRB+				
1	310			
2	330			
3	330			
4	210			

Dataset Report

Jser Name: daphne.woodman
Computer Name: ICPMS1
Dataset File Path: c:\elandata\dataset\062905-2\
Report Date/Time: Wednesday, June 29, 2005 14:13:44

Daphne Woodman 6-29-05

Autosampler Position: 20

The Dataset

Time	Sample ID	Batch ID	Read Type	Description	Init. Quant	Prep. Vol.	Aliquot. Vol.	Diluted V
12:47:21 Wed 29-Jun-05	Blank		Blank					
12:49:22 Wed 29-Jun-05	Standard 1		Standard #1					
12:51:23 Wed 29-Jun-05	Standard 2		Standard #2					
12:53:25 Wed 29-Jun-05	Standard **3**		Standard #3					
12:55:26 Wed 29-Jun-05	Standard **4**		Standard #4					
12:57:27 Wed 29-Jun-05	QC Std 1		QC Std #1					
12:59:29 Wed 29-Jun-05	QC Std 2		QC Std #2					
13:01:30 Wed 29-Jun-05	QC Std **3**		QC Std #3					
13:03:31 Wed 29-Jun-05	QC Std **4**		QC Std #4					
13:05:33 Wed 29-Jun-05	QC Std 9		QC Std #9					
13:07:35 Wed 29-Jun-05	QC Std 10		QC Std #10					
13:09:40 Wed 29-Jun-05	5343-1		Sample	Air Analysis				
13:11:46 Wed 29-Jun-05	**5343-2**		Sample	Air Analysis				
13:13:50 Wed 29-Jun-05	**5343-3**		Sample	Air Analysis				
13:15:54 Wed 29-Jun-05	**5343-3**	s	Spike - 1	Air Analysis				
13:17:57 Wed 29-Jun-05	**5343-4**		Sample	Air Analysis				
13:19:57 Wed 29-Jun-05	QC Std 1		QC Std #1					
13:21:58 Wed 29-Jun-05	QC Std **4**		QC Std #4					
13:27:32 Wed 29-Jun-05	QC Std #2		Sample	Air Analysis				
13:29:36 Wed 29-Jun-05	**5343-3**	x2	Sample	Air Analysis				
13:31:40 Wed 29-Jun-05	**5343-3**	x2s	Spike - 1	Air Analysis — stopped tube				
13:33:40 Wed 29-Jun-05	QC Std 1		QC Std #1					
13:35:40 Wed 29-Jun-05	QC Std **4**		QC Std #4					
13:42:54 Wed 29-Jun-05	**5343-3**	x2	Sample	Air Analysis				
13:44:57 Wed 29-Jun-05	**5343-3**	x2s	Spike - 1	Air Analysis				
13:46:57 Wed 29-Jun-05	**QC** Std 1		QC Std #1					
13:48:58 Wed 29-Jun-05	QC Std **4**		QC Std #4					
13:58:47 Wed 29-Jun-05	**5343-3**	x5	Sample	Air Analysis				
14:00:51 Wed 29-Jun-05	**5343-3**	x5s	Spike - 1	Air Analysis				
14:02:51 Wed 29-Jun-05	QC Std 1		QC Std #1					
14:04:52 Wed 29-Jun-05	QC Std **4**		QC Std #4					

Sample/Batch Report

Daphne Woodman 6-29-05

User Name: daphne.woodman
Computer Name: ICPMS1
Sample File: C:\elandata\Sample\Method 12.sam
Report Date/Time: Wednesday, June 29, 2005 14:14:04

A/S Loc.	Batch ID	Sample ID	Description	Sample Type	Init. Quant.	Prep. Vol.	Aliquot Vol.	Diluted Vol.	Solids Ratio
12		5343-1	Air Analysis						
13		5343-2	Air Analysis						
14		5343-3	Air Analysis						
15	s	5343-3	Air Analysis	Spike - 1					
16		5343-4	Air Analysis						
5		QC Std #2	Air Analysis						
17	x2	5343-3	Air Analysis						
18	x2s	5343-3	Air Analysis	Spike - 1					
19	x5	5343-3	Air Analysis						
20	x5s	5343-3	Air Analysis	Spike - 1					

elementOne **ICP-MS RUN SHEET** **5343**

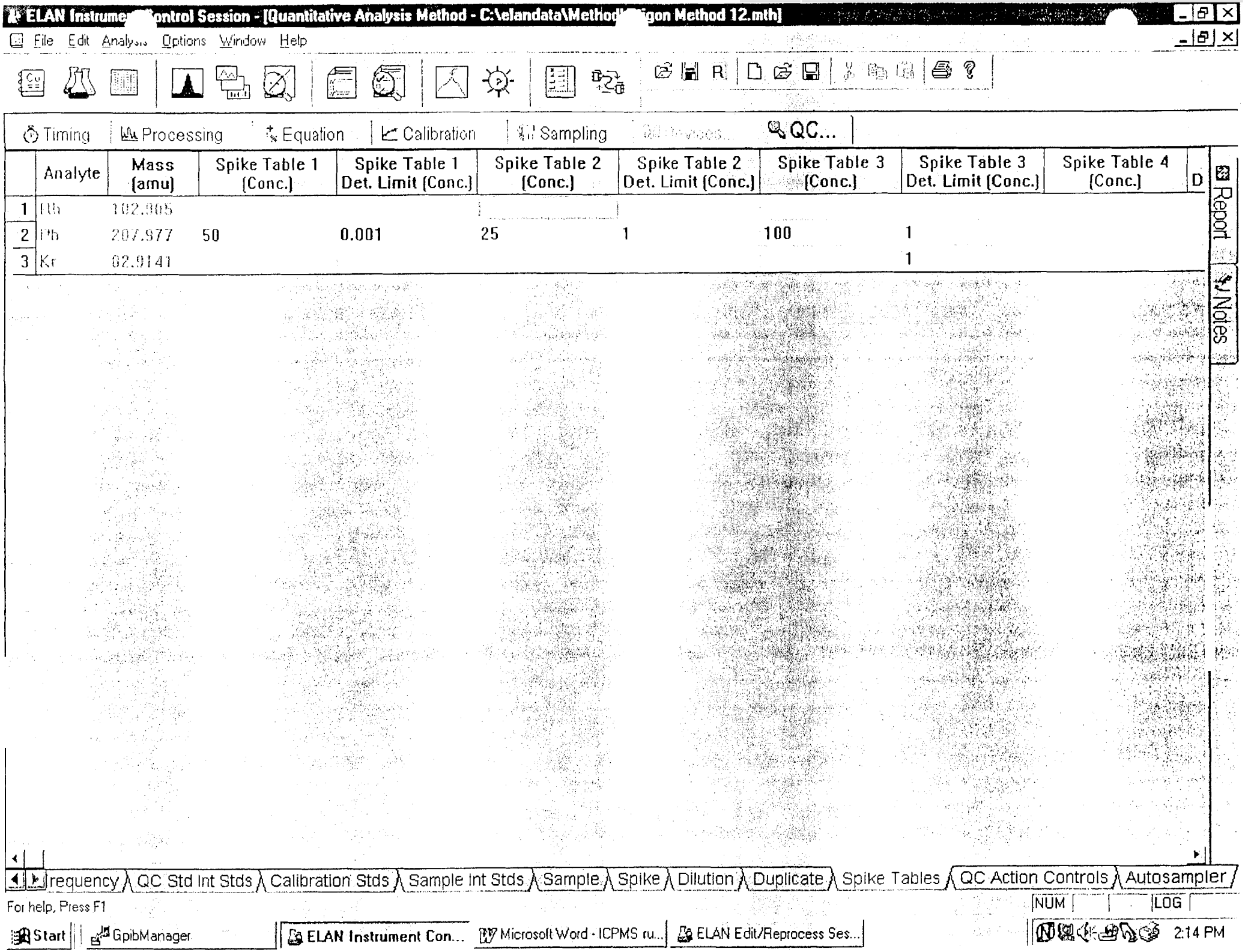
Analyst: **D B W**____ Date: 06-29-05 **Solid Samples a** / *Liquid Samples*

Daphne Williams 6-29-05

A/S Loc	Batch #for sample sets	Sample Lab ID	Sample Description	Type Sample / QC Spike / QC Dup / QC Reg Blank	Spike concentratio	Prep (ml)	Weight (g)	Aliquot (ml)	Diluted to Volume (ml)
			LRB	S		100			
11			LRB	SS	Table #1	100			
12			5343-1	S		100			
13			5343-2	S		100			
14			5343-3	S		100			
15			5343-3	SS	Table #1	100			
16			5343-4	S		100			
Dilutions and Rechecks									
5			QC Std #2						
17			5343-3	S		100		5.0	10
1S			5343-3	SS	Table #1	100		5.0	10
19			5343-3	S		100		2.0	10
20			5343-3	SS	Table #1	100		2.0	10

Spikes are post at 0.02 mL of 25ppm spiking solution lot 021405-A in a final volume of 10ml

Submitted for QC:	Date:	Time:	By:	QC Review:	Date:	Time:	By:
Re-Test Required:	No:	Yes:	Comments:				
Resubmitted for QC:	Date:	Time:	By:	QC Review:	Date:	Time:	By:


ELAN Instrume ontrol Session - [Quantitative Analysis Method - C:\elandata\Method igon Method 12.mth]
File Edit Analysis Options Window Help
Timing
Processing
Equation
Calibration
Sampling
QC...
Analyte
Mass (amu)
Spike Table 1 (Conc.)
Spike Table 1 Det. Limit (Conc.)
Spike Table 2 (Conc.)
Spike Table 2 Det. Limit (Conc.)
Spike Table 3 (Conc.)
Spike Table 3 Det. Limit (Conc.)
Spike Table 4 (Conc.)
D
1 Rb 102.905
2 Pb 207.977 50 0.001 25 1 100 1
3 Kr 82.9141 1
Report
Notes
requency
QC Std Int Stds
Calibration Stds
Sample Int Stds
Sample
Spike
Dilution
Duplicate
Spike Tables
QC Action Controls
Autosampler
For help, Press F1
NUM
LOG
Start
GpibManager
ELAN Instrument Con...
Microsoft Word - ICPMS ru...
ELAN Edit/Reprocess Ses...
2:14 PM

Method 6020 Multi Metals Summary Report
Sample ID: Blank
Sample Date/ Wednesday. June 29, 2005 12:47:21
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	303597.8		ppb
I>	Ho	165	713648.9		ppb
I-	Pb	208	2101.4		ppb
	Kr	83	84.3		ppb

Replicates
Concentration

Concentration

Concentration

Method 6020 Multi Metals Summary Report
Sample ID: Standard 1
Sample Date/ Wednesday. June 29,2005 12:49:22
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	297004.7		ppb
I>	Ho	165	708975.9		ppb
I-	Pb	208	28948.9	1.02766	ppb
	Kr	83	76.7		ppb

Replicates
Concentration

1.007303

Concentration

1.040377

Concentration

1.035296

Method 6020 Multi Metals Summary Report
Sample ID: Standard 2
Sample Date/ Wednesday. June 29,2005 12:51:23
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	297464.9		ppb
I>	Ho	165	714860.3		ppb
I-	Pb	208	2786397.4	105.66608	ppb
	Kr	83	93.7		ppb

Replicates
Concentration

105.584561

Concentration

105.390353

Concentration

106.023312

Method 6020 Multi Metals Summary Report
Sample ID: Standard 3
Sample Date/ Wednesday. June 29. 2005 12:53:25
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	289475.5		ppb
I>	Ho	165	708681		ppb
I-	Pb	208	13033567.2	498.86673	ppb
	Kr	83	172		ppb

Replicates
Concentration

497.549137

Concentration

495.005421

Concentration

504.045631

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/ Wednesday. June 29, 200512:57:27
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	283855.3		ppb
I>	Ho	165	677125.6		ppb
I-	Pb	208	21004.5	0.76561	ppb
	Kr	83	116.7		ppb

Replicates
Concentration

1.082499

Concentration

0.673277

Concentration

0.541069

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 3
Sample Date/ Wednesday. June 29. 2005 13:01:30
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	267064.2		ppb
I>	Ho	165	668154.5		ppb
I-	Pb	208	5019560.4	203.73455	ppb
	Kr	83	109.5		ppb

Replicates
Concentration

203.599227

Concentration

203.964078

Concentration

203.640336

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/ Wednesday. June 29,2005 13:03:31
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	2817942		ppb
I>	Ho	165	684143.7		ppb
I-	Pb	208	2703283.3	107.11345	ppb
	Kr	83	121.7		ppb

Replicates
Concentration

106.544129

Concentration

107.051378

Concentration

107.744845

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 9
Sample Date/ Wednesday, June 29,2005 13:05:33
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	233835.1		ppb
I>	Ho	165	615495.2		ppb
I-	Pb	208	16094.1	0.63572	ppb
	Kr	83	62.3		ppb

Replicates
Concentration

0.928406

Concentration

0.556802

Concentration

0.421937

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 10
Sample Date/ Wednesday, June 29. 2005 13:07:35
Sample Description:
ConcentrationResults

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	233759.1		ppb
I>	Ho	165	627476.2		ppb
I-	Pb	208	1357396.1	58.62435	ppb
	Kr	83	58		ppb

Replicates
Concentration

59.151313

Concentration

58.943423

Concentration

57.778315

Method 6020 Multi Metals Summary Report
Sample ID: 5343-1
Sample Date/ Wednesday, June 29.2005 13:09:40
Sample Desci Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	249988		ppb
I>	Ho	165	666626.7		ppb
I-	Pb	208	2779312.7	113.03311	ppb
	Kr	83	64.8		ppb

Replicates
Concenkation

112.981065

Concentration

113.464352

Concentration

112.65391

Method 6020 Multi Metals Summary Report
Sample ID: 5343-2
Sample Date/ Wednesday. June 29.2005 13:11:46
Sample Desci Air Analysis
ConcentrationResults

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	250960.3		ppb
I>	Ho	165	670493.9		ppb
I-	Pb	208	2264608.7	91.56477	ppb
	Kr	83	61		ppb

Replicates
Concentration

92.185912

Concentration

91.719674

Concentration

90.788732

Method 6020 Multi Metals Summary Report
Sample ID: 5343-4
Sample Date/ Wednesday. June 29.2005 13:17:57
Sample Desci Air Analysis
ConcentrationResults

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	252032.8		ppb
I>	Ho	165	669764.1		ppb
I-	Pb	208	45361.7	1.75964	ppb
	Kr	83	66.7		ppb

Replicates
Concentration

1.841454

Concentration

1.758938

Concentration

1.678529

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/ Wednesday. June 29.2005 13:19:57
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	321298.8		ppb
I>	Ho	165	768943.6		ppb
I-	Pb	208	3763.5	0.05311	ppb
	Kr	83	91		ppb

Replicates
Concentration

0.08585

Concentration

0.045101

Concentration

0.028364

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/ Wednesday, June 29.2005 13:21:58
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	302499		ppb
I>	Ho	165	729201.4		ppb
I-	Pb	208	2887257.7	107.34536	ppb
	Kr	83	106		ppb

Replicates
Concentration

107.706802

Concentration

107.57819

Concentration

106.751084

Method 6020 Multi Metals Summary Report
Sample ID: QC Std #2
Sample Date/ Wednesday. June 29, 2005 13:27:32
Sample Desc: Air Analysis
Concentration Results

	Analyle	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	291267.6		ppb
I>	Ho	165	705235.5		ppb
I-	Pb	208	29709.7	1.06279	ppb
	Kr	83	78.2		ppb

Replicates
Concentration

1.043852

Concentration

1.06637

Concentration

1.078134

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/ Wednesday, June 29,2005 13:46:57
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	300495.6		ppb
I>	Ho	165	7131922		ppb
I-	Pb	208	3667.6	0.06	ppb
	Kr	83	68.3		ppb

Replicates
concentration

0.087001

Concentration

0.050188

Concentration

0.042811

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/ Wednesday. June 29,2005 13:48:58
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	290532.2		ppb
I>	Ho	165	710199.6		ppb
I-	Pb	208	2782621.7	106.23443	ppb
	Kr	83	103.3		ppb

Replicates
Concentration

107.518029

Concentration

105.61162

Concentration

105.573656

Method 6020 Multi Metals Summary Report
Sample ID: 5343-3
Sample Dater Wednesday. June 29,2005 13:58:47
Sample Desci Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	280270.8		ppb
I>	Ho	165	696012.2		ppb
I-	Pb	208	362281.8	14.04252	ppb
	Kr	83	72.3		ppb

Replicates
Concentration

14.132281

Concentration

13.952578

Concentration

14.042692

Method 6020 Multi Metals Summary Report
Sample ID: 5343-3
Sample Date/ Wednesday, June 29, 2005 14:00:51
Sample Desci Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	288000.4		ppb
I>	Ho	165	712162.5		ppb
I-	Pb	208	1693223.9	64.43009	ppb
	Kr	83	75.3		ppb

Replicates
Concentration

64.703978

Concentration

64.685185

Concentration

63.901092

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/ Wednesday. June 29.2005 14:02:51
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	292654.5		ppb
I>	Ho	165	703282		ppb
I-	Pb	208	4014.2	0.07543	ppb
	Kr	83	74.2		ppb

Replicates
Concentration

0.107863

Concentration

0.06327

Concentration

0.055158

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/ Wednesday. June 29,2005 14:04:52
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens.	Conc. Mean	Report Unit
	Rh	103	289116.2		ppb
I>	Ho	165	705650.7		ppb
I-	Pb	208	2751307.7	105.69845	ppb
	Kr	83	88.7		ppb

Replicates
Concentration

105.735632

Concentration

105.503896

Concentration

105.855815

APPENDIX V CHAIN OF CUSTODY

5343

Air Analysis, Inc
3904 Clarks Creek Road
Plainfield, IN 46168
PH: 317-837-8514
FAX: 317-837-8518

COPY

Chain of Custody Form

Date: 6-15-05

Job Number: SDI

Invoice to: Air Analysis, Inc
3904 Clarks Creek Road
Plainfield, IN 46168

Report to: Mike Dicen @ above address
Fax Results to 317-837-8518

Additional Notes

Sample ID	Number of Containers	Description	Container P or G	Sample Date	Analysis to perform
R1	1	0.1N HNO_3	G	6/3	Method 12
R2	1	↓	G	6/3	
R3	1	↓	G	6/3	
	Blank		G		lead
R1		Filters →			High Purity Quartz
R2		↓			
R3		↓			
		Blank			

SAMPLER DATE: MD 6-15

SHIPMENT METHOD: Fed Ex

AIRBILL NUMBER:

Required Turnaround: 24 HR | 48 HR | 5 BUSINESS DAYS | 10 BUSINESS DAYS | OTHER

RELINQUISHED BY	MD	Date	5 PM	RELINQUISHED BY		Date		COURIER	
Company	AAE	Time	6:15	Company		Time			
RECEIVED BY		Date		RECEIVED BY	Paul Smith	Date	6-16-05	Via FedEx	Condition good
Company		Time		Company	Element One Inc	Time	1105		

APPENDIX VI CALIBRATION DATA

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26
12/12/01

Steel Dynamics
Columbia City

	Run 1	Run 2	Run 3	Y Average
Y qa =	0.910	0.906	0.918	0.911

Average result must be within 5% of Y

Result (%):	4.90%

Dry Gas Meter Box:	
ID :	80
Y :	0.960
Delta H :	1.89

RUN 1	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		1.210	80	78
2	Steel Dynamics	1.100	81	78
3	12/12/01	0.680	80	78
4	(Post Test) per EMTIC Guideline GD-26	0.980	80	78
5		0.693	80	78
6		0.649	80	77
7		0.638	78	77
8		0.660	78	77
9		1.100	79	77
10		1.045	78	76
11		0.726	78	76
12		0.616	78	76
13		0.638	77	75
14		0.550	78	76
15		0.605	79	75
16		0.902	80	75
17		1.100	80	76
18		1.100	80	77
19		1.100	78	76
20		1.100	80	79
21		0.880	80	77
22	463.000	0.935	80	77
23	397.263	0.935	80	77
24		0.662	86	77

Volume	Avg. Dh		Avg. Meter T(F)
65.737	0.85		77.94

Barometric Pressure:	29.80	Meter Y:	0.96
Test Time:	120	Delta Ha:	1.89

Yqa =	0.910

RUN 2	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1	Steel Dynamics	1.05	78	77
2	12/12/01	1.09	81	77
3	(Post Test) per EMTIC Guideline GD-26	1.01	81	77
4		0.75	81	77
5		0.66	81	77
6		0.72	81	78
7		0.75	82	79
8		0.62	84	79
9		0.56	84	79
10		0.66	84	80
11		1.10	86	81
12		1.06	87	82
13		0.74	86	83
14		0.72	86	83
15		0.77	87	84
16		0.83	89	84
17		0.66	90	86
18		0.66	90	86
19		1.21	87	87
20		0.97	88	87
21	528.640	0.80	90	87
22	463.515	0.72	90	88
23		0.69	90	89
24		0.72	90	88

Volume	Avg. Dh		Avg. Meter T(F)
85.125	0.81		83.79

Barometric Pressure:	29.80	Meter Y:	0.960
Test Time:	120	Delta Ha:	1.890

Yqa =	0.906

RUN 3	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		0.61	90	88
2	Steel Dynamics	0.71	90	88
3	12/12/01	1.16	90	90
4	Columbia City	1.00	92	89
5		0.71	91	90
6		0.66	92	90
7		0.62	93	90
8		0.58	93	90
9		0.60	93	90
10		0.81	92	90
11		1.03	92	90
12		0.89	91	90
13		0.95	91	89
14		0.66	93	90
15		0.62	93	90
16		0.58	93	90
17		0.53	94	90
18		0.46	94	91
19		0.91	96	92
20		0.95	96	92
21	590.671	0.89	96	92
22	528.646	0.86	96	92
23		0.74	97	93
24		0.87	96	94

Volume	Avg. Dh		Avg. Meter T(F)
81.825	0.74		91.79

Barometric Pressure:	29.80	Meter Y:	0.960
Test Time:	120	Delta Ha:	1.890

Yqa =	0.918

ΔAir Analysis, Inc.

3904 Clarks Creek Road
Plainfield, Indiana 46168
(317) 837-8514
(317) 837-8518 fax

Pitot Tube Calibration

Reference: *40CFR* 60, *Appendix* A, Method 5 Section 2 1

External Tubing Diameter:	0.95 centimeters
Base to **Opening** Plane Distance (Pa):	1.2 centimeters
Base to Opening Plane Distance (Pb):	**1.2 centimeters**

	Measured	Allowable
Pa/Dt	**1.26cm**	**1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)**
Pb/Dt	**1.26cm**	**1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)**
Angle a **1**	**1** deg	***a* 1 and *a* 2 ≤ 10.0'**
Angle **a** 2	**1** deg	***a* 1 and α 2 ≤ 10.0'**
Angle **β 1**	**0** deg	**β 1 and β 2 ≤ 5.0°**
Angle $ 2	**0** deg	**β 1 and *$ 2* ≤ 5.0'**
z (cm)	0.0	z is less than **0.32cm (1/8th")**
w (cm)	0.0	w is less than **0.08cm (1/32nd")**
	If all criteria are *met, Pitot Coefficient is 0.84*	**Pitot Coefficient: 0.84**

Calibrated By: [signature] Date Calibrated: January 3,2005

Thermocouple Test

Control factor	*Mercury Thermometer F*	*Probe Response*
ICE	41'	39'
AMBIENT	59'	**58°**
BOILING/ HOT H20	140'	139'

Test performed by: [signature] Date of test: January 3,2005

GRASEBY NUTECH
EPA Method 5
Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Filename: C:\Documents and Settings\michael dicen\My Documents\[meter box#80cal.XLS]3PTCQCAL
Revised: 8/1/97 Version: 1.01

Model #: mst
Serial #: 90680.00

Date: ——————>
Barometric Pressure: ——————> 30.05 (in. Hg)
Theoretical Critical Vacuum:—> 14.17 (in. Hg)

!!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

——————— DRY GAS METER READINGS ———— -CRITICAL ORIFICE READINGS

Delta H (in H20)	Time (min)		Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu fl)	Initial Temps. Inlet (deg F)	Outlet (deg F)	Final Temps. Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Final (deg F)	Average (deg F)
1.62		5.00	832.500	836.070	3.570	56.0	56.0	57.0	57.0	3	0.533	18.5	58.0	57.0	57.5
1.62		5.00	836.070	839.610	3.540	57.0	57.0	58.0	57.0	3	0.533	18.5	57.0	57.0	57.0
1.62		5.00	839.610	843.186	3.576	58.0	57.0	58.0	57.0	3	0.533	18.5	57.0	57.0	57.0

********** RESULTS **********

— DRY GAS METER — VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	—— ORIFICE —— VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	— DRY GAS METER — CALIBRATION FACTOR Y Value (number)	Variation (number)	—— ORIFICE —— CALIBRATION FACTOR Delta H@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)	
3.678	104.2	3.523	99.8	3.439	0.958	-0.004	1.884	47.87	0.002	
3.642	103.1	3.525	99.8	3.438	0.968	0.006	1.881	47.77	-0.001	
3.677	104.1	3.525	99.8	3.438	0.958	-0.003	1.881	47.77	-0.001	
		Average Y ——>			0.961		1.882	47.80	<—— Average dH@	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfin ofau at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

SIGNED: _____ **Date:** 01 / 03 / 2005

APPENDIX VII SUBMITTED PROTOCOL

Compliance Test Protocol
Indiana Department of Environmental Management
Office of Air Quality/Compliance Data Section
100 North Senate Avenue, Post Office Box 6015
Indianapolis, IN 46206-6015
Phone: 317/232-8338 Fax: 317/233-6865

Date Prepared: 2-25-05 Proposed Test Date: 6-13-05 Plant Address: 2601 CR 700E Plant Location: Columbia City

1. SOURCE INFO: ID/Permit No.: F089-16214-00107
Company: Steel Dynamics Inc
Mail Address: 2601 S CR 700E
City, State, Zip: Columbia City IN 46712
Contact: William Boucher Phone: 260 625 8852

5. Select Applicable Program:
Title V ● FESOP ●
SSOA ● MSOP ●
Other ●

AGENCY USE ONLY: Date Received:
Inspector: Approval Date:
Reviewer: Comments:

2. TEST COMPANY INFORMATION
Name: Air Analysis Inc
Address: 3904 Clarks Creek Road
City, State, Zip: Plainfield, IN 46168
Contact: M. Dicen Phone: 837-8514

3. PROCESS INFORMATION (Submit a Separate Form for Each Unit)
Unit to Test: EAF
Max. Rated Capacity: 200 tons Coal slag | hr
Proposed Operating Speed: Maximum

3a. Describe Method Used to Determine Operating Level:
Charge weight
Pollution Control Equipment: Baghouse

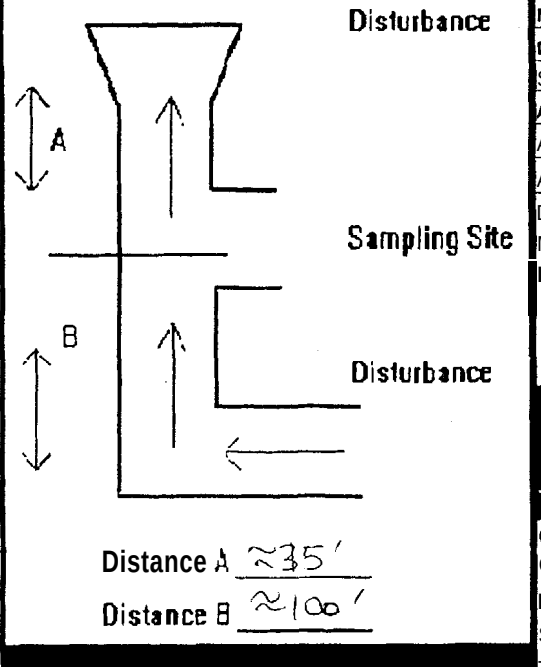
3b. Process Description:
Fuel Type: NA

4. TEST INFORMATION

	No. Runs	Time
Method 1-4	3	90m
Method 5 ☐ 5A ☐ 5B ☐ 5D ☐ 5E ☐ 5I ☐		
Method 6 ☐ 6A ☐ 6B ☐ 6C ☐		
Method 7 ☐ 7A ☐ 7B ☐ 7C ☐ 7D ☐ 7E ☐		
Method 9		
Method 201 ☐ 201A ☐		
Method 202		
Other: (12) lead only	3	90 min

4a. Describe Any Deviations from Standard Test Method:

6. SAMPLE SITE LOCATION



No. of Method 5 Sample Points:	24
Diameter at Sample Site:	19' 11.26"
Stack Height:	135 ft
Approximate Stack Gas Flow (ACFM):	850,000
Approximate Stack Gas Temp (deg. F):	200
Approximate Stack Gas Moisture (%):	1 %

Does sample port location meet 40 CFR 60, Appx. A, Method 1, Sec. 12 Requirements: Yes ☒ No ☐
If No, explain:

326 IAC 3-6-2(a) requires this completed form to be submitted 35 days prior to the proposed test date to the above address. 326 IAC 2-1.1-7(6)(B) requires any applicable test fee to be submitted with the protocol. (FEE NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OR VE TESTING ONLY.)

7. REASON FOR TEST
Operating Permit: Yes ☐ No ☐
Construction Permit: Yes ☒ No ☐
If yes, Unit Start Up Date:
State Agreed Order No.:
Title V: Yes ☐ No ☐
Compliance with 326 IAC NSPS 40 CFR 60 Subpart ____. Yes ☐ No ☐
Other (EPA, CD, State, 114):

APPENDIX VIII PRODUCTION DATA

EAF Daily Production Report

Printed: 06/20/05 09:28
Page: 3 of 4

Start Date: 06/12/05
End Date: 06/13/05
Station: EAFA

Production Date: 06/13/05

General Data

Heat	Shift	Location	Heat Order	Order Grade	Grade Tapped	Start Time	Tapped Time	Tap-to-Tap Duration min	Tapping Temperature F
A016059	2	EAFA_FCE	M004094.02	A992-10N15	A992-10N15	06/13/05 06:30:07	06/13/05 07:09:32	50	2977.0
A016060	2	EAFA_FCE	M004094.03	A992-10N15	A992-10N15	06/13/05 07:13:37	06/13/05 07:54:03	45	2977.0
A016061	2	EAFA_FCE	M004094.04	A992-10N15	A992-10N15	06/13/05 07:59:23	06/13/05 08:38:58	45	2980.0
A016062	1	EAFA_FCE	M004094.05	A992-10N15	A992-10N15	06/13/05 09:06:14	06/13/05 09:49:34	71	2995.0
A016063	1	EAFA_FCE	M004093.01	A992-9N10	A992-9N10	06/13/05 09:52:19	06/13/05 10:37:24	48	
A016064	1	EAFA_FCE	M004093.02	A992-9N10	A992-9N10	06/13/05 10:40:34	06/13/05 11:24:19	47	3118.0
A016065	1	EAFA_FCE	M004093.03	A992-9N10	A992-9N10	06/13/05 11:27:15	06/13/05 12:19:35	55	3039.0
A016066	1	EAFA_FCE	M004093.04	A992-9N10	A992-9N10	06/13/05 12:22:00	06/13/05 13:05:40	46	
A016067	1	EAFA_FCE	M004093.05	A992-9N10	A992-9N10	06/13/05 13:08:35	06/13/05 13:44:55	39	

Consumption Data

Production Date: 06/13/05 Shift: 1 Shift Start: 06/13/05 09:00 Shift End: 06/13/05 21:00 Crew: D

Heat	Tapped Weight t	Charge Weight t	Elec. Energy Used kWh	Lance Oxygen scf	Burner Fuel scf	Burner Oxygen scf	Scrap lbs	Burnt Lime lbs	Charge Carbon lbs	Dolo Lime lbs
~~A016058~~	~~103.50~~	~~135.65~~	~~43560~~	~~6400~~	~~2172~~	~~11211~~	~~271300~~	~~10002~~	~~2386~~	~~12448~~
A016059	121.20	136.55	42590	7584	2388	11454	273100	10172	2382	11498
A016060	121.60	135.65	45980	3259	2198	11015	271300	10128	2380	11480
A016061	122.50	135.85	45320	6491	2528	12067	271700	10168	0	10866
A016062	121.60	136.30	47260	4941	2558	12693	272600	10186	1772	10850
A016063	133.60	130.50	49770	6120	2171	10830	261000			
A016064	131.20	130.95	46930	4984	1662	8446	261900	10270	1778	10854
A016065	123.70	126.05	43770	5137	3101	14335	252100	10196	1772	10830
A016066	121.90	130.90	43920	5179	2079	10599	261800	10176	1782	10796
A016067	121.90	130.70	44450	4177	1954	9828	261400	10082	1776	10786

6:30
1:44
7.25
1193.45
→ 164.6 LB/HR

7:16 - 9:27
9:48 - 11:58
12:22 - 2:32

NO. 1148
JUN. 21. 2005 9:50AM STEEL DYNAMICS

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-12-05
Crew : C AM / PM
Supervisor : Leroy
Furnace : A
1 st Helper SARRAZIN

Heat #	A016059	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	269/200	617	624	T&T	7
MWH 1st / Tatal	/4259	624	632	Waiting on caster	8
Power On 1st / Total / Tap-Tap	3126 50	632	707	P-ON	35
0 2 (scf) 1st / Total	/190546	707		TAP	
Inj C (lbs) 1st / Total	/259				
Charge C (lbs)	1067				
Lime 1st / Total	5084/-				
Olivine 1st 1 Total	-/-				
Dolo Lime 1st / Total	5433/-				
Ladle Lime / MgO	-/500				
Tap C (wt%)	040				
Tap O (ppm)	719				
Tap Temp (degF)	2977				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	753				
Tap wt actual (lbs)	120.9				
Tap Time / Ladle #	707 | 3				
Patch FCE (Y/N)	✓				

Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	*Total* Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-12-05
Crew : C AM / PM
Supervisor : Leroy
Furnace : A
1 st Helper SARRAZIN

Heat #	A0160060	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	271/200	707	715	T&T	8
MWH 1st / Total	/4598	715	752	P-ON	37
Power On 1st / Total / Tap-Tap	3424 / 45	752		TAP	
O2 (scf) 1st / Total	/16529				
Inj C (lbs) 1st / Total	/2730				
Charge C (lbs)	1060				
Lime 1st / Total	5084 / —				
Olivine 1st / Total	— / =				
Dolo Lime 1st / Total	5433 / —				
Ladle Lime / MgO	—/500				
Tap C (wt%)	.036				
Tap O (ppm)	808				
Tap Temp (degF)	2977				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	72.2				
Tap wt actual (lbs)	121.4				
Tap Time / Ladle #	52 / 1				
Patch FCE (Y/N)	N				

Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch tbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-12-05
Crew: C AM (PM)
Supervisor: Lacy
Furnace: A
1st Helper SARRAZIN

Heat #	A016061	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	270/000	752	801	TdT	9
MWH 1st / Total	/45320	801		p-on	
Power On 1st / Total / Tap-Tap	~~34.08~~ 44				
02 (scf) 1st / Total	/179314				
Inj C (lbs) 1st / Total	/3206				
Charge C (lbs)	8860				
Lime 1st / Total	5093/—				
Olivine 1st / Total	—/—				
Dolo Lime 1st / Total	5425/—				
Ladle Lime / MgO	—/500				
Tap C (wt%)	.031				
Tap O (ppm)	937				
Tap Temp (degF)	2980				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	75.8				
Tap wt actual (lbs)	1223				
Tap Time / Ladle #	8:37 / 7				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

(comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-13-05
Crew : D (AM) PM
Supervisor : Fred
Furnace : 4
1 st Helper Raleigh

Heat #	A0160 62	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	27000	8:37	9:08	T+T + Over Charge	
MWH 1st / Total	/ 4726	9:05		Power	
Power On / Off / Total / Tap-Tap	34:43 / 70				
O2 (scf) 1st / Total	/ 17651				
Inj C (lbs) 1st / Total	/ 3557				
Charge C (lbs)	890				
Lime 1st / Total	5105 / —				
Olivine 1st / Total	— / —				
Dolo Lime 1st / Total	5424 / —				
Ladle Lime / MgO	— / 500				
Tap C (wt%)	.044				
Tap O (ppm)	655				
Tap Temp (degF)	2995				
Slag Rating (1-5) 1 foam	3				
Ladle tare wt (lbs)	75.3				
Tap wt actual (lbs)	121.4				
Tap Time / Ladle #	9:47 / 3				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Miic Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Chrome

1=fluid 5=thick

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-13-05
Crew: D (AM/PM)
Supervisor: Fred
Furnace: A
1 st Helper Raleigh

Heat #	A016063	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	268600	9:47	9:54	TAP	
MWH 1st / Total	/49770	9:54		Power	
Power On 1st / Total / Tap-Tap	36:43 / 47				
0 2 (scf) 1st / Total	/16987				
Inj C (lbs) 1st / Total	/3803				
Charge C (lbs)	889				
Lime 1st / Total	5135 / —				
Olivine 1st / Total	— / —				
Dolo Lime 1st / Total	5427 / —				
Ladle Lime / MgO	— /500				
Tap C (wt%)	.1048				
Tap O (ppm)	659				
Tap Temp (degF)	3036				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	71.9				
Tap wt actual (lbs)	133.6				
Tap Time / Ladle #	10:35 / 5				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Chrome

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-13-05
Crew : A (AM) PM
Supervisor : Fred
Furnace : A
1 st Helper Power

Heat #	A01606B	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	260600	10:35	10:42	T+T	
MWH 1st / Total	/ 46930	10:42		Power	
Power On 1st / Total / Tap-Tap	3429 / 46				
O2 (scf) 1st / Total	/ 134396				
Inj C (lbs) 1st / Total	/ 1662				
Charge C (lbs)	886				
Lime 1st / Total	/ 5098				
Olivine 1st / Total	/ -				
Dolo Lime 1st / Total	/ 5415				
Ladle Lime / MgO	500				
Trap C (wt%)	.036				
Tap O (ppm)	1042				
Tap Temp (degF)	3118				
Slag Hating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	75.2				
Trap wt actual (lbs)	131.6				
Tap Time / Ladle #	1127 / 2				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		(A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Chrome

CP—159

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-13-05
Crew: D (AM) PM
supervisor: Fred
Furnace: A
1 st Helper Raleigh

Heat #	A0166065	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	250000	11:22	11:29	T&T	
MWH 1st / Total	/ 43770	11:29		Power	
Power On 1st / Total / Tap-Tap	33:06 / 55				
O2 (scf) 1st / Total	/ 147363				
Inj C (lbs) 1st / Total	/ 2478			Brok ● e⊘	
Charge C (lbs)	891				
Lime 1st / Total	/ 5088				
Olivine 1st / Total	/ —				
Dolo Lime 1st / Total	/ 5398				
Ladle Lime / MgO	500				
Tap C (wt%)	.043				
Tap O (ppm)	737				
Tap Temp (degF)	3039				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	75.9				
Tap wt actual (lbs)	123.6				
Tap Time / Ladle #	12:17 / 3				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

C⊘-163

Chrome

22.6 mwH
IS med
Scrap cave

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-13-05
Crew : D (AM / PM)
Supervisor : Fred
Furnace : A
1 st Helper Raleigh

Heat #	A016066	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	270800	12:17	12:24	T+T	
MWH 1st / Total	/43920	12:24		Power	
Power On 1st / Total / Tap-Tap	32 / 45				
O2 (scf) 1st / Total	/157805				
Inj C (lbs) 1st / Total	/3029				
Charge C (lbs)	866				
Lime 1st / Total	/5041				
Olivine 1st / Total	/ —				
Dolo Lime 1st / Total	/5343				
Ladle Lime / MgO	500				
Tap C (wt%)	.037				
Tap O (ppm)	1033				
Tap Temp (degF)	3133				
Slag Rating (1-5) 1-fluid 5=thick foam	4				
Ladle tare wt (lbs)	74.7				
Tap wt actual (lbs)	122.0				
Tap Time / Ladle #	13:03 / 7				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Chrome

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-13-05
Crew : D (AM) / PM
Supervisor : Fred
Furnace : 4
1 st Helper Raleigh

Heat #	A06067	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	260000	13:03	13:10	TAT	
MWH 1st / Total	/4450	1310		Power	
Power On 1st / Total / Tap-Tap	30:23 / 34				
O2 (scf) 1st / Total	/140314				
Inj C (lbs) 1st / Total	/1747				
Charge C (lbs)	887				
Lime 1st / Total	/5024				
Olivine 1st / Total	/ —				
Dolo Lime 1st / Total	/5911				
Ladle Lime / MgO	500				
Tap C (wt%)	.051				
Tap O (ppm)	5-24				
Tap Temp (degF)	2962				
Slag Rating (1-5) 1-fluid 5=thick foam	4				
Ladle tare wt (lbs)	75.1				
Tap wt actual (lbs)	122.0				
Tap Time / Ladle #	13:43 / 2				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-13-05
Crew : A D (AM) PM
Supervisor : Fred
Furnace : A
1 st Helper Raleigh

Heat #	4016059	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	260000	13:43	13:49	TFT	
MWH 1st / Total	44400	13:47	14:52	Delay for crane	
Power On 1st / Total / Tap-Tap	31:30 110	14:52		Power	
02 (scf) 1st / Total	176656				
Inj C (lbs) 1st / Total	2089				
Charge C (lbs)	840				
time 1st / Total	493				
Olivine 1st / Total	-				
Dolo Lime 1st / Total	5425				
Ladle Lime / MgO	500				
Tap C (wt%)	032				
Tap O (ppm)	932				
Tap Temp (degF)	2987				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	76				
Tap wt actual (lbs)	1242				
Tap Time / Ladle #	15:34 3				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Chrome

Indiana Air Permit Compliance Testing

Steel Dynamics Incorporated
Columbia City, Indiana

Report on:
Electric Arc Furnace
Lead Emissions

Performed by:

ΔAir Analysis, Inc.
Project Number: 388
June 22,2006

ΔAir Analysis, Inc.
3904 Clarks Creek Road ▪ Plainfield, Indiana ▪ 46168
317.837.8514
877.683.TEST

ΔAir Analysis, Inc.

3904 Clarks Creek Road ▪ Plainfield, Indiana **46168**
Tel 317 837-8514 Fax. **317 837-8518**

Certification Page

Air Analysis, Inc. represents that the information provided in this report is true and accurate. We at Air Analysis, Inc. strive to remain true to our mission, that the people involved are people of integrity, the **data** accurate, and the reporting timely.

Sincerely,



Michael M. Dicen, President
Air Analysis, Inc.

Date: 7-2-02

TABLE OF CONTENTS

1. Executive Summary (Page **3)**
Test Summary, Table 1

2. Results (Page 4)
Lead Emissions, Table 2

3. DESCRIPTION OF PROCESSES AND FIELD NOTES (Page *5)*

4. **Methodology** (Pages 6 & 7)
Summary of Sampling Procedures
Description of Sampling Methods

APPENDIX

SAMPLE CALCULATIONS	I
FIELD DATA PRINTOUTS	II
FIELD DATA	III
LABORATORY DATA	IV
CHAIN OF CUSTODY	V
CALIBRATION DATA	VI
SUBMITTED PROTOCOL	VII
PRODUCTION DATA	VIII

Executive Summary

Air Analysis, Inc. was contracted by Steel Dynamics, Inc. to perform air emissions sampling of the Electric Arc Furnace baghouse in Columbia City, Indiana, on June 22, 2006. The objective of the test program was to determine compliance with Indiana air permit requirements. Sampling was performed for lead emissions. The following personnel were involved with the testing program:

Air Analysis	Mike Dicen
Air Analysis	Marcus Allen
IDEM	Jarrod Fisher
SDI	Bill Bougher

The testing program was performed utilizing US EPA Methods 1-4, 12. Three one and one half hour test runs were performed for lead and the average of the three runs is listed below:

Test Summary

Table 1

Date	Source	Time	Pollutants	Mass Emissions	Pollutant Concentration
6/22/06	EAF Baghouse Exhaust	7:58-12:00	Lead	0.019 lbs/hr	2.8*E-6 (gr/dscf)

Results

Lead Emissions Test Conditions

Table 2

Gas Conditions		1	2	3	Avg
Ts	Stack Temperature	217.8	208.8	206.5	211.1
Bwo	Moisture (volume %)	4.1	3.28	3.45	3.6
O2	Oxygen (dry volume %)	21	21	21	21
CO2	Carbon Dioxide (dry volume %)	0	0	0	0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1,057,237	1,036,826	981,177	1,025,080
Qstd	Standard Conditions (dscfm)	793,801	795,628	754,103	781, 178
Pollutant Results					
Ec E(me)	Emission Rate, (gr/dscf) Emission Rate, (lbs/hr)	3.1E-6 0.02	3.2E-6 0.02	2.2E-6 0.014	2.8E-6 0.019

DESCRIPTION OF SOURCE PROCESSES AND FIELD NOTES

Electric Arc Furnaces (EAFs) - - Stack 1
Two (2) single shell electric arc furnaces (EAFs), identified as EAF-la and EAF-lb. These furnaces operate at a nominal combined rate of 300 tons of molten steel per hour and utilize a direct-shell evacuation control (DEC) system (_fourth hole– duct), an overhead roof exhaust system consisting of a capture system consisting of a segmented canopy hood, scavenger duct, and cross-draft partitions.

These furnaces utilize the following emission control technologies:
(i) A DEC for carbon monoxide (CO) and volatile organic compounds (VOC) emissions;
(ii) Low NOx/oxy fuel burners (combustion control) for nitrogen oxide (NOx) emissions; and
(iii) A baghouse (identified as EAF Baghouse, ID# 1) for particulate (PM and PM10) emissions.

The particulate and lead emissions escaping the DEC system are collected by the overhead roof exhaust system and exhaust through a stack identified as EAF Baghouse stack (Stack 1).
There are no roof monitors in the meltshop.
Opacity is measured with a continuous opacity monitor (COM).
CO and THC emissions exhausting through the EAF Baghouse stack (Stack 1) are measured with a CO continuous emission monitor system (CEMS) and a THC CEMS, respectively.

Ladle Metallurgy Station (LMS) - - Stack 1
One (1) ladle metallurgy refining station (LMS) (ID# 3a) with a nominal casting rate of 300 tons of steel per hour.
The LMS particulate emissions are collected by the overhead roof exhaust system and exhaust through the common EAF Baghouse stack (Stack I).

Continuous Casters (CCs) - - Stack 1
The two (2) continuous casters have a nominal combined casting capacity of 300 tons of steel per hour.

The particulate emissions from the continuous casters are collected by the overhead roof exhaust system and exhaust through the common electric arc furnace baghouse stack (Stack 1).

Methodology

The sampling procedures used by Air Analysis, Inc. are as follows:

Title 40 CFR Part 60 Appendix A
Method 1 "Sampling of Velocity Traverses for Stationary Sources"
Method 2 "Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3 "Gas Analysis for the Determination of Molecular Weight"
Method 4 "Determination of Moisture Content in Stack Gas"
Method 12 "Determining of Lead Emissions"

SAMPLE POINT DETERMINATION-EPA METHOD 1
Sampling point locations were determined according to EPA Reference Method 1.

		Sampling Points		
Locations	**Dimensions**	**Ports**	**Points Per Port**	**Total Points**
Baghouse	239.75"D	4	6	24

** Exact measure points and distances to disturbances are listed in Appendix- Field Data

VELOCITY AND VOLUMETRIC FLOW RATE – EPA METHOD 2
EPA Method 2 was used to determine the gas velocity and flow rate at the stack. Figure 4-2 includes the components of the EPA Method 2 sampling apparatus. Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the Method 1 determined traverse points. The velocity pressures were measured with a Type S pitot tube. Gas temperature measurements were made with a Type K thermocouple and digital pyrometer.

GAS COMPOSITION AND MOLECULAR WEIGHT – EPA METHOD 3
In order to determine the oxygen and carbon dioxide concentrations, a sample of gas was obtained and analyzed in accordance with EPA Method 3. The gas sample was collected using a Fyrite analyzer. The results were used to determine gas molecular weight.

MOISTURE CONTENT – EPA METHOD 4
The flue gas moisture content at the testing locations was determined in accordance with EPA Method 4. Figure 4-2 includes the Method 4 sampling components. The gas moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorption. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

△Air Analysis, Inc.

Steel Dynamics, Inc.
Project Number: 388

Lead DETERMINATION – EPA METHOD 12

Stack gas is withdrawn isokinetically and particulate/lead matter is collected on the nozzle, probe and filter and 0.1 N nitric acid solution. The probe temperature and filter are maintained at temperatures of 248 degrees F (+/- 25 deg. F). The impinger temperature and exit gas is maintained at temperatures at or below 68 degrees F. The nozzle, probe and glass filter containers are rinsed with nitric acid and the rinse is captured in a sealed glass container.

Laboratory sample analysis is measured by Inductively Coupled Plasma technology

APPENDIX I SAMPLE CALCULATIONS

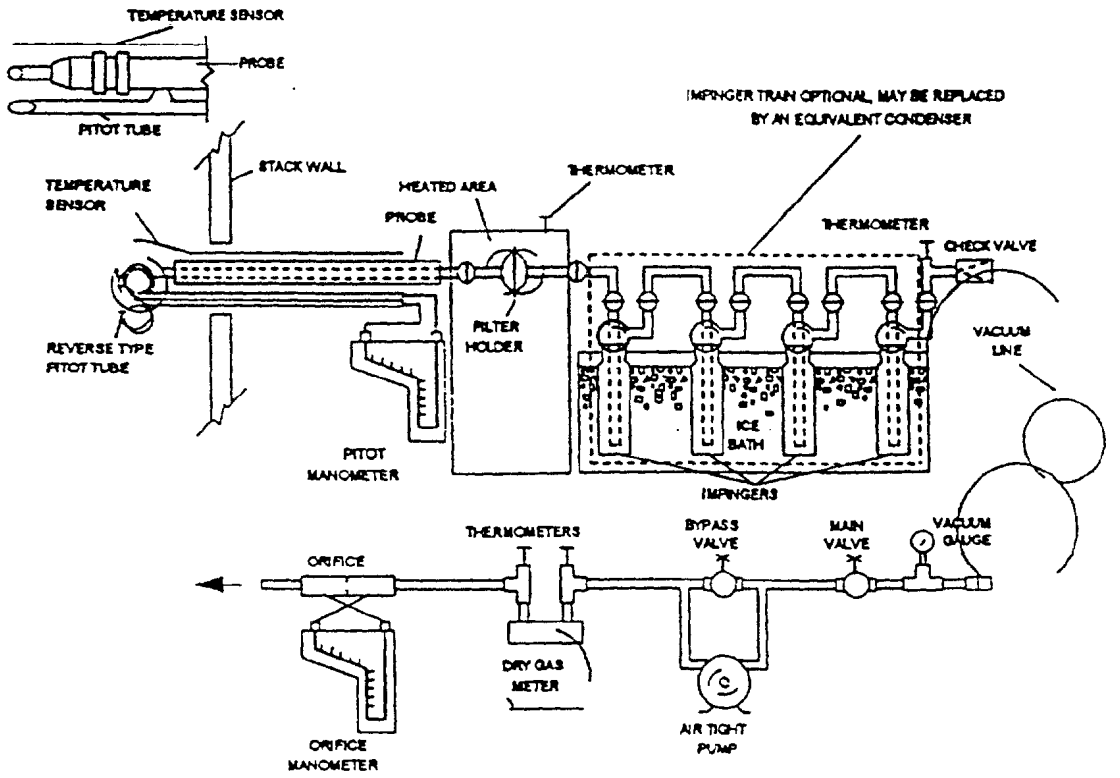


Figure 5-1. Metals 6 Particulate *Sampling* Train

SAMPLE CALCULATIONS

The tables presenting the results are generated electronically from raw data. It may not be possible to exactly duplicate these results using a calculator. The reference method data, results and all calculations are carried to sixteen decimal places throughout. The final table is formatted to an appropriate number of significant figures.

1. Volume of water collected (wscf)

$$V_{wstd}=(0.04707)(V_{lc})$$

Where:

V_{lc}	total volume of liquid collected in impingers and silica gel (ml)
V_{wstd}	volume of water collected at standard conditions (ft^3)
0.04707	conversion factor (ft^3/ml)

2. Volume of gas metered, standard conditions (dscf)

$$V_{mstd}=\frac{(17.64)(V_m)(P_{baro}+\frac{\Delta H}{13.6})(Y_d)}{(460+T_m)}$$

Where:

P_{baro}	barometric pressure (in Hg)
T_m	average dry gas meter temperature (°F)
V_m	volume of gas sample through dry gas meter at meter conditions (ft^3)
V_{mstd}	volume of gas sample through dry gas meter at standard conditions (ft^3)
Y_d	gas meter correction factor (dimensionless)
DH	average pressure drop across meter box orifice (in H_2O)
17.64	conversion factor (°R/in Hg)
13.6	conversion factor (in H_2O/in Hg)
460	°F to °R conversion constant

3. Sample gas pressure (in Hg)

$$P_s=P_{baro}+(\frac{P_g}{13.6})$$

Where:

P_{baro}	barometric pressure (in Hg)
P_g	sample gas static pressure (in H_2O)
P_s	absolute sample gas pressure (in H_2O)
13.6	conversion factor (in H_2O/in Hg)

4. Actual vapor pressure (in Hg)

$$P_v = P_s$$

Where:

P_v	vapor pressure, actual (in Hg)
P_s	absolute sample gas pressure (in Hg)

5. Moisture Content (%)

$$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$$

Where:

B_{wo}	proportion of water vapor in the gas stream by volume
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
V_{wstd}	volume of water collected at standard conditions (ft^3)

6. Saturated moisture content (%)

$$B_{ws} = \frac{(P_v)}{(P_s)}$$

Where:

B_{ws}	proportion of water vapor in gas stream by volume at saturated conditions (%)
P_v	vapor pressure, actual (in Hg)
P_s	absolute sample gas pressure (in Hg)

7. Molecular weight of dry gas stream (lb/lb-mole)

$$M_d = M_{CO2}\frac{(CO2)}{(100)} + M_{O2}\frac{(O2)}{(100)} + M_{CO-N2}\frac{(CO+N2)}{(100)}$$

Where:

Md	dry molecular weight of sample gas (lb/lb-mole)
M_{CO2}	molecular weight of carbon dioxide (lb/lb-mole)
M_{O2}	molecular weight of oxygen (lb/lb-mole)
M_{CO+N2}	molecular weight of carbon monoxide and nitrogen (lb/lb-mole)
CO_2	proportion of carbon dioxide in the gas stream by volume (%)
O_2	proportion of oxygen in the gas stream by volume (%)
$CO + N_2$	proportion of carbon monoxide and nitrogen in gas stream by volume (%)
100	conversion factor, %

8. Molecular weight of sample gas (lb/lb-mole)

$$M_s = (M_d \times (1 - B_{wo})) + (M_{H_2O} \times B_{wo})$$

Where:

Md	dry molecular weight of sample gas (lb/lb-mole)
B_{wo}	proportion of water vapor in the gas stream by volume
M_{H2O}	molecular weight of water (lb/lb-mole)
Ms	molecular weight of sample gas, wet basis (lb/lb-mole)

9. Velocity of sample gas (ft/sec)

$$V_s = (K_p \times C_p \times \sqrt{\Delta p} \times \sqrt{\frac{(t_s + 460)}{(M_s \times P_s)}})$$

Where:

Kp	velocity pressure coefficient (dimensionless)
Cp	pitot tube constant
Ms	molecular weight of sample gas, wet basis (lb/lb-mole)
Ps	absolute sample gas pressure (in. Hg)
t_s	average sample gas temperature (°F)
Vs	average sample gas velocity (ft/sec)
460	°F to °R conversion factor

10. Total flow of sample gas (acfm)

$$Q_s = (60)(A_s)(V_s)$$

Where:

As	cross section area of sampling location (ft^2)
Qs	volumetric flow rate at actual conditions (acfm)
vs	sample gas velocity (ft/sec)
60	conversion factor, seconds to minutes

11. Total flow of sample gas (dscfm)

$$Q_{std} = \frac{(Q_a)(P_s)(17.64)(1-B_{wo})}{(t_s+460)}$$

Where:

Bwo	proportion of water vapor in the gas stream by volume
Ps	absolute sample gas pressure (in. Hg)
Qa	volumetric flow rate at actual conditions (acfm)
Qstd	volumetric flow rate at standard conditions (dscfm)
t_s	average sample gas temperature (°F)
17.64	conversion factor, (°R/in.Hg)
460	°F to °R conversion factor

12. Total flow of sample gas (dscfh)

$$Q_{std/hr} = [\frac{(Q_a)(P_s)(17.64)(1-B_{wo})}{(t_s+460)}](60)$$

Where:

Bwo	proportion of water vapor in the gas stream by volume
PS	absolute sample gas pressure (in. Hg)
Qa	volumetric flow rate at actual conditions (acfm)
Qstd/hr	volumetric flow rate at standard conditions (dscfmx60)
t_s	average sample gas temperature (°F)
17.64	conversion factor, (°R/in.Hg)
460	°F to °R conversion factor

13. **Percent Isokinetic** (%)

$$I = \frac{(0.09450)(T_s)(V_{mstd})}{(P_s)(V_s)(\frac{(D_n)^2(\pi)}{(144)(4)})(\theta)(1-B_{wo})}$$

Where:

Dn	diameter of nozzle, inches
Bwo	proportion of water vapor int he gas stream by volume
I	percent of isokinetic sampling (%)
Ps	absolute sample gas pressure (in. Hg)
T_s	average sample gas temperature (OR)
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
Vs	average sample gas velocity (ft/sec)
ϑ	total sample time, minutes
0.09450	constant

14. Pollutant concentration (gr/dscf)

$$C_{gr/dscf} = \frac{(15.43)(m_n)}{V_{mstd}}$$

Where:

$C_{gr/dscf}$	measured concentration in gas stream, gr/dscf
Mn	pollutant collected, corrected for reagent blank, grams
V_{mstd}	volume of gas sample through the dry gas meter at standard conditions (ft^3)
15.43	conversion factor, grams to grains

15. Pollutant Emissions, Mass Emissions Rate lbs/hr

$$E_{lbs/hr} = \frac{(\mu g_{HCl})(2.2046e-9)(Q_{std})(60)}{(V_{std})}$$

Where:

$E_{lbs/hr}$	Mass emissions rate, pounds per hour
µg pollutant	micrograms of pollutant emissions
Q_{std}	volumetric flow rate at standard conditions, dry basis (dscfm)
V_{std}	Volume Standard conditions
2.2046e-9	conversion factor, pounds per microgram
60	conversion factor, minutes per hour

APPENDIX II FIELD DATA PRINTOUTS

STACK EMISSION SUMMARY				
SOURCE TESTED	EAF			
COMPANY NAME	Steel Dynamics			
DATE OF TEST	*06122106*			
	Run 1	**Run 2**	**Run 3**	**Average**
Filterable (gr/dscf)	0.00000307	0.00000321	0.00000218	0.00000282
Filterable (lbs/hr)	0.02090213	0.02188319	0.01405112	0.01894548
Avg. Stack Vol. Flow Rate				
ACFM	1057237 10	1036826.31	981176.92	1025080 11
DSCFM	793801.13	795628.10	754103.49	781177 57
Avg. Stack Temp.	217.818	206.833	206.583	211.078
Stack Gas Velocity	56.205	55 120	52.162	54.4957
Avg. Velocity Head	0.7691	07520	0.6753	0.7321
Avg Sq Rt of Delta P	0.8770	0.8672	0.8217	0.8553
%Isokinetics:	99.66	95.14	96.53	97.11
Allowable isokinetic 90-110%				
% Moisture of Stack Gas	4.09%	3.28%	3.45%	3.61%
Sample Volume	55 207	67.267	60.995	61.156

COMPANY NAME: Steel Dynamics
LOCATION: Columbia City, IN
SOURCE TESTED: EAF
DATE OF TEST: 06/22/06
RUN NO: 1
lead

Molecular Weight of Stack Gas, Dry **Basis, Md**

%CO2	0
%O2	21
Md	28.84

Volume of Water Vapor Collected @ **STD.** COND.. Vwv

Vlc	50 1
Vw(std)	2.357

Volume of Dry **Gas** Collected @ STD. COND. **Vm(std)**

Tm(F)	88.386
Vm	59.849
Pb(inches Hg)	30 000
delta H	*2629*
gamma	0 94G
Vm(std)	55.207

Moisture Content of Stack Gas, **Bwo**

Bwo	**4.09%**
1-Bwo	9591%

Molecular Weight of Stack Gas, **Ms**

Ms	28.40

Area of Stack (enter diameter in **inches),** As

Depth-in	
Width-in	
diameter	239 75
No of Slacks	1
As(L*W)	0
As(dia.)	313.504843

Static Pressure, **Ps**

Static	0 500
Ps	**29.96**

Slack Gas **Velocity, Vs, fps**

Cp	3 84
sqr(delta p)	0.877
Ts	217818
Vs	56 205

Stack Gas **Flowrate, Qs, acfm**

As	313.504843
Qs	1057237

Stack Gas **Flowrate** @ STD. COND., **Dry** Basis, **Qstd.**

Qstd	793801.13

Velocity **at the Nozzle,** Vn

Dia. of Nozzle	0.25
Time **of** Run	64.2
Vn	**56.01**

An(nozzle): 0.000341
ENDED AT 64:13

% Isokinetic, %I

%I	99.66

% Isokinetic measured from intermediate values

%I	100.04

Pollutant **Mass Emission Rate,** PMR. **lbs./hr.**

Mn	0 0000110
PMR	**0.0209021**

Filterable

Grains per a d

gr/acf =	0.0000024

Grains per **dscf**

gr/dscf =	0.0000031

FIELD DATA

K-Factor = 3.40

Start Time	8:50
Stop Time	64 1

Run 1	Delta P	Square Delta P	Volume	Delta H2	Stack Temp	DGM	DGM
1	1.000	1.000		**3.400**	179	85	85
2	0.950	0.980		**3.264**	174	85	85
3	0.770	0.877		**2.618**	183	86	85
4	0.780	0.883		**2.652**	195	87	85
5	0.630	0.794		**2.142**	200	88	85
6	0.630	0.794		**2.142**	211	89	85
7	0.670	0.819		**2.278**	236	88	85
8	0.700	0.837		**2.380**	246	90	86
9	0.670	0.819		**2.278**	252	92	86
10	0.990	0.995		**3.366**	229	93	86
11	0.650	0.806		**2.210**	235	92	86
12	0.930	0.964		**3.162**	219	93	86
13	0.700	0.837		**2.380**	197	90	87
14	0.750	0.866		**2.550**	207	90	88
15	0.800	0.894		**2.720**	209	90	88
16	0.810	0.900		**2.754**	215	92	88
17	0.830	0.911		**2.822**	217	93	88
18	0.770	0.877		**2.618**	229	93	89
19	0.670	0.819		**2.278**	242	90	89
20	0.750	0.866		**2.550**	243	90	89
21	0.670	0.819		**2.278**	253	92	89
22	0.380	0.938	188.322	**2.992**	221	92	89
23			128.473				
24							

Avg. Dp	Avg. Sq. Dp	Volume	Delta H	Avg. Ts(F)		Avg. Meter T(F)
0.773	0.877	59 849	2 629	217.818		88 396

COMPANY NAME: Steel Dynamics
LOCATION: Columbia City N
SOURCE TESTED: EAF
DATE OF TEST: 08/22/06
RUN NO.: 2
POLLUTANT: lead

Enter Data

Molecular Weight of Stack **Gas,** Dry **Basis,** Md

%CO2	
%O2	21
Md	**28.84**

Volume of Water Vapor Collected @ **STD.** COND., Vwv

Vlc	48.5
Vw(std)	2.281

Volume of Dry Gas **Collected** 4 **STD.** COND., **Vm(std)**

Tm(F)	91.104
Vm	73.295
Pb(inches Hg)	30.000
delta H	2.576
gamma	0.946
Vm(std)	**67.267**

Moisture Content of **Stack** Ges, **Bwo**

Bwo	3.28%
1-Bwo	96.72%

Molecular Weight of Stack Gas, **Ms**

Ms	28.48

Area of Stack **(enter** diameter In inches), **As**

Depth-in	0
Width-in	
diameter	239.76
No. of Slacks	1
As(L*W)	0
As(dia.)	313.504843

Static **Pressure,** Ps

Static	(0.500)
Ps	**29.96**

Stack Gas **Velocity, Vs, fps**

Cp	0.84
sqr(delta p)	*0.867*
Ts	208.833
Vs	55.120

Stack Gaa **Flowrate, Qs, acfm**

As	313.504843
Qs	1036826

Slack Gas **Flowrate** @ STD. COND.. Dry Basis, Qstd

Qstd.	795628.10

Velocity at the **Nozzle,** Vn

Dia. of Nozzle	0.25	An(nozzle) 0.000341
Time of Run	81.75	
Vn	**52.44**	

% Isokinetic, %I

%I	95.14

% Isokinetic measured from intermediate **values**

%I	95.51

Pollutant **Mass Emission** Rats, PMR, **lbs./hr.**

Mn	0.5600140
PMR	0.0218832

Filterable

Grains per acf

gr/acf	=	0.0000025

Grains *per* **dscf**

gr/dscf	=	0.0000032

FIELD DATA

K - Factor = 3.40

Start Time	10:55
Stop Time	12:35

Run 2	Delta P	Square Delta P	Volume	Delta H2	Stack Temp	DGM	DGM
1	0.850	0.922		**2.890**	210	89	89
2	1.100	1.049		**3.740**	200	89	89
3	0.850	0.922		**2.890**	187	89	89
4	0.750	0.866		**2.550**	201	90	89
5	0.630	0.794		**2.142**	210	92	89
6	0.710	0.843		**2.414**	211	92	89
7	0.700	0.837		**2.380**	220	90	90
8	0.800	0.894		**2.720**	225	91	89
9	0.730	0.854		**2.482**	215	92	90
10	0.720	0.849		**2.448**	237	93	89
11	0.730	0.854		**2.482**	243	93	89
12	0.800	0.894		**2.720**	238	94	89
13	0.600	0.775		**2.040**	197	91	89
14	0.900	0.949		**3.060**	186	92	90
15	0.980	0.990		**3.332**	187	94	90
16	0.850	0.922		**2.890**	185	95	90
17	0.680	0.825		**2.312**	190	95	90
18	0.840	0.917		**2.856**	207	95	90
19	0.600	0.775		**2.040**	197	92	90
20	0.900	0.949		**3.060**	192	93	91
21	0.690	0.831		**2.346**	200	94	90
22	0.580	0.762	261.989	**1.972**	217	95	91
23	0.570	0.755	188.694	**1.938**	225	96	90
24	0.620	0.787		**2.108**	232	96	90
25	0.650	0.806		**2.210**	230	96	91
26	0.500	0.707		**1.700**	236	96	91
27	0.590	0.768		**2.006**	239	97	92
28	0.670	0.819		**2.278**			

Avg. Dp	Avg. Sq. Dp	Volume	Delta H	Avg. Ts(F)		Avg. Meter T(F)
0.758	0.867	73.295	2.576	208.833		91.104

COMPANY NAME: Steel Dynamics
LOCATION: Columbia 3 tv. IN
SOURCE TESTED: EAF
DATE OF TEST: 06/22/08
RUN NO.: 3
POLLUTANT: 'sad

Enter Data

Molecular Weight of Stack Gas. Dry Basis, Md
%CO2
%02 21
Md **28.84**

Volume of Water **Vapor Collected** @ STD. COND.. Vwv
Vlc 46 4
Vw(std) **2 183**

Volume of Dry Gas **Collected** @ STD. **COND., Vm(std)**
Tm(F) 86.583
Vm 65.954
Pb(inches Hg) 30 000
delta H 2.338
gamma 0 946
Vm(std) 60.995

Moisture Content of Stack Gas, **Bwo**
Bwo **3.45%**
1-Bwo **96.55%**

Molecular Weight of Stack Gas, **Ms**
Ms **28.47**

Area **of Stack** [enter diameter in inches), As
Depth-in 0
Width-in
diameter 238.75
No. of Stacks 1
As(L*W) **0**
As(dia.) 313.504843

Static **Pressure,** Ps
Static
Ps 29 96

Stack Gas **Velocity,** Vs, fps
Cp 0 84
sqr(delta p) 0822
Ts 206.583
Vs **52.162**

Stack Gas **Flowrate, Qs,** acfm
As 313.504843
Qs **981177**

Stack Gas **Flowrate** @ STD. COND., **Dry** Basis. Qstd.
Qstd. **754103.49**

Velocity at the **Nozzle,** Vn
Dia. of Nozzle 0 25 An(nozzle) 0.000341
Time of Run 77.09
Vn 50.35

% Isokinetic, %I
%I 96.53

% Isokinetic measured **from** intermedii values
%I **96.90**

Pollutant Mass **Emission** Rate. PMR, **lbs./hr.**
Mn 0.0000086
PMR 0.0140511
Filterable

Grains per **acf**
gr/acf = **0.000007**

Grains per **dscf**
gr/dscf = 0.0000022

FIELD DATA

K - Factor = 3.40

Start Time	16:20
Stop Time	17:45

Run 3	Delta P	Square Delta P	Volume	Delta H2	Stack Temp	DGM	DGM
1	0.710	0.843		2.414	222	81	80
2	0.970	0.985		3.298	185	81	81
3	1.000	1.000		3.400	178	83	81
4	1.000	1.000		3.400	171	83	81
5	0.900	0.949		3.060	168	84	81
6	0.800	0.894		2.720	175	85	82
7	0.790	0.889		2.686	193	86	83
8	0.630	0.794		2.142	198	87	83
9	0.720	0.849		2.448	202	88	83
10	0.650	0.806		2.210	203	88	83
11	0.610	0.781		2.074	217	89	84
12	0.570	0.755		1.938	223	89	84
13	0.400	0.632		1.360	224	87	85
14	0.640	0.800		2.176	237	88	86
15	0.700	0.837		2.380	233	89	85
16	0.790	0.889		2.686	195	90	86
17	0.810	0.900		2.754	183	91	86
18	0.650	0.806		2.210	197	92	86
19	0.250	0.500		0.850	210	90	87
20	0.590	0.768		2.006	211	92	87
21	0.610	0.781		2.074	219	95	87
22	0.600	0.775	347.954	2.040	232	96	88
23	0.560	0.748	282.000	1.904	244	97	89
24	0.550	0.742		1.870	238	98	89

Avg. Dp	Avg. Sq. Dp	Volume	Delta H	Avg. Ts(F)		Avg. Meter T(F)
0.688	0.822	65.954	2.338	206.583		86.583

APPENDIX III FIELD DATA

VELOCITY TRAVERSE POINT DETERMINATION
(EPA Method 1)

Steel Dynamics @ **Columbia City. IN**
Circular Stack
Taverse Points on Diameter.
Stack Dia. (inches)? 139.75

mints:	4	6	8	10	12
1	16.06	**10.55**	7.67	6.23	**5.03**
2	59.94	**35.00**	25.17	19.66	**16.06**
3	179.81	**70.97**	46.51	35.00	**28.29**
4	223.69	**168.78**	77.44	54.18	**42.44**
5		**204.75**	162.31	81.99	**59.94**
6		**229.20**	193.24	157.76	**85.35**
7			214.58	185.57	**154.40**
8			232.08	204.75	**179.81**
9				220.09	**197.31**
10				233.52	**211.46**
11					**223.69**
12					**234.72**

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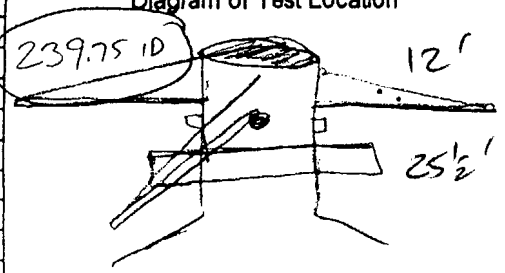
N NUMBER 1 POLLUTANT TESTED LEAD EPA METHOD 12

Start Time: 10:50

End Time: 10:11

mpany:	SDI
cation:	Columbia City
it Tested:	EAF
ler Operator:	M Dicer
obe Operator:	M. Aller
ent Contact:	Bill Bowden
ency Contact:	Jarrod Fisher
E. Reader:	—
J Project:	Date: 6-22-06
rometric Pressure:	30.0
nbient Temperature:	76

Diagram of Test Location



	CO2	O2
1	0	21
2	0	21
3	0	21
Avg.	0	Avg. 21

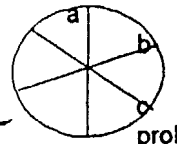
Silica ID	#8
Silica wt.	16.1 grams
Impingers	34 mls
Moisture Total	50.1 mls
Pretest Pitot Ch.	pass / fail
Postest Pitot Ch.	pass / fail

Nozzle size measurement

a nozzle (quartz, glass, SS)

b

c



Avg. 0.25 probe (quartz, glass, SS, Ti)

Teflon

Meter Y	0.996
Meter DeltaH@	1.9
Pretest Leak Ch. 0 cfm@	11
Post test Leak Ch. 0 cfm@	11

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Static Pressure Stack Temp. (F)	Probe Temp. (F)	−0.5 Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				128.473								
1	3	1.0	3.4	132.0	179	265	270	73	85	85	8	Begin Cycle 1
2	6	0.96	3.26	135.3	174	264	270	68	85	85	8	
3	9	0.77	2.62	137.9	183	261	269	74	86	85	6	
4	12	0.78	2.65	140.4	195	261	260	74	87	85	6	
5	15	0.63	2.1	143.5	200	264	260	70	88	85	5	
6	18	0.63	2.1	145.6	211	261	262	66	89	85	5	
7	21	0.67	2.27	148.9	236	263	263	71	88	85	5	
8	24	0.70	2.3	150.7	246	272	251	63	90	86	5	
9	27	0.67	2.27	153.2	252	263	262	62	92	86	5	
10	30	0.99	3.36	157.0	229	269	260	63	93	86	7	
11	33	0.65	2.2	159.2	235	262	265	65	92	86	6	
12	36	0.93	3.1	162.2	219	263	266	65	93	86	7	Top ←
13	39	0.70	2.3	164.7	197	268	258	71	90	87	6	
14	42	0.75	2.55	167.8	207	264	260	63	90	88	6	Cycle ↓
15	45	0.80	2.7	169.8	209	264	261	63	90	88	6	
16	48	0.81	2.75	173.3	215	265	259	64	92	88	6	
17	51	0.83	2.8	176.1	217	261	260	65	93	88	6	
18	54	0.77	2.6	179.1	229	261	260	65	93	87	6	
19	57	0.67	2.28	181.4	242	266	269	64	90	86	6	
20	60	0.75	2.55	184.2	243	261	260	63	90	89	5	Filter Number:
21	63	0.67	2.28	186.9	253	264	260	63	92	89	5	Filter preweight:
22	66	0.88	2.99	188.322	221	260	260	63	92	89	7	Filter postweight: — End here
23	69											Total:
24	72											Beaker ID:
25												Beaker preweight:
26												Beaker postweight:
27												Total:
28												
29												
30												

end 04:13

↑

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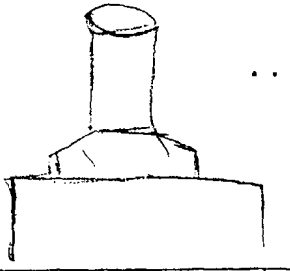
N NUMBER 2 POLLUTANT TESTED Lead EPA METHOD 12

Start Time: 10:55

End Time: 12:35

mpany:	SDI
cation:	Columbia City
t Tested:	EAF
ler Operator:	M Dean
obe Operator:	M Allen
ant Contact:	B. Boyden
ency Contact:	J. Fisher
E. Reader:	
J Project:	Date: 6-22-06
rometric Pressure:	30
nbient Temperature:	80

Diagram of Test Location



	CO2	O2
1	0	21
2	0	21
3	0	21
Avg.		Avg.
Silica ID		#9
Silica wt.		18.5 grams
Impingers		30 mls
Moisture Total		48.5 mls
Pretest Pitot Ch.		(pass) / fail
Postest Pitot Ch.		pass / fail

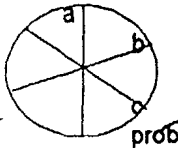
Nozzle size measurement

a nozzle (quartz, glass, SS)

b

c

Avg. 0.25



probe (quartz, glass, SS, Ti) Teflon

Meter Y	0.946
Meter DeltaH@	1.9
Pretest Leak Ch.	0 cfm@ 16
Post test Leak Ch.	0 cfm@ 16

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Static Pressure / Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				188.694			-0.5					
1	3	0.85	2.89	191.7	210	261	266	68	89	89	8	
2	6	1.1	3.40	195.0	200	264	267	63	89	89	10	
3	9	0.85	2.89	197.9	187	261	266	61	89	89	7.5	
4	12	0.75	2.55	200.7	201	254	269	65	90	89	6.5	
5	15	0.63	2.142	203.2	210	254	267	66	92	89	5.5	
6	18	0.71	2.414	205.8	211	254	264	66	92	89	6	
7	21	0.70	2.38	208.5	220	255	270	64	90	90	6.5	
8	24	0.80	2.72	211.3	225	258	269	66	91	89	7	
9	27	0.73	2.48	213.8	215	256	268	66	92	90	6	
10	30	0.72	2.448	216.4	237	260	268	68	93	89	6.5	
11	33	0.73	2.48	219.1	243	261	268	68	93	89	6	
12	36	0.80	2.72	221.9	238	261	267	68	94	89	7	
13	39	0.60	2.0	224.5	197	263	264	68	91	89	5	
14	42	0.90	3.0	227.8	186	256	269	67	92	90	8	
15	45	0.98	3.32	230.4	197	255	264	68	94	90	8.5	
16	48	0.85	2.89	233.6	165	252	258	68	95	90	7	
17	51	0.68	2.31	236.0	190	252	277	67	95	90	7	
18	54	0.84	2.85	238.7	207	255	269	68	95	90	7	
19	58	0.66	2.0	241.7	197	255	264	68	97	90	5	
20	60	0.90	3.0	244.5	192	254	270	68	93	91	8	Filter Number:
21	63	0.69	2.34	247.2	200	255	268	68	94	90	6	Filter preweight:
22	66	0.59	1.97	249.5	217	255	269	68	95	91	5	Filter postweight:
23	69	0.57	1.93	251.9	225	255	267	68	96	90	5	Total:
24	72	0.62	2.108	254.2	232	254	269	68	96	90	5	Beaker ID:
25	75	0.68	2.31	256.6	230	255	270	68	96	91	5	Beaker preweight:
26	78	0.50	1.7	259.0	236	260	269	68	96	91	5	Beaker postweight:
27	81	0.59	1.98	261.5	239	255	268	68	96	92	5	Total:
28	8:44	0.67	2.30	264.999					97	91	6	
29												
30												

Run 1 = 34 mL

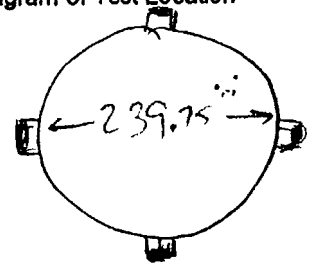
AIR ANALYSIS, INC

RUN NUMBER 3 POLLUTANT TESTED Lead EPA METHOD 12

Start Time: 16:20
End Time: 5:45

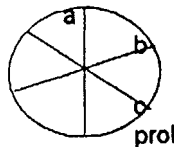
Company:	SDI
Location:	Columbus City
Unit Tested:	EAF
Meter Operator:	MD
Probe Operator:	MA
Client Contact:	SB
Agency Contact:	JE
DEP Reader:	—
AAI Project:	Date: 6-27-00
Barometric Pressure:	30
Ambient Temperature:	

Diagram of Test Location



	CO2	O2
1	0	21
2	0	21
3	0	21
Avg.	0	Avg. 21
Silica ID		☆ 10
Silica wt.		16.4 grams
Impingers		30 mls
Moisture Total		46.4 mls
Pretest Pitot Ch.		pass / fail
Postest Pitot Ch.		pass / fail

Nozzle size measurement
a nozzle (quartz, glass, SS)
b
c
Avg.



Teflon
probe (quartz, glass, SS, Ti)

Meter Y	0.996
Meter DeltaH@	1.9
Pretest Leak Ch. 0	cfm@ 15
Post test Leak Ch. 0	cfm@ 15

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Static Pressure Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				282.0			-0.5					
1	3	0.71	2.4	284.6	222	265	269	69	81	80	2	
2	6	0.97	3.2	287.7	185	254	270	54	81	81	6	
3	9	1.0	3.4	291.06	178	258	267	57	83	81	8	
4	12	1.0	3.4	294.9	171	256	264	60	84	81	9	
5	15	0.90	3.06	296.6	168	255	270	61	85	81	8	
6	18	0.80	2.72	299.5	175	261	267	59	85	82	8	
7	21	0.79	2.63	302.5	193	258	275	57	86	83	6.5	
8	24	0.63	2.14	304.8	196	251	267	58	87	83	5	
9	27	0.72	2.44	307.4	202	255	268	58	88	83	6	
10	30	0.65	2.21	310.3	203	254	268	59	88	83	6	
11	33	0.61	2.07	312.5	207	264	268	58	89	84	5	
12	36	0.57	1.93	314.8	220	254	271	58	89	84	4.5	
13	39	0.60	1.36	316.9	224	264	267	60	87	85	2.5	
14	42	0.64	2.17	319.4	237	248	267	59	88	86	5	
15	45	0.70	2.38	321.9	233	251	268	59	89	86	5	
16	48	0.79	2.68	324.7	195	264	264	58	90	86	6	
17	51	0.81	2.75	327.7	193	254	266	58	91	86	6.5	
18	54	0.65	2.21	330.1	197	261	269	59	92	86	5.5	
19	57	0.26	0.85	332.1	210	269	269	65	90	87	2	
20	60	0.59	2.00	334.4	211	248	271	60	92	87	5	Filter Number:
21	63	0.61	2.07	336.4	214	252	269	58	94	87	5	Filter preweight:
22	70	0.60	2.04	339.4	232	253	269	60	96	89	4.5	Filter postweight:
23	75	0.56	1.90	342.3	241	256	269	61	97	89	4.5	Total:
24	80	0.55	1.87		238	253	270	61	98	89		Beaker ID:
25												Beaker preweight:
26	77	12 m		347.9	54							Beaker postweight:
27												Total:
28												
29												
30												

APPENDIX IV LABORATORY DATA

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	27JUN-06		A738999
	Completed	PO Number	
	03-JUL-06	CREDIT CARD	
	Printed	Sampled	
	06-JUL-06	22-JUN-06	

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: BLANK HNO3
MATRIX TYPE: NONSPECIFIC WATER
SUBMITTER CODE: 7124

FAA/ ICP **ACID DIGESTION** OF AQUEOUS SAMPLES, TOTAL RECOVERABLE **SW846-3005A**

Analyst: J. LEAK | Analysis Date: 30-JUN-06 09:30 | Instrument: PREP | Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

Total volume received = 195 ml.

LEAD **ICP SW846-6010B** NELAC:Y

Analyst: J. KRAMER | Analysis Date: 01-JUL-06 05:48 | Instrument: ICP | Test: M116.3.0

Prep: FAA/ ICP **ACID DIGESTION** OF AQUEOUS **SAMPLES, TOTAL** RECOVERABLE **SW846-3005A** P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.010	mg/L

Sample Comments

AMENDED REPORT - KJM - 06-JUL-06 :
Total volume received added at client request

BDL Below Detection Limit

Sample was received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Kurt J Maines

Approved by: KURT MAINES 06-JUL-06

HERITAGE

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	28-JUN-06		A739003
	Completed	PO Number	
	10-JUL-06	CREDIT CARD	
	Printed	Sampled	
	10-JUL-06	22-JUN-06	

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: BLANK FILTER
MATRIX TYPE: SLUDGE, SOIL, SOLID OR SEDIMENT
SUBMITTER CODE: 7124

FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES SW846-3050B

Analyst V. PATEL — Analysis Date: 07-JUL-06 09:30 — Instrument: PREP — Test: P129.7.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1		Filter
FINAL VOLUME	50		mL

LEAD ICP SW846-6010B — NELAC:Y

Analyst J. KRAMER — Analysis Date: 08-JUL-06 09:06 — Instrument ICP — Test: M116.3.0

Rep: FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES SW846-3050B P129.7.0

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.50	ug

Sample Comments

BDL Below Detection Limit

Sample was not received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Scott A Bryan

Approved by: SCOTT BRYAN 10-JUL-06

HERITAGE

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	28-JUN-06		A739000
	Completed	PO Number	
		CREDIT CARD	
		Sampled	
	10-JUL-06	22JUN-06	

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: RUN 1 FILTERS
MATRIX TYPE: SLUDGE, SOIL, SOLID OR SEDIMENT
SUBMITTER CODE: 7124

FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES SW846-3050B

Analyst: V. PATEL | Analysis Date: 07-JUL-06 09:30 | Instrument: PREP | Test: P129.7.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1		Filter
FINAL VOLUME	50		mL

LEAD ICP SW846-6010B NELAC:Y

Analyst J. KRAMER | Analysis Date: 08-JUL-06 08:56 | Instrument: ICP | Test M116.3.0

Prep: FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES SW846-3050B P129.7.0

Parameter	Result	Det. Limit	Units
LEAD	11.	0.50	ug

Sample Comments

Sample was not received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Scott A Bryan

Approved by: SCOTT BRYAN 10-JUL-06

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	28-JUN-06		A739001
	Completed	PO Number	
	10-JUL-06	CREDIT CARD	
	Printed	Sampled	
	10-JUL-06	22-JUN-06	

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: RUN 2 FILTERS
MATRIX TYPE: SLUDGE, SOIL, SOLID OR SEDIMENT
SUBMITTER CODE: 7124

FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES SW846-3050B

Analyst: V. PATEL | Analysis Date: 07-JUL-06 09:30 | Instrument: PREP | Test: P129.7.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1		Filter
FINAL VOLUME	50		mL

LEAD ICP SW846-6010B NELAC:Y

Analyst J. KRAMER | Analysis Date: 08-JUL-06 09:00 | Instrument: ICP | Test: M116.3.0

Prep: FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES SW846-3050B P129.7.0

Parameter	Result	Det. Limit	Units
LEAD	14.	0.50	ug

Sample Comments

Sample was not received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Scott A Bryan

Approved by: SCOTT BRYAN 10-JUL-06

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	28-JUN-06		A739002
	Completed	PO Number	
	10-JUL-06	CREDIT CARD	
	Printed	Sampled	
	10-JUL-06	22-JUN-06	

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: RUN 3 FILTERS
MATRIX TYPE: SLUDGE, SOIL, SOLID OR SEDIMENT
SUBMITTER CODE: 7124

FAA OR ICP **ACID** DIGESTION OF **S/S/S** SAMPLES **SW846-3050B**

Analyst: V. PATEL **Analysis Date: 07-JUL-06 09:30** Instrument: **PREP** **Test: P129.7.0**

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1		Fitter
FINAL VOLUME	50		mL

LEAD ICP **SW846-6010B** NELAC:Y

Analyst: J. KRAMER **Analysis** Date: **08-JUL-06 09:03** Instrument: ICP **Test M116.3.0**

Prep: FAA OR ICP ACID DIGESTION OF S/S/S SAMPLES SW846-3050B P129.7.0

Parameter	Result	Det. Limit	Units
LEAD	**8.6**	**0.50**	ug

Sample Comments

Sample was not received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Scott A Bryan

Approved by: SCOTT BRYAN 10-JUL-06

HERITAGE

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	27-JUN-06		A738996
	Completed 03-JUL-06	PO Number CREDIT CARD	
	Printed 06-JUL-06	Sampled 22-JUN-06	

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: RUN 1 EAF
MATRIX TYPE: NON-SPECIFIC WATER
SUBMITTER CODE: 7124

FAA/ ICP ACID DIGESTION OF AQUEOUS SAMPLES, TOTAL RECOVERABLE SW846-3005A

Analyst: J. LEAK | Analysis Date: 30-JUN-06 09:30 | Instrument: PREP | Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

Total volume received = 265 ml.

LEAD ICP SW846-6010B NELAC:Y

Analyst: J. KRAMER | Analysis Date: 01-JUL-06 05:38 | Instrument: ICP | Test: M116.3.0

Prep: FAA/ ICP ACID DIGESTION OF AQUEOUS SAMPLES. TOTAL RECOVERABLE SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	0.034	0.010	mg/L

Sample Comments

AMENDED REPORT - KJM - 06-JUL-06 :

Total Volume of Sample received added per client request.

Sample was received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Kurt J Maines

Approved by: KURT MAINES 06-JUL-06

$\frac{0.034 mg}{L} \times \frac{L}{1000 mL} \times 265 mL \times \frac{g}{1000 mg}$

$= 0.000009\ g$

CERTIFICATE OF ANALYSIS

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	27-JUN-06		A738997
	Completed	PO Number	
	03-JUL-06	CREDIT CARD	
	Printed	Sampled	
	06-JUL-06	22-JUN-06	

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS. IN 46231

Sample Description

CLIENT ID: RUN 2 EAF
MATRIX TYPE: NONSPECIFIC WATER
SUBMITTER CODE: 7124

FAA/ ICP ACID DIGESTION OF AQUEOUS SAMPLES. TOTAL RECOVERABLE SW846-3005A

Analyst J. LEAK | Analysis Date: 30-JUN-06 09:30 | Instrument: PREP | Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

Total volume received = 252 ml.

LEAD ICP SW846-6010B NELAC:Y

Analyst J. KRAMER | Analysis Date: 01-JUL-06 05:42 | Instrument: ICP | Test: M116.3.0

Prep: FAA/ ICP ACID DIGESTION OF AQUEOUS SAMPLES. TOTAL RECOVERABLE SW846-3005A P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	0.095	0.010	mg/L

Sample Comments

AMENDED REPORT - KJM - 06-JUL-06 :

Total volume received added at client request.

Sample was received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Kurt J Maines

Approved by: KURT MAINES 06-JUL-06

$\frac{0.095\ mg}{L} \times \frac{L}{1000\ mL} \times 252\ mL \times \frac{g}{1000\ mg} =$

$= 0.0000239$

CERTIFICATE OF ANALYSIS

Service Location		Project
HERITAGE ENVIRONMENTAL SERVICES, LLC COMMERCIAL LABORATORY OPERATIONS 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8304	27-JUN-06	A738998
	Completed 03-JUL-06	PO Number CREDIT CARD
	Printed 06-JUL-06	**Sampled** 22-JUN-06

Report To	Bill To
MICHAEL DICEN AIR ANALYSIS, INC 3904 CLARKS CREEK ROAD PLAINFIELD, IN 46168	RESIDENTIAL CUSTOMER 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231

Sample Description

CLIENT ID: RUN 3 EAF
MATRIX TYPE: NON-SPECIFIC WATER
SUBMITTER CODE: 7124

FAA/ ICP ACID DIGESTION OF AQUEOUS SAMPLES, TOTAL RECOVERABLE SW846-3005A

Analyst J. LEAK **Analysis** Date: 30-JUN-06 09:30 **Instrument:** PREP Test: P130.4.0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL VOLUME	50		mL

Total volume received = 278 ml.

LEAD ICP SW846-6010B NELAC:Y

Analyst: J. KRAMER **Analysis** Date: 01-JUL-06 05:45 **Instrument** ICP Test: M116.3.0

Prep: FAA/ ICP **ACID DIGESTION** OF **AQUEOUS SAMPLES. TOTAL RECOVERABLE SW846-3005A** P130.4.0

Parameter	Result	Det. Limit	Units
LEAD	0.16	0.010	mg/L

Sample Comments

AMENDED REPORT - KJM - 06-JUL-06 :

Total volume received added at client request.

Sample was received on ice at temperature 24.2 C.
Sample chain of custody number 39117.

Kurt J Maines

Approved by: KURT MAINES 06-JUL-06

$= 0.16 \frac{mg}{L} \times \frac{L}{1000 mL} \times \frac{g}{1000 mg} \times 27$

$= 0.000044$

APPENDIX V CHAIN OF CUSTODY

Air **Analysis, Inc** **3904 Clarks Creek** Road **Plainfield, IN 46168** **PH: 317-837-8514** **FAX: 317-837-8518**	Chain of Custody Form **Date:** June 23 06	**Job Number:** 388 Invoice to: Air Analysis, Inc 3904 Clarks Creek Road Plainfield, IN 46168

Sample ID	Number of Containers	Description	Container P or G	Sample Date	Analysis to perform
R1	2	~~Blk~~ Filter / HNO_3	P/G	6-22	M12
R2	2	"	"		"
R3	2	"	"		"
	2	Blanks			

Report to: Mike Dicen @ above address
Fax Results to 317-837-8518

Additional Notes

SAMPLER DATE: 6-22

SHIPMENT METHOD

AIRBILL NUMBER

Required Turnaround: 24 HR | 48 HR | 5 BUSINESS DAYS | 10 BUSINESS DAYS | OTHER _____

RELINQUISHED BY	MA	Date	6-23	RELINQUISHED BY		Date		COURIER
Company		Time		Company		Time		
RECEIVED BY	Heritage	Date		RECEIVED BY		Date		
Company		Time		Company		Time		

APPENDIX VI CALIBRATION DATA

ΔAir Analysis, Inc.

3904 Clarks Creek Road
Plainfield, Indiana 46168
(317) 837-8514
(317) 837-8518 fax

Pitot Tube Calibration

Reference: 40CFR 60, **Appendix A,** Method **2,** Section 2 2

External Tubing Diameter:	0.95 centimeters
Base to Opening Plane Distance (Pa):	1.2 centimeters
Base to Opening Plane Distance (Pb):	**1.2 centimeters**

	Measured	Allowable
Pa/Dt	**1.26cm**	**1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)**
Pb/Dt	**1.26cm**	**1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)**
Angle a **1**	1 deg	**a 1 and a 2 ≤ 10.0'**
Angle a 2	1 deg	**a 1 and a 2 ≤ 10.0'**
Angle **β** 1	**0** deg	**β 1 and β 2 ≤ 5.0'**
Angle β 2	**0** deg	**β 1 and $ 2 ≤ 5.0°**
z (cm)	0.0	z is less than **0.32cm (1/8th")**
w (cm)	0.0	w is less than **0.08cm (1/32nd")**
	If all criteria are met, Pitot Coefficient is 0.84	**Pitot Coefficient: 0.84**

Calibrated By: Marcus Date Calibrated: Sept 8, 2006

Thermocouple Test

Control factor	*Mercury Thermometer F*	*Probe Response*
ICE	**39°**	**38°**
AMBIENT	58'	**59°**
BOILING/ HOT H20	147'	148'

Test performed by: Marcus Date of test: , T 8, 2005

GRASEBY NUTECH
EPA Method 5
Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Filename: C:\Documents and Settings\bby231\Application Data\Microsoft\Templates\[Copy of meter box#80cal.xlt]3PTCQCAL
Revised: 8/1/97 Version: 1.01

Model #: mst
Serial #: 90680.00

Date: ——————>
Barometric Pressure: ——> 29.87 (in. Hg)
Theoretical Critical Vacuum:—> 15.00 (in. Hg)

!!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

	DRY GAS METER READINGS									-CRITICAL ORIFICE READINGS-					
			Volume	Volume	Volume	Initial Temps.		Final Temps.		Orifice	K' Orifice	Actual	– Ambient Temperature –		
Delta H	Time		Initial	Final	Total	Inlet	Outlet	Inlet	Outlet	Serial#	Coefficient	Vacuum	Initial	Final	Average
(in H2O)	(min)		(cu ft)	(cu ft)	(cu ft)	(deg F)	(deg F)	(deg F)	(deg F)	(number)	(see above)	(in Hg)	(deg F)	(deg F)	(deg F)
2	70	5.00	118.245	122.890	4.645	46.0	41.0	46.0	41.0	4	0.689	15.0	40.0	40.0	40.0
2	70	5.00	122.890	127.520	4.630	48.0	42.0	48.0	42.0	4	0.689	15.0	40.0	40.0	40.0
2	70	5.00	127.520	132.139	4.619	50.0	43.0	50.0	43.0	4	0.689	15.0	40.0	40.0	40.0

********** RESULTS **********

DRY GAS METER		ORIFICE			DRY GAS METER		ORIFICE			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y Value (number)	Variation (number)	CALIBRATION FACTOR Delta H@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)	
4.893	138.6	4.602	130.3	4.367	0.940	-0.006	1.886	47.91	0.004	
4.863	137.7	4.602	130.3	4367	0.946	0.000	1.883	47.82	0.000	
4.837	137.0	4.602	130.3	4.367	0.951	0.005	1.879	47.72	-0.004	
		Average Y ——>			0.946		1.883	47.82	<—— Average dH@	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

SIGNED: Mona Allen

Date: 01/18/2006

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26
12/12/01

Steel Dynamics
Columbia City, IN

	Run1	Run 2	Run 3	Average
Y qa =	0.901	0.977	0.972	0.950

Average result must **be within** 5% **of Y**

Result (%):	-0.37%

PASS POST CAL

ID :	80
Y :	0.946
Delta H :	1.89

RUN 1	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		3.400	85	85
2	Steel Dynamics	3.264	85	85
3	12/12/01 **Dry Gas Meter Box:**	2.618	86	85
4	(Post Test) per EMTIC Guideline GD-26	2.652	87	85
5		2.142	88	85
6		2.142	89	85
7		2.278	88	85
8		2.380	90	86
9		2.278	92	86
10		3.366	93	86
11		2.210	92	86
12		3.162	93	86
13		2.380	90	87
14		2.550	90	88
15		2.720	90	88
16		2.754	92	88
17		2.822	93	88
18		2.618	93	89
19		2.278	90	89
20		2.550	90	89
21		2.278	92	89
22	188.322	2.992	92	89
23	128.473	0.000	0	0
24		0.000	0	0

Volume	Avg. Dh		Avg. Meter T(F)
59.849	2.41		81.02

Barometric Pressure:	30.00	**Meter Y:**	0.946
Test Time:	64.2	**Delta Ha:**	1.89

Yqa =	0.901

RUN 2	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1	Steel Dynamics	2.89	89	89
2	12/12/01	3.74	89	89
3	(Post Test) per EMTIC Guideline GD-26	2.89	89	89
4		2.55	90	89
5		2.14	92	89
6		2.41	92	89
7		2.38	90	90
8		2.72	91	89
9		2.48	92	90
10		2.45	93	89
11		2.48	93	89
12		2.72	94	89
13		2.04	91	89
14		3.06	92	90
15		3.33	94	90
16		2.89	95	90
17		2.31	95	90
18		2.86	95	90
19		2.04	92	90
20		3.06	93	91
21	261.989	2.35	94	90
22	188.694	1.97	95	91
23		1.94	96	90
24		2.11	96	90

Volume	Avg. Dh		Avg. Meter T(F)
73.295	2.58		91 10

Barometric Pressure:	30.00	Meter Y:	0 946
Test Time:	81 75	Delta Ha:	1 890

Yqa =	0.977

RUN 3	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		2.41	81	80
2	Steel Dynamics	3.30	81	81
3	12/12/01	3.40	83	81
4	Columbia City, IN	3.40	83	81
5		3.06	84	81
6		2.72	85	82
7		2.69	86	83
8		2.14	87	83
9		2.45	88	83
10		2.21	88	83
11		2.07	89	84
12		1.94	89	84
13		1.36	87	85
14		2.18	88	86
15		2.38	89	85
16		2.69	90	86
17		2.75	91	86
18		2.21	92	86
19		0.85	90	87
20		2.01	92	87
21	347.954	2.07	95	87
22	282.000	2.04	96	88
23		1.90	97	89
24		1.87	98	89

Volume	Avg. Dh		Avg. Meter T(F)
65.954	2.34		86.58

Barometric Pressure:	30 00	Meter Y:	0.946
Test Time:	77 09	Delta Ha:	1 890

Yqa =	0.972

APPENDIX VII SUBMITTED PROTOCOL

COMPLIANCE TEST PROTOCOL
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Date Prepared: April 17, 2006 **Proposed Test Date:** June 23, 2006

Plant Address and Location: 2601 County Road 700 East, Columbia City, IN 46725

Check program if applicable:
FESOP: ____
Title V: X
SSOA: ____

AGENCY USE ONLY	Date Rec'd:
Inspector:	Reviewer: Date Appr:

1. Source Information

AFS: Id Number: Permit Number: PSD/SSM 183-18426-00030
Company: Steel Dynamics, Inc
Mail Address: 2601 County Road 700 East
City: Columbia City Zip: 46725
Co.Contact: Bill Bougher Phone: (260) 625-8484

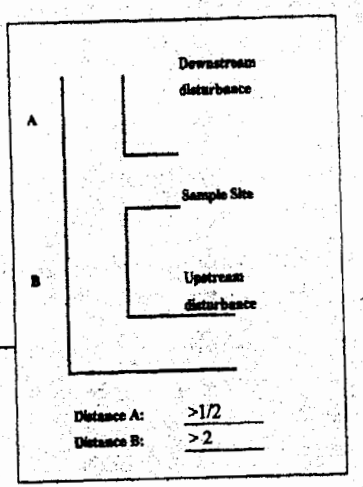
2. Tester Information

Name: Air Analysis, Inc
Address: 3904 Clarks Creek Rd
Contact: Michael Dicen Phone: 317-837-8514
Pre-Test Inspection Complete? Yes

3. Process Information

Unit to Test: Electric Arc Furnace
Max. Rated Capacity: 300 tons/hr
Proposed Operating Speed: 150 tons/hour
Pollution Control Equipment: Baghouse
Process Description: Molten Steel

Fuel Type: Natural gas Low NOx burners or oxy-fuel burners



4. Test Information

		# Runs	Time/Run
Methods 1-4	Moisture/Flow	3	60 min
Method 5			
Method 6			
Method 7			
Method 29	Mercury and Lead	3	60 min
Other Testing:			

326 IAC 3-2.1 requires this completed form and fee to be submitted 35 days prior to proposed test date to:
(FEE NOT APPLICABLE IF FESOP OR TITLE V)

Questions may be directed to 317-232-8338, FAX: 317-233-6865

Compliance Data Section
Office of Air Management
Indiana Department of Environmental Management
100 North Senate
PO BOX 6015
Indianapolis, IN 46206-6015

5. Sampling Strategy

a. Describe any deviations from the standard [illegible]:
Reduced capacity due to operation of one EAF

b. Describe method used to determine [illegible]:
Plant personnel will keep record of production

6. Sample Site Location

Does sample port location meet 40 CFR 60, Appx. A, Method 1 Section 1.2 requirements: Yes/No: YES If No, Explain:

Number of sample points for M5: 24
Diameter at sample site: 20' Stack [illegible]: 120'
Approx. stack gas flow (ACFM): 1116200
Approx. gas temp. (degF): 200
Approx. gas moisture (%): 3%

Reason for test:
State Agreed Order: Yes/No: [illegible] Yes/No: Yes
Construction Permit: Yes/No: [illegible]
NSPS 40 CFR 60 Subpart: [illegible]
Title V: [illegible]
Other (i.e. EPA, CD, state, 114) [illegible]

APPENDIX VIII PRODUCTION DATA

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-2-2006
Crew: C (AM) PM
Supervisor: Andy
Furnace: A
1 st Helper: SARRAZIN

Heat #	A024303	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	270000	1745	1752	TAT	7
MWH 1st / Total	/4700	1752	1829	Pour	37
Power On 1st / Total / Tap-Tap	3340 / 44	1829			
O2 (scf) 1st / Total	/182443				
Inj C (lbs) 1st / Total	/2581				
Charge C (fbs)	2363				
Lime 1st / Total	5700 /				
Olivine 1st / Total	2277 /				
Dolo Lime 1st / Total	2531 /				
Ladle Lime / MgO	/500				
Tap C (wt%)	.045				
Tap O (ppm)	887				
Tap Temp (degF)	3015				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	77.1				
Tap wt actual (lbs)	120.6				
Tap Time / Ladle #	1829 / 5				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total *Minutes* Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

184.1 T/HR

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-22-06
Crew : C (AM) PM
Supervisor : Andy
Furnace : A
1 st Helper SARRAZ.m

Heat #	A024302	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	270/00	1705	1712	TAP E	7
MWH 1st / Total	/460	1712	1745	Pow	33
Power On 1st / Total / Tap-Tap		1745		TAP	
02 (scf) 1st / Total					
Inj C (lbs) 1st / Total	/1178				
Charge C (lbs)	2356				
Lime 1st / Total	5766/ —				
Olivine 1st / Total	2292/ —				
Dolo Lime 1st / Total	2525/ —				
Ladle time / MgO	—/500				
Tap C (wt%)	.048				
Tap O (ppm)	721				
Tap Temp (degF)	2947				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	73.6				
Tap wt actual (lbs)	1205				
Tap Time / Ladle #	1745 | 7				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments.

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-22-06
Crew : C (AM) PM
Supervisor : Andy
Furnace : A
1 st Helper SARRAZIN

Heat #	AR024201	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	200/60	1620	1632	T&T 5,700	12
MWH 1st / Total	/4650	1632	1705	Pour	33
Power On 1st / Total / Tap-Tap	3230 45	1705		TAP	
O2 (scf) 1st / Total	/15683				
Inj C (lbs) 1st / Total	/1537				
Charge C (lbs)	2354				
Lime 1st / Total	5746 /				
Olivine 1st / Total	2210 /				
Dolo Lime 1st / Total	2512 /				
Ladle time / MgO	/ 500				
Tap C (wt%)	.048				
Tap O (ppm)	716				
Tap Temp (degF)	2954				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	70.8				
Tap wt actual (lbs)	120.7				
Tap Time / Ladle #	1705 1				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-22-06
Crew : C (AM) PM
Supervisor : Andy
Furnace : 4
1 st Helper SARRAZIN

Heat #	A024300	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (tbs)	270/600	1535	1550	TdT Slag on	15
MWH 1st / Total	/4360	1550	1620	Pow	30
Power On 1st / Total / Tap-Tap	3036 / 45	1620		TAP	
O2 (scf) 1st / Total	/158545				
Inj C (lbs) 1st / Total	/2085				
Charge C (lbs)	2339				
Lime 1st / Total	5743/ -				
Olivine 1st / Total	2244/ -				
Dolo Lime 1st / Total	2519/ -				
Ladle Lime / MgO	- /500				
Tap C (wt%)	.039				
Tap O (ppm)	1060				
Tap Temp (degF)	2991				
Slag Rating (1-5) 1=fluid 5=thick foam	3				
Ladle tare wt (lbs)	715				
Tap wt actual (lbs)	119.4				
Tap Time / Ladle #	1620 / 4				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-22-06
Crew : C (AM) PM
Supervisor : Andy
Furnace : A
1 st Helper SARRAZIN

Heat #	A024299	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	270600	1310	1327	TAP Wait	17
MWH 1st / Total	4690	1327	1337	Pour	10
Power On 1st / Total / Tap-Tap	3128 / 145	1337	1510	lost power	93
O2 (scf) 1st / Total	18343	1510	1535	Pour	25
Inj C (lbs) 1st / Total	1563	1535		TAP	
Charge C (lbs)	2346				
Lime 1st / Total	5740				
Olivine 1st / Total	2254				
Dolo Lime 1st / Total	2510				
Ladle Lime / MgO	500				
Tap C (wt%)	.033				
Tap O (ppm)	1349				
Tap Temp (degF)	2991				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	76.7				
Tap wt actual (lbs)	114.9				
Tap Time / Ladle #	1555 / 5				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments: changed c Ø

Steel Dynamics, Inc.
Structural 4 Rail Mill

EAF Heat Record

Date : 6-22-06
Crew : C (AM) PM
Supervisor : Andy
Furnace : A
1 st Helper STARRATT

Heat #	A024298	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	265/500	1230	1237	TAP, Slg A0	7
MWH 1st / Total	/4312	1237	1310	Pow	33
Power On 1st / Total / Tap-Tap	AM 40	1310		TAP	
02 (scf) 1st / Total	/15631				
Inj C (lbs) 1st / Total	/1851				
Charge C (lbs)	2335				
Lime 1st / Total	5753/—				
Olivine 1st / Total	2238/—				
Dolo Lime 1st / Total	2510/—				
Ladle Lime / MgO	—/500				
Tap C (wt%)	.35				
Tap O (ppm)	1035				
Tap Temp (degF)	3027				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	75.0				
Tap wt actual (lbs)	120.6				
Tap Time / Ladle #	1310 / 7				
Patch FCE (Y/N)	N				

Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-22-06
Crew: C (AM) PM
Supervisor: Andy
Furnace: A
1st Helper: SARRAZIN

		Start	Finish	Operating Events	Minutes
Heat #	A024297				
Scrap wt 1st / 2nd (lbs)	265/700	1138	1146	T&S	8
MWH 1st / Total	/4599	1196	1201	P-on	15
Power On 1st / Total / Tap-Tap	343 / 52	1201	1204	~~TAP~~ charge BO	3
O2 (scf) 1st / Total	/191023	1204	1230	DON	26
Inj C (lbs) 1st / Total	/1621	1230		TAP	
Charge C (lbs)	2346				
Lime 1st / Total	5740 / —				
Olivine 1st / Total	2258 / —				
Dolo Lime 1st / Total	2515 / —				
Ladle Lime / MgO	—/500				
Tap C (wt%)	.044				
Tap O (ppm)	933				
Tap Temp (degF)	3027				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	749				
Tap wt actual (lbs)	120.3				
Tap Time / Ladle #	1230 / 6				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments: A468

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-22-06
Crew : C (AM) PM
Supervisor : Andy
Furnace : E-
1 st Helper SARRAZIN

Heat #	A024296	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	272900	1056	1103	T&T	7
MWH 1st / Total	/4517	1103	1135	P-on	35
Power On 1st / Total / Tap-Tap	3233 / 42	1135		TAP	
O2 (scf) 1st / Total	/141601				
Inj C (lbs) 1st / Total	/2335				
Charge C (lbs)	2359				
Lime 1st / Total	5725 / —				
Olivine 1st / Total	2200 / —				
Dolo Lime 1st / Total	2515 / —				
Ladle Lime / MgO	— / 500				
Tap C (wt%)	.046				
Tap O (ppm)	809				
Tap Temp (degF)	2489				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	71.1				
Tap wt actual (lbs)	117.1				
Tap Time / Ladle #	1138 / 1				
Patch FCE (Y/N)	✓				

Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-22-06
Crew: (AM) PM
Supervisor: Andy
Furnace: A
1 st Helper SARRAZIN

Heat #	A084795	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	270000	1011	1021	T&T Tap Gate	10
MWH 1st / Total	/4454	1021	1056	Pow	35
Power On 1st / Total / Tap-Tap	3148 / 45	1056		TAP	
02 (scfj 1st / Total	/18207				
Inj C (lbs) 1st / Total	/2099				
Charge C (lbs)	2346				
Lime 1st / Total	5713 / —				
Olivine 1st / Total	2217 / —				
Dolo Lime 1st / Total	2515 / —				
Ladle Lime / MgO	— /500				
Tap C (wt%)	.0414				
Tap O (ppm)	840				
Tap Temp (degF)	2961				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	71.1				
Tap wt actual (lbs)	118.7				
Tap Time / Ladle #	1056 / LF				
Patch FCE (Y/N)	Y				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Sun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-22-06
: C AM PM
Supervisor :
Furnace : And
1 st Helper SL RAR.
SARRAR.N

Heat #	A024294	start	Finish	Operating E...	
Scrap wt 1st / 2nd (lbs)	260000	929	935	TAT	6
MWH 1st / Total	1369	935	1011	Pow	56
Power On 1st / Total / Tap-Tap	31 36 42	1011		TAP	
02 (scf) 1st / Total	19087				
Inj C (lbs) 1st / Total	279				
Charge C (lbs)	2367				
Lime 1st / Total	572 / —				
Olivine 1st / Total	2224 / —				
Dolo Lime 1st / Total	2518 / —				
Ladle Lime / MgO	500				
Tap C (wt%)	.039				
Tap O (ppm)	1059				
Tap Temp (degF)	2992				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	719				
Tap wt actual (lbs)	179.0				
Tap Time / Ladle #	1011 / 7				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-29-06
Crew : C AM/PM
Supervisor : Andy
Furnace : A
1 st Helper SARAH.N

Heat #	A024293	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	264600	847	855	TLT	8
MWH 1st / Total	/4476	855	929	P-ON	34
Power On 1st / Total / Tap-Tap	312 42	929		TAP	
O2 (scf) 1st / Total	/18325				
Inj C (lbs) 1st / Total	/2116				
Charge C (lbs)	2369				
Lime 1st / Total	5708 / —				
Olivine 1st / Total	2231 / —				
Dolo Lime 1st / Total	2512 / —				
Ladle Lime / MgO	500				
Tap C (wt%)	.038				
Tap O (ppm)	1227				
Tap Temp (degF)	3051				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	75.5				
Tap wt actual {lbs)	120.8				
Tap Time / Ladle #	929 | 6				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Sun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-21-06
Crew : D AM (PM)
Supervisor : B. LaRoy
Furnace : South
1 st Helper D. Talley

Heat #	A024292	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	270800	08:04	08:11	Tap-Turn	7
MWH 1st / Total	— / 46.20	08:11	08:43	Power on	32
Power On 1st / Total / Tap-Tap	32.21 / 43	08:43	847	Melt-Comp	4
O2 (scf) 1st / Total	— / 167790	847		Tap	
Inj C (lbs) 1st / Total	— / 2049				
Charge C (lbs)	2366				
Lime 1st / Total	5707 / —				
Olivine 1st / Total	2230 / —				
Dolo Lime 1st / Total	2481 / —				
Ladle Lime / MgO	500				
Tap C (wt%)	.041				
Tap O (ppm)	918				
Tap Temp (degF)	2967				
Slag Rating (1-5) 1-fluid 3=thick foam	4				
Ladle tare wt (lbs)	76.7				
Tap wt actual (lbs)	118.8				
Tap Time / Ladle #	847 / 5				
Patch FCE (Y/N)	N				

Area(s) **Patched** (12 o'clock = taphole)		**Electrodes**		**Total Minutes Misc Delays**	
Gun #1 tbs **Used**		A phase	Add/Slip	**Total Minutes** Add/Slip Electrodes	
Gun #2 Lbs **Used**		B phase	Add/Slip	**Total Minutes Refractory Repair**	
Bottom Patch Lbs Used		C phase	Add/Slip	**Total Minutes** Scrap Cnarging	

Comments:

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date: 6-20-06
Crew: A (A) F
Supervisor: Gray
Furnace: 5
1 st Helper Raleigh

Heat #	A024265	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	208000 / 90000	16:42	16:48	TAP-Twin	
MWH 1st / Total	1800 / 48410	16:48	17:03	Power	
Power On 1st / Total / Tap-Tap	14:54 / 36:18 / 93	17:03	17:04	2nd	
O2 (scf) 1st / Total	16.77 / 166108	17:04		Pwdr	
Inj C (lbs) 1st / Total	— / 1355				
Charge C (lbs)	2270				
Lime 1st / Total	/ 5800				
Olivine 1st / Total	/ 2356				
Dolo Lime 1st / Total	/ 2018				
Ladle Lime / MgO	500				
Tap C (wt%)	.055				
Tap O (ppm)	576				
Tap Temp (degF)	2929				
Slag Rating (1-5) 1-fluid 5=thick foam	3				
Ladle tare wt (lbs)	71.7				
Tap wt actual (lbs)	131.5				
Tap Time / Ladle #	17:26 | 4				
Patch FCE (Y/N)					
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

(6-22-06) heat DATA

Steel Dynamics, Inc.
Structural & Rail Mill

EAF Heat Record

Date : 6-21-06
Crew: D AM PM
Supervisor : B. LaRay
Furnace : South
1 st Helper D. Talley

Heat #	A024291	Start	Finish	Operating Events	Minutes
Scrap wt 1st / 2nd (lbs)	258400	07:26	07:32	Tap & Turn	6
MWH 1st / Total	—/44.09	07:32	08:03	Power on	31
Power On 1st / Total / Tap-Tap	—/30.41/38	08:03	8:04	Check	1
O2 (scf) 1st / Total	—/14406	08:04			
Inj C (lbs) 1st / Total	—/1767				
Charge C (lbs)	2060				
Lime 1st / Total	5724/—				
Olivine 1st / Total	2214/—				
Dolo Lime 1st / Total	2529/—				
Ladle Lime / MgO	500				
Tap C (wt%)	.042				
Tap O (ppm)	1040				
Tap Temp (degF)	3044				
Slag Raiing (1-5) 1-fluid 5=thick foam	4				
Ladle tare wt (lbs)	70.3				
Tap wt actual (lbs)	118.2				
Tap Time / Ladle #	08:04/1				
Patch FCE (Y/N)	N				
Area(s) Patched (12 o'clock = taphole)		Electrodes		Total Minutes Misc Delays	
Gun #1 Lbs Used		A phase	Add/Slip	Total Minutes Add/Slip Electrodes	
Gun #2 Lbs Used		B phase	Add/Slip	Total Minutes Refractory Repair	
Bottom Patch Lbs Used		C phase	Add/Slip	Total Minutes Scrap Charging	

Comments:

ACKNOWLEDGEMENTS

I would like to thank Mr. Brad Brown and his associates for their cooperation, patience and input in the coordination of the testing program conducted at Steel Dynamics, Inc., Structural and Rail Division. Their knowledge and experience in process control and operation, and project development proved invaluable towards the completion of this project.

Fred H. Guenther
Project Manager

TABLE OF CONTENTS

ACKNOWLEDGEMENTS . . . . . *i*

PREFACE . . . . . *iv*

1.0 INTRODUCTION **1**

2.0 TEST RESULTS SUMMARY **8**

3.0 FACILITY DESCRIPTION **29**

4.0 TEST PROCEDURES **32**

5.0 ANALYTICAL PROCEDURES **38**

6.0 QUALITY ASSURANCE PROCEDURES **41**

7.0 CONCLUSIONS **42**

LIST OF TABLES

TABLES **1-1D - EPA** METHOD **5/202 - PARTICULAT MATTER EMISSIONS TEST** RESULTS - ELECTRIC ARC **FURNACE - BAGHOUSE** OUTLET (EXHAUST STACK) . . . . . 10 - 14

TABLE 2 - EPA METHOD 6C - SULFUR DIOXIDE **EMISSIONS (SO_2)** TEST RESULTS - ELECTRIC ARC FURNACE - **BAGHOUSE** OUTLET (EXHAUST STACK) 15

TABLE 3 - EPA METHOD 7E - NITROGEN OXIDES **(NO_X)** EMISSIONS TEST RESULTS - ELECTRIC ARC **FURNACE - BAGHOUSE** OUTLET (EXHAUST STACK) 16

TABLE 4 - EPA METHOD 13B - **FLUORIDE** (F) EMISSIONS TEST RESULTS - ELECTRIC ARC FURNACE - **BAGHOUSE** OUTLET **(EXHAUST** STACK) **17**

TABLES 5-5C - EPA METHOD 18 - GASEOUS ORGANIC COMPOUND EMISSIONS TEST RESULTS - ELECTRIC ARC **FURNACE - BAGHOUSE** OUTLET (EXHAUST STACK) . . . . . **18 - 21**

TABLES 6-6C - EPA METHOD 29 - METALS EMISSIONS TEST RESULTS - **ELECTRIC** ARC FURNACE - **BAGHOUSE** OUTLET (EXHAUST STACK) . . . . . 22 - 25

LIST OF TABLES (CONTINUED)

TABLE 7 - EPA METHOD 316 - FORMALDEHYDE (HCHO) EMISSIONS TEST RESULTS - ELECTRIC ARC FURNACE - BAGHOUSE OUTLET (EXHAUST STACK) 26

TABLE 8 - EPA METHOD 7E - NITROGEN OXIDES (NO_X) EMISSIONS TEST RESULTS - REHEAT FURNACE - EXHAUST STACK 27

Table 9 - EPA Method 10 - Carbon Monoxide (CO) Emissions Test Results - REHEAT FURNACE - Exhaust Stack 28

LIST OF FIGURES

FIGURE 1 - ELECTRIC ARC FURNACE - BAGHOUSE/STACK CONFIGURATION 30

FIGURE 2 - ELECTRIC ARC FURNACE - STACK SAMPLING LOCATION 30

FIGURE 3 - REHEAT FURNACE - STACK CONFIGURATION 31

FIGURE 4 - REHEAT FURNACE - STACK SAMPLING LOCATION 31

APPENDICES

APPENDIX A - FIELD TEST DATA
APPENDIX B - PROCESS OPERATING DATA
APPENDIX C - LABORATORY ANALYSIS AND IAP ANALYTICAL DATA
APPENDIX D - REAGENT CERTIFICATIONS AND MATERIAL SAFETY DATA
APPENDIX E - CALIBRATION AND CERTIFICATION DATA
APPENDIX F - SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS
APPENDIX G - CORRESPONDENCE

PREFACE

I, Terry Shackelford, do hereby certify that the source emissions testing conducted at Steel Dynamics, Inc., Structural and Rail Division near Columbia City, Indiana was performed in accordance with the procedures set forth by the United States Environmental Protection Agency, and that the data and results submitted within this report are an exact representation of the testing.

Terry L. Shackelford
Senior Test Engineer

I, Fred Guenther, do hereby attest that all work on this project was performed under my direct supervision, and that this report accurately and authentically presents the source emissions testing conducted at Steel Dynamics, Inc., Structural and Rail Division near Columbia City, Indiana.

Fred H. Guenther
Test Supervisor

SOURCE EMISSIONS COMPLIANCE TESTING
EPA Methods 1, 2, 3, 3A, 4, 5, 6C, 7E, 13B, 18, 29, 202 and 316
Performed on the
Electric Arc Furnace
Baghouse Outlet (Exhaust Stack)
and
EPA Methods 7E and 10
Performed on the
Reheat Furnace
Exhaust Stack
at
Steel Dynamics, Inc.
Structural and Rail Division
Columbia City, Indiana

February 18 - 20, 2003

Project No. 03-T-201

1.0 INTRODUCTION

This report presents the results of the source emissions compliance testing conducted by Guenther/Shackelford Associates (G/SA) for Steel Dynamics, Inc. (SDI), Structural and Rail Division near Columbia City, Indiana.

The primary purpose of this testing program was to obtain PM_{10} (particulate matter ≤ 10 microns in particle size) samples of particulate matter (PM) and condensible particulate matter (CPM), fluoride (F), gaseous organic compounds (hexane, benzene, toluene, naphthalene), metals (beryllium, lead, manganese, mercury) and formaldehyde (HCHO) from the effluent gas stream of the baghouse serving the Electric Arc Furnace (EAF). To determine, through instrumental analyzer procedures (IAP), sulfur dioxide (SO_2) and

nitrogen oxides (NO_X) emissions concentrations from the baghouse exhaust gas, and to determine NO_X and carbon monoxide (CO) concentrations from the effluent gas stream of the Reheat Furnace (RF) and associated equipment at SDI's Structural and Rail Division operations to establish outlet emission rates. Also, to determine via SDI's continuous emission monitoring system (CEMS) plume opacities of the flue gas vented from the EAF baghouse through its exhaust stack to atmosphere.

G/SA's responsibility was to collect and analyze PM, CPM, F, gaseous organic compounds (GOC). metals and HCHO samples, evaluate CEMS opacity data and IAP for SO_2, NO_X, and CO, and perform data reduction for emission concentrations determination. SDI's responsibility was to maintain process operating parameters and to provide process operating data per compliance test requirements.

The following report provides information pertaining to the SDI Structural and Rail Division operations, emissions testing and analytical results.

The emissions testing conducted on the EAF Baghouse Outlet (Exhaust Stack) was performed Tuesday, February 18, through Thursday, February 20, 2003, and the testing on the RF Exhaust Stack was performed on Wednesday, February 19, 2003.

The following requirements were specific for the testing program:

1. Equipment calibrations performed and calibration data provided.

2. Three (3) consecutive, four (4)-hour, minimum, PMICPM, three (3) consecutive, two (2)-hour, minimum, metals and three (3) consecutive, one (1)-hour, minimum, F, GOC and HCHO emissions test runs performed at the EAF exhaust stack per the Indiana Department of Environmental Management (IDEM) Construction Permit #CP-183-10097-00030.

3. Three (3) consecutive, one (1)-hour, minimum, SO_2 and NO_X emissions test runs performed, simultaneously, at the EAF exhaust stack, and three (3) consecutive, one (1)-hour, minimum, NO_X and CO emissions test runs performed, simultaneously, at the RF exhaust stack per IDEM Construction Permit #CP-183-10097-00030.

4. Three (3) consecutive, four (4)-hour, minimum, visible emisions (VE) observations performed on the outlet exhaust of the EAF baghouse or CEMS *opacity data recorded per IDEM Construction Permit #CP-183-10097-00030.

5. Process manufacturing capacities and control devices maintained at required operating conditions, and production rates recorded during the emissions testing periods.

6. All testing and analyses performed in accordance with current U.S. Environmental Protection Agency (USEPA) test methodologies and analytical procedures for PM, SO_2, NO_X, CO, F, GOC, metals, CPM and HCHO emissions determinations.

7. PM/CPM ($PM_{,,}$) emissions from the EAF baghouse shall not exceed an average concentration limit of 0.0052 grains per dry standard cubic foot (grldscf), and PM emissions from the baghouse shall not exceed an average concentration limit of 0.0018 gr/dscf and an average rate limit of 58.5 pounds per hour (lb/hr), and a 3% average VE/opacity limit pursuant to IDEM Construction Permit #CP-183-10097-00030.

8. SO, emissions from the EAF shall not exceed a average rate limit of 50.0 lb/hr pursuant to IDEM Construction Permit #CP-183-10097-00030.

9. NO_X emissions from the EAF shall not exceed an average rate limit of 102.0 lb/hr and an average concentration limit of 0.51 lb/ton of steel tapped pursuant to IDEM Construction Permit #CP-183-10097-00030.

10. NO, and CO emissions from the RF shall not exceed average concentration limits of 0.11 pounds per million Btu (lb/mmBtu) and 0.03 lb/mmBtu, respectively, pursuant to IDEM Construction Permit #CP-183-10097-00030.

11. Fluoride emissions from the EAF shall not exceed an average rate limit of 0.68 lb/hr pursuant to IDEM Construction Permit #CP-183-10097-00030.

12. Gaseous organic compounds of hexane, benzene, toluene and naphthalene have no emissions limit standards and were tested for information purposes and permit development only.

13. Metal emissions of beryllium (Be), lead (Pb), manganese (Mn) and mercury (Hg) from the EAF shall not exceed an average rate limit of 5.75E-05, 0.114, 1.14 and 0.02 lb/hr, respectively, pursuant to IDEM Construction Permit #CP-183-10097-00030.

14. Formaldehyde has no emissions limit standard(s) and was tested for information purposes and permit development only.

Note: EPA Method 5 (PM) and 201A/202 (PM_{10}/CPM) testing were not required to be performed in this case because all of the PM emissions from the EAF Baghouse are assumed to be $\leq$10 microns in particle size. Therefore, only EPA Method 51202 (PMICPM) sampling was conducted per IDEM's approval.

The emissions testing program was supervised by GISA, whose headquarters is in Crown Point, Indiana. GISA also performed stack gas flow rate and moisture content determinations, GOC sampling train preparation and sample recovery, and the carbon dioxide (CO_2), oxygen (O_2), PMICPM, F, GOC, metals and HCHO emissions testing at the EAF baghouse outlet, data collection and reduction, and prepared in part the final report. Pretest and post-test equipment calibrations, CO, and O, analysis, and PMICPM, E, metals and HCHO sampling trains preparation and samples recovery were performed by G/SA's affiliate, Source Assessment Technologies, LLC (S.A.T.), whose headquarters is in Wheatland, Missouri. S.A.T. also performed the PMICPM, SO,, NO_X, CO, F, GOC, metals and HCHO data reduction, and in part the final report preparation. The

IAP emissions testing for SO_2 and NO_X, and CO, and O_2 content conducted at the EAF baghouse outlet sampling location, and the IAP emissions testing for NO_X and CO, and O_2 content conducted at the RF exhaust stack sampling location were performed by G/SA's subcontractor, Grace Consulting, Inc. (GCI), whose headquarters is in Wellington, Ohio. The F, GOC, and metals and HCHO analyses were subcontracted by G/SA's analytical broker, Sampling & Analytical Management, Inc. (SAMI), whose headquarters is in Medina, Ohio, to Element One in Wilmington, North Carolina, Research Triangle Park Laboratories, Inc. in Raleigh, North Carolina and Datachem Laboratories in Cincinnati, Ohio, respectively. The PM/CPM analyses was subcontracted to EMSL Analytical, Inc., whose laboratory is in Indianapolis, Indiana.

The emissions testing was performed in accordance with USEPA Reference Methods 1, 2, 3, 3A, 4, 5 (PM), 6C (SO_2), 7E (NO_2), 10 (CO), 13B (F), 18 (GOC), 29 (metals) and 316 (HCHO), Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), "Standards of Performance for Stationary Sources", Appendix A, "Test Methods", and Method 202 (CPM), Title 40, Code of Federal Regulations, Part 51, (40 CFR 51), "Standards of Performance for Stationary Sources", Appendix M, "Test Methods" and IDEM Rule 326 IAC 3-2.1.

The testing program was approved by and/or coordinated with the following personnel:

Brad Brown, Environmental Engineer, SDI-SRD

Kevin Perala, Melt Shop Manager, SDI-SRD

Kevin Bort, Engineering Manager, SDI-SRD

Bob LaRoy, Melt Shop Supervisor, SDI-SRD

Dave Stapleton, Melt Shop Supervisor, SDI-SRD

Sanoyce Crawford, EAF Baghouse Operator, SDI-SRD

Roy Perala, Rolling Mill Manager, SDI-SRD

Reggie Wright, RF Operator, SDI-SRD

The emissions testing was performed by the following personnel:

Fred Guenther, Test Supervisor, G/SA

Terry Shackelford, Senior Test Engineer, GISA (S.A.T.)

Brandon Peyton, Senior Test Technician, G/SA

Andy Perdue, Test Technician, GISA

Jesse Richmond, Test Technician, G/SA

Tim Moody, Test Engineer, GCI

The emissions testing was observed by the following personnel:

Steve Friend, Environmental Scientist, Air Compliance Section, IDEM

David Harrison, Environmental Scientist, Air Compliance Section, IDEM

2.0 TEST RESULTS SUMMARY

The source emissions compliance testing was performed utilizing USEPA Methods 1, 2, 3, 3A, 4, 5, 6C, 7E, 13B, 18, 29, 202 and 316 at the EAF baghouse outlet sampling location, and USEPA Methods 7E and 10 at the RF exhaust stack sampling location. A summary of the test results is given below:

SAMPLING LOCATION	AVG. TOTAL PM_{10}, *(Gr/DSCF)*	AVG. PM, *Gr/DSCF*	AVG. PM, Lb/Hr	AVG. OPACITY, %
EAF Baghouse Outlet	0.00089 (Limit: 0.0052)	0.00068 (Limit: 0.0018)	4.64 (Limit: 58.5)	1.4 (Limit: 3)

SAMPLING LOCATION	AVG. SO_x, *Lb/Hr*	AVG. NO_x, *Lb/Hr*	AVG. NO_x, *Lb/TPW*	AVG. FLUORIDE (F), *Lb/Hr*
EAF Baghouse Outlet	20.38 (Limit: 50.0)	28.51 (Limit: 102.0)	0.171 (Limit: 0.51)	11.291 (Limit: 0.68)

SAMPLING LOCATION	AVG. GOC (HEXANE), *ppmv*	AVG. GOC (BENZENE), *ppmv*
EAF Baghouse Outlet	Not Detected (Limit: None)	Not Detected (Limit: None)
	AVG. GOC (TOLUENE), *ppmv*	AVG. GOC (NAPHTHALENE), *ppmv*
	Not Detected (Limit: None)	Not Detected (Limit: None)

SAMPLING LOCATION	AVG. BERYLLIUM (Be), *Lb/Hr*	AVG. LEAD (Pb), *Lb/Hr*
EAF Baghouse Outlet	0.00E+00 (Limit: 5.75E-5)	0.0168 (Limit: 0.114)
	AVG. MANGANESE (Mn), *Lb/Hr*	AVG. MERCURY (Hg), *Lb/Hr*
	0.101 (Limit: 1.14)	0.072 (Limit: 0.02)

SAMPLING LOCATION	AVG. FORMALDEHYDE (HCHO), *µ*
EAF Baghouse Outlet	Not Detected (Limit: None)

SAMPLING LOCATION	AVG. NO,, *Lb/mmBtu*	AVG. CO, *Lb/mmBtu*
RF Exhaust Stack	**0.100 (Limit: 0.11)**	**0.003 (Limit: 0.03)**

A complete list of test parameters for each Method *51202,* 6C, 7E, 13B, *18, 29* and *316* emissions test run performed at the EAF sampling location, and each Method 7E and 10 emissions test run performed at the RF sampling location can be found in Tables 1 through 7, and Tables 8 and 9, respectively.

Sample calculations and examples of the equations used to generate the test results can be found in Appendix F.

TABLES

EAF BAGHOUSE OUTLET

G/SA . . . . . ENVIRONMENTAL TESTING CONSULTANTS
P.O. Box 807, Crown Point, IN 46307 TEL (219) 663-5394 / FAX (219) 662-7037

TABLE 1
EPA METHOD 5 / 202
TOTAL PARTICULATE MATTER (=/<10 MICRON) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE – BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	18-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	1248-1715	0429-0925	1120-1555
Sampling Time (Minutes)	240	240	240
Average Process Weight Rate (TPH)	175.8	171.9	183.1
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.997	0.997
Nozzle Area (Ft^2)	0.000349	0.000346	0.000346
Barometric Pressure (In. Hg)	28.98	29.02	29.08
Static Pressure (In. H20)	-0.35	-0.30	-0.35
Dry Gas Meter Sample Volume (DCF)	215.883	226.138	206.067
Average Dry Gas Meter Temperature ("F)	62.8	77.7	75.2
Average Orifice Meter Delta H (In. H20)	2.808	2.444	2.083
Volume Condensate Collected (Ml)	39.0	58.3	75.2
Average C02 Concentration (%)	0.0	0.0	0.0
Average 02 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.816	0.846	0.804
Average Stack Gas Temperature ("F)	141.8	132.6	159.9
Total **PM10** Mass concentration **(Grams, g)**	0.0109	0.0138	0.0115

CALCULATED DATA

Absolute Pressure (In. Hg)	28.95	29.00	29.05
Dry Gas Meter Sample volume at Standard Conditions (DSCF)	210.400	216.112	198.077
Water Vapor Volume at Standard Conditions (SCF)	1.836	2.744	3.540
Moisture Fraction (Unitless)	0.009	0.013	0.018
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.70	28.65
Stack Gas Velocity (FPS)	49.9	51.3	49.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	940,595	966,984	938,710
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	791,439	824,362	762,451
Isokinetic Sampling (%)	99.8	99.1	98.2
TPM10 Emissions Concentration (Gr/DSCF)	0.00080	0.00099	0.00090
TPM10 Emissions Concentration (Lb/DSCF)	1.14E-07	1.41E-07	1.28E-07
TPM10 Emissions Rate (Lb/Hr)	5.42	6.96	5.86
TPM10 Emissions Concentration (Lb/TPW)	0.0309	0.0405	0.0320

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	948,763	Emission
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	792,751	Limit:
✓ **Average TPM10** Emissions Concentration **(Gr/DSCF)**	0.00089	0.0052 Gr/DSCF
Average TPM10 Emissions Concentration **(Lb/DSCF)**	1.28E-07	
✓ **Average TPM10** Emissions Rate **(Lb/Hr)**	6.08	
Average TPM10 Emissions Concentration **(Lb/TPW)**	0.0345	

Signature of Reviewer: Fred H. Quentter

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TABLE 1A
EPA METHOD 5 / 202
FILTERABLE PARTICULATE MATTER EMISSIONS TEST RESULTS (FRONT-HALF)

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	18-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24Hour)	1248-1715	0429-0925	1120-1555
Sampling Time (Minutes)	240	240	240
Average Process Weight Rate (TPH)	175.8	171.9	183.1
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.997	0.997
Nozzle Area (Ft^2)	0.000349	0.000346	0.000346
Barometric Pressure (In. Hg)	28.98	29.02	29.08
Static Pressure (In. H20)	-0.35	-0.30	-0.35
Dry Gas Meter Sample Volume (DCF)	215.883	226.138	206.067
Average Dry Gas Meter Temperature ("F)	62.8	77.7	75.2
Average Orifice Meter Delta H (In. H20)	2.808	2.444	2.083
Volume Condensate Collected (Ml)	39.0	58.3	75.2
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.816	0.846	0.804
Average Stack Gas Temperature (°F)	141.8	132.6	159.9
Filterable PM Mass Concentration (Grams, g)	**0.0083**	**0.0114**	**0.0079**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.95	29.00	29.05
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	210.400	216.112	198.077
Water Vapor Volume at Standard Conditions (SCF)	1.836	2.744	3.540
Moisture Fraction (Unitless)	0.009	0,013	0.018
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.70	28.65
Stack Gas Velocity (FPS)	49.9	51.3	49.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	940,595	966,984	938,710
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	791,439	824,362	762,451
Isokinetic Sampling (%)	99.8	99.1	98.2
FPM Emissions Concentration (Gr/DSCF)	0.00061	0.00081	0.00062
FPM Emissions Concentration (Lb/DSCF)	8.70E-08	1.16E-07	8.79E-08
FPM Emissions Rate (Lb/Hr)	4.13	5.75	4.02
FPM Emissions Concentration (Lb/TPW)	0.0235	0.0335	0.0220

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	948,763	**Emission**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	792,751	**Limits:**
Average FPM Emissions Concentration **(Gr/DSCF)**	0.00068	0.0018 Gr/DSCF
Average FPM Emissions Concentration **(Lb/DSCF)**	9.71E-08	
Average FPM Emissions Rate **(Lb/Hr)**	4.64	58.5 Lb/Hr
Average FPM Emissions Concentration **(Lb/TPW)**	0.0263	

Signature of Reviewer: Fred H. Quentter

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TABLE 1B
EPA METHOD 5 / 202
CONDENSIBLE PARTICULATE MATTER EMISSIONS TEST RESULTS (BACK-HALF)

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	18-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	1248-1715	0429-0925	1120-1555
Sampling Time (Minutes)	240	240	240
Average Process Weight Rate (TPH)	**175.8**	**171.9**	**183.1**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.997	0.997
Nozzle Area (Ft^2)	0.000349	0.000346	0.000346
Barometric Pressure (In. Hg)	28.98	29.02	29.08
Static Pressure (In. H20)	-0.35	-0.30	-0.35
Dry Gas Meter Sample Volume (DCF)	215.883	226.138	206.067
Average Dry Gas Meter Temperature (°F)	62.8	77.7	75.2
Average Orifice Meter Delta H (In. H20)	2.808	2.444	2.083
Volume Condensate Collected (Ml)	39.0	58.3	75.2
Average C02 Concentration (%)	0.0	0.0	0.0
Average 02 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.816	0.846	0.804
Average Stack Gas Temperature (°F)	141.8	132.6	159.9
Condensible PM Mass Concentration (Grams, g)	**0.0026**	**0.0024**	**0.0036**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.95	29.00	29.05
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	210.400	216.112	198.077
Water Vapor Volume at Standard Conditions (SCF)	1.836	2.744	3.540
Moisture Fraction (Unitless)	0.009	0.013	0.018
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.70	28.65
Stack Gas Velocity (FPS)	49.9	51.3	49.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	940,595	966,984	938,710
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	791,439	824,362	762,451
Isokinetic Sampling (%)	99.8	99.1	98.2
CPM Emissions Concentration (Gr/DSCF)	0.00019	0.00017	0.00028
CPM Emissions Concentration (Lb/DSCF)	2.72E-08	2.45E-08	4.01E-08
CPM Emissions Rate (Lb/Hr)	1.29	1.21	1.83
CPM Emissions Concentration (Lb/TPW)	0.0074	0.0070	0.0100

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**948,763**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**792,751**
Average CPM Emissions Concentration (Gr/DSCF)	**0.00021**
Average CPM Emissions Concentration (Lb/DSCF)	**3.06E-08**
Average CPM Emissions Rate (Lb/Hr)	
Average CPM Emissions Concentration (Lb/TPW)	**0.0081**

Signature of Reviewer: Fred H. Quentler

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TABLE 1C

EPA METHOD 5 / 202

CONDENSIBLE PARTICULATE MATTER EMISSIONS TEST RESULTS (INORGANICS)

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201

SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	18-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	1248-1715	0429-0925	1120-1555
Sampling Time (Minutes)	240	240	240
Average Process Weight Rate (TPH)	175.8	171.9	183.1
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.997	0.997
Nozzle Area (Ft^2)	0.000349	0.000346	0.000346
Barometric Pressure (In. Hg)	28.98	29.02	29.08
Static Pressure (In. H20)	-0.35	-0.30	-0.35
Dry Gas Meter Sample Volume (DCF)	215.883	226.138	206.067
Average Dry Gas Meter Temperature ("F)	62.8	77.7	75.4
Average Orifice Meter Delta H (In. H20)	2.808	2.444	2.083
Volume Condensate Collected (Ml)	39.0	58.3	75.4
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.816	0.846	0.804
Average Stack Gas Temperature ("F)	141.8	132.6	159.9
Inorganic CPM Mass Concentration (Grams, g)	**0.0003**	**0.0006**	**0.0004**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.95	29.00	29.05
Dry Gas Meter Sample volume at Standard Conditions (DSCF)	210.400	216.112	198.077
Water Vapor Volume at Standard Conditions (SCF)	1.836	2.744	3.540
Moisture Fraction (Unitless)	0.009	0.013	0.018
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.70	28.65
Stack Gas Velocity (FPS)	49.9	51.3	49.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	940,595	966,984	938,710
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	791,439	824,362	762,451
Isokinetic Sampling (%)	99.8	99.1	98.2
ICPM Emissions Concentration (Gr/DSCF)	0.00002	0.00004	0.00003
ICPM Emissions Concentration (Lb/DSCF)	3.14E-09	6.12E-09	4.45E-09
ICPM Emissions Rate (Lb/Hr)	0.15	0.30	0.20
ICPM Emissions Concentration (Lb/TPW)	0.0008	0.0018	0.0011

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	948,763
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	792,751
Average ICPM Emissions Concentration (Gr/DSCF)	0.00003
Average ICPM Emissions Concentration (Lb/DSCF)	4.57E-09
Average ICPM Emissions Rate (Lb/Hr)	0.22
Average ICPM Emissions Concentration (Lb/TPW)	0.0012

Signature of Reviewer: Fred H. Quentler

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TABLE 1D
EPA METHOD 5 / 202
CONDENSIBLE PARTICULATE MATTER EMISSIONS TEST RESULTS (ORGANICS)

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	18-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24Hour)	1248-1715	0429-0925	1120-1555
Sampling Time (Minutes)	240	240	240
Average Process Weight Rate (TPH)	**175.8**	**171.9**	**183.1**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.997	0.997
Nozzle Area (Ft^2)	0.000349	0.000346	0.000346
Barometric Pressure (In. Hg)	28.98	29.02	29.08
Static Pressure (In. H20)	-0.35	-0.30	-0.35
Dry Gas Meter Sample Volume (DCF)	215.883	226.138	206.067
Average Dry Gas Meter Temperature (°F)	62.8	77.7	75.2
Average Orifice Meter Delta H (In. H20)	2.808	2.444	2.083
Volume Condensate Collected (Ml)	39.0	58.3	75.2
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.816	0.846	0.804
Average Stack Gas Temperature ("F)	141.8	132.6	159.9
Organic CPM Mass Concentration (Grams, g)	**0.0023**	**0.0018**	**0.0032**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.95	29.00	29.05
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	210.400	216.112	198.077
Water Vapor Volume at Standard Conditions (SCF)	1.836	2.744	3.540
Moisture Fraction (Unitless)	0.009	0.013	0.018
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.70	28.65
Stack Gas Velocity (FPS)	49.9	51.3	49.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	940,595	966,984	938,710
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	791,439	824,362	762,451
Isokinetic Sampling (%)	99.8	99.1	98.2
OCPM Emissions Concentration (Gr/DSCF)	0.00017	0.00013	0.00025
OCPM Emissions Concentration (Lb/DSCF)	2.41E-08	1.84E-08	3.56E-08
OCPM Emissions Rate (Lb/Hr)	1.14	0.91	1.63
OCPM Emissions Concentration (Lb/TPW)	0.0065	0.0053	0.0089

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**948,763**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**792,751**
Average OCPM Emissions Concentration **(Gr/DSCF)**	**0.00018**
Average OCPM Emissions Concentration **(Lb/DSCF)**	**2.60E-08**
Average OCPM Emissions Rate **(Lb/Hr)**	**1.23**
Average OCPM Emissions Concentration **(Lb/TPW)**	**0.0069**

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TABLE 2
EPA METHOD 6C
SULFUR DIOXIDE (SO2) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI — PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET — DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	18-Feb-03	18-Feb-03	18-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	1217-1317	1411-1511	1619-1719
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	165.5	171.7	164.0
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0.997
Barometric Pressure (In. Hg)	28.98	28.98	28.98
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	44.385	44.676	45.434
Average Dry Gas Meter Temperature (°F)	63.4	70.7	74.1
Average Orifice Meter Delta H (In. H20)	1.652	1.652	1.652
Volume Condensate Collected (Ml)	8.7	11.4	6.8
Average C02 Concentration (%)	0.6	0.7	1.0
Average 0 2 Concentration (%)	20.1	18.7	19.4
Average Square Root of Delta P (In. H2O½)	0.908	0.913	0.875
Average Stack Gas Temperature (°F)	140.8	139.3	145.3
Average Corrected SO2 Concentration (PPMV)	**2.92**	**1.57**	**2.56**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.96	28.96	28.96
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	43.429	43.113	43.561
Water Vapor Volume at Standard Conditions (SCF)	0.410	0.537	0.325
Moisture Fraction (Unitless)	0.009	0.012	0.007
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.90	28.86	28.94
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.80	28.73	28.86
Stack Gas Velocity (FPS)	55.4	55.7	53.5
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,044,268	1,049,923	1,008,454
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	880,438	884,735	845,625
SO2 Emissions Concentration (Lb/DSCF)	4.86E-07	2.61E-07	4.26E-07
302 Emissions Rate (Lb/Hr)	25.66	13.86	21.61
SO2 Emissions Concentration (Lb/TPW)	0.155	0.081	0.132

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**1,034,215**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**870,266**	**Emission**
Average SO2 Emissions Concentration **(Lb/DSCF)**	**3.91E-07**	**Limit:**
Average SO2 Emissions Rate **(Lb/Hr)**	**20.38**	**50.0 Lb/Hr**
Average SO2 Emissions Concentration **(Lb/TPW)**	**0.123**	

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TABLE 3
EPA METHOD 7E
NITROGEN OXIDES (NOx) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI — PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET — DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	18-Feb-03	18-Feb-03	18-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	1217-1317	1411-1511	1619-1719
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	165.5	171.7	164.0
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0.997
Barometric Pressure (In. Hg)	28.98	28.98	28.98
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	44.385	44.676	45.434
Average Dry Gas Meter Temperature ("F)	63.4	70.7	74.1
Average Orifice Meter Delta H (In. H20)	1.652	11.652	1.652
Volume Condensate Collected (Ml)	8.7	11.4	6.9
Average C02 Concentration (%)	0.6	0.7	1.0
Average 0 2 Concentration (%)	20.1	18.7	19.4
Average Square Root of Delta P (In. H2O½)	0.908	0.913	0.875
Average Stack Gas Temperature ("F)	140.8	139.3	145.3
Average Corrected NOx Concentration as NO2 (PPMV)	**6.00**	**3.60**	**4.10**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.96	28.96	28.96
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	43.429	43.113	43.561
Water Vapor Volume at Standard Conditions (SCF)	0.410	0.537	0.325
Moisture Fraction (Unitless)	0.009	0.012	0.007
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.90	28.86	28.94
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.80	28.73	28.86
Stack Gas Velocity (FPS)	55.4	55.7	53.5
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,044,268	1,049,923	1,008,454
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	880,438	884,735	845,625
NOx Emissions Concentration (Lb/DSCF)	7.17E-07	4.30E-07	4.90E-07
NOx Emissions Rate (Lb/Hr)	37.86	22.83	24.85
NOx Emissions Concentration (Lb/TPW)	0.229	0.133	0.152

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	1,034,215	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	870,266	**Emission**
Average **NOx** Emissions Concentration **(Lb/DSCF)**	5.46E-07	**Limits:**
✓ Average **NOx** Emissions Rate **(Lb/Hr)**	28.51	**102.0 Lb/Hr**
Average **NOx** Emissions Concentration **(Lb/TPW)**	0.171	**0.51 Lb/TPW**

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TABLE 4
EPA METHOD 13B
FLUORIDE (F) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	20-Feb-03	20-Feb-03	20-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24Hour)	0336-0508	0645-0810	0933-1057
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	231.8	217.9	200.9
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0,997
Nozzle Area (Ft^2)	0.000344	0.000344	0.000344
Barometric Pressure (In. Hg)	29.22	29.22	29.22
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	53.990	52.086	56.351
Average Dry Gas Meter Temperature ("F)	62.0	69.8	91.7
Average Orifice Meter Delta H (In. H20)	2.130	2.025	2.405
Volume Condensate Collected (MI)	17.2	13.9	10.0
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. $H2O^{1/2}$)	0.829	0.806	0.844
Average Stack Gas Temperature (°F)	138.9	153.3	155.8
F Mass Concentration (Milligrams, mg)	**4.4**	**5.3**	**7.1**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.20	29.20	29.20
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	53.471	50.805	52.836
Water Vapor Volume at Standard Conditions (SCF)	0.810	0.654	0.471
Moisture Fraction (Unitless)	0.015	0.013	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.836	28.836
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.67	28.70	28.74
Stack Gas Velocity (FPS)	50.4	49.5	51.9
Stack Gas Flow Rate at Actual Conditions (ACFM)	950,020	933,055	978,294
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	805,271	773,890	811,393
Isokinetic Sampling (%)	101.3	100.1	99.2
F Emissions Concentration (Gr/DSCF)	0.00127	0.00161	0.00207
F Emissions Concentration (Lb/DSCF)	1.81E-07	2.30E-07	2.96E-07
F Emissions Rate (Lb/Hr)	8.767	10.681	14.425
F Emissions Concentration (Lb/TPW)	0.038	0.049	0.072

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**953,790**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**796,851**	
Average F Emissions Concentration **(Gr/DSCF)**	**0.00165**	**Emission**
Average F Emissions Concentration **(Lb/DSCF)**	**2.36E-07**	**Limit:**
Average F Emissions Rate **(Lb/Hr)**	**11.291**	**0.68 Lb/Hr**
Average F Emissions Concentration **(Lb/TPW)**	**0.053**	

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TABLE 5
EPA METHOD 18
GASEOUS ORGANIC COMPOUND (HEXANE) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI — PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET — DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	20-Feb-03	20-Feb-03	20-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0336-0508	0645-0810	0933-1057
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	**231.8**	217.9	**200.9**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0.997
Barometric Pressure (In. Hg)	29.22	29.22	29.22
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	53.990	52.086	56.351
Average Dry Gas Meter Temperature (°F)	62.0	69.8	91.7
Average Orifice Meter Delta H (In. H20)	2.130	2.025	2.405
Volume Condensate Collected (MI)	17.2	13.9	10.0
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.829	0.806	0.844
Average Stack Gas Temperature ("F)	138.9	153.3	155.8
Total Hexane Concentration (PPMV)	**ND**	**ND**	**ND**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.20	29.20	29.20
Bry Gas Meter Sample Volume at Standard Conditions (DSCF)	53.471	50.805	52.836
Water Vapor Volume at Standard Conditions (SCF)	0.810	0.654	0.471
Moisture Fraction (Unitless)	0.015	0.013	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.836	28.836
Net Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.67	28.70	28.74
Stack Gas Velocity (FPS)	50.4	49.5	51.9
Stack Gas Flow Rate at Actual Conditions (ACFM)	950,020	933,055	978,294
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	805,271	773,890	811,393
Hexane Emissions Concentration (Lb/DSCF)	0.00E+00	0.00E+00	0.00E+00
Hexane Emissions Rate (Lb/Hr)	0.000	0.000	0.000
Hexane Emissions Concentration (Lb/TPW)	0.000	0.000	0.000

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**953,790**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**796,851**	**No**
Average Hexane Emissions Concentration **(Lb/DSCF)**	**0.00E+00**	**Emission**
Average Hexane Emissions Rate **(Lb/Hr)**	**0.000**	**Limit**
Average Hexane Emissions Concentration **(Lb/TPW)**	**0.000**	

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TABLE 5A
EPA METHOD 18
GASEOUS ORGANIC COMPOUND (BENZENE) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI — PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET — DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	20-Feb-03	20-Feb-03	20-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0336-0508	0645-0810	0933-1057
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	**231.8**	217.9	**200.9**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0.997
Barometric Pressure (In. Hg)	29.22	29.22	29.22
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	53.990	52.086	56.351
Average Dry Gas Meter Temperature (°F)	62.0	69.8	91.5
Average Orifice Meter Delta H (In. H20)	2.130	2.025	2.405
Volume Condensate Collected (MI)	17.2	13.9	10.0
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.829	0.806	0.844
Average Stack Gas Temperature ("F)	138.9	153.3	155.8
Total Benzene Concentration (PPMV)	**ND**	**ND**	**ND**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.20	29.20	29.20
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	53.471	50.805	52.836
Water Vapor Volume at Standard Conditions (SCF)	0.810	0.654	0.471
Moisture Fraction (Unitless)	0.015	0.013	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.836	28.836
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.67	28.70	28.74
Stack Gas Velocity (FPS)	50.4	49.5	51.9
Stack Gas Flow Rate at Actual Conditions (ACFM)	950,020	933,055	978,294
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	805,271	773,890	811,393
Benzene Emissions Concentration (Lb/DSCF)	0.00E+00	0.00E+00	0.00E+00
Benzene Emissions Rate (Lb/Hr)	0.000	0.000	0.000
Benzene Emissions Concentration (Lb/TPW)	0.000	0.000	0.000

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**953,790**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**796,851**	**No**
Average Benzene Emissions Concentration **(Lb/DSCF)**	**0.00E+00**	**Emission**
Average Benzene Emissions Rate **(Lb/Hr)**	**0.000**	**Limit**
Average Benzene Emissions Concentration **(Lb/TPW)**	**0.000**	

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TABLE 5B
EPA METHOD 18
GASEOUS ORGANIC COMPOUND (TOLUENE) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	20-Feb-03	20-Feb-03	20-Feb-03
Sampling Location	**Exhaust Stack**	**Exhaust Stack**	**Exhaust Stack**
Test Time, Start-Stop (24 Hour)	0336-0508	0645-0810	0933-1057
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	**231.8**	**217.9**	**200.9**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0.997
Barometric Pressure (In. Hg)	29.22	29.22	29.22
Static Pressure (In. H2O)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	53.990	52.086	56.351
Average Dry Gas Meter Temperature (°F)	62.0	69.8	91.7
Average Orifice Meter Delta H (In. H2O)	2.130	2.025	2.405
Volume Condensate Collected (Ml)	17.2	13.9	10.0
Average CO2 Concentration (%)	0.0	0.0	0.0
Average O2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.829	0.806	0.844
Average Stack Gas Temperature (°F)	138.9	153.3	155.8
Total Toluene Concentration (PPMV)	**ND**	**ND**	**ND**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.20	29.20	29.20
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	53.471	50.805	52.836
Water Vapor Volume at Standard Conditions (SCF)	0.810	0.654	0.471
Moisture Fraction (Unitless)	0.015	0.013	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.836	28.836
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.67	28.70	28.74
Stack Gas Velocity (FPS)	50.4	49.5	51.9
Stack Gas Flow Rate at Actual Conditions (ACFM)	950,020	933,055	978,294
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	805,271	773,890	811,393
Toluene Emissions Concentration (Lb/DSCF)	0.00E+00	0.00E+00	0.00E+00
Toluene Emissions Rate (Lb/Hr)	0.000	0.000	0.000
Toluene Emissions Concentration (Lb/TPW)	0.000	0.000	0.000

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**953,790**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**796,851**	**No**
Average Toluene Emissions Concentration (Lb/DSCF)	**0.00E+00**	**Emission**
Average Toluene Emissions Rate (Lb/Hr)	**0.000**	**Limit**
Average Toluene Emissions Concentration (Lb/TPW)	**0.000**	

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TABLE 5C
EPA METHOD 18
GASEOUS ORGANIC COMPOUND (NAPHTHALENE) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	20-Feb-03	20-Feb-03	20-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0336-0508	0645-0810	0933-1057
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	**231.8**	**217.9**	**200.9**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.997	0.997	0.997
Barometric Pressure (In. Hg)	29.22	29.22	29.22
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	53.990	52.086	56.351
Average Dry Gas Meter Temperature ("F)	62.0	69.8	91.7
Average Orifice Meter Delta H (In. H20)	2.130	2.025	2.405
Volume Condensate Collected (Ml)	17.2	13.9	10.0
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. $H2O^{1/2}$)	0.829	0.806	0.844
Average Stack Gas Temperature (°F)	138.9	153.3	155.8
Total Naphthalene Concentration (PPMV)	**ND**	**ND**	**ND**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.20	29.20	29.20
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	53.471	50.805	52.836
Water Vapor Volume at Standard Conditions (SCF)	0.810	0.654	0.471
Moisture Fraction (Unitless)	0.015	0.013	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.836	28.836
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.67	28.70	28.74
Stack Gas Velocity (FPS)	50.4	49.5	51.9
Stack Gas Flow Rate at Actual Conditions (ACFM)	950,020	933,055	978,294
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	805,271	773,890	811,393
Naphthalene Emissions Concentration (Lb/DSCF)	0.00E+00	0.00E+00	0.00E+00
Naphthalene Emissions Rate (Lb/Hr)	0.000	0.000	0.000
Naphthalene Emissions Concentration (Lb/TPW)	0.000	0.000	0.000

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	953,790	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	796,851	No
Average Naphthalene Emissions Concentration **(Lb/DSCF)**	0.00E+00	Emission
Average Naphthalene Emissions Rate **(Lb/Hr)**	0.000	Limit
Average Naphthalene Emissions Concentration **(Lb/TPW)**	0.000	

Signature of Reviewer: Fred H. Quantius

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TABLE 6
EPA METHOD 29
METALS (BERYLLIUM, Be) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE – BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	19-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0501-0723	0845-1145	1255-1540
Sampling Time (Minutes)	120	120	120
Average Process Weight Rate (TPH)	170.6	222.6	223.9
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.989	0.989
Nozzle Area (Ft^2)	0.000294	0.000294	0.000294
Barometric Pressure (In. Hg)	29.02	29.02	29.08
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	93.199	86.755	84.423
Average Dry Gas Meter Temperature ("F)	66.4	62.9	66.9
Average Orifice Meter Delta H (In. H20)	2.126	1.883	1.786
Volume Condensate Collected (Ml)	28.8	45.4	35.1
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.811	0.785	0.771
Average Stack Gas Temperature (°F)	141.0	143.9	167.8
Be Mass Concentration (Micrograms, μg)	ND	ND	ND

CALCULATED DATA

Absolute Pressure (In. Hg)	29.00	29.00	29.06
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	90.175	84.444	81.704
Water Vapor Volume at Standard Conditions (SCF)	1.356	2.137	1.652
Moisture Fraction (Unitless)	0.015	0.025	0.020
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.68	28.57	28.62
Stack Gas Velocity (FPS)	49.5	48.2	48.1
Stack Gas Flow Rate at Actual Conditions (ACFM)	933,055	908,551	906,666
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	,782,730	750,812	725,926
Isokinetic Sampling (%)	102.8	100.4	100.5
Be Emission Concentration (Gr/DSCF)	0.0000000	0.0000000	0.0000000
Be Emission Concentration (Lb/DSCF)	0.00E+00	0.00E+00	0.00E+00
Be Emission Rate (Lb/Hr)	0.00E+00	0.00E+00	0.00E+00
Be Emission Concentration (Lb/TPW)	0.000000	0.000000	0.000000

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	916,091	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	753,156	
Average Be Emission Concentration (Gr/DSCF)	0.0000000	Emission
Average Be Emission Concentration (Lb/DSCF)	0.00E+00	Limit:
Average Be Emission Rate (Lb/Hr)	0.00E+00	5.75E-5 Lb/Hr
Average Be Emission Concentration (Lb/TPW)	0.000000	

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TABLE 6A
EPA METHOD 29
METALS (LEAD, Pb) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	19-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	**Exhaust Stack**	**Exhaust Stack**	**Exhaust Stack**
Test Time, Start-Stop (24 Hour)	0501-0723	0845-1145	1255-1540
Sampling Time (Minutes)	120	120	120
Average Process Weight Rate (TPH)	**170.6**	**222.6**	**223.9**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.989	0.989
Nozzle Area (Ft^2)	0.000294	0.000294	0.000294
Barometric Pressure (In. Hg)	29.02	29.02	29.08
Static Pressure (In. H2O)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	93.199	86.755	84.423
Average Dry Gas Meter Temperature (°F)	66.4	62.9	66.9
Average Orifice Meter Delta H (In. H2O)	2.126	1.883	1.786
Volume Condensate Collected (Ml)	28.8	45.4	35.1
Average CO2 Concentration (%)	0.0	0.0	0.0
Average O2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.811	0.785	0.771
Average Stack Gas Temperature (°F)	141.0	143.9	167.8
Pb Mass Concentration (Micrograms, µg)	**11.0**	**19.0**	**13.0**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.00	29.00	29.06
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	90.175	84.444	81.704
Water Vapor Volume at Standard Conditions (SCF)	1.356	2.137	1.652
Moisture Fraction (Unitless)	0.015	0.025	0.020
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.68	28.57	28.62
Stack Gas Velocity (FPS)	49.5	48.2	48.1
Stack Gas Flow Rate at Actual Conditions (ACFM)	933,055	908,551	906,666
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	782,730	750,812	725,926
Isokinetic Sampling (%)	102.8	100.4	100.5
Pb Emission Concentration (Gr/DSCF)	0.0000019	0.0000035	0.0000025
Pb Emission Concentration (Lb/DSCF)	2.69E-10	4.96E-10	3.51E-10
Pb Emission Rate (Lb/Hr)	0.0126	0.0223	0.0153
Pb Emission Concentration (Lb/TPW)	0.000074	0.000100	0.000068

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**916,091**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**753,156**	
Average Pb Emission Concentration (Gr/DSCF)	**0.0000026**	**Emission**
Average Pb Emission Concentration (Lb/DSCF)	**3.72E-10**	**Limit:**
Average Pb Emission Rate (Lb/Hr)	**0.0168**	**0.114 Lb/Hr**
Average Pb Emission Concentration (Lb/TPW)	**0.000081**	

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TABLE 6B

EPA METHOD 29

METALS (MANGANESE, Mn) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI | PROJECT NO.: 03-T-201

SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	19-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0501-0723	0845-1145	1255-1540
Sampling Time (Minutes)	120	120	120
Average Process Weight Rate (TPH)	**170.6**	222.6	223.9
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.989	0.989
Nozzle Area (Ft^2)	0.000294	0.000294	0.000294
Barometric Pressure (In. Hg)	29.02	29.02	29.08
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	93.199	86.755	84.423
Average Dry Gas Meter Temperature ("F)	66.4	62.9	66.9
Average Orifice Meter Delta H (In. H20)	2.126	1.883	1.786
Volume Condensate Collected (Ml)	28.8	45.4	35.1
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.811	0.785	0.771
Average Stack Gas Temperature (°F)	141.0	143.9	167.8
Mn Mass Concentration (Micrograms, µg)	**61.0**	**110.0**	**88.0**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.00	29.00	29.06
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	90.175	84.444	81.704
Water Vapor Volume at Standard Conditions (SCF)	1.356	2.137	1.652
Moisture Fraction (Unitless)	0.015	0.025	0.020
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.68	28.57	28.62
Stack Gas Velocity (FPS)	49.5	48.2	48.1
Stack Gas Flow Rate at Actual Conditions (ACFM)	933,055	908,551	906,666
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	782,730	750,812	725,926
Isokinetic Sampling (%)	102.8	100.4	100.5
Mn Emission Concentration (Gr/DSCF)	0.0000104	0.0000201	0.0000166
Mn Emission Concentration (Lb/DSCF)	1.49E-09	2.87E-09	2.37E-09
Mn Emission Rate (Lb/Hr)	0.070	0.129	0.103
Mn Emission Concentration (Lb/TPW)	0.000411	0.000581	0.000462

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	916,091	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	753,156	
Average Mn Emission Concentration **(Gr/DSCF)**	0.0000157	Emission
Average Mn Emission Concentration **(Lb/DSCF)**	**2.25E-09**	Limit:
Average Mn Emission Rate **(Lb/Hr)**	0.101	**1.14 Lb/Hr**
Average Mn Emission Concentration **(Lb/TPW)**	0.000485	

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TABLE 6C
EPA METHOD **29**
METALS (MERCURY, Hg) EMISSIONS TEST RESULTS

CLIENT: SDI-CCI — PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET — DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	19-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0501-0723	0845-1145	1255-1540
Sampling Time (Minutes)	120	120	120
Average Process Weight Rate (TPH)	**170.6**	**222.6**	**223.9**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.989	0.989
Nozzle Area (Ft^2)	0.000294	0.000294	0.000294
Barometric Pressure (In. Hg)	29.02	29.02	29.08
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	93.199	86.755	84.423
Average Dry Gas Meter Temperature (°F)	66.4	62.9	66.9
Average Orifice Meter Delta H (In. H20)	2.126	1.883	1.786
Volume Condensate Collected (Ml)	28.8	45.4	35.1
Average C 0 2 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.811	0.785	0.771
Average Stack Gas Temperature (°F)	141.0	143.9	167.8
Hg Mass Concentration (Micrograms, µg)	**19.0**	**121.3**	**43.0**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.00	29.00	29.06
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	90.175	84.444	81.704
Water Vapor Volume at Standard Conditions (SCF)	1.356	2.137	1.652
Moisture Fraction (Unitless)	0.015	0.025	0.020
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.68	28.57	28.62
Stack Gas Velocity (FPS)	49.5	48.2	48.1
Stack Gas Flow Rate at Actual Conditions (ACFM)	933,055	908,551	906,666
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	782,730	750,812	725,926
Isokinetic Sampling (%)	102.8	100.4	100.5
Hg Emission Concentration (Gr/DSCF)	0.0000033	0.0000222	0.0000081
Hg Emission Concentration (Lb/DSCF)	4.65E-10	3.17E-09	1.16E-09
Hg Emission Rate (Lb/Hr)	0.022	0.143	0.051
Hg Emission Concentration (Lb/TPW)	0.000128	0.000641	0.000226

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**916,091**	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**753,156**	
Average Hg Emission Concentration (Gr/DSCF)	**0.0000112**	Emission
Average Hg Emission Concentration **(Lb/DSCF)**	**1.60E-09**	Limit:
Average Hg Emission Rate **(Lb/Hr)**	**0.072**	**0.02 Lb/Hr**
Average Hg Emission Concentration **(Lb/TPW)**	**0.000332**	

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TABLE 7
EPA METHOD **316**
FORMALDEHYDE **(HCHO)** EMISSIONS TEST RESULTS

CLIENT: SDI-CCI — PROJECT NO.: 03-T-201
SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET — DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	20-Feb-03	20-Feb-03	20-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0335-0520	0645-0810	0933-1056
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	**261.4**	**217.9**	**200.9**
Stack Area (Ft^2)	314.16	314.16	314.16
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.989	0.989	0.989
Nozzle Area (Ft^2)	0.000276	0.000276	0.000276
Barometric Pressure (In. Hg)	29.22	29.22	29.22
Static Pressure (In. H20)	-0.30	-0.30	-0.30
Dry Gas Meter Sample Volume (DCF)	47.450	43.840	44.052
Average Dry Gas Meter Temperature (°F)	48.7	58.6	70.8
Average Orifice Meter Delta H (In. H20)	2.150	1.945	2.013
Volume Condensate Collected (Ml)	9.4	15.5	29.5
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.864	0.810	0.806
Average Stack Gas Temperature (°F)	145.0	155.9	153.2
HCHO Mass Concentration (Micrograms, μg)	**ND**	**ND**	**ND**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.20	29.20	29.20
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	47.837	43.327	42.546
Water Vapor Volume at Standard Conditions (SCF)	0.442	0.730	1.389
Moisture Fraction (Unitless)	0.009	0.017	0.032
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.66	28.49
Stack Gas Velocity (FPS)	52.7	49.9	49.7
Stack Gas Flow Rate at Actual Conditions (ACFM)	993,374	940,595	936,825
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	838,607	773,702	762,183
Isokinetic Sampling (%)	108.3	106.3	106.0
HCHO Emissions Concentration (Gr/DSCF)	0.00000	0.00000	0.00000
HCHO Emissions Concentration (Lb/DSCF)	0.00E+00	0.00E+00	0.00E+00
HCHO Emissions Rate (Lb/Hr)	0.000	0.000	0.000
HCHO Emissions Concentration (Lb/TPW)	0.000	0.000	0.000

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	956,931	
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	791,497	
Average HCHO Emissions Concentration **(Gr/DSCF)**	0.00000	**No**
Average HCHO Emissions Concentration **(Lb/DSCF)**	0.00E+00	**Emission**
Average HCHO Emissions Rate **(Lb/Hr)**	0.000	**Limit**
Average HCHO Emissions Concentration **(Lb/TPW)**	0.000	

Signature of Reviewer: Fred H. Quentin

RF EXHAUST STACK

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TABLE 8
EPA METHOD **7E**
NITROGEN OXIDES **(NOx) EMISSIONS TEST** RESULTS

CLIENT: SDI - CCI — PROJECT NO.: 03-T-201
SOURCE TESTED: REHEAT FURNACE — DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	19-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	1152-1252	1447-1547	1810-1910
Sampling Time (Minutes)	60	60	60
Representative NG Fuel (F) Factor **(DSCF/mmBtu)**	**8710**	**8710**	**8710**
Average 0 2 Concentration (%)	9.5	9.7	9.9
Average Corrected NOx Concentration as NO2 (PPMV)	**48.97**	**52.11**	**53.68**

CALCULATED DATA

NOx Emissions Concentration (Lb/DSCF)	5.85E-06	6.23E-06	6.41E-06
NOx Emissions Concentration Per "F" Factor (Lb/mmBtu)	0.093	0.101	0.106

Average **NOx** Emissions Concentration **(Lb/DSCF)**	6.04E-06	Emission Limit:
Average **NOx** Emissions Concentration Per **"F"** Factor **(Lb/mmBtu)**	0.100	**0.11 Lb/mmBtu**

Signature of Reviewer: Fred H. Quentler

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TABLE 9
EPA METHOD 10
CARBON MONOXIDE (CO) EMISSIONS TEST RESULTS

CLIENT: SDI – CCI | PROJECT NO.: 03-T-201
SOURCE TESTED: REHEAT FURNACE | DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	19-Feb-03	19-Feb-03	19-Feb-03
Sampling Location	**Exhaust Stack**	**Exhaust Stack**	**Exhaust Stack**
Test Time, Start-Stop (24 Hour)	1152-1252	1447-1547	1810-1910
Sampling Time (Minutes)	60	60	60
Representative NG Fuel (F) Factor (DSCF/mmBtu)	**8710**	**8710**	**8710**
Average O2 Concentration (%)	9.5	9.7	9.9
Average Corrected CO Concentration (PPMV)	**2.27**	**3.36**	**2.36**

CALCULATED DATA

CO Emissions Concentration (Lb/DSCF)	1.65E-07	2.44E-07	1.72E-07
CO Emissions Concentration Per "F" Factor (Lb/mmBtu)	0.003	0.004	0.003

Average CO Emissions Concentration (Lb/DSCF)	2.05E-07	**Emission Limit:**
Average CO Emissions Concentration Per "F" Factor (Lb/mmBtu)	0.003	**0.03 Lb/mmBtu**

Signature of Reviewer: Fred H. Quentler

3.0 FACILITY DESCRIPTION

The Steel Dynamics, Inc., Structural and Rail Division facility manufactures steel products from scrap metal. The facility has the capacity to produce over 200 tons of steel per hour.

The Structural and Rail Division is located at 2601 County Road 700 East near Columbia City, Indiana in Whitley County. The facility start-up date was August 26, 2002.

The Structural and Rail Division operations consist basically of one (1) single shell electric arc furnace (EAF) incorporating a jet-pulse, fabric filter baghouse with exhaust stack for particulate removal, one (1) back-up single shell EAF, a ladle metallurgical station for refining, one (1) natural gas-fired reheat furnace (RF) with seperate exhaust stack, continuous casting, hot roll milling and slag processing. The emissions compliance testing was performed on the EAF and RF exhaust stacks. See Figures 1, 2, 3 and 4.

During the emissions testing on February 18, 19 and 20, 2003, the process tap rates averaged 169.3, 194.4 and 221.8 tons of steel per hour, respectively.

Process operating data recorded during the emissions testing can be found in Appendix B of this report.

FIGURES

FIGURES

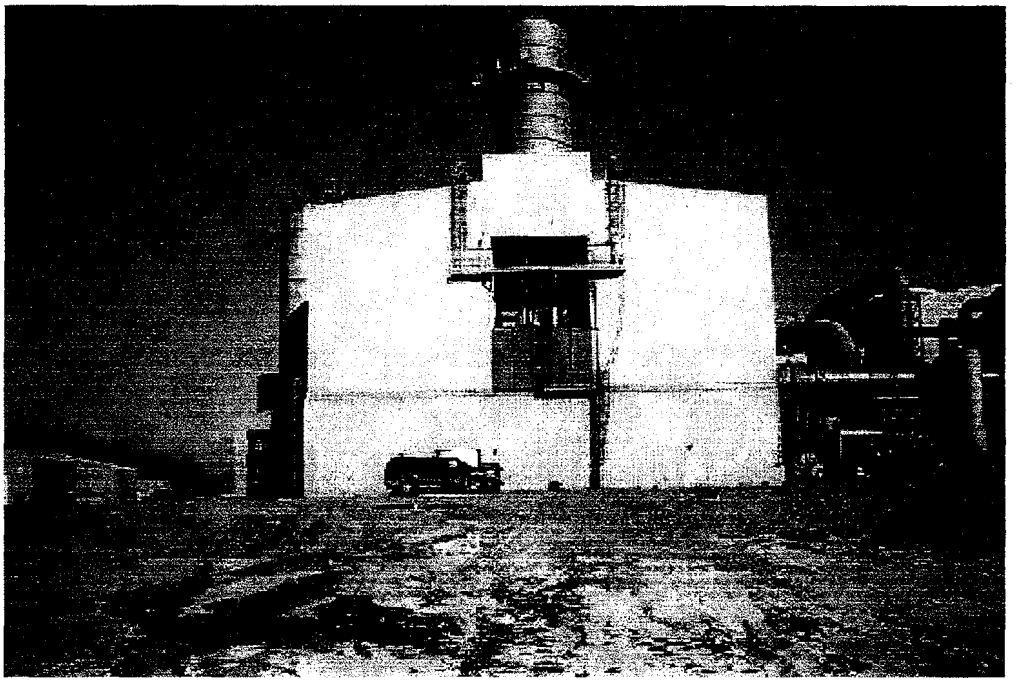


Figure 1 - Electric Arc Furnace - Baghouse/Stack Configuration

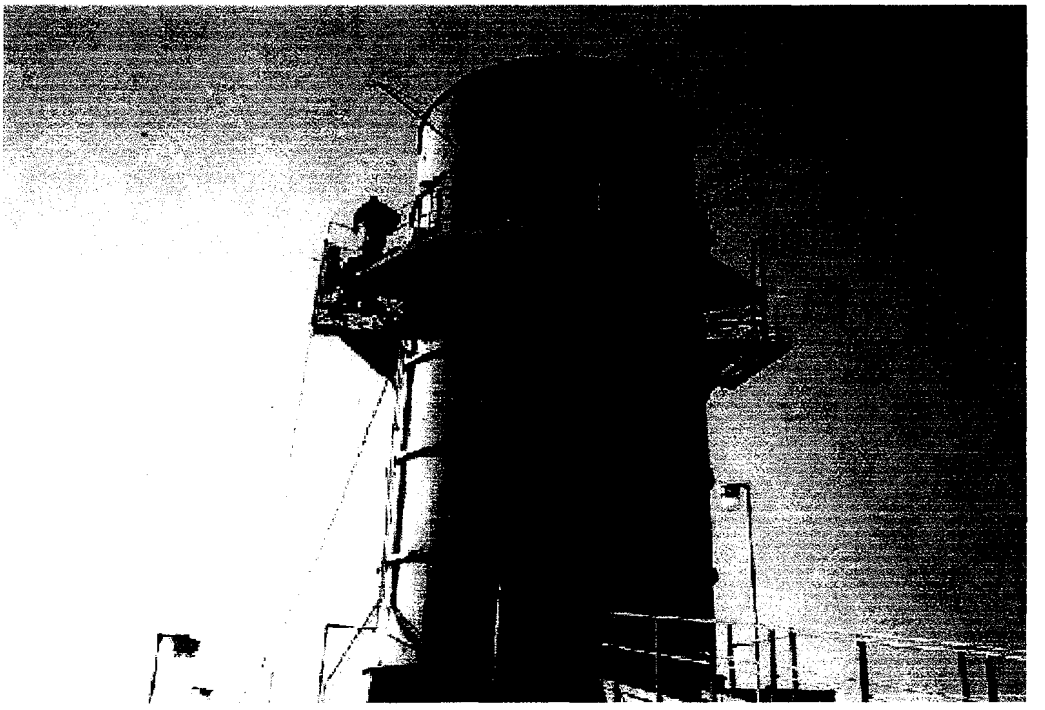


Figure 2 - Electric Arc Furnace - Stack Sampling Location

FIGURES (CONT.)

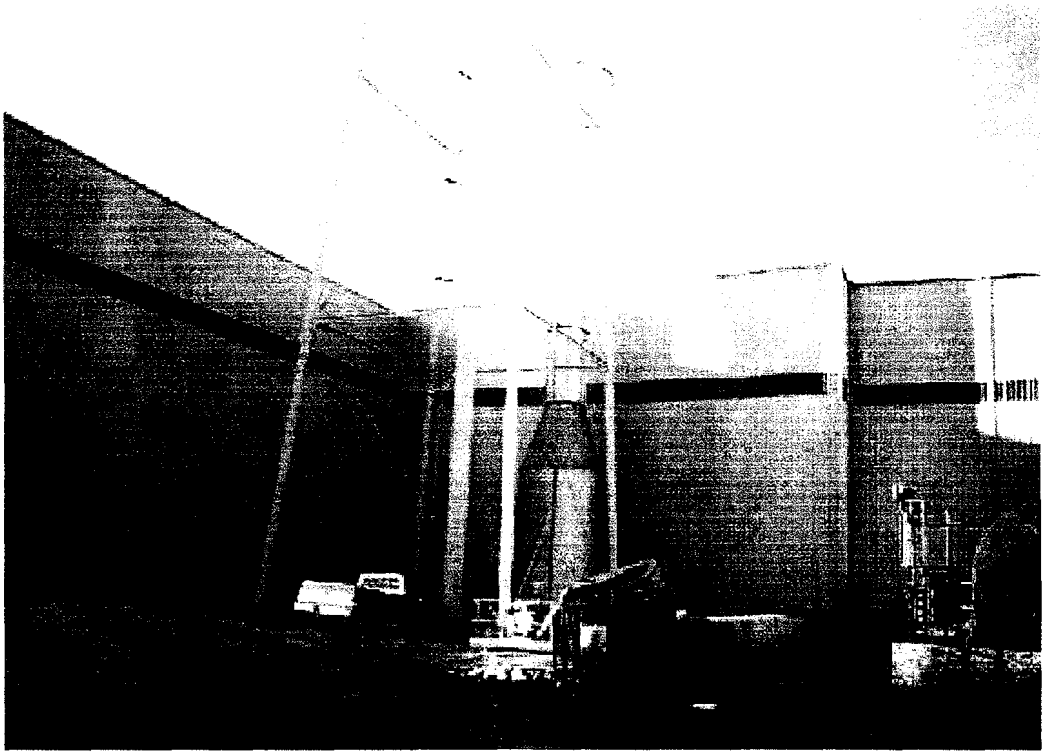


Figure 3 - Reheat Furnace - Stack Configuration

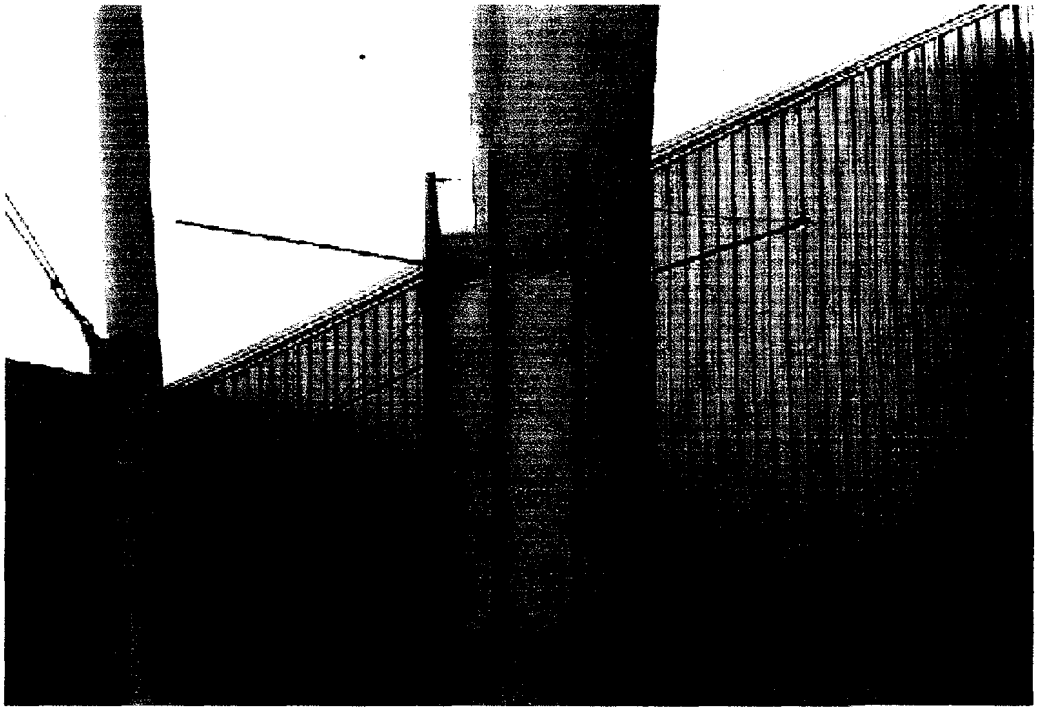


Figure4 - Reheat Furnace - Stack Sampling Location

4.0 TEST PROCEDURES

G/SA, and G/SA's affiliates and subcontractors use all current USEPA accepted testing methodologies in their Air Quality Programs as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A. For this testing program, the following specific methodologies were utilized:

USEPA Method 1 - Sample and Velocity Traverses for Stationary Sources

USEPA Method 2 - Determination of Stack Gas Velocity and Volummetric Flow Rate (Type S Pitot Tube)

USEPA Method 3 - Gas Analysis for the Determination of Dry Molecular Weight

USEPA Method 3A - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

USEPA Method 4 - Determination of Moisture Content in Stack Gases

USEPA Method 5 - Determination of Particulate Emissions from Stationary Sources

USEPA Method 6C - Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

USEPA Method 7E - Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)

USEPA Method 9 - Visual Determination of the Opacity of Emissions from Stationary Sources *(Opacity* CEMS *Data Substituted for this Method for the EAF*

Bughouse Outlet)

USEPA Method 10 - Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

USEPA Method 13B - Determination of Total Fluoride Emissions from Stationary Sources - Specific Ion Electrode Method

USEPA Method 18 - Measurement of Gaseous Organic Compoumd Emissions by Gas Chromatography

USEPA Method 29 - Determination of Metals Emissions from Stationary Sources

USEPA Method 202 - Determination of Condensible Particulate Emissions from Stationary Sources

USEPA Method 316 - Sampling and Analysis for Formaldehyde Emissions from Stationary Sources in the Mineral Wool Industry

USEPA Methods 2, 4, 51202, 13B, 29 and 316 were performed at the EAF sampling location using two (2) Apex Instruments, Model 522, control units and sampling trains incorporating 9′, effective length, stainless-steel probes with heated, borosilicate glass liners, stainless-steel nozzles and Type S, stainless-steel pitot tubes, ¼" O.D., stainless-steel static pressure/gas sampling tubes and Type K (Chromel/Alumel) thermocouples; aluminum filter ovens and borosilicate glass filter holders with Teflon filter supports with Viton-O-Rings, and 0.3 micron (99.9% retention), Whatman 8.2 cm, glass microfiber filters (Method 51202) or quartz filters (Method13B, Method 29 and Method 316); foam insulated, aluminum impinger units with the appropriate Greenburg-Smith and modified

Greenburg-Smith glass impinger assemblies, and stainless-steel umbilical adapters with Type K (Chromel/Alumel) gas exit thermocouples; and two (2)-90' umbilicals with various interconnecting fittings, plugs and connectors.

USEPA Method 3 was performed at the EAF sampling location during the PM/CPM, F, GOC, metals and HCHO testing to determine exhaust gas concentrations of CO_2 and O_2 using a Bacharach, Duplex Fyrite Kit, Gas Analyzer to extract and measure integrated gas samples collected in Calibrated Instruments, Inc. 10 liter, pillow type, Tedlar bags at the outlet of the stainless-steel probe's gas sampling tube.

USEPA Method 3A was performed at the EAF sampling location during the Method 6C and 7E testing, and at the RF sampling location during the Method 7E and 10 testing using a Fuji, NDIR CO_2 Monitor and a California Analytical, Paramagnetic O_2 Monitor to determine stack gas concentrations of CO_2 and O_2, respectively

USEPA Methods 6C, 7E and 10 were performed at the EAF and RF IAP testing locations using a Western Research, Model 721 AT, NDIR SO, Monitor (EAF baghouse outlet), a Thermo-Electron, Model 10A, Chemiluminescent NO/NO_X Monitor (EAF baghouse outlet and RF exhaust stack) and a Thermo-Electron, Model 48, GFCIR CO Monitor (RF exhaust stack), respectively.

The aforementioned monitors at both IAP testing locations incorporated a 6', effective

length, stainless-steel, heated sample probe with sintered, stainless-steel filter; a Teflon condenser assembly with peristaltic pump; ¼" O.D. × 300' long Teflon sample line and bias-check line; a Strata, Version 2.0, Data Acquisition System; two (2) #1 cylinders of certified zero grade N_2 gas, several #1 cylinders of protocol CO_2, O_2, SO_2, NO_X and CO span gases; and various interconnecting regulators, Teflon tubing, stainless-steel fittings and valves.

Calibration data, including on-site dry gas meter calibration checks, and pretest run and post-test run IAP calibrations of the aforementioned instrumentation, and calibration span gas certifications can be found in Appendix E.

Cyclonic flow checks were omitted at the EAF baghouse outlet and RF exhaust stack sampling locations due to the acceptable stack and test port configurations based on Method 1 requirements, and relatively laminar flows noted during the preliminary traverse procedures conducted prior to the emissions testing a each sampling location.

At the conclusion of each PM/CPM test run, impinger sample (CPM) pH levels were determined with EM colorpHast pH Strips with a 0 to 6 pH range. Impinger contents were purged, if applicable, with prefiltered ambient air utilizing a W.A. Hammond Drierite Gas Purifier (ambient air conditioning tube) or nitrogen (N_2) utilizing a Gast ¼ h.p. vacuum pump incorporating a Dwyer, Model RMA-23-SSV, Rate-Master Flowmeter (5-50 lpm range), and ¼" O.D. latex rubber tubing, regulators, interconnecting fittings

and valves. Because each impinger sample solution indicated a pH >4.5, the option to perform a one (1) hour ambient air or N_2 purge was exercised after each PMICPM test run.

The gas stream data collected at the EAF baghouse outlet sampling location during the USEPA Methods 2, 3, 3A, 4, 51202, 13B, 29 and 316 testing, to determine stack gas conditions, and PMICPM, F, metals and HCHO emissions concentrations, was used in conjunction with USEPA Methods 6C, 7E and 18 testing to obtain *SO,,* NO_X and GOC calculated emissions results.

USEPA Method 9 VE observations of the EAF baghouse effluent (stack exhaust) were substituted with CEMS plume opacity readings.

No testing or sample recovery procedure deviations or errors occurred during the onsite sampling phase of the testing program.

Certifications and material safety data for the chemical reagents used in performing the PMICPM, F, metals and HCHO testing and sample recovery procedures are included in Appendix D.

No significant process deviations or upsets occurred during the emissions testing periods.

The emissions test data and supporting data collected during the onsite sampling can be found in Appendix A of this report. The PM/CPM, SO_2, NO_X, CO, F, GOC, metals and HCHO emissions values and CEMS opacities, and relative data are presented in the "Test Results Summary".

5.0 ANALYTICAL PROCEDURES

G/SA, and G/SA's affiliates and subcontractors utilize all current analytical procedures outlined in the following reference methods as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A:

USEPA Method 1 - Sample and Velocity Traverses for Stationary Sources

USEPA Method 2 - Determination of Stack Gas Velocity and Volummetric Flow Rate (Type S Pitot Tube)

USEPA Method 3 - Gas Analysis for the Determination of Dry Molecular Weight

USEPA Method 3A - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)

USEPA Method 4 - Determination of Moisture Content in Stack Gases

USEPA Method *5* - Determination of Particulate Emissions from Stationary Sources

USEPA Method 6C - Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)

USEPA Method 7E - Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)

USEPA Method 9 - Visual Determination of the Opacity of Emissions from Stationary Sources *(Opacity CEMS Data Substituted for this Method for the EAF Baghouse Outlet)*

a Thermo-Electron, Model 48, GFCIR CO Monitor was used to conduct USEPA Methods 6C, 7E and 10 IAP to determine SO_2, NO_X and CO emissions concentrations, respectively. USEPA Method 13B (F) analysis was performed utilizing an Accumet, Model AR25, pH/Ion Meter in conjunction with a Symphony Combination Fluoride Electrode. USEPA Method 18 (GOC) analysis was performed with a Varian, Model 3400, Gas Chromatograph/Flame Ionization Detector (GC/FID). USEPA Method 29 (metals) analysis was performed using a Perkin-Elmer, Model 300XL, ICP and a CETAC, Model M-6000A, Mercury Analyzer. A Milton Roy, Spectronic 21D, Spectrophotometer was used to perform USEPA Method 316 (HCHO) analysis.

No analytical procedure errors occurred during the PM/CPM, F, GOC, metals and HCHO analyses phase of the testing program.

All pertinent laboratory analyses and IAP analytical data can be found in Appendix C of this report.

6.0 QUALITY ASSURANCE PROCEDURES

Each reference method presented in the U.S. Code of Federal Regulations details the instrument calibration requirements, sample turnover and analysis, data reduction and verification, types of equipment required and the appropriate sampling and analytical procedures to assure maximum performance and accuracy. G/SA, and G/SA's affiliates and subcontractors adhere to the guidelines for quality control set forth by the United States Environmental Protection Agency. These procedures are outlined in the following documents:

Code of Federal Regulations, Title 40, Part 51

Code of Federal Regulations, Title 40, Part 60

Quality Assurance Handbook, Volume 1, EPA 60019-76-005

Quality Assurance Handbook, Volume 2, EPA 600/4-77-027a

Quality Assurance Handbook, Volume **3,** EPA 600/4-77-027b

7.0 CONCLUSIONS

The baghouse serving the Electric Arc Furnace demonstrated an average total PM_{10} (PM/CPM) emissions concentration of 0.00089 grldscf during the compliance testing, which is 17.12% of the required IDEM PM,, emissions concentration limit of 0.0052 grldscf. The baghouse also demonstrated an average PM emissions concentration of 0.00068 grldscf and an emissions rate of 4.64 lblhr during the compliance testing, which is 37.78% of the required IDEM PM emissions concentration limit of 0.0018 grldscf and 7.93% of the emissions rate limit of 58.5 lb/hr.

The EAF baghouse outlet (stack exhaust) demonstrated an average CEMS plume opacity of 1.4% which was recorded during the PMICPM testing. The opacity limit for the baghouse required by IDEM is 3%.

The EAF demonstrated an average SO, emissions rate of 20.38 lblhr during the compliance testing, which is 40.76% of the required IDEM SO, emissions rate limit of 50.0 lblhr. The EAF also demonstrated an average NO, emissions rate of 28.51 lb/hr and an average emissions concentration of 0.171 lb/TPW during the compliance testing, which is 27.95% of the required IDEM NO, emissions rate limit of 102.0 lb/hr and 33.53% of the emissions concentration limit of 0.51 lb/TPW.

The EAF demonstrated an average F emissions rate of 11.291 lblhr during the

compliance testing, which is *1,660.44% of* the required *IDEM* F emissions rate limit of 0.68 lblhr.

However, the EAF demonstrated no detectable GOC emissions of hexane, benzene, toluene and naphthalene or HCHO.

The EAF also demonstrated average metals emissions of Be at a rate of 0.00E+00 lblhr, Pb at a rate of 0.0168 lblhr, Mn at a rate of 0.101 lb/hr and Hg at a rate of 0.072 lb/hr during the compliance testing, which is *0.00% of* the required ***IDEM*** Be emissions rate limit of 5.75E-5 lblhr, *14.74% of* the Pb emissions rate limit of 0.114 lb/hr, *8.86% of* the Mn emissions rate limit of 1.14 lblhr, and *360.00% of* the Hg emissions rate limit of 0.02 lblhr,

The Reheat Furnace demonstrated an average NO_X emissions concentration of 0.100 lb/mmBtu during the compliance testing, which is *90.91% of* the required IDEM emissions concentration limit of 0.11 lb/mmBtu. The RF also demonstrated an average CO emissions concentration of 0.003 lb/mmBtu during the compliance testing, which is *10.00% of* the required IDEM emissions concentration limit of 0.03 lb/mmBtu.

The usefulness and/or significance of the emissions values presented in this document as they relate to the compliance status of the EAF and RF based on process operations shall be determined by others.

For additional information pertaining to the testing program see Appendix G at the end of this report.

APPENDICES

APPENDIX A

FIELD TEST DATA

USEPA METHOD 1

S.A.T., *LLC* Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 1 – SITE DETERMINATION FIELD DATA SHEET

Client: Steel Dynamics - CCI
Source: EAF
Project No.: 03-T-198
Date: 1/9/03

Flue Data:

Distance from far inside wall to outside of port: 246.2 in.
Port length: 60 in.
I.D. or depth of flue: 240 in.
Width of flue (rect): N.A. in.
Area of flue: 314.159 sq. ft.
Equivalent dia., De = 2LW / (L+W)

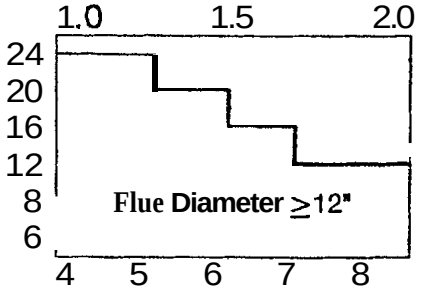
De = 240 in.

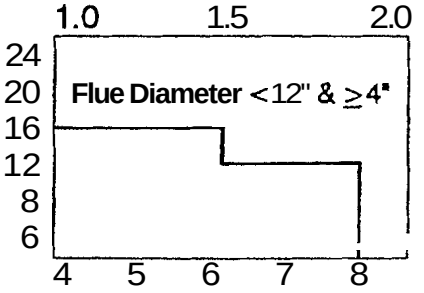
Distance from the nearest flow disturbance to the center line of the test ports:

Upstream (A)	Downstream (B)
_____ in.	_____ in.
Number of diameters	Number of diameters
_____ unitless	_____ unitless

Traverse Points Determination:

Diameters upstream from disturbance





Minimum number of traverse points

Diameters downstream from disturbance

Traverse Points Measurements:

Circular flue (Percentage of flue diameter) / Rectangular flue (Percentage of flue depth)

Point No.	2	4	6	8	10	12
1	14.6 / 25.0	6.7 / 12.5	4.4 / 8.3	3.2 / 6.3	2.6 / 5.0	2.1 / 4.2
2	85.4 175.0	25.0 / 37.5	14.6 / 25.0	10.5 / 18.8	8.2 / 15.0	6.7 / 12.5
3		75.0 / 62.5	29.6 / 41.7	19.4 / 31.3	14.6 / 25.0	11.8 / 20.8
4		93.3 / 87.5	70.4 / 58.3	323143.8	22.6 / 35.0	17.7 / 29.2
5			85.4 / 75.0	67.7 / 56.3	34.2 / 45.0	25.0 / 37.5
6			95.6 / 91.7	80.6 / 68.8	65.8 / 55.0	35.6 / 45.8
7				89.5 / 81.3	77.4 / 65.0	64.4 / 54.2
8				96.8 / 93.8	85.4 / 75.0	75.0 / 62.5
9					91.8 / 85.0	82.3 / 70.8
10					97.4 / 95.0	88.2 / 79.2
11						93.3 / 87.5
12						97.9 / 95.8

Traverse Points Dimensions:

1	5.04 in.	7	_____ in.
2	16.08 in.	8	_____ in.
3	28.32 in.	9	_____ in.
4	42.48 in.	10	_____ in.
5	60.00 in.	11	_____ in.
6	85.44 in.	12	_____ in.

Sketch Of Flue

USEPA METHOD 2/4

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 2 / 4 FIELD TEST DATA

Client	SDI-CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division - Columbia City, IN	Unit	Electric Arc Furnace - BO (ES)
Date	02/18/03	Ambient Temperature (°F)	59
Meter Operator	A. Perdue	Barometeric Pressure (inches Hg)	28.98
Probe Operator(s)	J. Richmond	Static Pressure (± inches H20)	-0.30
Control Unit No.	609198	Nozzle Diameter (in.)	N/A
Pitot Cp	0.84	Filter No.	N/A
Meter Y	0.997	Front-half No.	N/A
Run No.	1	Back-half No.	N/A
Stack Area (ft²)	314.16		
%CO2 / %02	0.6 / 20.1		
Condensate (milliliters)	-5	Silica Gel (grams)	13.7
Test Time (24 hour)	1218-1333		
Sample Time (minutes)	60.0		

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³)	Dry Gas Meter Temperature Tm (°F)	Notes
					Initial Volume 864.850		
W-	1	161	0.862	1.652		60	
	2	156	0.900	1.652		60	
	3	150	0.795	1.652		61	
	4	131	0.952	1.652		61	
	5	121	0.775	1.652		62	
	6	119	0.765	1.652		62	
N-	1	136	0.985	1.652		62	
	2	142	0.930	1.652		62	
	3	144	0.925	1.652		63	
	4	148	0.880	1.652		63	
	5	148	0.895	1.652		63	
	6	151	0.875	1.652		64	
E-	1	138	0.810	1.652		63	
	2	141	0.875	1.652		63	
	3	146	0.725	1.652		64	
	4	160	0.705	1.652		64	
	5	164	0.835	1.652		64	
	6	166	0.950	1.652		64	
S-	1	115	0.865	1.652		65	
	2	118	0.775	1.652		65	
	3	126	0.735	1.652		66	
	4	132	0.725	1.652		66	
	5	133	0.655	1.652	Final Volume 909.235	67	
	6	134	0.665	1.652		67	
		Average 140.8	Avg. Sqrt. 0.908	Average 1.652	Volume Sampled 44.385	Average 63.4	

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EPA METHOD 2 / 4 FIELD TEST DATA

Client SDI-CCI
Plant Structural and Rail Division – Columbia City, IN
Date 02/18/03
Meter Operator A. Perdue
Probe Operator(s) J. Richmond
Control Unit No. 609198 Nozzle Diameter (in.) N/A
Pitot Cp 0.84 Filter No. N/A
Meter Y 0.997 Front-half No. N/A
Run No. 2 Back-half No. N/A

Project No. G/SA 03-T-201
Unit Electric Arc Furnace – BO (ES) Stack Area (ft²) 314.16
Ambient Temperature (°F) 67
Barometeric Pressure (inches Hg) 28.98
Static Pressure (± inches H2O) -0.30
%CO2 / %02 0.7 / 18.7
Condensate (milliliters) -5 Silica Gel (grams) 16.4
Test Time (24 hour) 1415-1548
Sample Time (minutes) 60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³)	Dry Gas Meter Temperature Tm (°F)	Notes
					Initial Volume 909.532		
S-	1	141	0.915	1.652		67	
	2	142	0.965	1.652		67	
	3	144	0.835	1.652		68	
	4	158	0.865	1.652		69	
	5	162	0.785	1.652		69	
	6	167	0.865	1.652		69	
W-	1	167	0.775	1.652		70	
	2	144	0.955	1.652		71	
	3	121	0.915	1.652		70	
	4	115	0.875	1.652		72	
	5	120	0.885	1.652		72	
	6	121	0.810	1.652		72	
N-	1	137	0.950	1.652		72	
	2	141	0.915	1.652		72	
	3	136	0.850	1.652		73	
	4	130	0.815	1.652		73	
	5	152	0.950	1.652		71	Vacuum pump failed @
	6	137	0.845	1.652		71	1513. Resumed @ 1521.
E-	1	122	0.850	1.652		72	
	2	132	0.775	1.652		71	
	3	133	0.735	1.652		71	
	4	137	0.675	1.652		71	
	5	140	0.660	1.652	Final Volume 954.208	71	
	6	144	0.610	1.652		72	
		Average 139.3	Avg. Sqrt. 0.913	Average 1.652	Volume Sampled 44.676	Average 70.7	

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 2 / 4 FIELD TEST DATA

Client	SDI-CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division - Columbia City, IN	Unit	Electric Arc Furnace - BO (ES) — Stack Area (ft^2) 314.16
Date	02/18/03	Ambient Temperature (°F)	70
Meter Operator	A. Perdue	Barometeric Pressure (inches Hg)	28.98
Probe Operator(s)	J. Richmond	Static Pressure (± inches H20)	-0.30
Control Unit No.	609198 Nozzle Diameter (in.) N/A	%CO2 / %02	1.0 / 19.4
Pitot Cp	0.84 Filter No. N/A	Condensate (milliliters)	-14 Silica Gel (grams) 20.9
Meter Y	0.997 Front-half No. N/A	Test Time (24 hour)	1620-1729
Run No.	3 Back-half No. N/A	Sample Time (minutes)	60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft^3) Initial Volume 955.000	Dry Gas Meter Temperature Tm (°F)	Notes
E-	1	129	0.780	1.652		70	
	2	136	0.755	1.652		70	
	3	137	0.710	1.652		70	
	4	140	0.705	1.652		71	
	5	144	0.655	1.652		70	
	6	148	0.675	1.652		71	
S-	1	153	0.850	1.652		72	
	2	161	0.710	1.652		72	
	3	164	0.685	1.652		72	
	4	167	0.690	1.652		73	
	5	164	0.685	1.652		73	
	6	158	0.665	1.652		74	
W-	1	135	0.925	1.652		73	
	2	127	0.775	1.652		75	
	3	118	0.875	1.652		75	
	4	124	0.755	1.652		76	
	5	137	0.750	1.652		77	
	6	141	0.775	1.652		77	
N-	1	139	0.935	1.652		77	
	2	150	0.862	1.652		77	
	3	153	0.785	1.652		78	
	4	154	0.795	1.652		78	
	5	153	0.805	1.652	Final Volume	79	
	6	156	0.830	1.652	1000.434	79	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		145.3	**0.875**	**1.652**	**45.434**	**74.1**	

19-4 .34 .3 31.52

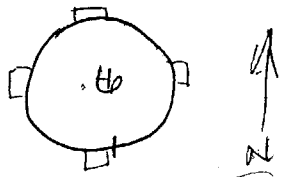
S.A.T., LLC P.O. Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140 Page 1 of 1

Modified EPA Method 6 (SO2) Testing – Field Data Sheet

Run # 1 Traverse Location EAST Baghouse Outlet 3/4

Client STEEL Dynamics	Project # 03-T-201
Plant EAST Outlet	Unit EAST Baghouse
Date 02-18-03	Project Site Columbia City
Meter Operator A. PERDUE	
Probe Operator JESSE	

Schematic of Stack Cross Section



Ambient Temperature (°F) 69	Baro. Press. (in. Hg) 28.98

Probe Length (ft.) 9'	
Probe Liner Material GLASS	
Probe Heater Setting (°F) 250	
Oven Heater Setting, If Applicable (°F) N/A	

Control Unit # 609198	Meter Y (C Factor) 0.997
Filter Oven # 1	Meter Delta H@ 1.652
Impinger Unit # 1019	Meter K (Orifice Factor) 2.729
Pitot # P9-2	Pitot Cp .84
Pitot Leak Check: Initial	OK Final OK
DGM Leak Rate Before:	OK CFM @ 10 in. Hg
DGM Leak Rate After:	OK CFM @ 5 in. Hg
Static Pressure (± in. H2O)	-.30

First traverse point all the way In / Out

Inside Dimension(s) (in.)		Port Dimen. (in.)	Gas Flow Direction
Diameter 240		Dia. 4	In
L /	W /	L 6	Out ✓

IGS Bag # N/A	Gas Analyzer # 1
%CO2 0.0	%O2 20.1
H2O (ml/g) -5 gal	Silica Gel (g) ~~250~~ 13.7
Total Condensate Collected, Vlc (ml) 5.7	
Test Start Time (24 Hour) 12:18	Test Stop Time (24 Hour) 13:33
Purge Start Time (24 Hour) ~~1359~~	Purge Stop Time (24 Hour) ~~1454~~

Traverse Point Number	Stop Watch Time Minutes / Sampling Period	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) 864.850 / Initial Volume 869.850	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
W 1	2.5	161	.862	1.652	866.850	60	193	N/A	30	3.0	
	5.0	156	.90		867.235	60	203		31	3.0	
3	7.5	150	.895		869.050	61	204		32	2.9	
4	10.0	131	.952		870.815	61	203		33	3.0	
5	12.5	121	.775		872.50	62	208		34	2.95	
6	15.0	119	.765		874.427	62	196		36	2.95	
N 1	17.5	136	.985		876.60	62	233		34	3.0	
2	20.0	142	.930		878.025	62	254		35	3.0	
3	22.5	144	.925		879.845	63	213		36	3.0	
4	25.0	148	.880		881.655	63	214		39	3.0	
5	27.5	148	.895		883.455	63	221		40	3.0	
6	30.0	151	.875		885.252	64	254		40	3.0	
E 1	32.5	138	.810		887.085	63	255		35	3.0	
2	35.0	141	.875		888.905	63	255		36	3.0	
3	37.5	146	.725		890.745	64	245		37	3.1	
4	40.0	160	.705		892.600	64	229		37	3.1	
5	42.5	164	.835		894.480	64	234		38	3.1	
6	45.0	166	.950		896.371	64	233		38	3.1	
S 1	47.5	115	.865		898.825	65	271		37	3.2	
2	50.0	118	.775		900.255	65	280		40	3.0	
3	52.5	126	.735		902.150	66	275		41	3.1	
4	55.0	132	.725		904.035	66	273		44	3.0	
5	57.5	133	.655		906.840	67	269		47	3.0	
6	60.0	134	.665		909.235	67	275		50	3.0	
Averages / Totals		140.4		1.652	44.385	63.7					

S.A.T., LLC P.O. Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140 Page 1 of 1

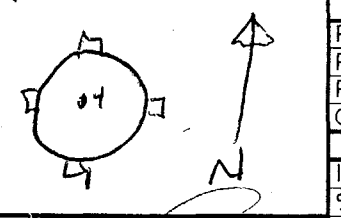
Modified EPA Method ~~6 (SO2)~~ Testing – Field Data Sheet

Run # 2 Traverse Location EAF Baghouse Outlet

Client STEEL Dynamics	Project # 03-T-201
Plant Columbia City	Unit EAF Baghouse Outlet
Date 02-18-03	Project Site Columbia City, IN
Meter Operator JESSE	
Probe Operator A. PERDUE	

Control Unit #	609198	Meter Y (C Factor)	.997	
Filter Oven #	N/A	Meter Delta H@	1.652	
Impinger Unit #	1020	Meter K (Orifice Factor)	2.729	
Pitot #	09-2	Pitot Cp	.84	
Pitot Leak Check: Initial	OK	Final	OK.	
DGM Leak Rate Before:	0	CFM @	10	in. Hg
DGM Leak Rate After:	0	CFM @	7	in. Hg
Static Pressure (± in. H2O)	-.30			

Schematic of Stack Cross Section



First traverse point all the way In / Out

Inside Dimension(s) (in.)		Port Dimen. (in.)	Gas Flow Direction
Diameter	240	Dia. 4	In
L / W	/	L 6	Out ✓

Ambient Temperature (°F)	67	Baro. Press. (in. Hg)	28.98
Probe Length (ft.)	9'		
Probe Liner Material	GLASS		
Probe Heater Setting (°F)	250		
Oven Heater Setting, If Applicable (°F)	N/A		
IGS Bag #	N/A	Gas Analyzer #	ZAP
%CO2	0.7	%O2	18.7
H2O (ml/g)	-EMPTY	Silica Gel (g)	250 / 264
Total Condensate Collected, Vlc (ml)	11.4		
Test Start Time (24 Hour)	14:15	Test Stop Time (24 Hour)	15:48
Purge Start Time (24 Hour)	N/A	Purge Stop Time (24 Hour)	N/A

Traverse Point Number	Stop Watch Time Minutes / Sampling Period 60/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 909.532	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
S 1	2.5	141	.915	1.652	911.450	67	191	N/A	35	3.0	NONE
2	5.0	142	.965	1.652	913.275	67	195	N/A	35	3.1	NONE
3	7.5	144	.835	1.652	915.145	68	209	N/A	34	3.0	NONE
4	10.0	158	.865	1.652	917.015	69	213	N/A	34	3.15	NONE
5	12.5	162	.785	1.652	918.985	69	215	N/A	36	3.2	NONE
6	15.0	167	.865	1.652	920.805	69	220	N/A	36	3.2	NO NOTES
W 1	17.5	167	.775	1.652	922.615	70	221	N/A	34	3.1	NADA
2	20.0	144	.955	1.652	924.560	71	251	N/A	34	3.1	NONE
3	22.5	121	.915	1.652	926.350	70	250	N/A	37	3.1	
4	25.0	115	.875	1.652	928.150	72	255	N/A	37	3.1	NO NOTES
5	27.5	120	.885	1.652	930.045	72	258	N/A	37	3.1	
6	30.0	121	.810	1.652	931.922	72	260	N/A	37	3.1	
N 1	32.5	137	.950	1.652	933.805	72	231	N/A	34	3.15	
2	35.0	141	.915	1.652	935.675	72	228	N/A	36	3.10	NO NOTES
3	37.5	136	.850	1.652	937.570	73	235	N/A	37	3.15	
4	40.0	130	.815	1.652	939.405	73	230	N/A	38	3.15	P
5	42.5	152	.950	1.652	941.275	71	221	N/A	33	3.15	Pump stopped @ 3:13
6	45.0	137	.845	1.652	942.950	71	219	N/A	33	3.15	3:21 START UP
E 1	47.5	122	.850	1.652	944.875	72	290	N/A	35	3.15	
2	50.0	132	.775	1.652	946.715	71	268	N/A	38	3.15	
3	52.5	133	.735	1.652	948.585	71	269	N/A	39	3.15	
4	55.0	137	.675	1.652	950.445	71	263	N/A	42	3.2	
5	57.5	140	.6100	1.652	952.015	71	263	N/A	43	3.2	
6	60.0	144	.610	1.652	954.208	72	260	N/A	45	3.15	
Averages / Totals		133.3		1.652	44.676	70.7					

22.30

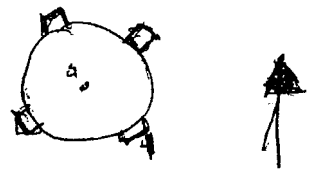
S.A.T., LLC P.O. Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140 Page 1 of 1

Modified EPA Method 6 (SO2) Testing – Field Data Sheet

Run # 3 Traverse Location EAF Baghouse Outlet 2/4

Client STEEL Dynamics	Project # 03-T-201
Plant Columbia City	Unit EAF Baghouse outlet
Date 02-18-03	Project Site Columbia City
Meter Operator A. PERDUE	
Probe Operator JESSE	

Schematic of Stack Cross Section



Ambient Temperature (°F) 70	Baro. Press. (in. Hg) 28.98
Probe Length (ft.) 9'	
Probe Liner Material GLASS	
Probe Heater Setting (°F) 250	
Oven Heater Setting, If Applicable (°F) N/A	

Control Unit # 609198	Meter Y (C Factor) .997		
Filter Oven # N/A	Meter Delta H@ 1.652		
Impinger Unit # 1224	Meter K (Orifice Factor) 2.729		
Pitot # PG-2	Pitot Cp .84		
Pitot Leak Check: Initial	OK	Final OK	
DGM Leak Rate Before:	0	CFM @ 10	in. Hg
DGM Leak Rate After:	0	CFM @ 7	in. Hg
Static Pressure (± in. H2O)	-.30		

First traverse point all the way (In) Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In
L / W /	L 60	Out ✓

IGS Bag # N/A		Gas Analyzer #	
%CO2 0		%O2 19.4	
H2O (ml/g) -14 ml		Silica Gel (g) 250 20.9	
Total Condensate Collected, Vlc (ml) 6.9			
Test Start Time (24 Hour) 16:20		Test Stop Time (24 Hour) 17:24	
Purge Start Time (24 Hour) 1756		Purge Stop Time (24 Hour) 1825	

Traverse Point Number	Stop Watch Time Minutes / Sampling Period 60 / 24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 955.000	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
E 1	2.5	129	.780	1.652	956.850	70	245	NA	41	4.1	NO NEW NOTES
2	5.0	136	.755	1.652	958.425	70	240	N/A	41	4.2	
3	7.5	137	.710	1.652	960.215	70	240	N/A	41	4.2	NADA
4	10.0	140	.705	1.652	962.125	71	237	N/A	43	4.5	
5	12.5	144	.655	1.652	964.000	70	256	N/A	45	4.3	
6	15.00	148	.675	1.652	965.935	71	255	N/A	44	4.2	
S 1	17.5	153	.850	1.652	967.815	72	250	N/A	48	4.2	
2	20.0	161	.710	1.652	969.715	72	252	N/A	50	4.2	
3	22.5	164	.685	1.652	971.620	72	266	N/A	51	4.2	
4	25.0	167	.690	1.652	973.523	73	265	N/A	51	4.5	
5	27.5	164	.685	1.652	975.445	73	260	N/A	54	4.5	
6	30.0	158	.665	1.652	977.363	74	263	N/A	55	4.7	
W 1	32.5	135	.925	1.652	979.285	73	255	N/A	48	4.7	
2	35.0	127	.775	1.652	981.215	75	242	N/A	48	4.5	
3	37.5	118	.875	1.652	983.175	75	232	N/A	48	4.2	
4	40.0	124	.755	1.652	985.100	76	228	N/A	49	4.2	
5	42.5	137	.750	1.652	987.045	77	238	N/A	49	4.5	
6	45.0	141	.775	1.652	989.026	77	242	N/A	48	4.3	
N 1	47.5	139	.935	1.652	990.895	77	231	N/A	38	4.2	
2	50.0	150	.862	1.652	992.875	77	231	N/A	41	4.5	
3	52.5	153	.785	1.652	994.686	78	224	N/A	43	4.3	
4	55.0	154	.795	1.652	996.595	78	226	N/A	43	4.3	
5	57.5	153	.806	1.652	998.610	79	226	N/A	43	4.3	
6	60.0	156	.830	1.652	1000.434	79	237	N/A	44	4.3	
Averages / Totals		145.3		1.652	45.434	74.1					

USEPA METHOD 3

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA Method 3 – Gas Analysis Field Data Sheet

Client SDI-CCI | Project # 03-T-201 | Fo = 20.9 − %O2 / %CO2

Process Structural & Rail Dec. | Unit EAF | Fo = 1.083 to 1.230 (for bitum. coal)

Date 2-18-03 + 2-19-03 | Fuel Type NG

IGS Analyzer I.D. # GA-2 | Leak Check? OK

Analyst T. Shackelford

Run Number	Location	Bag I.D. Number	Trial	Percent CO2	Percent CO2 + O2	Percent O2	Analytical Time
1	BO	R1	1	0	20.9	20.9	EST
			2	0	20.9	20.9	
2-18-03			3	0	20.9	20.9	0544
			Average	0		20.9	
2	BO	R2	1	0	20.9	20.9	EST
			2	0	20.9	20.9	
2-19-03			3	0	20.9	20.9	1028
			Average	0		20.9	
3	BO	R3	1	0	20.9	20.9	EST
			2	0	20.9	20.9	
2-19-03			3	0	20.9	20.9	1647
			Average	0		20.9	
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
			1				
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			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				

COMMENTS:

S.A.T., LLC Rt. 2, Box 2165, Wheatland. MO 65779 TEL/FAX (417) 282-6140

EPA Method 3 – Gas Analysis Field Data Sheet

Client SDT-CCI | Project # T-201 | Fo = 20.9 – %02 / %CO2

Process Structural Rail Die- | Unit

Date 2-20-03 | Fuel Type NG | Fo = 1.083 to 1.230 (for bitum. coal)

IGS Analyzer I.D. # GA2 | Leak Check? ok

Analyst T. Shackleford

Run Number	Location	Bag I.D. Number	Trial	Percent C02	Percent C02 + 02	Percent 02	Analytical Time
	BO	R1	1	0	20.9	20.9	EST
			2	0	20.9	20.9	
			3	0	20.9	20.9	0548
			Average	0		20.9	
2	BO	R2	1	0	20.9	20.9	EST
			2	0	20.9	20.9	
			3	0	20.9	20.9	0829
			Average	0		20.9	
3	BO	R3	1	0	20.9	20.9	EST
			2	0	20.9	20.9	
			3	0	20.9	20.9	1122
			Average	0		20.9	
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
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			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				

COMMENTS:

USEPA METHOD 5/202

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 5 / 202 FIELD TEST DATA

Client	SDI – CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Electric Arc Furnace – BO (ES)
Date	02/18/03	Ambient Temperature (°F)	28
Meter Operator	B. Peyton	Barometeric Pressure (inches Hg)	28.98
Probe Operator(s)	J. Richmond	Static Pressure (± inches H20)	-0.35
Control Unit No.	507123	Nozzle Diameter (in.)	0.253
Pitot Cp	0.84	Filter No.	02-283
Meter Y	0.989	Front-half No.	FH-1A
Run No.	1	Back-half No.	BH-1W, BH-1M
Stack Area (ft²)	314.16		
%CO2 / %02	0.0 / 20.9		
Condensate (milliliters)	3	Silica Gel (grams)	36.0
Test Time (24 hour)	1248-1715		
Sample Time (minutes)	240.0		

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 716.033	Dry Gas Meter Temperature Tm (°F)	Notes
W-	1	151	0.680	2.670		50	
	2	146	0.590	2.360		52	Pretest Nozzle Cal:
	3	173	0.670	2.570		53	A = 0.254"
	4	117	0.720	3.060		55	B = 0.253"
	5	136	0.680	2.850		60	C = 0.252"
	6	127	0.620	2.600		61	Avg. = 0.253"
N-	1	135	0.780	3.310		63	
	2	139	0.680	2.890		65	
	3	145	0.550	2.320		66	
	4	155	0.540	2.240		66	
	5	119	0.650	2.810		61	
	6	126	0.420	1.840		68	
E-	1	163	0.700	2.860		65	
	2	139	0.950	4.050		66	
	3	129	0.620	2.700		67	
	4	145	0.650	2.750		67	
	5	161	0.650	2.670		66	
	6	141	0.620	2.630		66	
S-	1	121	0.670	2.930		65	
	2	140	0.740	3.140		65	Post-test Nozzle Cal:
	3	154	0.700	2.900		65	A = 0.253"
	4	169	0.700	2.830		65	B = 0.253"
	5	127	0.780	3.370	Final Volume 931.916	64	C = 0.252"
	6	144	0.720	3.030		65	Avg. = 0.253"
		Average 141.8	Avg. Sqrt. 0.816	Average 2.808	Volume Sampled 215.883	Average 62.8	

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 5 / 202 FIELD TEST DATA

Client	SDI – CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Electric Arc Furnace – BO (ES) — Stack Area (ft^2) 314.16
Date	02/19/03	Ambient Temperature (°F)	30
Meter Operator	A. Perdue	Barometeric Pressure (inches Hg)	29.02
Probe Operator(s)	J. Richmond	Static Pressure (± inches H20)	-0.30
Control Unit No.	609198 — Nozzle Diameter (in.) 0.252	%CO2 / %O2	0.0 / 20.9
Pitot Cp	0.84 — Filter No. 02-285	Condensate (milliliters)	12 — Silica Gel (grams) 46.3
Meter Y	0.997 — Front-half No. FH-2A	Test Time (24 hour)	0429-0925
Run No.	**2** — Back-half No. BH-2W, BH-2M	Sample Time (minutes)	240.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft^3) Initial Volume 18.244	Dry Gas Meter Temperature Tm (°F)	Notes
S-	1	118	0.750	2.470		64	
	2	133	0.725	2.360		67	Pretest Nozzle Cal:
	3	140	0.705	2.300		71	A = 0.252"
	4	133	0.710	2.370		74	B = 0.252"
	5	155	0.675	2.180		75	C = 0.253"
	6	114	0.635	2.210		77	Avg. = 0.252"
E-	1	151	0.935	3.040		75	
	2	148	0.825	2.730		78	
	3	138	0.975	3.290		79	
	4	128	0.875	3.000		79	
	5	132	0.805	2.760		81	
	6	121	0.715	2.500		81	
N-	1	134	0.965	3.290		80	
	2	141	0.795	2.700		82	
	3	149	0.705	2.370		83	
	4	155	0.640	2.140		84	
	5	135	0.850	2.940		85	
	6	140	0.625	2.150		86	
W-	1	158	0.655	2.140		79	
	2	133	0.535	1.830		80	
	3	118	0.515	1.740		70	
	4	103	0.625	2.240		79	
	5	97	0.562	2.030	Final Volume 244.382	78	
	6	108	0.535	1.880		77	
		Average **132.6**	Avg. Sqrt. **0.846**	Average **2.444**	Volume Sampled **226.138**	Average **77.7**	

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 5 / 202 FIELD TEST DATA

Client	SDI – CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Electric Arc Furnace – BO (ES)
Date	02/19/03	Ambient Temperature (°F)	36
Meter Operator	A. Perdue	Barometeric Pressure (inches Hg)	29.08
Probe Operator(s)	J. Richmond	Static Pressure (± inches H20)	−0.35
Control Unit No.	609198	Nozzle Diameter (in.)	0.252
Pitot Cp	0.84	Filter No.	02-286
Meter Y	0.997	Front-half No.	FH-3A
Run No.	3	Back-half No.	BH-3W, BH-3M

%CO2 / %02	0.0 / 20.9		
Condensate (milliliters)	30	Silica Gel (grams)	45.2
Test Time (24 hour)	1120-1555		
Sample Time (minutes)	240.0		
Stack Area (ft²)	314.16		

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³)	Dry Gas Meter Temperature Tm (°F)	Notes
					Initial Volume 246.761		
W-	1	117	0.915	3.000		63	
	2	149	0.705	2.210		65	
	3	165	0.725	2.230		67	
	4	177	0.725	2.210		69	
	5	127	0.855	2.830		70	
	6	154	0.735	2.340		71	
N-	1	154	0.650	2.070		72	
	2	168	0.685	2.140		72	
	3	166	0.685	2.150		74	
	4	172	0.650	2.040		75	
	5	134	0.550	1.850		77	
	6	149	0.625	2.070		79	
E-	1	175	0.685	2.160		77	
	2	185	0.675	2.100		78	
	3	145	0.585	1.950		80	
	4	167	0.550	1.760		78	
	5	178	0.525	1.650		78	
	6	186	0.485	1.510		79	
S-	1	157	0.650	2.110		78	
	2	170	0.625	2.000		79	Post-test Nozzle Cal:
	3	179	0.650	2.090		84	A = 0.251"
	4	138	0.625	2.110		80	B = 0.252"
	5	158	0.585	1.910	Final Volume	80	C = 0.253"
	6	167	0.456	1.490	452.828	79	Avg. = 0.252"
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		159.9	0.804	2.083	206.067	75.2	

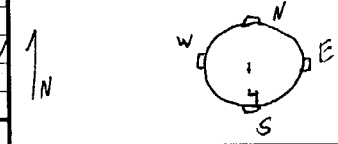
S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140 Page 1 of 1

EPA Method 5 / 202 (PM / CPM) Testing – Field Data Sheet

Run # 1 **Sampling Location** EAF Baghouse Outlet

Client SDI	Project # 03-T-201	Ambient Temperature (°F) 28	Baro. Press. (in. Hg) ~~29.88~~ 28.98
Plant SDI Columbia City	Unit EAF	Assumed Moisture (%) 2	Calculated Moisture (%)
Date 02/18/03	Project Site Columbia City, IN		
Meter Operator B. Peyton		Nozzle # N-253	Probe Length (ft.) 9
Probe Operator J. Richmond		Nozzle Diameter (in.) .253	Probe Liner Material Glass
		Nozzle Material Stainless	Probe Heater Setting (°F) 250
		Probe # P-9-1	Oven Heater Setting (°F) 250

Schematic of Stack Cross Section



Control Unit # 507123	Meter Y (C Factor) 0.989	First traverse point all the way (In) Out	
Filter Oven # 10 11	Meter Delta H@ 1.906	Inside Dimension(s) (in.)	Port Dimen. (in.) / Gas Flow Direction
Impinger Unit # 5/202 B	Meter K / Orifice Factor 3.633	Diameter 240	Dia. 4
Pitot # P-9-1	Pitot Cp 0.84	L — W —	L 6
Pitot Leak Check: Initial OK	Final OK		In / Out ✓
DGM Leak Rate Before: 0.0	CFM @ 18.0 in. Hg	Filter #(s)	02-283
DGM Leak Rate After: 0	CFM @ 10 in. Hg	Front-half #(s)	N/A
Static Pressure (± in. H2O) -.35		Back-half #(s)	~~N/A~~

IGS Bag #		%CO2	%O2 20.9
Condensate (g/ml)	0 ml	Silica Gel (g)	200
Total Vlc (ml)	240	Sample Solution pH	7.6
Gas Purge? Yes No / N2 CO2		Total Acetone Wash (ml)	200
Total D.I. H2O Rinse (ml)	200	Total MeCl2 Rinse (ml)	100
Start Time (24 hour) 12:48		Stop Time (24 hour) 17:15	

Traverse Point Number	Stop Watch Time: Minutes / Sample Point 240/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³): Initial Volume 716.033	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
W 1	10	151	0.68	2.67	724.809	50	230	252	N/A	35	4.2	Pitot
2	20	146	0.59	2.36	732.589	52	240	238		39	4.0	Nozzle
3	30	173	0.67	2.57	741.236	53	242	238		38	4.4	Cal
4	40	117	0.72	3.06	750.480	55	230	242		37	5.2	Pitot #
5	50	136	0.68	2.85	759.455	60	228	240		40	4.95	Probe
6	60	137	0.62	2.60	767.744	61	225	238		39	4.0	Oven
N 1	70	135	0.78	3.31	780.008	63	258	262		41	6.0	Avg.
2	80	139	0.68	2.89	786.902	65	257	259		49	5.4	
3	90	145	0.55	2.32	796.954	66	258	263		55	4.9	
4	100	155	0.54	2.24	804.562	66	258	258		59	4.0	
5	110	119	0.65	2.81	813.261	61	255	258		57	5.8	
6	120	126	0.42	1.84	820.466	66	259	262		47	3.8	
E 1	130	163	0.70	2.86	829.962	65	258	253		41	4.3	
2	140	139	0.95	4.05	842.502	66	245	230		44	7.2	
3	150	129	0.62	2.70	850.324	67	253	237		45	4.6	
4	160	145	0.65	2.75	858.450	67	248	238		45	4.6	
5	170	161	0.65	2.67	869.152	66	223	227		44	4.2	
6	180	141	0.42	2.63	877.675	66	223	227		42	4.3	Pitot
S 1	190	121	0.67	2.93	886.744	65	260	248		43	5.0	Nozzle
2	200	140	0.74	3.19	896.092	65	261	268		45	5.9	Cal
3	210	154	0.70	2.90	905.000	65	251	264		47	4.9	Pitot #
4	220	169	0.70	2.83	913.921	65	252	265		47	4.8	Probe
5	230	127	0.78	3.27	923.502	64	255	265		42	5.2	Oven
6	240	144	0.72	3.03	931.916	65	254	266		46	5.3	Avg.
Average / Total		144.4		2.868	215.883	62.8						

55-4

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEUFAX (417) 282-6140 Page 1 of 1

EPA Method 5 / 202 (PM / CPM) Testing – Field Data Sheet

Run # 92 Sampling Location EAF BAGHOUSE OUTLET

Client STEEL DYNAMICS	Project # 03-T-201
Plant Columbia City	Unit EAF Baghouse Outlet
Date 02-19-03	Project Site Columbia City
Meter Operator A. PERDUE	
Probe Operator JESSE Richmond	

Schematic of Stack Cross Section



Ambient Temperature (°F) 30		Baro. Press. (in. Hg) 29.02	
Assumed Moustire (%) 2%		Calculated Moisture (%) —	
Nozzle # S-252		Probe Length (ft.) 9'	
Nozzle Diameter (in.) .252		Probe Liner Material GLASS	
Nozzle Material SS		Probe Heater Setting (°F) 250	
Probe # P-9-1		Oven Heater Setting (°F) 250	
Control Unit # 609198	Meter Y (C Factor) 0.997		
Filter Oven # 1 of 2	Meter Delta H@ 1.652		
Impinger Unit # RB5202	Meter K / Orifice Factor 2.729		
Pitot # P-9-1	Pitot Cp .84		
Pitot Leak Check: Initial OK	Final OK		
DGM Leak Rate Before: 0	CFM @ 10 in. Hg		
DGM Leak Rate After: 0	CFM @ 8 in. Hg		
Static Pressure (± in. H2O) -.3			

First traverse point all the way	In	Out
Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240 / —	Dia. 4 / 6	In / Out ✓
Filter #(s) 02-285		—
Front-half #(s)		—
Back-half #(s)		

IGS Bag # P-2		%CO2 0	%O2 20.9
Condensate (g/ml) 12 ml		Silica Gel (g) 250 / 10.3	
Total Vlc (ml) 58.3		Sample Solution pH 7.5	
Gas Purge? ~~Yes~~ No / N2 O2		Total Acetone Wash (ml) 100	
Total D.I. H2O Rinse (ml) 200		Total MeCl2 Rinse (ml) 100	
Start Time (24 hour) 04:29		Stop Time (24 hour) 09:25	

Traverse Point Number	Stop Watch Time Minutes / Sample Point 240/24	H Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 18.244	J Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
S 1	10	118	.750	2.47	27.765	64	238	289	N/A	43	5.20	Pitot
2	20	133	.725	2.36	37.345	67	231	266	N/A	43	5.20	Nozzle
3	30	140	.705	2.30	46.335	71	239	270	N/A	46	5.00	Cal
4	40	133	.710	2.37	55.750	74	229	271	N/A	43	5.00	B=0.020"
5	50	155	.675	2.18	64.695	75	240	273	N/A	47	4.90	B=0.020"
6	60	114	.635	2.21	73.702	77	244	254	N/A	47	4.95	NO NOTES
E 1	70	151	.935	3.04	84.025	75	270	260	N/A	40	6.90	Cal=0.252"
2	80	148	.825	2.73	94.235	78	264	259	N/A	51	6.55	Avg=0.252"
3	90	138	.975	3.29	105.225	79	264	258	N/A	58	7.10	
4	100	128	.875	3.00	115.575	79	263	263	N/A	64	6.9	
5	110	132	.805	2.76	125.636	81	264	259	N/A	62	5.0	
6	120	121	.715	2.50	135.187	81	265	256	N/A	55	5.2	NO NOTES
N 1	130	134	.965	3.29	146.122	80	246	256	N/A	43	6.9	
2	140	141	.795	2.70	156.425	82	250	259	N/A	48	6.2	
3	150	149	.705	2.37	165.658	83	235	253	N/A	48	5.1	
4	160	155	.640	2.14	174.584	84	233	253	N/A	46	5.0	
5	180	135	.850	2.94	184.975	85	233	260	N/A	49	6.1	
6	180	140	.625	2.15	193.955	86	236	250	N/A	49	5.0	NO NOTES
W 1	190	158	.655	2.14	202.665	79	270	256	N/A	47	4.5	
2	200	133	.535	1.83	210.845	80	261	257	N/A	57	4.2	
3	210	118	.515	1.74	218.825	70	267	267	N/A	57	4.0	
4	230	103	.625	2.24	227.565	79	268	267	N/A	57	4.8	
5	230	97	.562	2.03	236.135	78	262	254	N/A	57	4.2	
6	240	104	.535	1.88	244.382	77	262	258	N/A	56	4.1	
Average / Total		130.6			226.138	77.7						

EPA Method 5 / 202 (PM / CPM) Testing – Field Data Sheet

Run # 3 **Sampling Location** BAF BAGHOUSE OUTLET

Client STEEL DYNAMIC	Project # 03-T-201
Plant COLUMBIA CITY	Unit EAF BAGHOUSE OUTLET
Date 02-19-03	Project Site COLUMBIA CITY
Meter Operator A. DERDUE	
Probe Operator JESSE RICHMOND	

Schematic of Stack Cross Section



Ambient Temperature (°F) 36	Baro. Press. (in. Hg) 29.08
Assumed Moisture (%) 2%	Calculated Moisture (%)

Nozzle # S-252	Probe Length (ft.) 9'
Nozzle Diameter (in.) 0.252	Probe Liner Material GLASS
Nozzle Material SS	Probe Heater Setting (°F) 250
Probe # P-9-1	Oven Heater Setting (°F) 250

Control Unit # 609198	Meter Y (C Factor) 0.997
Filter Oven # 101	Meter Delta H@ 1.652
Impinger Unit # R25202	Meter K / Orifice Factor 2.729
Pitot # P-9-1	Pitot Cp 0.84
Pitot Leak Check: Initial OK	Final OK
DGM Leak Rate Before: 0 CFM @ 10	in. Hg
DGM Leak Rate After: 0 CFM @ 7	in. Hg
Static Pressure (± in. H2O) -.3	

First traverse point all the way	In	Out
Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In
L / W	L 6	Out ✓
Filter #(s) 02-286	02-286	—
Front-half #(s)		
Back-half #(s)		

IGS Bag #	%CO2 0 %O2 20.9
Condensate (g/ml) 30 ml	Silica Gel (g) 250
Total Vlc (ml)	Sample Solution pH 4.5
Gas Purge? Yes No / N2 O2	Total Acetone Wash (ml) 65
Total D.I. H2O Rinse (ml)	Total MeCl2 Rinse (ml) 100
Start Time (24 hour) 11:20	Stop Time (24 hour) 2:55

Traverse Point Number	Stop Watch Time Minutes / Sample Point	H Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume	J Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
					246.761							
1	10	117	.915	3.00	257.250	63	263	252	N/A	49	5.1	
2	20	149	.705	2.21	266.205	65	263	254	N/A	52	5.0	
3	30	165	.725	2.23	275.205	67	263	254	N/A	55	4.9	
4	40	177	.725	2.21	284.195	69	263	254	N/A	58	4.8	
5	50	127	.855	2.83	294.105	70	263	252	N/A	55	6.1	
6	60	154	.735	2.34	303.340	71	262	252	N/A	54	5.0	
1	70	154	.650	2.07	312.065.	72	253	245	N/A	40	3.9	
2	80	168	.685	2.14	320.920	72	252	254	N/A	44	4.2	
3	90	166	.685	2.15	329.650	74	255	260	N/A	43	4.3	
1.40 4	100	172	.650	2.04	338.00	75	262	254	N/A	46	4.6	
5	110	134	.550	1.85	345.915	77	243	241	N/A	45	3.5	
2.00 6	120	149	.625	2.07	354.494	79	250	249	N/A	45	4.0	
1	130	175	.685	2.16	363.050	77	262	253	N/A	41	4.2	
2	140	185	.675	2.10	371.750	78	260	255	N/A	49	4.2	
2.30 3	150	145	.585	1.95	380.055	80	259	246	N/A	48	4.0	
2.40 4	160	167	.550	1.76	388.025	78	263	250	N/A	45	3.8	
2.50 5	170	174	.525	1.65	395.755	78	260	252	N/A	46	3.2	
3:00 6	180	186	.485	1.51	403.175	79	261	253	N/A	45	3.1	
1	190	157	.650	2.11	411.750	78	255	252	N/A	42	4.1	
2	200	170	.625	2.00	420.105	79	249	247	N/A	43	4.0	
3	210	179	.660	2.09	428.585	84	246	260	N/A	44	4.1	
4	220	138	.625	2.11	437.465	80	250	230	N/A	45	4.2	
5	230	158	.585	1.91	445.435	80	254	246	N/A	46	4.0	
6	240	167	.456	1.49	452.828	79	259	522	N/A	46	3.1	
Average / Total		159.9		2.083	206.067	75.2						

USEPA METHODS 3A, 6C, 7E AND 10

EAF Baghouse Outlet

Test Run 1 Begin. STRATA Version 2.0
Operator: Moody
Plant Nam SDI Columbia City
Location: EAF

		02 %	C02 %	NOx ppm	SO2 ppm
Start Averaging					
2118/2003	12:18:46	19.87	1.25	3.86	5.20
211812003	12:19:46	20.00	1.10	4.52	5.03
211812003	12:20:46	20.03	1.04	4.12	4.89
2/18/2003	12:21:47	20.04	0.98	4.39	4.55
2118/2003	12:22:47	19.77	0.97	4.90	4.55
2118/2003	12:23:47	20.10	0.91	4.58	4.41
2/18/2003	12:24:47	20.20	0.80	5.29	4.57
2118/2003	12:25:47	19.96	0.66	11.46	4.95
2/18/2003	12:26:47	20.20	0.38	12.57	5.24
2/1812003	12:27:47	20.31	0.31	13.13	4.89
2118/2003	12:28:47	20.36	0.28	7.70	4.52
2118/2003	12:29:47	20.47	0.23	4.59	3.93
2/18/2003	12:30:47	20.50	0.24	24.81	3.37
211812003	12:31:47	20.14	0.54	20.87	2.24
2/18/2003	12:32:47	20.03	0.76	12.89	2.05
2/1812003	12:33:47	20.20	0.72	8.89	1.95
2118/2003	12:34:47	20.18	0.72	8.74	2.08
2118/2003	12:35:47	20.16	0.75	8.38	1.92
2/18/2003	12:36:47	20.14	0.77	7.83	2.03
211812003	12:37:47	20.13	0.78	7.17	2.02
211812003	12:38:47	20.09	0.80	6.58	2.30
2/1812003	12:39:47	20.08	0.80	6.26	2.33
2118/2003	12:40:47	20.07	0.79	4.92	2.29
211812003	12:41:48	20.05	0.81	5.27	2.33
211812003	12:42:48	20.07	0.82	5.55	2.22
211812003	12:43:48	20.00	0.88	4.46	2.18
2118/2003	12:44:48	20.00	0.89	3.00	2.19
2118/2003	12:45:48	20.01	0.87	2.28	2.01
211812003	12:46:48	19.95	0.86	1.81	1.73
2118/2003	12:47:48	19.90	0.81	1.89	1.55
2/18/2003	12:48:48	19.95	0.81	1.53	1.64
2118/2003	12:49:48	19.93	0.85	1.34	1.66
2/18/2003	12:50:48	19.89	0.91	1.37	1.77
2118/2003	12:51:48	19.88	0.92	1.41	1.93
211812003	12:52:48	19.82	1.05	1.41	1.99
2/1812003	12:53:48	19.78	1.10	1.45	1.93
2118/2003	12:54:48	19.77	1.19	1.75	1.61
211812003	12:55:48	19.90	1.09	3.11	1.64
2/18/2003	12:56:48	20.08	0.84	5.95	2.03
2/18/2003	12:57:48	20.08	0.79	5.07	2.00
2/18/2003	12:58:48	20.11	0.76	5.51	2.04
2/18/2003	12:59:46	20.21	0.66	11.56	1.89
2/18/2003	13:00:46	20.26	0.58	16.93	2.04
2/18/2003	13:01:46	20.25	0.56	13.09	2.11

211812003	13:02:46	20.24	0.60	15.08	2.48
2118/2003	13:03:46	20.05	0.83	4.53	3.30
211812003	13:04:47	19.85	1.12	1.97	4.01
2118/2003	13:05:47	19.51	1.46	1.72	4.56
2118/2003	13:06:47	19.60	1.51	1.53	5.09
2/18/2003	13:07:47	19.57	1.53	1.65	4.91
2118/2003	13:08:47	19.45	1.51	1.73	5.21
2/18/2003	13:09:47	19.14	1.48	1.84	5.01
2/18/2003	13:10:47	19.13	1.46	1.80	5.06
2/18/2003	13:11:47	19.12	1.37	1.59	4.96
2118/2003	13:12:47	19.37	1.27	4.38	5.68
2/18/2003	13:13:47	19.60	0.92	14.26	6.00
2118/2003	13:14:47	19.97	0.47	13.77	5.74
211812003	13:15:47	20.00	0.30	3.35	5.45
211812003	13:16:47	20.05	0.26	1.57	4.80
2118/2003	13:17:47	20.09	0.24	1.75	4.38
Test Run 1 End					
Average	1679 sam	19.96	0.85	6.11	3.31

Test Run 2 Begin. STRATA Version 2.0
Operator: Moody
Plant Nam SDI Columbia City
Location: EAF

		02 %	C02 %	NOx ppm	SO2 ppm
Start Averaging					
211812003	14:12:52	18.88	0.80	5.85	2.52
2118/2003	14:13:52	18.88	0.80	4.99	2.78
2/18/2003	14:14:52	18.85	0.81	4.91	2.40
2118/2003	14:15:52	18.87	0.80	5.06	2.31
2118/2003	14:16:52	18.83	0.85	5.06	2.41
2/18/2003	14:17:53	18.79	0.89	4.89	2.53
2/18/2003	14:18:53	18.79	0.90	4.39	2.71
2/18/2003	14:19:53	18.80	0.87	3.14	2.59
2/18/2003	14:20:53	18.79	0.89	2.05	2.34
2/18/2003	14:21:53	18.77	0.86	1.63	2.06
2/18/2003	14:22:53	18.78	0.86	1.21	2.11
2/18/2003	14:23:53	18.76	0.89	1.17	2.03
2/18/2003	14:24:53	18.60	1.11	1.14	2.11
2/18/2003	14:25:53	18.40	1.45	1.39	2.34
2/18/2003	14:26:53	18.29	1.75	1.43	2.47
2/18/2003	14:27:53	18.37	1.68	1.26	2.72
2/18/2003	14:28:53	18.32	1.76	1.42	3.35
2/18/2003	14:29:53	18.24	1.96	1.44	4.01
2/18/2003	14:30:53	18.34	1.83	1.43	4.24
2/18/2003	14:31:53	18.35	1.81	1.42	3.77
2/18/2003	14:32:53	18.34	1.73	1.72	2.95
2/18/2003	14:33:53	18.34	1.48	2.11	2.99
2/18/2003	14:34:53	18.41	1.12	2.19	2.92
2/18/2003	14:35:53	18.56	1.00	2.43	2.52
2/18/2003	14:36:54	18.78	1.00	1.77	2.25
2/18/2003	14:37:54	18.80	0.94	3.30	1.95
2/18/2003	14:38:54	18.89	0.84	3.11	1.92
2/18/2003	14:39:54	18.99	0.73	3.58	2.27
2/18/2003	14:40:54	19.06	0.56	4.65	2.51
2/18/2003	14:41:54	19.09	0.49	14.84	2.54
2/18/2003	14:42:54	19.24	0.31	2.64	2.58
2/18/2003	14:43:54	19.25	0.27	1.41	2.63
2/18/2003	14:44:54	19.26	0.27	1.30	2.60
2/18/2003	14:45:54	19.24	0.26	3.14	2.49
2/18/2003	14:46:54	19.23	0.28	21.25	2.29
2/18/2003	14:47:54	19.00	0.51	15.80	2.24
2/18/2003	14:48:54	18.89	0.68	9.20	2.11
2/18/2003	14:49:54	18.88	0.69	5.53	2.07
2/18/2003	14:50:54	18.84	0.73	4.03	2.01
2/18/2003	14:51:54	18.82	0.77	3.97	1.98
2/18/2003	14:52:52	18.81	0.76	3.99	1.68
2/18/2003	14:53:52	18.85	0.72	3.25	1.52
2/18/2003	14:54:52	18.93	0.75	2.49	1.51
2/18/2003	14:55:52	18.93	0.74	4.25	1.60

2/18/2003	14:56:52	18.83	0.77	4.48	1.28
2/18/2003	14:57:52	18.76	0.85	3.43	1.28
2/18/2003	14:58:53	18.76	0.88	3.60	1.64
2/18/2003	14:59:53	18.76	0.90	3.78	1.87
2/18/2003	15:00:53	19.04	0.59	3.26	1.85
2/18/2003	15:01:53	19.07	0.49	3.16	1.97
2/18/2003	15:02:53	19.07	0.48	4.93	1.98
2/18/2003	15:03:53	19.02	0.58	3.31	1.90
2/18/2003	15:04:53	19.01	0.70	2.53	1.81
2/18/2003	15:05:53	18.94	0.73	2.47	1.78
2/18/2003	15:06:53	18.93	0.77	2.70	1.50
2/18/2003	15:07:53	18.78	0.84	1.72	1.41
2/18/2003	15:08:53	18.69	0.94	0.91	2.05
2/18/2003	15:09:53	18.55	1.00	0.83	2.34
2/18/2003	15:10:53	18.36	1.30	0.87	2.94
2/18/2003	15:11:53	18.36	1.50	0.91	2.74
Test Run 2 End					
Average	1679 sam	18.78	0.91	3.67	2.30

Test Run 3 Begin. STRATA Version 2.0
Operator: Moody
Plant Name: SDI Columbia City
Location: EAF

		O2 %	CO2 %	NOx ppm	SO2 ppm
Start Averaging					
2118/2003	16:20:15	19.40	1.45	3.80	3.01
211812003	16:21:15	19.45	1.34	3.31	3.31
2118/2003	16:22:15	19.45	1.50	3.37	3.19
211812003	16:23:15	19.61	1.25	4.04	3.12
211812003	16:24:15	19.63	1.10	4.15	3.05
211812003	16:25:15	19.60	1.04	4.84	3.21
211812003	16:26:15	19.55	1.23	4.75	2.96
211812003	16:27:15	19.53	1.33	4.92	3.02
211812003	16:28:15	19.52	1.24	2.14	2.96
211812003	16:29:15	19.49	1.25	2.36	2.95
211812003	16:30:16	19.55	1.25	2.42	3.03
211812003	16:31:16	19.51	1.03	4.04	3.14
211812003	16:32:16	19.49	1.13	4.23	3.01
211812003	16:33:16	19.49	0.99	4.21	2.95
2118/2003	16:34:16	19.60	0.97	4.22	2.94
211812003	16:35:16	19.48	0.90	4.21	2.80
211812003	16:36:16	19.35	1.15	4.44	2.83
2118/2003	16:37:16	19.38	1.13	4.13	2.97
211812003	16:38:16	19.38	1.03	3.78	2.96
2118/2003	16:39:16	19.34	1.44	3.83	3.12
211812003	16:40:16	19.37	1.34	3.84	3.06
211812003	16:41:16	19.31	1.32	9.30	3.03
211812003	16:42:16	19.24	1.31	3.23	3.04
2118/2003	16:43:16	19.30	1.30	3.23	3.12
211812003	16:44:16	19.29	1.30	3.21	3.09
2/18/2003	16:45:16	19.26	0.98	12.80	3.00
211812003	16:46:16	19.29	0.91	8.40	3.03
211812003	16:47:16	19.31	1.04	4.45	2.99
2118/2003	16:48:16	19.32	1.14	4.20	2.16
211812003	16:49:17	19.32	1.35	4.31	2.05
2118/2003	16:50:17	19.33	1.25	4.22	2.12
211812003	16:51:17	19.32	0.96	3.78	2.24
2118/2003	16:52:17	19.31	1.10	3.93	2.22
211812003	16:53:17	19.34	1.20	3.84	2.45
2118/2003	16:54:15	19.38	1.04	3.87	2.26
2118/2003	16:55:15	19.36	1.24	3.90	2.30
211812003	16:56:15	19.36	1.13	3.91	2.39
2118/2003	16:57:15	19.35	1.34	3.99	3.19
211812003	16:58:15	19.30	1.24	3.85	3.29
211812003	16:59:15	19.31	0.99	3.75	3.32
211812003	17:00:15	19.33	0.98	4.93	3.40
2118/2003	17:01:15	19.33	1.32	4.89	3.45
2118/2003	17:02:15	19.32	1.45	4.45	3.32
211812003	17:03:15	19.32	1.44	4.60	3.36
2118/2003	17:04:15	19.40	1.24	4.25	3.31

2/18/2003	17:05:15	19.43	1.18	4.30	3.41
2/18/2003	17:06:15	19.40	1.19	4.32	4.03
2/18/2003	17:07:15	19.40	1.21	4.40	4.04
2/18/2003	17:08:15	19.40	0.96	2.95	4.10
2/18/2003	17:09:15	19.36	0.94	2.88	4.15
2/18/2003	17:10:15	19.37	0.99	2.87	4.06
2/18/2003	17:11:16	19.35	1.21	2.98	4.04
2/18/2003	17:12:16	19.44	1.32	3.25	2.94
2/18/2003	17:13:16	19.41	1.32	3.26	2.88
2/18/2003	17:14:16	19.43	1.24	3.22	2.84
2/18/2003	17:15:16	19.41	1.22	3.87	2.95
2/18/2003	17:16:16	19.38	1.38	3.89	2.92
2/18/2003	17:17:16	19.38	1.42	3.99	2.99
2/18/2003	17:18:16	19.35	1.32	4.01	2.92
2/18/2003	17:19:16	19.37	1.32	4.12	3.85
Test Run 3 End					
Average	1679 sam	19.40	1.20	4.18	3.06

RF Exhaust Stack

Test Run 1 Begin. STRATA Version 2.0
Operator: Moody
Plant Nam SDI Columbia City
Location: Reheat furnace

		02 %	C02 %	CO ppm	NOx ppm
211912003	11:52:33	10.16	5.74	2.63	45.13
Start Averaging					
211912003	11:53:33	9.08	6.35	2.55	49.66
211912003	11:54:32	9.38	6.13	2.57	63.91
211912003	11:55:33	9.38	6.18	2.67	51.34
211912003	11:56:33	9.65	6.05	2.71	39.00
211912003	11:57:32	11.37	5.03	2.93	32.91
211912003	11:58:32	10.22	5.73	2.98	35.93
211912003	11:59:33	10.67	5.39	2.79	55.36
211912003	12:00:34	10.41	5.55	2.75	57.87
211912003	12:01:32	10.08	5.77	2.86	40.87
211912003	12:02:33	11.57	4.91	3.10	33.53
211912003	12:03:33	9.99	5.82	3.09	38.91
211912003	12:04:32	9.36	6.17	2.76	46.84
211912003	12:05:32	8.44	6.64	2.57	64.75
211912003	12:06:33	8.39	6.70	2.56	52.99
211912003	12:07:34	9.21	6.27	2.62	47.59
211912003	12:08:32	9.21	6.24	2.90	55.35
211912003	12:09:33	9.13	6.27	2.66	74.83
211912003	12:10:33	8.57	6.60	2.87	68.54
211912003	12:11:32	8.34	6.74	2.62	57.20
2119/2003	12:12:32	9.66	6.00	3.14	52.42
211912003	12:13:33	8.63	6.60	3.13	59.20
211912003	12:14:34	9.01	6.35	2.98	67.93
211912003	12:15:32	8.91	6.42	3.08	64.49
211912003	12:16:33	8.75	6.53	2.85	52.74
211912003	12:17:33	9.56	6.10	3.05	43.24
211912003	12:18:32	9.56	6.06	3.27	45.23
211912003	12:19:32	9.41	6.09	2.95	76.84
211912003	12:20:33	8.76	6.47	3.14	74.45
2/19/2003	12:21:32	8.59	6.60	2.89	51.01
211912003	12:22:32	9.52	6.09	3.17	46.70
211912003	12:23:33	8.67	6.57	3.12	57.69
211912003	12:24:34	8.94	6.38	3.01	64.16
211912003	12:25:32	8.46	6.67	3.02	65.29
211912003	12:26:33	7.48	7.16	2.85	55.05
211912003	12:27:33	7.61	7.15	2.97	40.26
211912003	12:28:32	7.88	6.98	2.90	41.39
211912003	12:29:32	7.80	7.00	2.78	54.01
211912003	12:30:33	9.81	5.89	3.09	61.78
211912003	12:31:34	10.75	5.35	3.26	50.58
211912003	12:32:32	11.89	4.67	3.41	45.47
211912003	12:33:33	12.05	4.60	4.06	41.11
211912003	12:34:33	11.08	5.11	3.28	51.20
211912003	12:35:32	11.72	4.72	3.50	52.36

211912003	12:36:32	11.26	5.06	3.28	30.51
211912003	12:37:33	9.91	5.94	3.38	25.04
211912003	12:38:34	9.10	6.27	3.85	33.38
211912003	12:39:32	6.67	7.56	3.15	33.53
211912003	12:40:33	6.50	7.61	3.22	42.34
211912003	12:41:33	7.02	7.36	3.16	44.05
2/19/2003	12:42:32	8.45	6.66	3.21	42.63
211912003	12:43:32	9.29	6.19	4.04	38.42
211912003	12:44:33	7.52	7.14	3.13	41.74
211912003	12:45:34	8.47	6.65	3.24	36.82
211912003	12:46:32	8.63	6.57	3.36	33.89
211912003	12:47:33	9.58	5.99	3.30	38.97
211912003	12:48:33	9.75	5.89	3.39	43.43
211912003	12:49:32	9.86	5.85	3.23	39.75
211912003	12:50:32	9.89	5.83	3.06	37.60
211912003	12:51:33	9.96	5.82	3.30	34.89
Test Run	End				
Average	1687 sam	9.30	6.18	3.07	48.78

Test Run 2 Begin. STRATA Version 2.0
Operator: Moody
Plant Nam SDI Columbia City
Location: Reheat furnace

		02 %	C02 %	CO ppm	NOx ppm
Start Averaging					
2119/2003	14:48:29	9.38	6.10	3.77	46.27
2119/2003	14:49:27	9.45	6.09	3.74	42.31
2119/2003	14:50:28	10.43	5.54	4.05	38.89
2/19/2003	14:51:29	9.34	6.18	4.02	47.28
2119/2003	14:52:29	9.54	6.04	3.80	62.09
2119/2003	14:53:28	9.03	6.42	3.57	46.01
2/19/2003	14:54:28	8.66	6.65	3.75	46.81
2119/2003	14:55:29	10.06	5.82	3.92	50.63
2/19/2003	14:56:28	8.48	6.71	3.42	59.64
2119/2003	14:57:28	8.74	6.53	3.88	82.55
2119/2003	14:58:29	8.32	6.78	3.89	85.47
211912003	14:59:27	8.17	6.90	3.92	81.94
2/19/2003	15:00:28	9.75	6.00	4.26	73.96
2119/2003	15:01:28	8.68	6.61	3.70	78.08
2/19/2003	15:02:29	8.86	6.47	3.88	96.65
2/19/2003	15:03:28	8.45	6.76	3.74	69.28
211912003	15:04:28	8.59	6.68	3.68	61.81
2119/2003	15:05:29	9.52	6.15	3.90	60.52
2119/2003	15:06:27	8.48	6.72	3.62	67.31
2119/2003	15:07:28	8.33	6.78	3.35	82.01
2/19/2003	15:08:29	8.44	6.76	3.76	61.71
2119/2003	15:09:29	8.23	6.87	3.86	56.04
2/19/2003	15:10:28	9.82	5.99	3.99	46.27
211912003	15:11:28	8.76	6.59	4.23	56.79
2/19/2003	15:12:29	9.23	6.26	4.38	79.08
2/19/2003	15:13:27	8.68	6.63	3.90	50.51
2/19/2003	15:14:28	8.83	6.57	4.10	40.60
2/19/2003	15:15:29	10.81	5.44	5.07	31.42
2/19/2003	15:16:29	10.01	5.88	4.39	38.37
2/19/2003	15:17:28	10.40	5.57	3.94	59.64
2/19/2003	15:18:28	9.97	5.91	3.76	41.85
2/19/2003	15:19:29	9.83	6.01	3.92	38.07
2/19/2003	15:20:28	10.71	5.45	4.46	34.94
2/19/2003	15:21:28	9.38	6.25	3.86	37.91
2/19/2003	15:22:29	9.57	6.11	3.95	39.20
2/19/2003	15:23:27	9.80	5.97	3.70	40.42
2/19/2003	15:24:28	9.41	6.20	4.06	41.53
2/19/2003	15:25:28	9.63	6.08	3.88	38.21
2/19/2003	15:26:29	9.40	6.21	3.90	35.97
2/19/2003	15:27:28	9.30	6.25	4.09	35.28
2/19/2003	15:28:28	9.55	6.10	3.86	40.08
2/19/2003	15:29:29	10.08	5.76	3.69	43.00
2/19/2003	15:30:27	9.87	5.90	4.00	44.86
2/19/2003	15:31:28	9.77	5.98	3.92	40.17

2119/2003	15:32:28	9.63	6.05	3.96	41.11
211912003	15:33:29	9.69	6.02	3.73	37.91
2119/2003	15:34:28	9.44	6.15	3.95	40.35
2/1912003	15:35:28	9.44	6.14	3.87	40.95
2119/2003	15:36:29	9.95	5.84	3.95	43.32
211912003	15:37:27	10.30	5.63	4.08	43.73
2119/2003	15:38:28	10.10	5.76	4.50	42.15
2119/2003	15:39:28	9.86	5.92	4.46	41.57
2119/2003	15:40:29	10.03	5.80	4.43	39.66
211912003	15:41:28	10.11	5.74	4.70	40.41
2119/2003	15:42:28	10.43	5.55	4.73	45.71
2119/2003	15:43:29	11.01	5.15	4.99	49.26
2119/2003	15:44:27	11.13	5.09	4.73	47.27
211912003	15:45:28	11.59	4.80	4.80	51.08
2119/2003	15:46:29	10.77	5.28	4.59	66.76
2119/2003	15:47:29	9.15	5.28	4.62	43.19
Test Run	End				
Average	1723 sam	9.54	6.08	4.04	51.11

Test Run 3 Begin. STRATA Version 2.0
Operator: Moody
Plant Nam SDI Columbia City
Location: Reheat Furnace

		02 Yo	C02 %	CO ppm	NOx ppm
2/1912003	18:11:40	9.21	6.36	1.12	57.05
2/1912003	18:12:40	10.68	5.48	1.25	50.17
2/19/2003	18:13:41	9.58	6.14	1.22	59.57
Start Averaging					
2/19/2003	18:14:39	9.51	6.17	1.26	58.85
2/19/2003	18:15:40	9.82	6.10	1.45	40.14
211912003	18:16:41	10.03	5.98	1.78	43.76
2/19/2003	18:17:39	10.82	5.44	1.67	48.39
2/19/2003	18:18:40	10.12	5.87	1.40	61.06
2119/2003	18:19:40	9.98	5.97	1.80	51.32
2/19/2003	18:20:39	9.70	6.14	1.57	43.78
2/19/2003	18:21:39	11.22	5.27	1.83	34.93
2119/2003	18:22:40	10.62	5.60	1.75	56.24
2/19/2003	18:23:41	11.15	5.20	1.59	71.11
2119/2003	18:24:39	9.96	5.98	0.96	49.71
2/19/2003	18:25:40	10.98	5.43	1.25	39.44
2/19/2003	18:26:40	11.21	5.22	1.67	36.75
2/19/2003	18:27:39	10.14	5.84	1.16	52.82
2/1912003	18:28:39	10.17	5.86	1.68	45.38
2119/2003	18:29:40	9.27	6.40	1.10	40.10
2/19/2003	18:30:41	11.40	5.15	2.07	34.13
2/19/2003	18:31:39	10.14	5.88	2.28	45.77
2/19/2003	18:32:40	9.47	6.20	2.07	64.53
2/19/2003	18:33:40	9.08	6.51	2.05	42.21
2/19/2003	18:34:39	9.51	6.32	2.00	32.50
2/19/2003	18:35:39	11.34	5.16	2.61	29.95
2/19/2003	18:36:40	9.85	6.02	2.22	50.01
2/19/2003	18:37:41	9.89	6.04	2.30	41.11
2/19/2003	18:38:39	9.34	6.37	2.30	37.03
2/1912003	18:39:40	11.23	5.26	2.40	29.27
2/19/2003	18:40:40	9.33	6.33	2.67	40.62
2/19/2003	18:41:39	9.51	6.19	2.37	66.06
2/19/2003	18:42:40	9.67	6.16	2.69	45.19
2/1912003	18:43:40	9.51	6.28	2.79	40.55
2119/2003	18:44:41	10.65	5.59	2.92	38.55
2119/2003	18:45:39	9.52	6.24	2.57	50.92
2/19/2003	18:46:40	8.63	6.74	2.49	61.73
2/19/2003	18:47:41	8.52	6.82	3.07	55.94
2/19/2003	18:48:39	9.79	6.11	2.93	46.60
2119/2003	18:49:40	8.95	6.54	3.08	63.18
2/19/2003	18:50:40	8.98	6.51	3.14	75.84
2119/2003	18:51:41	8.66	6.75	3.30	62.27
2/19/2003	18:52:39	8.47	6.85	3.32	64.00
2119/2003	18:53:40	10.05	5.93	3.99	65.01
2/19/2003	18:54:41	9.22	6.39	3.67	84.70

2/19/2003	18:55:39	8.65	6.72	3.72	71.79
2119/2003	18:56:40	8.14	6.99	4.38	68.69
2119/2003	18:57:40	9.89	6.04	4.45	60.72
2119/2003	18:58:41	8.93	6.56	4.43	69.84
2119/2003	18:59:39	8.65	6.70	4.00	67.00
2119/2003	19:00:40	8.58	6.74	4.29	64.66
2119/2003	19:01:41	8.60	6.70	4.40	64.81
2119/2003	19:02:39	8.72	6.66	4.21	63.43
2119/2003	19:03:40	9.56	6.18	5.16	57.50
211912003	19:04:40	9.51	6.19	4.51	56.62
2119/2003	19:05:41	9.22	6.36	4.78	54.69
2/19/2003	19:06:39	9.51	6.20	4.68	48.93
2119/2003	19:07:40	9.28	6.34	4.93	48.89
2/19/2003	19:08:41	9.44	6.26	5.27	45.33
2119/2003	19:09:39	11.29	5.17	5.87	36.99
2119/2003	19:10:40	11.02	5.32	5.95	38.67
Test Run Average	End 1611 sam	9.73	6.10	2.95	51.80

CEMS OPACITY MEASUREMENTS

STEEL DYNAMICS, INC.
OPACITY VALUES

TIME	18-Feb-03 RUN #1	TIME	19-Feb-03 RUN #2	TIME	19-Feb-03 RUN #3
1248	0.5	0429	0.1	1120	1.2
	1		1		0.7
	0.9		3.3		0.5
	0.8		3.6		0.2
	0.6		3.2		0.1
	0.5		1.8		0.9
	0.8		2.9		1.3
	1.5		2.6		1.3
	1.8		0.8		1.2
	1.7		1.8		1
	2		4.1		0.8
	2.5		3.9		0.4
	1.7		3.2		0.9
	1		2.7		1
	1.7		1.8		0.8
	1.6		1.1		1
	1		1.9		1.2
	1.5		0.9		1.2
	1.9		3.3		0.9
	1.6		3.9		0.4
	0.7		3		0.6
	0.6		3		0.5
	0.6		3.3		0.3
	1.4		3.6		0
	1.6		3.6		0
	1.2		3.2		0.1
	0.7		2.6		0.2
	1.1		2.3		0.3
	0.8		1.8		0.1
	0.5		1.1		1
	1.7		3		1
	1.5		2.5		0.9
	2.3		1.1		0.9
	2.3		1.4		0.7
	1.2		1.5		0.7
	0.6		1.9		0.8
	0.6		1.3		0.8
	1.8		0.8		0.8
	2.3		1.3		0.7
	2.1		1.3		0.6
1715	1.8		1.3		0.3
			1.7		0.5
			2.2		0.5
			2.7		0.5
			4.3		0.7
			1.2	1555	0.6
		0925	0.5		
AVERAGES	**1.3**		**2.2**		**0.7**

Enertec NTDAHS®
Daily Averages Report
Generated : 03/17/03 14:26

Company: Steel Dynamics
00:00
Plant: 2601 County Road 700 E
14:23
City/St: Columbia City, IN
Source: EAF

Period Start: 02/18/03

Period End: 02/21/03

Validation Type: 4/6 min
Averaging Period: 6 min
Type: Block

Avg

Opacity (%)

Period Start	:00	:06	:12	:18	:24	:30	:36	:42	:48	:54	Avg.
02/18/03 00:00	0.3	0.5	0.6	0.2	0.3	0.5	0.4	0.3	0.7	0.6	0.4
02/18/03 01:00	0.5	0.3	0.3	0.5	0.8	1.0	1.2	1.4	1.5	1.4	0.9
02/18/03 02:00	1.5	1.8	2.2	2.5	2.7	2.8	2.8	2.8	2.5	2.4	2.4
02/18/03 03:00	2.4	2.4	2.3	2.4	2.3	2.3	2.3	2.2	2.1	2.1	2.3
02/18/03 04:00	2.0	1.9	1.8	1.9	1.7	1.7	1.6	0.1	0.0	0.1	1.3
02/18/03 05:00	0.1	0.2	0.2	0.2	N/A	N/A	0.3	0.4	0.6	0.4	0.3
02/18/03 06:00	0.5	0.8	1.3	0.6	0.8	1.3	1.8	1.4	1.2	0.1IC	1.1
02/18/03 07:00	N/A	0.3SC	0.2	0.5	0.8	1.1	1.9	2.5	2.2	1.2	1.3
02/18/03 08:00	0.3	0.6	N/A	N/A	1.4ZF	1.6ZF	1.6ZF	1.4ZF	0.5ZF	1.3ZF	0.5
02/18/03 09:00	1.2ZF	1.3ZF	N/A	N/A	0.9	0.3	0.1	0.5	0.9	2.1	0.8
02/18/03 10:00	3.3	1.7	1.9	0.4	0.8	1.0	3.0	3.3	2.8	2.0	2.0
02/18/03 11:00	0.7	0.5	0.7	1.4	2.1	1.5	0.7	0.7	0.5	1.0	1.0
02/18/03 12:00	1.6	2.5	2.1	1.4	0.7	0.5	0.6	2.1	2.4	1.5	1.5
02/18/03 13:00	0.9	0.8	0.6	0.5	0.8	1.5	1.8	1.7	2.0	2.5	1.3
02/18/03 14:00	1.7	1.0	1.7	1.6	2.ODE	N/A	N/A	N/A	0.6ZF	N/A	1.5
02/18/03 15:00	1.8SC	1.0	1.5	1.9	1.6	0.7	0.6	0.6	1.4	1.6	1.2
02/18/03 16:00	1.2	0.7	1.1	0.8	0.5	1.7	1.5	2.3	2.3	1.2	1.3
02/18/03 17:00	0.6	0.6	1.8	2.3	2.1	1.8	1.0	0.5	0.4	0.5	1.2
02/18/03 18:00	0.6	0.5	0.4DE	0.4	N/A	N/A	0.4	0.5IC	N/A	N/A	0.5
02/18/03 19:00	0.3	0.5	0.7	0.6	0.4	N/A	N/A	0.4	0.3	0.3	0.4
02/18/03 20:00	0.3	0.5	0.7	0.8	0.9	1.0	1.3	1.6	1.7	1.8	1.0
02/18/03 21:00	1.9	2.1	2.1	2.1	2.3	2.5	2.5	2.5	2.3	2.4	2.3
02/18/03 22:00	2.5	2.6	2.5	2.6	2.6	2.8	2.9	3.0	3.1	3.3	2.8
02/18/03 23:00	3.4	3.4	3.5	3.4	3.4	3.4	3.5	3.5	3.7	3.8	3.5
02/19/03 00:00	4.1	4.1	3.9	3.5	3.3	2.9	2.8	2.7	2.9	2.8	3.3
02/19/03 01:00	2,5	2.6	2.5	2.3	2.4	2.2	2.2	2.1	1.9	1.9	2.2
02/19/03 02:00	2.0	1.8	1.8	1.6	1.6	1.6	1.5	1.6	1.5	2.3	1.7
02/19/03 03:00	2.3	3.8	4.9	4.5	2.6	1.3	1.6	N/A	N/A	4.2	3.1
02/19/03 04:00	3.3	3.2	0.2	0.5	0.3	0.1	1.0	3.3	3.6	3.2	1.9
02/19/03 05:00	1.8	2.9	2.6	0.8	1.8	4.1	3.9	3.2	2.7	1.8	2.5

02/19/03 06:00	1.1	1.9	0.9	3.3	3.9	3.0	3.0	3.3	3.6	3.3IC	2.6
02/19/03 07:00	N/A	3.6SC	3.6	3.2	2.6	2.3	1.8	1.1	3.0	2.5	2.5
02/19/03 08:00	1.1	1.4	1.5	1.9	1.3	0.8	1.3	1.3	1.3	1.7	1.3
02/19/03 09:00	2.2	2.7	4.3	1.2	0.5	0.3	0.4	0.1IC	N/A	0.8SC	1.6
02/19/03 10:00	0.4	0.4	0.1	0.2	0.7	1.1	1.0	0.7	0.2	0.2	0.5
02/19/03 11:00	0.2	0.3	1.1	1.3	1.2	0.7	0.5	0.2	0.1	0.9	0.7
02/19/03 12:00	1.3	1.3	1.2	1.0	0.8	0.4	0.9	1.0	0.8	1.0	1.0
02/19/03 13:00	1.2	1.2	0.9	0.4	0.6	0.5	0.3	0.0	0.0	0.1	0.5
02/19/03 14:00	0.2	0.3	0.1	1.0	1.0	0.9	0.9	0.7	0.7	0.8	0.7
02/19/03 15:00	0.8	0.8	0.7	0.6	0.3	0.5	0.5	0.5	0.7	0.6	0.6
02/19/03 16:00	0.3	0.1	0.0	0.3	0.5	0.5	0.3	0.2	N/A	N/A	0.3
02/19/03 17:00	N/A	N/A	0.1	0.1	0.1	0.0	0.1	0.3	0.4	0.4	0.2
02/19/03 18:00	0.5	0.6	N/A	N/A	0.6IC	0.7	0.8	0.8	0.8	0.9	0.7
02/19/03 19:00	0.9	1.0	0.9	0.9	0.8	0.9	0.9	0.9	1.0	1.1	0.9
02/19/03 20:00	1.1	1.1	1.1	1.2	1.2	1.0	1.1	1.0	1.1	1.2	1.1
02/19/03 21:00	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
02/19/03 22:00	1.2	1.3	1.4	1.5	1.3	1.4	1.6	1.7	1.7	1.7	1.5
02/19/03 23:00	1.8	1.9	2.0	2.0	2.0	2.1	2.0	2.2	2.4	2.4	2.1
02/20/03 00:00	2.4	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.5	2.5	2.4
02/20/03 01:00	2.5	2.5	2.5	2.6	2.7	2.8	2.8	2.9	2.8	2.8	2.7
02/20/03 02:00	2.8	2.8	2.8	3.2	3.3	3.1	2.7	2.8	2.8	2.7	2.9
02/20/03 03:00	2.8	N/A	N/A	0.5	0.4	0.4	0.4	0.3	0.2	0.9	0.7
02/20/03 04:00	1.4	1.6	1.1	1.1	1.1	0.8	0.8	1.2	0.9	0.9	1.1
02/20/03 05:00	0.9	0.9	0.9	1.0	0.2	0.7	1.2	1.2	1.2	1.2	0.9
02/20/03 06:00	0.9	1.2	0.5	1.0	1.2	1.6	1.4	1.3	1.2	0.5IC	1.1
02/20/03 07:00	N/A	2.8SC	3.1	3.1	2.8	2.7	2.7	2.5	3.3	3.4	2.9
02/20/03 08:00	3.0	3.8	3.5	3.4	3.0	2.8	3.5	3.7	3.8	3.3	3.4
02/20/03 09:00	3.0	3.4	3.3	2.9	3.5	3.7	3.5	3.4	3.1	2.9	3.3
02/20/03 10:00	2.7	2.7	3.2	3.4	3.4	3.2	3.1	2.9	2.6	2.5	3.0
02/20/03 11:00	2.5	2.5	2.5	2.4	2.5	2.5	2.4	2.4	2.4	2.3	2.4
02/20/03 12:00	2.4	2.2	2.2	2.1	2.0	2.1	2.2	2.4	2.5	2.5	2.2
02/20/03 13:00	2.1	2.3	2.4	2.1	1.9	2.1	2.3	2.4	2.4	2.3	2.2
02/20/03 14:00	2.3	2.5	2.2	2.0	2.0	2.1	2.3	2.0	1.8	1.7	2.1
02/20/03 15:00	2.1	2.0	1.9	1.9	1.7	1.7	1.6	1.8	2.0	1.9	1.9
02/20/03 16:00	1.7	1.6	1.6	1.3	1.5	1.7	1.6	1.9	2.0	1.8	1.7
02/20/03 17:00	1.8	1.8	1.6	1.6	1.3	1.5	1.6	1.6	1.6	1.6	1.6
02/20/03 18:00	1.3	1.2	1.2	1.3	1.5	1.6	1.7	1.8	2.0	2.1	1.6
02/20/03 19:00	2.2	2.5	2.5	2.5	2.4	2.2	2.3	2.2	2.4	2.3	2.3
02/20/03 20:00	2.2	2.5	2.5	2.4	2.3	2.0	2.0	2.0	1.8	1.7	2.1
02/20/03 21:00	1.6	1.6	1.5	1.4	1.5	1.4	1.5	1.4	1.3	1.4	1.5
02/20/03 22:00	1.5	1.4	1.4	1.3	1.4	1.5	1.6	1.7	1.7	1.6	1.5

02/20/03 23:00	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
02/21/03 00:00	1.7	1.8	1.9	2.0	2.0	2.0	2.0	2.0	1.9	2.0	1.9
02/21/03 01:00	1.8	1.6	1.6	1.5	1.2	1.3	1.2	1.2	1.2	1.2	1.4
02/21/03 02:00	1.2	1.2	1.4	1.6	1.6	1.6	1.7	2.0	2.0	2.3	1.6
02/21/03 03:00	2.4	2.4	2.5	2.4	2.5	2.7	2.8	2.8	2.8	2.7	2.6
02/21/03 04:00	2.5	2.4	2.4	2.5	2.6	2.6	2.5	2.4	2.4	2.2	2.4
02/21/03 05:00	2.0	1.9	1.9	1.9	2.2	2.3	2.3	2.0	1.9	1.7	2.0
02/21/03 06:00	1.5	1.6	1.5	1.4	1.6	1.6	1.6	1.8	1.8	1.8	1.6
02/21/03 07:00	1.6	1.5	1.5	1.5	1.6	1.5	1.6	1.6	1.7	1.8	1.6
02/21/03 08:00	1.9	1.9	2.0	2.1	2.2	2.1	2.3	2.2	2.4	2.4	2.1
02/21/03 09:00	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.4	2.3	2.1	2.4
02/21/03 10:00	1.9	1.9	1.9	1.9	1.8	1.7	1.7	1.6	1.7	1.7	1.8
02/21/03 11:00	1.7	1.6	1.6	1.6	1.6	1.6	1.8	1.9	1.9	2.0	1.7
02/21/03 12:00	2.1	2.4	2.3	2.2	2.0	2.0	2.2	2.3	2.2	2.0	2.1
02/21/03 13:00	2.0	1.9	1.9	1.9	1.9	1.0	0.1	0.1	0.1	0.1	1.1
02/21/03 14:00	0.0	0.0	0.0	0.0	0.0						

Final Average*	**1.7**
Maximum*	**4.9**
Minimum*	**0.0**

'Does not include Invalid Averaging Periods ("N/A")

Calibration Codes

IC - In calibration
SC - Span Calibration PASS
MC - Midrange Calibration PASS
ZC - Zero Calibration PASS
CF - Calibration Fail
SF - Span Calibration Fail
MF - Midrange Calibration Fail
ZF - Zero Calibration Fail
DN - Process Down

Status Codes

OC - Out of Control (CFR-75)
06 - Out of Control (CFR-60)
OB - Out of Control (75 & 60)
HW - Hardware fault
IG - Ignore Data
LF - Communication Link Failure
ND - NO Data
DE - Data or CEMSPEAK Task Error

USEPA METHOD 13B

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 13B FIELD TEST DATA

Client	STEEL DYNAMICS, INC.	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Elecric Arc Furnace – BO (ES)
Date	02120103	Ambient Temperature (°F)	23
Meter Operator	A. Perdue	Barometeric Pressure (inches Hg)	29.22
Probe Operator(s)	F. Guenther	Static Pressure (± inches H20)	-0.30
Control Unit No.	609198	Nozzle Diameter (in.)	0.251
Pitot Cp	0.84	Filter No.	F-1 (Blank)
Meter Y	0.997	Front-half No.	FH-1
Run No.	1	Back-half No.	BH-1

Stack Area (ft²) 314.16

%CO2 / %02 0.0 / 20.9

Condensate (milliliters) 8.0 Silica Gel (grams) 9.2

Test Time (24 hour) 0336-0508

Sample Time (minutes) 60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³)	Dry Gas Meter Temperature Tm (°F)	Notes
					Initial Volume 499.535		
S-	1	152	0.810	2.400		56	
	2	155	0.775	2.230		49	Pretest Nozzle Cal:
	3	154	0.830	2.410		52	A = 0.250"
	4	127	0.850	2.590		53	B = 0.251"
	5	114	0.840	2.620		54	C = 0.251"
	6	105	0.785	2.510		56	Avg. = 0.251"
W-	1	130	0.740	2.300		60	
	2	131	0.730	2.280		61	
	3	137	0.710	2.190		61	
	4	141	0.750	2.310		62	
	5	144	0.640	1.970		64	
	6	147	0.625	1.910		63	
N-	1	172	0.650	1.930		66	
	2	171	0.630	1.860		64	
	3	169	0.665	1.970		64	
	4	147	0.810	2.490		64	
	5	124	0.530	1.700		65	
	6	124	0.625	2.010		66	
E-	1	138	0.635	1.990		65	
	2	128	0.625	1.980		68	
	3	125	0.635	2.070		70	
	4	132	0.565	1.800		67	
	5	135	0.575	1.830	Final Volume 553.525	68	
	6	132		1.780		69	
		Average 138.9	Avg. Sqrt. 0.829	Average 2.130	Volume Sampled 53.990	Average 62.0	

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Elecric Arc Furnace – BO (ES)
Date	02/20/03	Ambient Temperature (°F)	25
Meter Operator	A. Perdue	Barometeric Pressure (inches Hg)	29.22
Probe Operator(s)	F. Guenther	Static Pressure (± inches H20)	–0.30
Control Unit No.	609198	Nozzle Diameter (in.)	0.251
Pitot Cp	0.84	Filter No.	F-2 (Blank)
Meter Y	0.997	Front-half No.	FH-2
Run No.	2	Back-half No.	BH-2

Stack Area (ft²)	314.16		
%CO2 / %02	0.0 /	20.9	
Condensate (milliliters)	5.0	Silica Gel (grams)	8.9
Test Time (24 hour)	0645–0810		
Sample Time (minutes)	60.0		

Traverse Point Number	Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³)	Dry Gas Meter Temperature Tm (°F)	Notes
				Initial Volume 555.226		
E– 1	181	0.695	2.030		64	
2	180	0.635	1.850		64	
3	175	0.755	2.230		66	
4	142	0.605	1.910		69	
5	131	0.625	2.000		68	
6	133	0.550	1.760		68	
S– 1	140	0.715	2.270		70	
2	153	0.635	1.980		70	
3	157	0.750	2.320		70	
4	159	0.715	2.210		71	
5	164	0.715	2.190		71	
6	165	0.635	1.940		71	
W– 1	182	0.815	2.430		71	
2	180	0.805	2.410		71	
3	149	0.785	2.470		71	
4	132	0.535	1.730		71	
5	152	0.585	1.830		71	
6	148	0.615	1.940		71	
N– 1	147	0.625	1.960		69	
2	138	0.615	1.960		70	
3	133	0.650	2.100		71	
4	137	0.550	1.760		71	
5	149	0.525	1.660	Final Volume	73	
6	153	0.525	1.660	607.312	74	
	Average 153.3	Avg. Sqrt. 0.806	Average 2.025	Volume Sampled 52.086	Average 69.8	

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division - Columbia City, IN	Unit	Elecric Arc Furnace - BO (ES)
Date	02/20/03	Ambient Temperature (°F)	26
Meter Operator	A. Perdue	Barometeric Pressure (inches Hg)	29.22
Probe Operator(s)	F. Guenther	Static Pressure (± inches H2O)	-0.30
Control Unit No.	609198	%CO2 / %O2	0.0 / 20.9
Pitot Cp	0.84	Condensate (milliliters)	-2
Meter Y	0.997	Test Time (24 hour)	0933-1057
Run No.	**3**	Sample Time (minutes)	60.0
Nozzle Diameter (in.)	0.251	Stack Area (ft²)	314.16
Filter No.	F-3 (Blank)	Silica Gel (grams)	12.0
Front-half No.	FH-3		
Back-half No.	BH-3		

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 608.000	Dry Gas Meter Temperature Tm (°F)	Notes
N-	1	141	0.745	2.460		81	
	2	150	0.695	2.320		88	
	3	154	0.675	2.200		83	
	4	165	0.550	1.760		83	
	5	169	0.565	1.810		85	
	6	172	0.525	1.670		85	
E-	1	131	0.925	3.070		90	
	2	125	0.895	3.130		89	
	3	135	0.750	2.590		90	
	4	138	0.770	2.650		91	
	5	143	0.775	2.660		92	
	6	150	0.760	2.590		93	
S-	1	161	0.825	2.770		94	
	2	161	0.775	2.600		94	
	3	162	0.715	2.400		95	
	4	170	0.650	2.160		95	
	5	180	0.685	2.250		96	
	6	186	0.765	2.480		96	
W-	1	186	0.745	2.430		97	
	2	180	0.650	2.130		96	Post-test Nozzle Cal:
	3	162	0.630	2.130		96	A = 0.250"
	4	147	0.805	2.790		97	B = 0.252"
	5	137	0.605	2.130	Final Volume	97	C = 0.251"
	6	134	0.715	2.530	664.351	98	Avg. = 0.251"
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		155.8	**0.844**	**2.405**	**56.351**	**91.7**	

13.6c

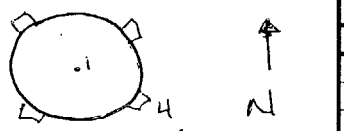
S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140 Page 1 of 1

EPA Method 13B (F) Testing – Field Data Sheet

Run # 1 Sampling Location EAF BAGHOUSE OUTLET

Client STEEL DYNAMICS	Project # 03-T-201
Plant COLUMBIA CITY	Unit EAF BAGHOUSE OUTLET
Date 02-20-03	Project Site COLUMBIA CITY
Meter Operator A. PERDUE	
Probe Operator F. GUENTHER	

Schematic of Stack Cross Section



Ambient Temperature (°F) 23		Baro. Press. (in. Hg) 29.22	
Assumed Moisture (%) 2%		Calculated Moisture (%)	

Control Unit # 669L98	Meter Y (C Factor) 0.997	Nozzle # N-251	Probe Length (ft.) 8'
Filter Oven # 1012	Meter Delta H@ 1.652	Nozzle Diameter (in.) .251	Probe Liner Material GLASS
Impinger Unit # RH	Meter K / Orifice Factor 2.729	Nozzle Material SS	Probe Heater Setting (°F) 250
Pitot # P9-2	Pitot Cp .84	Probe # P-9-2	Oven Heater Setting (°F) 250
Pitot Leak Check: Initial	OK Final OK		
DGM Leak Rate Before:	0 CFM @ 10 in. Hg	IGS Bag # RH	IGS Analyzer # GAS-2
DGM Leak Rate After:	0 CFM @ 6 in. Hg	%CO2 0 %O2 20.9	Condensate (g/ml) 8 ml
Static Pressure (± in. H2O)	-.30	Silica Gel (g) 9.2 50	Total Vlc (ml) 17.2
		FH DI H2O Rinse (ml) 200 15	BH DI H2O Rinse (ml) 185

First traverse point all the way ✓ In Out

Inside Dimension(s) (in.)		Port Dimen. (in.)	Gas Flow Direction
Diameter 240		Dia. 4	In
L ✓	W ✓	L 6	Out ✓

Filter Sample # FR1	RH-F
FH / BH Sample #	RH-F
Initial DI H2O Volume (ml)	200

Start Time (24 hour) 03:36	Stop Time (24 hour) 5:08

Traverse Point Number	Stop Watch Time Minutes / Sample Point 60/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 499.535	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
S 1	2.5	152	.816	2.4	501.805	56	261	239	N/A	32	3.8	Pitot leak
2	5.0	155	.775	2.23	504.010	49	256	238	N/A	36	3.5	Nozzle
3	7.5	154	.830	2.41	506.230	52	240	223	N/A	42	3.5	Cal /
4	10.0	127	.850	2.59	508.505	53	240	228	N/A	40	3.7	A=0.250"
5	12.5	114	.840	2.62	510.486	54	235	226	N/A	38	3.9	B=0.251"
6	15.0	105	.785	2.51	513.155	56	236	221	N/A	40	3.9	C=0.251"
W 1	17.5	130	.740	2.30	515.425	60	269	276	N/A	33	3.2	Avg=0.251"
2	20.0	131	.730	2.28	517.635	61	262	242	N/A	34	3.2	
3	22.5	137	.710	2.19	519.850	61	263	264	N/A	35	3.1	
4	25.0	141	.750	2.31	522.150	62	263	238	N/A	36	3.6	
5	27.5	144	.640	1.97	524.130	64	262	246	N/A	37	3.0	
6	30.0	147	.625	1.91	526.205	63	263	253	N/A	37	3.0	
N 1	32.5	172	.650	1.93	528.350	66	223	240	N/A	35	2.9	
2	35.0	171	.630	1.86	530.435	64	225	242	N/A	42	2.8	
3	37.5	169	.665	1.97	532.560	64	227	241	N/A	36	2.8	
4	40.0	147	.810	2.49	534.850	64	225	250	N/A	37	3.8	
5	42.5	124	.530	1.70	536.875	65	224	253	N/A	37	2.8	
6	45.0	124	.625	2.01	539.026	66	225	266	N/A	37	2.9	
E 1	47.5	138	.635	1.99	541.965	65	262	273	N/A	36	3.0	
2	50.0	128	.625	1.98	543.956	68	263	251	N/A	38	3.1	
3	52.5	125	.635	2.07	546.125	70	263	252	N/A	46	3.2	
4	55.0	132	.565	1.80	548.250	67	263	269	N/A	42	3.2	
5	57.5	135	.575	1.83	550.305	68	263	253	N/A	43	3.1	
6	60.0	132	.550	1.78	553.525	69	264	256	N/A	45	3.0	
Averages / Totals		138.9		2.30	53.990	62.0						

EPA Method 13B (F) Testing – Field Data Sheet

Run # 2 **Sampling Location** EAF Baghouse Outlet

Client Steel Dynamics	Project # 03-T-201	Ambient Temperature (°F) 25	Baro. Press. (in. Hg) 29.27
Plant Columbia City	Unit EAF Baghouse Outlet	Assumed Moisture (%) 20%	Calculated Moisture (%)
Date 02-20-03	Project Site Columbia City		
Meter Operator A. PERDUE		Nozzle # N-251	Probe Length (ft.) 6'
Probe Operator FRED. GUENTHER		Nozzle Diameter (in.) .251	Probe Liner Material GLASS
		Nozzle Material SS	Probe Heater Setting (°F) 250
Control Unit # 609198	Meter Y (C Factor) 0.997	Probe # P-9-2	Oven Heater Setting (°F) 250
Filter Oven # 10	Meter Delta H@ 1.652		
Impinger Unit # 22	Meter K / Orifice Factor 2.729	IGS Bag # R2	IGS Analyzer # Orsat
Pitot # P9-2	Pitot Cp .84	%CO2 0 %O2 20.9	Condensate (g/ml) 5 ml
Pitot Leak Check: Initial OK Final OK		Silica Gel (g) 250 / 6.9	Total Vlc (ml) 13.9
DGM Leak Rate Before: 0 CFM @ 10 in. Hg		FH DI H2O Rinse (ml) 200	BH DI H2O Rinse (ml) 100
DGM Leak Rate After: 0 CFM @ 7.5 in. Hg			
Static Pressure (± in. H2O) -.30		Start Time (24 hour) 06:45	Stop Time (24 hour) 08:10

Schematic of Stack Cross Section



First traverse point all the way ✓ In Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In
L ✓ W ✓	L 6	Out ✓

Filter Sample # R-2 R2-F

FH / BH Sample # R2-F

Initial DI H2O Volume (ml) 200

Traverse Point Number	Stop Watch Time Minutes / Sample Point 60/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 555.226	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
E 1	2.5	181	.695	2.02	557.250	64	260	257	N/A	41	5.0	
2	5.0	180	.635	1.85	559.325	64	260	251	N/A	40	5.0	
3	7.5	175	.755	2.23	561.650	66	260	256	N/A	43	5.1	
4	10.0	142	.605	1.91	563.740	69	260	225	N/A	45	5.0	
5	12.5	131	.625	2.00	565.885	68	259	229	N/A	49	5.0	
6	15.0	133	.550	1.76	568.015	68	260	232	N/A	50	4.9	
S 1	17.5	140	.715	2.27	570.405	80	260	235	N/A	40	5.0	
2	20.0	153	.635	1.98	572.535	70	259	230	N/A	43	5.0	
3	22.5	157	.750	2.32	574.845	70	260	232	N/A	43	5.5	
4	25.0	159	.715	2.21	577.105	71	260	244	N/A	44	6.0	
5	27.5	164	.715	2.19	579.450	71	260	251	N/A	42	5.2	
6	30.0	165	.635	1.94	581.560	71	260	256	N/A	42	5.3	
W 1	32.5	182	.815	2.43	583.920	71	260	250	N/A	39	6.9	
2	35.0	180	.805	2.41	586.270	71	260	255	N/A	40	6.0	
3	37.5	149	.795	2.47	588.950	71	260	264	N/A	41	5.5	
4	40.0	132	.535	1.73	590.965	71	260	263	N/A	41	4.0	
5	42.5	152	.585	1.83	593.60	71	260	269	N/A	41	4.0	
6	45.0	148	.615	1.94	595.110	71	260	265	N/A	41	4.1	
N 1	47.5	147	.625	1.96	597.230	69	260	241	N/A	32	4.1	
2	50.0	138	.615	1.96	599.235	70	260	243	N/A	36	4.1	
3	52.5	133	.650	2.10	601.350	71	260	244	N/A	38	5.0	
4	55.0	137	.550	1.76	603.405	71	260	255	N/A	39	5.0	
5	57.5	149	.525	1.66	605.368	73	259	252	N/A	39	3.9	
6	60	153	.525	1.66	607.312	74	258	249	N/A	39	3.9	
Averages / Totals		152.2		2.025	52.086	68.6						

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EPA Method 13B (F) Testing – Field Data Sheet

Run # 3 Sampling Location EAF BAGHOUSE OUTLET

Client Gerdau Ameristeel	Project # 02-T-201
Plant Columbia City	Unit EAF Baghouse Outlet
Date 02-20-03	Project Site Columbia City
Meter Operator A. PERDUE	
Probe Operator F. Guenther	

Schematic of Stack Cross Section



Ambient Temperature (°F) 26	Baro. Press. (in. Hg) 29.27
Assumed Moisture (%) 2.0	Calculated Moisture (%)

Nozzle # N-251	Probe Length (ft.) 9'
Nozzle Diameter (in.) .251	Probe Liner Material GLASS
Nozzle Material SS	Probe Heater Setting (°F) 250
Probe # P-9-2	Oven Heater Setting (°F) 250

Control Unit # 6091998	Meter Y (C Factor) 0.997
Filter Oven # 10L	Meter Delta H@ 1.652
Impinger Unit # R3-F	Meter K / Orifice Factor 2.729
Pitot # P-9-2	Pitot Cp .84
Pitot Leak Check: Initial OK	Final OK
DGM Leak Rate Before: 0	CFM @ 10 in. Hg
DGM Leak Rate After: 0	CFM @ 11 in. Hg
Static Pressure (± in. H2O) -.30	

First traverse point all the way ✓ In Out

Inside Dimension(s) (in.)		Port Dimen. (in.)		Gas Flow Direction
Diameter	240	Dia.	4	In
L	W	L	6	Out ✓

Filter Sample # R3-F	R3-F
FH / BH Sample #	R3-F
Initial DI H2O Volume (ml)	200

IGS Bag # R3	IGS Analyzer # Gas-Tech
%CO2 0 %O2 20.9	Condensate (g/ml) -2 ml
Silica Gel (g) 250 12.0	Total Vlc (ml) 10.0
FH DI H2O Rinse (ml) 75	BH DI H2O Rinse (ml) 125
Start Time (24 hour) 09:33	Stop Time (24 hour) 10.57

Traverse Point Number		Stop Watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 608.000	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
N	1	2.5	141	.745	2.46	610.375	81	260	254	N/A	46	5.9	
	2	5.0	150	.695	2.32	612.650	88	259	254	N/A	46	5.9	
	3	7.5	154	.675	2.20	615.240	83	260	255	N/A	51	5.2	
	4	10.0	165	.550	1.76	617.250	83	260	255	N/A	55	4.8	
	5	12.5	169	.565	1.81	619.300	85	258	256	N/A	39	4.2	
	6	15.0	172	.525	1.67	621.266	85	259	257	N/A	60	4.1	
E	1	17.5	131	.925	3.07	623.920	90	260	253	N/A	46	6.5	
	2	20.0	125	.895	3.13	626.600	89	260	253	N/A	48	6.9	
	3	22.5	135	.750	2.59	629.050	90	253	256	N/A	61	5.5	
	4	25.0	138	.770	2.65	631.520	91	254	258	N/A	50	7.0	
	5	27.5	143	.775	2.66	633.950	92	259	250	N/A	50	7.1	
	6	30.0	150	.760	2.59	636.385	93	259	253	N/A	52	5.5	
S	1	32.5	161	.825	2.77	638.850	44	240	253	N/A	49	5.8	
	2	35.0	161	.775	2.60	641.265	94	259	253	N/A	49	5.8	
	3	37.5	162	.715	2.40	643.680	95	259	252	N/A	52	5.2	
	4	40.0	170	.650	2.16	645.750	95	259	252	N/A	50	4.9	
	5	42.5	180	.685	2.25	648.025	96	259	253	N/A	50	4.7	
	6	45.0	186	.765	2.48	650.365	96	259	259	N/A	51	5.2	Post test
W	1	47.5	186	.745	2.43	652.725	97	251	242	N/A	49	5.1	Leak Check
	2	50.0	180	.650	2.13	654.945	96	245	248	N/A	48	4.6	Cool
	3	52.5	162	.630	2.13	657.155	96	238	248	N/A	50	4.6	A=0.250"
	4	55.0	147	.805	2.79	659.705	97	242	242	N/A	50	6.0	B=0.250"
	5	57.5	137	.605	2.13	661.925	97	245	243	N/A	50	4.8	C=0.251"
	6	60.0	134	.715	2.53	664.351	98	200	241	N/A	50	5.2	Avg=0.251"
Averages / Totals			155.8		2.446	610.351	91.1						

USEPA METHOD 18

S.A.T., LLG Page 1 of 1

Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA Method 18 (GOC) Testing – Field Data Sheet

Run # 1 Sampling Location

Client	Steel Dynamics, Inc	Schematic of Stack Cross Section	Operator Fred W. Guenther
Project #	02-T-201		
Plant	Columbia City, In.		Evacuated Container # 1
Unit	EAP		IGS Bag # 1
Project Site	Columbia City, In.		Flow Meter # 1
Date	2/23/23		Sample ID # 1

Pretest Leak Check	
Evacuated Container	0
IGS Bag	0

Inside Dimension(s)
Diameter ____ "
L ____ "W

Ambient	Start	Stop
Baro Press	29.22 in. Hg	29.22 in. Hg
Temp	26 °F	26 °F

Time (24 Hour)	Sampling Flow Rate (cc / minute)	Stack Gas Temperature (°F)	Notes
0336	100	156	Start
0341		189	
0346		153	
0351		113	
0356		112	
0401		106	
0406		130	
0411		142	
0416		151	
0421		174	
0426		160	
0431		127	
0436		154	End

Comments:

S.A.T., *LLC* Page 1 of 1

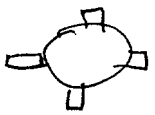
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EPA Method 18 (GOC) Testing – Field Data Sheet

Run # 2 Sampling Location

Client	Steel Dynamics, Inc
Project #	03-T-201
Plant	Columbia City
Unit	LAP
Project Site	Columbia City
Date	2/25/03

Schematic of Stack Cross Section



Operator	Fred & Gwen
Evacuated Container #	2
IGS Bag #	2
Flow Meter #	2
Sample ID #	2

Pretest Leak Check	
Evacuated Container	OK
IGS Bag	OK

Inside Dimension(s)
Diameter 240 "
L " W "

	Start	Stop
Ambient		
Baro Press	29.22 in Hg	29.22 in Hg
Temp	25 °F	25 °F

Time (24 Hour)	Sampling Flow Rate (cc / minute)	Stack Gas Temperature (°F)	Notes
0650	112	171	start
0700		135	
0705		143	
0710		161	
0715		165	
0720		182	
0725		154	
0730		135	
0735		142	
0740		143	
0745		143	
0750		137	
0755		136	stop

Comments:

S.A.T. , *LLC* Page 1 of 1

Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA Method 18 (GOC) Testing – Field Data Sheet

Run # 3 Sampling Location

Client	Steel Dynamics	Schematic of Stack Cross Section	Operator Fred A. Gurney
Project #	03-7-201		
Plant	Columbia City, In		Evacuated Container # 3
Unit	EAF		IGS Bag # 3
Project Site	Columbia City, In		Flow Meter # 3
Date	3/22/01		Sample ID # 3

Pretest Leak Check	
Evacuated Container	✓
IGS Bag	✓

Inside Dimension(s)
Diameter 240 "
L " W "

Ambient	Start	Stop
Baro Press	29.22 in Hg	29.22 in Hg
Temp	27 °F	27 °F

Time (24 Hour)	Sampling Flow Rate (cc / minute)	Stack Gas Temperature (°F)	Notes
0935	110	141	START
0944		152	
0954		165	
0959		130	
0959		130	
1004		143	
1009		150	
1014		155	
1019		122	
1024		182	
1029		157	
1034		139	
1039	↓	132	STOP

Comments:

USEPA METHOD 29

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EPA METHOD 29 FIELD TEST DATA

Client STEEL DYNAMICS, INC. Project No. G/SA 03-T-201
Plant Structural and Rail Division - Columbia City, IN Unit Electric Arc Furnace - BO (ES) Stack Area (ft²) 314.16
Date 02/19/03 Ambient Temperature (°F) 26
Meter Operator B. Peyton Barorneteric Pressure (inches Hg) 29.02
Probe Operator J. Richmond Static Pressure (± inches H20) -0.30
Control Unit No. 507123 Nozzle Diameter (in.) 0.232 %CO2 / %02 0.0 / 20.9
Pitot Cp 0.84 Filter No. M29-R1 (Blank) Condensate (milliliters) 13.9 Silica Gel (grams) 14.9
Meter Y 0.989 Front-half No. N/A Test Time (24 hour) 0501-0723
Run No. 1 Back-half No. M29-R1 Sample Time (minutes) 120.0

Traverse Point Number	Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 933.333	Dry Gas Meter Temperature Tm (°F)	Notes
W- 1	134	0.230	2.190		54	
2	158	0.750	2.190		57	Pretest Nozzle Cal:
3	159	0.690	2.010		57	A = 0.232
4	124	0.800	2.480		58	B = 0.232"
5	115	0.630	1.990		59	C = 0.232
6	130	0.750	2.320		60	Avg. = 0.232
N- 1	141	0.680	2.060		60	
2	154	0.630	1.870		60	
3	161	0.650	1.910		60	Tare Weights:
4	150	0.640	1.930		62	1st Impinger - 694.7 g
5	138	0.740	2.270		62	2nd Impinger - 690.2 g
6	152	0.700	2.110		63	3rd Impinger - 610.2 g
E- 1	136	0.650	2.080		72	4th Impinger - 737.0 g
2	160	0.630	1.950		74	5th Impinger - 724.9 g
3	120	0.780	2.580		73	6th Impinger - 823.5 g
4	120	0.620	2.020		70	
5	140	0.740	2.360		73	Final Weights:
6	148	0.630	1.990		73	1st Impinger - 687.3 g
S- 1	139	0.640	2.070		76	2nd Impinger - 705.7 g
2	122	0.650	2.150		74	3rd Impinger - 614.2 g
3	141	0.600	1.920		74	4th Impinger - 738.7 g
4	139	0.680	2.180		74	5th Impinger - 725.0 g
5	150	0.680	2.140	Final Volume 1026.532	74	6th Impinger - 838.4 g
6	152	0.720	2.260		74	
	Average	Avg. Sqrt.	Average	Volume Sampled	Average	
	141.0	**0.811**	**2.126**	**93.199**	**66.4**	

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EPA METHOD 29 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Electric Arc Furnace – BO (ES)
Date	02/19/03	Ambient Temperature (°F)	27
Meter Operator	B. Peyton	Barometeric Pressure (inches Hg)	29.02
Probe Operator	J. Richmond	Static Pressure (± inches H20)	-0.30
Control Unit No.	507123	%CO2 / %O2	0.0 / 20.9
Nozzle Diameter (in.)	0.232		
Pitot Cp	0.84	Condensate (milliliters)	30.4
Filter No.	M29-R2 (Blank)	Silica Gel (grams)	15.0
Meter Y	0.989	Test Time (24 hour)	0845-1145
Front-half No.	N/A		
Run No.	**2**	Sample Time (minutes)	120.0
Back-half No.	M29-R2		

Traverse Point Number	Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³)	Dry Gas Meter Temperature Tm (°F)	Notes
				Initial Volume 26.845		
N- 1	105	0.630	2.060		63	
2	103	0.700	2.300		64	
3	100	0.720	2.380		64	
4	98	0.650	2.170		65	
5	97	0.620	2.070		65	
6	97	0.600	2.000		65	
W- 1	138	0.850	2.630		64	
2	140	0.590	1.810		63	
3	149	0.560	1.700		64	Tare Weights:
4	156	0.610	1.420		62	1st Impinger – 708.6 g
5	167	0.610	1.790		63	2nd Impinger – 691.9 g
6	170	0.550	1.600		62	3rd Impinger – 596.3 g
S- 1	143	0.710	2.150		60	4th Impinger – 724.6 g
2	154	0.650	1.940		61	5th Impinger – 724.8 g
3	168	0.550	1.600		61	6th Impinger – 819.5 g
4	176	0.550	1.580		61	
5	177	0.550	1.590		62	Final Weights:
6	147	0.630	1.910		62	1st Impinger – 718.4 g
E- 1	135	0.670	2.070		62	2nd Impinger – 708.4 g
2	152	0.640	1.920		62	3rd Impinger – 599.7 g
3	168	0.650	1.910		63	4th Impinger – 725.8 g
4	166	0.530	1.570		64	5th Impinger – 724.3 g
5	176	0.540	1.570	Final Volume 113.600	64	6th Impinger – 834.5 g
6	172	0.500	1.460		64	
	Average	Avg. Sqrt.	Average	Volume Sampled	Average	
	143.9	**0.785**	**1.883**	**86.755**	**62.9**	

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EPA METHOD 29 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Electric Arc Furnace – BO (ES)
Date	02/19/03	Ambient Temperature (°F)	36
Meter Operator	B. Peyton	Barometeric Pressure (inches Hg)	29.08
Probe Operator	J. Richmond	Static Pressure (± inches H2O)	-0.30
Control Unit No.	507123	Nozzle Diameter (in.)	0.232
Pitot Cp	0.84	Filter No.	M29-R3 (Blank)
Meter Y	0.989	Front-half No.	N/A
Run No.	3	Back-half No.	M29-R3
Stack Area (ft²)	314.16	%CO2 / %02	0.0 / 20.9
Condensate (milliliters)	15.7	Silica Gel (grams)	19.4
Test Time (24 hour)	1255-1540		
Sample Time (minutes)	120.0		

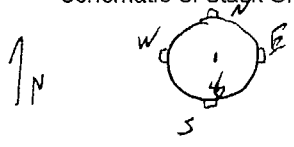
Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 114.500	Dry Gas Meter Temperature Tm (°F)	Notes
N-	1	195	0.680	1.920		64	
	2	156	0.730	2.200		65	Post-test Nozzle Cal:
	3	166	0.590	1.750		66	A = 0.232
	4	166	0.550	1.630		65	B = 0.233"
	5	134	0.540	1.690		65	C = 0.232"
	6	132	0.500	1.570		65	Avg. = 0.232"
W-	1	162	0.710	2.130		67	
	2	173	0.620	1.840		68	
	3	184	0.550	1.600		68	Tare Weights:
	4	187	0.700	2.030		68	1st Impinger – 697.1 g
	5	185	0.570	1.660		69	2nd Impinger – 684.8 g
	6	180	0.650	1.910		69	3rd Impinger – 613.7 g
S-	1	173	0.630	1.850		66	4th Impinger – 737.9 g
	2	183	0.610	1.770		66	5th Impinger – 731.4 g
	3	189	0.500	1.640		67	6th Impinger – 823.5 g
	4	186	0.520	1.500		67	
	5	175	0.900	2.650		67	Final Weights:
	6	141	0.490	1.530		68	1st Impinger – 683.4 g
E-	1	175	0.520	1.530		67	2nd Impinger – 700.9 g
	2	182	0.650	1.890		67	3rd Impinger – 617.5 g
	3	154	0.650	1.990		68	4th Impinger – 727.9 g
	4	137	0.500	1.570		68	5th Impinger – 730.9 g
	5	154	0.490	1.500	Final Volume 198.923	68	6th Impinger – 842.9 g
		159	0.500	1.510		67	
		Average 167.8	Avg. Sqrt. 0.771	Average 1.786	Volume Sampled 84.423	Average 66.9	

EPA Method 29 (Metals) Testing – Field Data Sheet

Run # 1 **Sampling Location** Baghouse Outlet

Client SDI	Project # 03-T-201
Plant SDI Columbia City	Unit EAF
Date 02/19/03	Project Site Columbia City, IN
Meter Operator B. Peyton	
Probe Operator J. Richmond	

Schematic of Stack Cross Section



Ambient Temperature (°F) 26		Baro. Press. (in. Hg) 29.02	
Assumed Moisture (%) 2		Calculated Moisture (%)	

Control Unit # 507123	Meter Y (C Factor) 0.989		
Pyrometer # 507123	Meter Delta H@ 1.906		
Impinger Unit # Metal R-1	Meter K / Orifice Factor 3.633		
Pitot # P-9-1	Pitot Cp 0.84		
Pitot Leak Check: Before OK	After OK		
DGM Leak Rate Before: 0.0	CFM @ 12.0	in. Hg	
DGM Leak Rate After: 0.0	CFM @ 9.0	in. Hg	
Static Pressure (± in. WC)	-0.30		

First traverse point all the way (In) Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In
L — W —	L 6	Out ✓

Filter #(s)	MR-1
5% HNO3/10% H2O2, ml (initial)	200
4% KmNO4/10% H2SO4, ml (initial)	200

IGS Bag # MR-1		%CO2 0	%O2 20.9
HNO3, g/ml (final) 12.19		KmNO4, g/ml (final)	
Total Rinses (ml) 100/100		Condensate (g/ml) 2.99	
Silica Gel (g) 14.9		Total Vlc (ml) 282	
Acetone Wash? Yes No ✓		Total Acetone Wash (ml)	
Start Time (24 hour) 5:01		Stop Time (24 hour) 7:23	

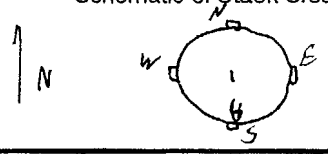
Traverse Point Number	Stop Watch Time Minutes / Sample Point 120/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) 933.333 / Initial Volume 933.333	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
W 1	5	134	0.73	2.19	937.182	54	244	268	NA	39	4.4	Pretest
2	10	158	0.75	2.19	941.213	57	256	270		40	4.4	Nozzle Dia.
3	15	159	0.69	2.01	944.952	57	256	270		41	4.3	A=0.232"
4	20	124	0.60	2.48	949.192	58	255	261		41	5.2	B=0.232"
5	25	115	0.63	1.99	953.255	59	253	271		42	4.2	C=0.232"
6	30	130	0.75	2.32	957.193	60	254	270		42	4.8	Avg=0.232"
N 1	35	141	0.64	2.06	960.730	60	248	239		38	4.0	
2	40	154	0.63	1.87	964.513	60	246	244		38	3.8	Initial Weight (g):
3	45	161	0.65	1.91	968.231	60	238	240		36	3.9	#1 Impinger – 668.7
4	50	150	0.64	1.93	971.813	62	238	244		36	3.9	#2 Impinger – 690.2
5	55	138	0.74	2.27	975.812	62	239	245		36	4.5	#3 Impinger – 690.2
6	60	152	0.70	2.11	979.607	63	240	240		36	4.9	#4 Impinger – 787.0
E 1	65	136	0.65	2.06	983.420	72	241	262		38	4.3	#5 Impinger – 725.7
2	70	160	0.63	1.95	986.983	74	244	260		43	4.4	#6 Impinger – 858.5
3	75	120	0.78	2.58	991.246	73	250	261		43	5.4	#7 Impinger –
4	80	120	0.62	2.02	994.992	70	242	260		44	4.4	
5	85	140	0.74	2.36	999.001	73	240	264		45	4.9	Final Weight (g):
6	90	148	0.63	1.99	1002.658	73	242	260		45	4.2	#1 Impinger – 688.2
S 1	95	139	0.64	2.07	1007.500	76	240	232		48	4.3	#2 Impinger – 702.7
2	100	122	0.65	2.15	1011.420	74	243	283		50	4.5	#3 Impinger – 694.2
3	105	141	0.60	1.97	1015.067	74	242	261		50	4.2	#4 Impinger – 792.7
4	110	139	0.68	2.18	1018.987	74	240	262		51	4.5	#5 Impinger – 736.0
5	115	150	0.68	2.14	1022.817	74	243	262		51	4.4	#6 Impinger – 893.1
6	120	152	0.72	2.26	1026.532	74	240	260		51	4.4	#7 Impinger –
Averages / Totals												

EPA Method 29 (Metals) Testing – Field Data Sheet

Run # 2 **Sampling Location** Baghouse Outlet

Client	SDI
Plant	SDI Columbia City
Date	02-19-03
Meter Operator	B. Peyton
Probe Operator	J. Richmond
Project #	02-T-201
Unit	BAP
Project Site	Columbia City, IN

Schematic of Stack Cross Section



Ambient Temperature (°F)	27	Baro. Press. (in. Hg)	29.02
Assumed Moisture (%)	2	Calculated Moisture (%)	—

Nozzle #	N-232	Probe Length (ft.)	9
Nozzle Diameter (in.)	0.232	Probe Liner Material	glass
Nozzle Material	glass	Probe Heater Setting (°F)	255
Probe #	P-9-1	Filter Oven Setting (°F)	285

Control Unit #	507123	Meter Y (C Factor)	0.989	
Pyrometer #	507123	Meter Delta H@	1.906	
Impinger Unit #	MR-2	Meter K / Orifice Factor	3.633	
Pitot #	P-9-1	Pitot Cp	0.84	
Pitot Leak Check: Before	OK	After	OK	
DGM Leak Rate Before:	0.0	CFM @	13	in. Hg
DGM Leak Rate After:	0.0	CFM @	6.0	in. Hg
Static Pressure (± in. WC)		−0.30		

First traverse point all the way (In) Out

Inside Dimension(s) (in.)		Port Dimen. (in.)	Gas Flow Direction
Diameter	240	Dia. 4	In —
L —	W —	L 6	Out ✓
Filter #(s)		MR-2	—
5% HNO3/10% H2O2, ml (initial)		200	
4% KmNO4/10% H2SO4, ml (initial)		200	

IGS Bag #	R-2	%CO2 0	%O2 20.9
HNO3, g/ml (final)	29.79	KmNO4, g/ml (final)	0.79
Total Rinses (ml)	100/100	Condensate (g/ml)	304.0
Silica Gel (g)	15.0	Total Vlc (ml)	45.4
Acetone Wash? Yes	No ✓	Total Acetone Wash (ml)	—
Start Time (24 hour)	8:45	Stop Time (24 hour)	11:45

Traverse Point Number	Stop Watch Time / Minutes / Sample Point 120/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) / Initial Volume 26.845	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
N 1	5	105	0.63	2.06	30.618	63	240	242	NA	48	3.6	
2	10	103	0.70	2.30	34.218	64	245	244		48	3.8	
3	15	100	0.72	2.38	38.481	64	245	238		49	3.9	
4	20	98	0.65	2.17	42.291	65	245	238		48	3.8	
5	25	97	0.62	2.07	46.140	65	248	240		47	3.6	
6	30	97	0.60	2.00	50.012	65	247	242		47	3.6	
W 1	35	138	0.85	2.63	54.281	64	236	238		41	4.0	
2	40	140	0.59	1.81	57.863	63	248	252		42	3.0	Initial Weight (g):
3	45	149	0.56	1.70	61.324	64	235	243		43	2.9	#1 Impinger – 708.0
4	50	156	0.61	1.42	64.729	62	247	244		44	2.3	#2 Impinger – 691.9
5	55	167	0.61	1.79	68.224	63	238	242		45	2.9	#3 Impinger – 696.3
6	60	170	0.55	1.60	72.004	62	237	238		45	2.8	#4 Impinger – 704.6
1 S 1	65	143	0.71	2.15	75.408	60	230	258		40	3.1	#5 Impinger – 704.8
2	70	154	0.65	1.94	79.400	61	260	270		44	3.0	#6 Impinger – 699.5
3	75	168	0.55	1.60	82.698	61	247	254		45	2.6	#7 Impinger – —
4	80	176	0.55	1.56	85.684	61	238	246		41	2.8	
5	85	177	0.55	1.59	89.000	62	239	251		44	2.9	Final Weight (g):
6	90	147	0.63	1.91	92.443	62	239	265		42	3.3	#1 Impinger – 716.4
E 1	95	135	0.67	2.07	96.600	62	248	268		42	3.3	#2 Impinger – 706.4
2	100	152	0.64	1.92	100.134	62	245	259		45	3.0	#3 Impinger – 699.7
3	105	168	0.65	1.91	103.600	63	242	255		51	3.0	#4 Impinger – 705.8
4	110	166	0.53	1.57	107.100	64	238	242		51	2.8	#5 Impinger – 704.5
5	115	176	0.54	1.57	110.345	64	243	257		51	2.6	#6 Impinger – 694.5
6	120	142	0.50	1.46	113.600	64	239	248	✓	51	2.5	#7 Impinger – —
Averages / Totals		143.9	—	—	86.755	62.9						

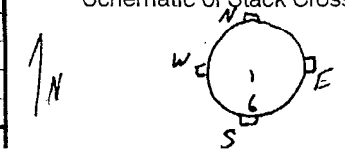
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EPA Method 29 (Metals) Testing – Field Data Sheet

Run # 3 **Sampling Location** Baghouse Outlet

Client SDI	Project # 03-T-701	Ambient Temperature (°F) 36	Baro. Press. (in. Hg) 29.08
Plant SDI Columbia City	Unit EAF	Assumed Moisture (%) 2	Calculated Moisture (%)
Date 02-19-03	Project Site Columbia City, IN		
Meter Operator B. Peyton		Nozzle # GN-232	Probe Length (ft.) 9
Probe Operator J. Richmond		Nozzle Diameter (in.) 0.232	Probe Liner Material glass
		Nozzle Material glass	Probe Heater Setting (°F) 255
Control Unit # 507123	Meter Y (C Factor) 0.989	Probe # P-9-1	Filter Oven Setting (°F) 255
Pyrorneter # 507123	Meter Delta H@ 1.906		
Impinger Unit # MR-1	Meter K / Orifice Factor 3.633	IGS Bag # MR-3	%CO2 0 %O2 20.9
Pitot # P-9-1	Pitot Cp 0.84	HNO3, g/ml (final) 0.2g	KmNO4, g/ml (final) 0.5g
Pitot Leak Check: Before OK	After OK	Total Rinses (ml) 100 / 100	Condensate (g/ml) 15.7g
DGM Leak Rate Before: 0.001	CFM @ 14.0 in. Hg	Silica Gel (g) 19.4g	Total Vlc (rnl) 35.1
DGM Leak Rate After: 0.000	CFM @ 7.0 in. Hg	Acetone Wash? Yes No ✓	Total Acetone Wash (ml) —
Static Pressure (+ in. WC) 0.30		Start Time (24 hour) 12:55	Stop Time (24 hour) 15:10

Schematic of Stack Cross Section



First traverse point all the way (In) Out

Inside Dimension(s)		Port Dirnen.	Gas Flow Direction
	(in.)	(in.)	
Diameter	240	Dia. 4	In
L —	W —	L 6	Out ✓
Filter #(s)		MR-3	
5% HNO3/10% H2O2, ml (initial)		200	
4% KmNO4/10% H2SO4, ml (initial)		200	

Traverse Point Number	Stop Watch Time Minutes / Sample Point 120/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 114.500	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Filter Holder Outlet Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
N 1	5	195	0.68	1.92	118.125	64	252	255	NA	53	4.2	Post-Test
2	10	156	0.73	2.20	122,000	65	249	257		57	4.9	Leak Check @
3	15	166	0.59	1.75	125.476	66	248	255		57	4.0	4=0.232"
4	20	166	0.55	1.63	126.802	65	250	248		60	3.9	3=0.232"
5	25	134	0.54	1.69	132.212	65	242	291		55	3.9	2=0.232"
6	30	132	0.50	1.57	135.610	65	240	248		50	3.9	1=0.232"
W 1	35	162	0.71	2.13	139.462	67	251	253		44	4.5	
2	40	193	0.62	1.84	143.019	68	250	256		52	4.3	Initial Weight (g):
3	45	184	0.55	1.60	146.320	68	248	258		57	4.0	#1 Impinger – 699.1
4	50	187	0.70	2.03	150.080	68	249	255		59	4.7	#2 Impinger – 699.8
5	55	185	0.57	1.66	153.632	69	251	258		61	4.0	#3 Impinger – 673.7
6	60	180	0.65	1.91	157.180	69	250	248		62	4.0	#4 Impinger – 787.9
S 1	65	173	0.63	1.85	160.953	66	241	238		53	4.0	#5 Impinger – 711.4
2	70	183	0.61	1.77	164.400	66	245	239		52	4.0	#6 Impinger – 688.5
3	75	169	0.57	1.64	167.758	67	245	240		52	3.8	#7 Impinger –
4	80	146	0.52	1.50	171.025	67	248	244		52	3.6	
5	85	175	0.90	2.65	175.324	67	240	243		52	5.0	Final Weight (g):
6	90	141	0.49	1.53	178.534	68	241	234		53	3.8	#1 Impinger – 699.4
E 1	95	175	0.52	1.53	181.652	67	238	261		42	3.4	#2 Impinger – 700.9
2	100	142	0.65	1.89	185.252	67	253	256		44	4.2	#3 Impinger – 677.5
3	105	154	0.65	1.99	188.962	68	254	255		45	4.9	#4 Impinger – 791.9
4	110	137	0.50	1.57	192.302	68	247	262		50	4.5	#5 Impinger – 720.9
5	115	154	0.49	1.50	195.700	68	256	261		51	4.6	#6 Impinger – 692.9
6	120	159	0.50	1.51	198.923	67	255	257		52	3.9	#7 Impinger –
Averaaes / Totals		161.0		1.126	84.423	66.3						

USEPA METHOD 316

S.A.T., LLG Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 316 FIELD TEST DATA

Client	SDI-CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division – Columbia City, IN	Unit	Elecric Arc Furnace – BO (ES)
Date	02120103	Ambient Temperature (°F)	23
Meter Operator	B. Peyton	Barometeric Pressure (inches Hg)	29.22
Probe Operator(s)	F. Guenther	Static Pressure (± inches H20)	-0.30
Control Unit No.	507123	Nozzle Diameter (in.)	0.225
Pitot Cp	0.84	Filter No.	HCHO-1 (Blank)
Meter Y	0.989	Front-half No.	FH-1
Run No.	1	Back-half No.	BH-1

Stack Area (ft²): 314.16
%CO2 / %02: 0.0 / 20.9
Condensate (milliliters): 0 Silica Gel (grams): 9.4
Test Time (24 hour): 0335-0520
Sample Time (minutes): 60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume: 199.688	Dry Gas Meter Temperature Tm (°F)	Notes
E-	1	156	0.820	2.240		40	
	2	159	0.700	1.900		40	Pretest Nozzle Cal:
	3	152	0.850	2.330		41	A = 0.225"
	4	128	0.730	2.100		42	B = 0.225"
	5	112	0.720	2.130		43	C = 0.224"
	6	106	0.520	1.570		45	Avg. = 0.225"
S-	1	130	0.890	2.600		47	
	2	135	0.810	2.350		48	
	3	142	0.800	2.310		49	
	4	147	0.800	2.300		50	
	5	151	0.830	2.370		50	
	6	158	0.750	2.110		50	
W-	1	174	0.690	1.900		50	
	2	172	0.800	2.210		51	
	3	160	1.010	2.840		50	
	4	132	0.680	2.010		51	
	5	127	0.880	2.630		52	
	6	129	0.630	1.880		52	
N-	1	159	0.700	2.000		52	
	2	168	0.650	1.820		52	
	3	167	0.690	1.800		53	
	4	171	0.800	2.350		53	
	5	127	0.720	2.160	Final Volume: 247.138	53	
	6	118	0.550	1.680		54	
		Average: 145.0	Avg. Sqrt.: 0.864	Average: 2.150	Volume Sampled: 47.450	Average: 48.7	

S.A.T., LLC Rt. 2, Box 2165. Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 316 FIELD TEST DATA

Client	SDI-CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division - Columbia City, IN	Unit	Elecric Arc Furnace - BO (ES)
Stack Area (ft^2)	314.16		
Date	02/20/03	Ambient Temperature (°F)	25
Meter Operator	B. Peyton	Barometeric Pressure (inches Hg)	29.22
Probe Operator(s)	F. Guenther	Static Pressure (± inches H20)	-0.30
Control Unit No.	507123	Nozzle Diameter (in.)	0.225
%CO2 / %02	0.0 / 20.9		
Pitot Cp	0.84	Filter No.	HCHO-2 (Blank)
Condensate (milliliters)	7	Silica Gel (grams)	8.5
Meter Y	0.989	Front-half No.	FH-2
Test Time (24 hour)	0645-0810		
Run No.	2	Back-half No.	BH-2
Sample Time (minutes)	60.0		

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft^3)	Dry Gas Meter Temperature Tm (°F)	Notes
					Initial Volume 246.865		
S-	1	185	0.700	1.920		54	
	2	178	0.680	1.890		55	
	3	171	0.760	2.150		56	
	4	142	0.710	2.110		57	
	5	135	0.620	1.820		57	
	6	141	0.610	1.820		58	
E-	1	148	0.720	2.130		58	
	2	152	0.680	2.000		59	
	3	161	0.650	1.900		60	
	4	165	0.620	1.790		59	
	5	169	0.550	1.580		59	
	6	176	0.480	1.360		59	
N-	1	182	0.780	2.190		59	
	2	184	0.600	1.670		58	
	3	154	0.840	2.460		58	
	4	135	0.650	2.510		58	
	5	139	0.650	1.960		59	
	6	142	0.630	1.900		60	
W-	1	153	0.650	1.910		59	
	2	143	0.640	1.910		59	
	3	133	0.650	1.990		60	
	4	143	0.660	1.990		61	
	5	154	0.630	1.870	Final Volume	62	
	6	156	0.620	1.840	290.705	63	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		155.9	0.810	1.945	43.840	58.6	

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EPA METHOD 316 FIELD TEST DATA

Client	SDI-CCI	Project No.	G/SA 03-T-201
Plant	Structural and Rail Division - Columbia City, IN	Unit	Elecric Arc Furnace - BO (ES)
Date	02120103	Ambient Temperature (°F)	27
Meter Operator	B. Peyton	Barometeric Pressure (inches Hg)	29.22
Probe Operator(s)	F. Guenther	Static Pressure (± inches H2O)	-0.30
Control Unit No.	507123	%CO2 / %O2	0.0 / 20.9
Pitot Cp	0.84	Filter No.	HCHO-3 (Blank)
Meter Y	0.989	Front-half No.	FH-3
Run No.	3	Back-half No.	BH-3
Nozzle Diameter (in.)	0.225	Condensate (milliliters)	19
Silica Gel (grams)	10.5	Test Time (24 hour)	0933-1056
Stack Area (ft²)	314.16	Sample Time (minutes)	60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 291.100	Dry Gas Meter Temperature Tm (°F)	Notes
W-	1	147	0.700	2.150		68	
	2	151	0.640	1.960		68	
	3	152	0.710	2.170		68	
	4	162	0.580	1.740		68	
	5	169	0.500	1.480		68	
	6	170	0.560	1.670		69	
N-	1	130	0.900	2.870		70	
	2	121	0.830	2.690		70	
	3	135	0.640	2.030		71	
	4	141	0.610	1.920		71	
	5	143	0.590	1.850		72	
	6	147	0.500	1.560		72	
E-	1	158	0.650	1.990		72	
	2	159	0.630	1.930		72	
	3	159	0.650	1.990		72	
	4	168	0.680	2.050		72	
	5	172	0.710	2.130		72	
	6	181	0.580	1.720		72	
S-	1	182	0.700	2.070		72	
	2	168	0.620	1.870		72	Post-test Nozzle Cal:
	3	157	0.530	1.630		72	A = 0.225"
	4	139	0.810	2.560		72	B = 0.224"
	5	133	0.580	1.850	Final Volume 335.152	72	C = 0.225"
	6	132	0.760	2.430		72	Avg. = 0.225"
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		153.2	0.806	2.013	44.052	70.8	

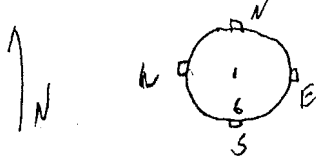
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EPA Method 316 (HCHO) Testing – Field Data Sheet

Run # 1 **Sampling Location** Baghouse Outlet

Client SDI	Project # 03-T-201	Ambient Temperature (°F) 23	Baro. Press. (in. Hg) 29.27
Plant SDI Columbia City	Unit E A F	Assumed Moisture (%) 2	Calculated Moisture (%)
Date 02-20-03	Project Site Columbia City, IN		
Meter Operator B. Peyton		Nozzle # N-253	Probe Length (ft.) 9
Probe Operator F. Guenther		Nozzle Diameter (in.) 0.225	Probe Liner Material glass
		Nozzle Material Stainless	Probe Heater Setting (°F) 255
		Probe # P-9	Oven By-Pass Setting (°F) NA

Schematic of Stack Cross Section



Control Unit # 507123	Meter Y (C Factor) 0.989	First traverse point all the way (In) Out	
Pyrometer # 507123	Meter Delta H@ 1.906	Inside Dimension(s) (in.) / Port Dimen. (in.) / Gas Flow Direction	IGS Bag #
Impinger Unit # HCHO-1	Meter K / Orifice Factor 3.633	Diameter 240 / Dia. 4 / In	IGS Analyzer #
Pitot # PG-1	Pitot Cp 0.84	L – W – / L 6 / Out ✓	%CO2 0 %O2 20.9
Pitot Leak Check: Initial OK Final OK		FH / BH Sample # HCHO-21	Condensate (g/ml) 0 ml
DGM Leak Rate Before: 0.0 CFM @ 13.5 in. Hg		Initial DI H2O Volume (ml) 200	Silica Gel (g) 94 / Total Vlc (ml) 94
DGM Leak Rate After: 0.0 CFM @ 7.0 in. Hg			FH DI H2O Rinse (ml) 100 / BH DI H2O Rinse (ml) 100
Static Pressure (± in. H2O) -.35			Start Time (24 Hour) 3:35 / Stop Time (24 Hour) 5:20

Traverse Point Number	Stop-watch Time Minutes / Sample Point ~~60~~/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 199.688	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Oven By-Pass Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
E 1	2.5	156	0.82	2.24	201.724	40	260	NA	38	4.1	Pretest Nozzle Cal: A = 0.225"
2	5	159	0.70	1.90	203.816	40	244		41	3.5	
3	7.5	152	0.85	2.33	205.752	41	244		44	4.0	B = 0.225"
4	10	128	0.73	2.10	207.592	42	242		45	3.6	C = 0.224"
5	12.5	117	0.72	2.13	209.456	43	242		46	3.6	Avg = 0.225"
6	15	106	0.52	1.57	211.327	45	239		42	3.0	
S 1	17.5	130	0.89	2.66	213.282	47	228		42	4.3	
2	20	135	0.81	2.35	215.908	48	237		44	4.1	
3	22.5	142	0.80	2.31	217.502	49	217		43	4.1	
4	25	147	0.80	2.30	219.357	50	207		43	3.3	
5	27.5	151	0.83	2.37	221.180	50	205		42	3.3	
6	30	158	0.75	2.11	222.950	50	202		43	2.9	
W 1	32.5	124	0.69	1.90	224.740	50	196		38	2.4	
2	35	172	0.80	2.21	226.540	51	198		39	3.8	
3	37.5	160	1.01	2.84	228.824	50	199		39	5.0	
4	40	132	0.69	2.01	230.961	51	198		39	4.0	
5	42.5	127	0.88	2.63	233.056	52	198		41	5.0	
6	45	129	0.63	1.89	235.165	52	198		42	4.0	
N 1	47.5	154	0.70	2.00	237.20	52	224		42	4.0	
2	50	166	0.69	1.82	240.621	53	228		42	3.8	
3	52.5	167	0.64	1.90	240.567	53	227		42	3.5	
4	55	141	0.60	2.35	242.320	53	259		42	4.2	
5	57.5	127	0.72	2.16	244.290	53	265	✓	30	3.9	
6	60	114	0.55	1.66	247.138	54	261		30	3.6	
Averages / Totals		135.0		2.00	47.450	49.7					

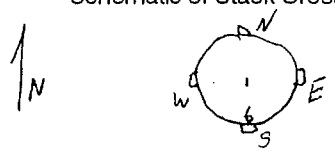
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EPA Method 316 (HCHO) Testing – Field Data Sheet

Run # 2 **Sampling Location** Baghouse Outlet

Client	SDI	Project #	03-T-201
Plant	SDI Columbia City	Unit	EAF
Date	02-20-03	Project Site	Columbia City, IN
Meter Operator	B. Peyton		
Probe Operator	F. Guenther		

Schematic of Stack Cross Section



Ambient Temperature (°F)	285	Baro. Press. (in. Hg)	29.22
Assumed Moisture (%)	2	Calculated Moisture (%)	~
Nozzle #	N-252	Probe Length (ft.)	9
Nozzle Diameter (in.)	0.225	Probe Liner Material	glass
Nozzle Material	Stainless	Probe Heater Setting (°F)	255
Probe #	P-9-1	Oven By-Pass Setting (°F)	N/A

Control Unit #	507123	Meter Y (C Factor)	0.989
Pyrometer #	507123	Meter Delta H@	1.906
Impinger Unit #	HCHO R-2	Meter K / Orifice Factor	3.633
Pitot #	P-9-1	Pitot Cp	0.84
Pitot Leak Check: Initial	Ok	Final	OK
DGM Leak Rate Before:	0.0 CFM @	10	in. Hg
DGM Leak Rate After:	0.005 CFM @	7.5	in. Hg
Static Pressure (± in. H2O)	-0.30		

First traverse point all the way (In) Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In
L – W –	L 6	Out ✓

IGS Bag #	R2	IGS Analyzer #	GA-2
%CO2	0	%O2	20.9
Silica Gel (g)	85	Condensate (g/ml)	7 ml
FH DI H2O Rinse (ml)	125	Total Vlc (ml)	155
FH / BH Sample #	HCHO-R2	BH DI H2O Rinse (ml)	125
Initial DI H2O Volume (ml)	200	Start Time (24 Hour)	6:45
		Stop Time (24 Hour)	8:10

Traverse Point Number	Stop-watch Time Minutes / Sample Point 60/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 246.865	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Oven By-Pass Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
S 1	2.5	185	0.70	1.92	248.632	54	251	NA	37	4.0	
2	5	176	0.68	1.89	250.642	55	259		37	3.0	
3	7.5	171	0.76	2.15	252.401	56	259		36	4.0	
4	10	142	0.71	2.11	254.354	57	258		38	4.0	
5	12.5	135	0.62	1.87	256.148	57	258		39	3.6	
6	15	141	0.61	1.82	257.900	58	256		40	3.6	
E 1	17.5	148	0.72	2.13	259.812	58	260		37	4.0	
2	20	152	0.68	2.00	261.683	59	261		36	3.9	
3	22.5	161	0.65	1.90	263.490	60	260		37	3.6	
4	25	165	0.62	1.79	265.251	59	260		41	3.5	
5	27.5	169	0.55	1.58	266.907	59	264		42	3.2	
6	30	176	0.48	1.36	268.432	59	262		42	2.8	
N 1	32.5	182	0.78	2.19	270.370	59	254		40	3.8	
2	35	184	0.60	1.69	272.072	58	254		40	3.3	
3	37.5	154	0.84	2.46	274.131	58	256		38	4.1	
4	40	135	0.65	2.51	276.213	58	256		39	4.5	
5	42.5	139	0.65	1.96	278.052	59	254		36	3.9	
6	45	142	0.63	1.90	279.859	60	254		38	3.8	
W 1	47.5	153	0.65	1.91	281.672	59	258		29	3.4	
2	50	143	0.64	1.91	283.492	59	258		33	3.4	
3	52.5	133	0.65	1.99	285.365	60	259		33	3.6	
4	55	143	0.66	1.99	287.168	61	255		34	3.6	
5	57.5	154	0.63	1.97	288.967	62	255		34	3.5	
6	60	156	0.62	1.84	290.705	63	256		34	3.5	
Averages / Totals		1550		1.886	43.840	59.16					

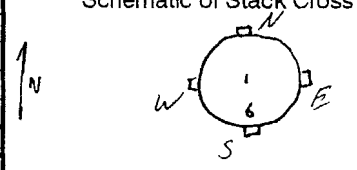
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EPA Method 316 (HCHO) Testing – Field Data Sheet

Run # 3 Sampling Location Baghouse Outlet

Client SDI	Project # 03-T-0201
Plant SDI Columbia City	Unit EAF
Date 02-20-03	Project Site Columbia City, IN
Meter Operator B. Peyton	
Probe Operator F. Guenther	

Schematic of Stack Cross Section



Ambient Temperature (°F) 27	Baro. Press. (in. Hg) 29.22
Assumed Moisture (%) 2	Calculated Moisture (%)

Nozzle # N-252	Probe Length (ft.) 9
Nozzle Diameter (in.) 0.225	Probe Liner Material Glass
Nozzle Material Stainless	Probe Heater Setting (°F) 255
Probe # P-9	Oven By-Pass Setting (°F) NA

Control Unit # 507123	Meter Y (C Factor) 0.989
Pyrometer # 507123	Meter Delta H@ 1.906
Impinger Unit # HCHOR-3	Meter K / Orifice Factor 3.633
Pitot # P-9	Pitot Cp 0.84
Pitot Leak Check: Initial OK	Final
DGM Leak Rate Before: 0.00	CFM @ 15 in. Hg
DGM Leak Rate After: 0.0	CFM @ 7.0 in. Hg
Static Pressure (± in. H2O) -0.30	

First traverse point all the way In Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In
L — W —	L 6	Out ✓

FH / BH Sample # HCHO-R3

Initial DI H2O Volume (ml) 200

IGS Bag # R3	IGS Analyzer # GM-3
%CO2 0 %O2 20.9	Condensate (g/ml) 19 ml
Silica Gel (g) 10.5	Total Vlc (ml) 29.5
FH DI H2O Rinse (ml) 125	BH DI H2O Rinse (ml) 25
Start Time (24 Hour) 9:33	Stop Time (24 Hour) 10:56

Traverse Point Number	Stop-watch Time Minutes / Sample Point 60/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (ft³) Initial Volume 291.100	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Oven By-Pass Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
W 1	2.5	147	0.70	2.15	293.024	68	239	NA	36	3.2	
2	5	151	0.64	1.96	294.855	68	245		37	3.1	
3	7.5	152	0.71	2.17	296.781	68	246		40	3.3	
4	10	162	0.58	1.74	298.507	68	244		41	3.0	
5	12.5	169	0.50	1.48	300.120	68	238		40	2.8	
6	15	170	0.56	1.67	301.812	69	245		40	2.9	
N 1	17.5	130	0.90	2.87	304.035	70	280		44	4.9	
2	20	121	0.83	2.69	306.192	70	262		46	4.5	
3	22.5	135	0.64	2.03	308.047	71	261		50	3.3	
4	25	141	0.61	1.92	309.824	71	262		52	3.1	
5	27.5	143	0.59	1.85	311.632	72	260		53	3.0	
6	30	147	0.50	1.56	313.276	72	261		54	2.8	
E 1	32.5	158	0.65	1.99	315.119	72	252		50	3.3	
2	35	159	0.63	1.93	316.961	72	258		51	3.3	
3	37.5	159	0.65	1.99	318.812	72	251		47	3.3	
4	40	168	0.68	2.05	320.724	72	256		46	3.3	
5	42.5	172	0.701	2.13	322.581	72	255		45	3.4	
6	45	181	0.58	1.72	324.218	72	243		44	2.9	
S 1	47.5	182	0.70	2.07	326.195	72	238		42	3.3	Post-test Nozzle Cal: A=0.225" B=0.224" C=0.226" Avg=0.225"
2	50	168	0.62	1.87	327.998	72	240		42	3.1	
3	52.5	157	0.53	1.63	329.679	72	241		43	3.0	
4	55	139	0.81	2.56	331.072	72	245		43	3.8	
5	57.5	133	0.56	1.65	332.983	72	250		44	3.1	
6	60	132	0.76	2.43	335.152	72	250		45	3.8	
Averages / Totals		152		2.03	44.052	70.8					

APPENDIX B

PROCESS OPERATING DATA

Date	Heat #	Scrap Wt	MWH Total	Power on Total Min	O2	Inj C	Charge C	Lime	Olivine	Dolo Lime f/total heat	MGO	Tap C	Tap O	Tap Temp
2/18/2003	A001723	145	52.53	41.18	17998	2687	663	3687		4237		0.029	1250	3085
2/18/2003	A001724	141.4	46.71	36.52	17495	2606	689	3690		4240		0.026	1384	3078
2/18/2003	A001725	136.15	44.54	34.06	13262	2415		3672		4188		0.042	762	3044
2/18/2003	A001726	135.9	41.6	32	16060	2018		3684		4180		0.033	1048	3082
2/18/2003	A001727	136.55	41.1	31	13869	1820		3678		4174		0.026	1357	3056
2/18/2003	A001728	136.05	43	34	15882	2004		3680		4154		0.031	1089	3048
2/18/2003	A001729	136.55	41.6	34	15821	1607		4075		4867		0.029	1246	3093
2/18/2003	A001730	135.15	43.2	35	14170	1828		4072	0	4861		0.031	1078	3054
2/18/2003	A001731	135.55	41.21	33.11	17775	2438		4069		4646	250	0.029	1275	3110
2/18/2003	A001732	135	46.45	36.43	14259	2291		4047		4857		0.035	929	3043
2/18/2003	A001733	135	42.6	32	14130	2312		4084	0	4890		0.031	1041	3029
2/18/2003	A001734	135.65	43.1	33	14269	1493		4110		5021	0	0.033	968	3036
2/18/2003	A001735	136.55	41.94	48	15455	1336		4210		5009		0.033	1028	3067
2/18/2003	A001736	136.2	43.66	33	15298	1188		4109		5418		0.036	916	3038
2/18/2003	A001737	135.55	41.26	30.39	18304	1342		4105		5426		0.029	1234	3074
2/19/2003	A001738	135.55	49.7	38.06	17957	2144		4104		5411	150	0.032	1111	3089
2/19/2003	A001739	136.4	43.6	34.1	15876	2001		4128		5407	150	0.031	1146	3088
2/19/2003	A001740	135.65	41.15	33.31	15147	1316	492	4128		5419	100	0.034	1020	3072
2/19/2003	A001741	136.5	42.08	33.25	15583	1493	577	3733		4212	150	0.032	1058	3054
2/19/2003	A001742	137.55	43.96	33.23	14818	1627	570	3718		4193		0.031	1130	3085
2/19/2003	A001743	137	45.09	34.34	12467	1828	572	3719		4188	50	0.032	898	3042
2/19/2003	A001744	137.85	44.71	34.17	13880	1191	550	3685		4191	50	0.029	1268	3088
2/19/2003	A001745	136.65	40.1	30	16020	1559	575	3670		4181	150	0.03	1103	3045
2/19/2003	A001746	135	40.4	31	14728	1964	554	3660		4195	100	0.035	934	3037
2/19/2003	A001747	136.55	41.3	32	14480	1514		4102		5454	150	0.031	960	2994
2/19/2003	A001748	136.05	43.3	33	14875	1491		5429		4113	150	0.031	998	3012
2/19/2003	A001749	135.85	41.2	31	14695	1428		4110		5429	150	0.031	1030	3016
2/19/2003	A001750	135.75	42.4	34	16552	1596		4125		5454	150	0.033	958	3015
2/19/2003	A001751	140.05	44	34	15990	1610		4150		5419	150	0.034	1001	3073
2/19/2003	A001752	141.6	46.2	35	14182	1465		4122		5389	150	0.043	685	2980
2/19/2003	A001753	142.05	41.9	31	15706	1567		4110		5271	150	0.031	1125	3081
2/19/2003	A001754	140.05	43.9	33	16895	1977		5376	0	4095	150	0.032	1019	3038
2/19/2003	A001755	142.55	44	32	15518	1835		4112		5407	150	0.034	911	3004
2/19/2003	A001756	140.55	42	31	14955	1663		4098		5415	150	0.034	964	3037
2/20/2003	A001757	136.25	50.88	40	15251	2599		4112		5440	50	0.026	1407	3089
2/20/2003	A001758	135.05	45.65	35.47	14693	2517	367	3779		4724	100	0.03	1089	3031
2/20/2003	A001759	135.95	44.88	36.28	14136	2030	411	3801		4738	50	0.028	1222	3059
2/20/2003	A001760	136.45	44.64	35.42	15031	2191	474	3748		4209	50	0.032	1081	3063
2/20/2003	A001761	135.15	45.9	36.07	13827	2546	469	3728	0	4391	100	0.038	966	3117
2/20/2003	A001762	136.15	48.76	36.51	13455	2081	455	3745		4388	50	0.03	3152	998
2/20/2003	A001763	136.3	43.86	34.17	14724	1484	455	3771		4684	50	0.033	1140	3127
2/20/2003	A001764	135.85	45.7	35	15280	1661	481	3679		4186	150	0.029	1356	3132
2/20/2003	A001765	135.9	43	33	15163	1751	501	3737		4210	150	0.033	1147	3119
2/20/2003	A001766	138.75	44.5	36	15767	1913	503	3664		4222	150	0.035	1043	3097
2/20/2003	A001767	136.25	47.4	40	16328	2271	537	4110		5450	150	0.03	1089	3041
2/20/2003	A001768	135.5	43.9	33	15621	1498	525	4086		4949	150	0.029	1282	3112
2/20/2003	A001769	136.55	41.6	31	15240	1583	539	3890		4956	100	0.029	1260	3096
2/20/2003	A001770	135.55	42.4	32	15054	1847	514	3950		4962	150	0.03	1264	3120
2/20/2003	A001771	136.05	41.5	31	16678	1889	545	3887		4738	150	0.035	1044	3115
2/20/2003	A001772	137.15	42.5	32	16870	2183	546	3892		4965	100	0.03	1170	3074
2/20/2003	A001773	135.05	43.7	34	17882	2363	526	3950		4949	150	0.032	1039	3042
2/20/2003	A001774	135.7	4432	36	15080	1679	563	3913		4966	150	0.028	1192	3035
2/20/2003	A001775	136	42.26	32	15764	1705	552	3939		4938	150	0.031	1157	3086
2/20/2003	A001776	135.5	42.26	32	15764	1705	556	3950		4421	150	0.024	1714	3146

Slag Rating	Ladle Tare wt	Tap Wt Actual	Ladle	Tap Time	Tap/Tap Time	Bagged LMF Lime	Bagged Lime	Bagged Dolo Lime	Calcium Aluminate
4	69.7	119.7	5	2/18/2003 6:48:00 AM	42		0	250	250
4	70.7	120.2	2	2/18/2003 7:52:00 AM	64		0	250	250
4	67.2	120.9	1	2/18/2003 8:33:00 AM	41		0	250	250
3	71.1	118.9	4	2/18/2003 9:38:00 AM	65		0	250	250
3	71.9	119.3	2	2/18/2003 10:18:00 AM	40	0	0	250	250
3	70.4	114.9	5	2/18/2003 11:05:00 AM	47		0	250	250
3	67.5	120.4	1	2/18/2003 11:47:00 AM	42		0	250	250
3	71.9	114.6	4	2/18/2003 12:28:00 PM	41		0	250	250
3	72.4	118.1	2	2/18/2003 1:16:00 PM	48		0	0	250
3	70.3	120.4	5	2/18/2003 2:03:00 PM	47		0	250	250
3	67.8	119.5	3	2/18/2003 2:44:00 PM	41		0	250	250
3	67.6	120.2	1	2/18/2003 3:27:00 PM	43		0	250	250
3	72.2	116.9	2	2/18/2003 4:16:00 PM	49		0	250	250
3	70.6	116.3	5	2/18/2003 4:59:00 PM	43		0	250	250
3	68.9	125.6	3	2/18/2003 5:44:00 PM	45		0	250	250
3	72.7	119.3	2	2/19/2003 3:42:00 AM	41		0	350	0
4	69	121.6	7	2/19/2003 4:30:00 AM	48		0	350	0
4	68	120.2	3	2/19/2003 5:13:00 AM	43		0	350	0
4	67.2	120.5	1	2/19/2003 6:05:00 AM	52		0	350	0
4	70.4	118.7	5	2/19/2003 6:55:00 AM	50		0	350	50
4	72.2	119.9	2	2/19/2003 7:35:00 AM	40	0	0	350	100
4	67.9	120	3	2/19/2003 8:23:00 AM	48	0	0	350	100
3	67	122.4	1	2/19/2003 9:41:00 AM	75		0	250	50
3	72.7	119.8	2	2/19/2003 10:20:00 AM	39	0	0	250	100
3	68.2	119.8	3	2/19/2003 11:00:00 AM	40		0	250	50
3	71.3	114	5	2/19/2003 11:44:00 AM	44		0	250	50
3	67.6	118.3	1	2/19/2003 12:28:00 PM	42		0	250	100
3	71.4	113.9	2	2/19/2003 1:16:00 PM	48		0	250	100
3	71.3	121	5	2/19/2003 1:59:00 PM	43		0	250	100
3	67.8	123.1	1	2/19/2003 2:42:00 PM	43		0	250	100
	72.1	117.5	4	2/19/2003 3:23:00 PM	41		0	250	100
3	73.2	121.7	2	2/19/2003 4:09:00 PM	46		0	250	100
3	69.9	121.1	5	2/19/2003 4:55:00 PM	46		0	250	100
3	72.2	118	4	2/19/2003 5:32:00 PM	37		0	250	100
4	72.1	122	4	2/20/2003 3:41:00 AM	41		0	350	50
4	721	121.2	2	2/20/2003 4:27:00 AM	46		0	350	50
4	68.5	122.4	5	2/20/2003 5:18:00 AM	51		0	350	50
4	66.2	119.6	1	2/20/2003 6:06:00 AM	48		0	350	50
4	71.6	120.1	2	2/20/2003 6:50:00 AM	44		0	350	50
4	67	120.7	3	2/20/2003 7:34:00 AM	44		0	350	50
4	68.5	119.9	5	2/20/2003 8:24:00 AM	50		0	350	50
3	71.7	115.2	4	2/20/2003 9:20:00 AM	55		0	250	100
3	65.6	120.6	1	2/20/2003 10:02:00 AM	42		0	250	150
3	72	120	2	2/20/2003 10:53:00 AM	51		0	250	150
3	68.2	120	3	2/20/2003 1:31:00 PM	60		0	250	100
3	66.9	117.9	3	2/20/2003 2:13:00 PM	42		0	250	100
3	71.5	117.7	2	2/20/2003 2:55:00 PM	42		0	250	100
3	66	119.6	1	2/20/2003 3:34:00 PM	39		0	250	100
3	71.9	115.8	4	2/20/2003 4:23:00 PM	49		0	250	100
3	68.3	115	5	2/20/2003 5:13:00 PM	50		0	250	100
2	66.5	118.5	3	2/20/2003 6:11:00 PM	58		0	350	100
3	72.1	112.9	2	2/20/2003 6:56:00 PM	45		0	350	100
3	71.6	110.5	6	2/20/2003 7:39:00 PM	43		0	350	100
3	68.7	130.2	5	2/20/2003 8:52:00 PM	73		0	350	100

APPENDIX C

LABORATORY ANALYSIS AND IAP ANALYTICAL DATA

PM/CPM ANALYSIS

EMSL Analytical

2001 E. 52nd Street
Indianapolis, IN 46205

(317) 570-5892
Fax: (317) 570-5894

PM GRAVIMETRIC ANALYSIS DATA SHEET

Client: Steel Dynamics, Inc.- Columbia City, IN(SDI-CCI)
Project Number: 03-T-201

Source Tested: Electric Arc Furnace
Source Sampling Location: BO (Stack)

Run No. 1
Filter No. 02-283
Acetone No. R1
Amount of Liquid Lost During Transport, ml 0
Acetone Blank Volume, ml 130.2
Acetone Wash Volume, ml 89
Acetone Blank Concen., mg/mg (Eq. 5-4)** 9.7903E-07
Acetone Wash Blank. rng (Eq. 5-5)** 0.0684

Container Number	Weight of Particulate Collected, g: Final Weight	Tare Weight	Weight Gain
1	0.24831	0.24781	0.0005
2	112.7402	112.73231	0.0079
Total			0.0084
		Less Acetone Blank	0.0001
		Weight of Particulate Matter	0.0083

	Volume of Liquid Collected: Impinger Volume, ml	Silica Gel Weight, g
Final	303	286
Initial	300	250
Liquid collected	3	36
Total Volume Collected	39	g* ml

Run No. 2
Filter No. 02-285
Acetone No. R2
Amount of Liquid Lost During Transport, ml 0
Acetone Blank Volume, ml 130.2
Acetone Wash Volume, ml 106
Acetone Blank Concen., mg/mg (Eq. 5-4)** 9.7903E-07
Acetone Wash Blank, mg (Eq. 5-5)** 0.0814

Container Number	Weight of Particulate Collected, g: Final Weight	Tare Weight	Weight Gain
1	0.2480	0.2474	0.0006
2	111.4181	111.4072	0.0109
Total			0.0115
		Less Acetone Blank	0.0001
		Weight of Particulate Matter	0.0114

	Volume of Liquid Collected: Impinger Volume, ml	Silica Gel Weight, g
Final	312	296.3
Initial	300	250
Liquid collected	12	46.3
Total Volume Collected	58.3	g* ml

Run No. 3
Filter No. 02-286
Acetone No. R3
Amount of Liquid Lost During Transport, ml 0
Acetone Blank Volume, ml 130.2
Acetone Wash Volume, ml 72
Acetone Blank Concen., mg/mg (Eq. 5-4)** 9.7903E-07
0.0553

Container Number	Weight of Particulate Collected, g: Final Weight	Tare Weight	Weight Gain
1	0.2440	0.2438	0.0002
2	112.9083	112.9005	0.0078
Total			0.0080
		Less Acetone Blank	0.0001
		Weight of Particulate Matter	0.0079

	Volume of Liquid Collected: Impinger Volume, ml	Silica Gel Weight, g
Final	330	295.2
Initial	300	250
Liquid collected	30	45.2
Total Volume Collected	75.2	g* ml

Acetone Blank

Run No. (s) 1, 2, & 3
Acetone Blank No. 1
Amount of Liquid Lost During Transport, ml 0
Acetone Blank Volume, ml 130.2
Acetone Blank Concen., mgirng (Eq. 5-4)** 9.7903E-07

Container Number	Weight of Acetone Residue, g: Final Weight	Tare Weight	Weight Gain
3	113.4470	113.4469	0.0001

* Convert weight of water to volume by dividing total weight increase by density of water:

$$\frac{\text{Increase}}{1\ \text{g/ml}} = \text{Volume Water, ml}$$

** See Federal Register, Method 5, Sections 6.6 & 6.7

Reference # 160300759 **Analyst** Doug Wiegand **Date** 4/2/03

Westmont, NJ (609)858-1260 | Piscataway, NJ (908)981-0550 | Carle Place, NY (516) 997-7251 | Srnyrna. GA (404)333-6066 | Houston, TX (713) 686-3635 | Indianapolis, IN (317) 803-297 | San Mateo, CA (415) 570-5401

April 2, 2003

Guenther/Shackelford Associates
P.O. Box 807
Crown Point. IN 46307

Project: **03-T-201**
Attention: **Fred Guenther/Terry Shackelford**
Ref Number: **160300759**

EPA Method 202 – Determination of Condensible Particulate Emissions from Stationary Sources

SAMPLE ID	MATRIX	ORGANIC PARTICULATE WEIGHT GAIN (g)	INORGANIC PARTICULATE WEIGHT GAIN (g)	BLANK CORRECTED WEIGHT GAIN (g)
R1W	H_2O		0.0024	0.0024
R1M	DCM	0.0004		0.0004
R2W	H_2O		0.0019	0.0018
M M	DCM	0.0007		0.0006
R3W	H_2O		0.0033	0.0033
R3M	DCM	0.0005		0.0004
H_2O Blank	H_2O		0.0001	0.0001
$MeCl_2$ Blank	DCM	0.0001		0.0001

Doug Wiegand
Chemistry Lab Manager

Chain-Of-Custody

EMSL Analytical, Inc.
Chemistry Lab
2001 E. 52nd Street (317)803-2997
Indianapolis, IN 46205 (317)803-3047 fax

Chain of Custody / Analysis Request Form

Print ALL Information. Put N/A in blanks not applicable

EMSL Project # 8
Account Rep:
Indicate State where samples collected:

REPORT RESULTS TO:	SEND INVOICE TO:	TURNAROUND TIME
Name:	Name: PO#:	Date Results needed by:
Company	Company	Standard Turnaround Time is 10 working days X
Address	Address	The following turnaround times require lab approval:
City	City	☐ 4-5 days ☐ 72 Hrs ☐ 48 Hrs
State ZIP	State ZIP	☐ 24 Hrs Approved by
TEL: FAX: 417-282-6140	TEL: FAX:	
Sampled by: (Signature) Brad Perdue	# of Samples in Shipment: 15	Date of Sample Shipment: 2-21-03

Failure to complete shaded areas will hinder processing of samples.

	Sample Number	Station Location /Sample ID	COMP	GRAB	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	Method Preserved: HCL	HNO3	H2SO4	ICE	OTHER	Sampling: DATE	TIME	List Test Needed
1.	R1-Filter-03-T-201			✓			✓								2/19		
2.	R2-Filter			✓			✓								2/19		
3.	R3-Filter			✓			✓								2/19		
4.	R1-A			✓			✓								2/19		
5.	R2-A			✓			✓								2/19		
6.	R3-A			✓			✓								2/19		
7.	Field Blank								✓						2/19		
8.																	
9.																	
10.																	

Relinquished By Signature	Date & Time Relinquished	Delivery Method	Received By Signature	Agency	Date & Time Received	Condition Noted
[signature]	2-21-03	Hand	[signature]	D	2/21 5:15	

Comments:

Please indicate reporting requirements: ☐ 1. Results Only ☐ 2. Results and QC ☐ 3. Reduced Deliverables ☐ 4. Disk Deliverable

EMSL Analytical, Inc.
Chemistry Lab
2001 E. 52nd Street (317)803-2997
Indianapolis, IN 46205 (317)803-3047 fax

Chain of Custody / Analysis Request Form

Print ALL Information. Put N/A in blanks not applicable

EMSL Project #_____
Account Rep:_____
Indicate State where samples collected:
_____

REPORT RESULTS TO:	SEND INVOICE TO:	TURNAROUND TIME
Name: Fred Gaeckler	Name: Fred PO#: Verbal	Date Results needed by:_____
Company GPSA	Company GPSA	Standard Turnaround Time is 10 working days ☒
Address	Address	The following turnaround times require lab approval:
City Crown Point	City Crown Point	☐ 4-5 days ☐ 72 Hrs ☐ 48 Hrs
State IN ZIP	State IN ZIP	☐ 24 Hrs Approved by
TEL: FAX:	TEL: FAX:	
Sampled by: (Signature) Andy Purdue	# of Samples in Shipment: 5	Date of Sample Shipment: 2-21-03

Failure to complete shaded areas will hinder processing of samples.

	Sample Number	Station Location /Sample ID	COMP	GRAB	MATRIX: WATER	SOIL	AIR	SLUDGE	OTHER	Method Preserved: HCL	HNO3	H2SO4	ICE	OTHER	Sampling: DATE	TIME	List Test Needed
1.	RL-W	03-T-204		✓			✓								2/18		
2.	RL-W			✓			✓								2/19		
3.	RB-W			✓			✓		✓						2/19		
4.	Hg Blk														2/19		
5.	RL-M			✓			✓								2/18		
6.	RB-M			✓			✓								2/19		
7.	RL-M			✓			✓								2/19		
8.	MeCl Blk	↓							✓						2/19		
9.																	
10.																	

Relinquished by Signature	Date & Time Relinquished	Delivery Method	Received By Signature	Agency	Date & Time Received	Condition Noted
[signature]	2-21-03 Noon		[signature]	5:15	2/21 5:15	

Comments:

Please indicate reporting requirements: ☐ 1. Results Only ☐ 2. Results and QC ☐ 3. Reduced Deliverables ☐ 4. Disk Deliverable

CO_2, O_2, SO_2, NO_X, AND CO CORRECTED VALUES

EAF Baghouse Outlet

Grace Consulting, Inc.

Sampling System Bias Check and **Measured** Value Correction

SDI
Columbia City **-** Unit **EAF**

Date: 2/1812003
Pollutant: NOx
Monitor Span: 50

Run Number	Average Measured Value	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Value, Dry Basis
1	6.11	0.09	0.08	-0.02	26.98	26.85	-0.26	26.70	6.00
2	3.67	0.08	0.11	0.06	26.85	26.43	-0.84	26.70	3.60
3	4.18	0.11	0.18	0.14	26.43	26.39	-0.08	26.70	4.10

Cgas = (Cavg -, Co) * Cma / (Cm - Co) Eq. 6C-1

where: Cgas = Effluent gas concentration, dry basis, ppm
Cavg =Average gas concentraiton indicated by gas analyzer, dry basis, ppm
Co = Average of initial and final system calibration bias check responses for the zero gas, ppm
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm
Cma = Actual concentration of the upscale calibration gas, pprn

Grace Consulting, Inc.

Sampling System **Bias** Check and Measured Value Correction

SDI
Columbia City - Unit **EAF**

Date: 2/18/2003
Pollutant: SO2
Monitor Span: 50

Run Number	Average Measured Value	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Value, Dry Basis
1	3.31	0.05	1.00	1.90	27.40	27.59	0.38	28.30	2.92
2	2.30	1.00	0.61	-0.78	27.59	27.98	0.78	28.30	1.57
3	3.06	0.61	0.58	-0.06	27.98	27.75	-0.46	28.30	2.56

$$Cgas = (Cavg - Co) * Cma / (Cm - Co) \qquad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, ppm
Cavg = Average gas concentraiton indicated by gas analyzer, dry basis, ppm
Co = Average of initial and final system calibration bias check responses for the zero gas, pprn
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm
Cma = Actual concentration of the upscale calibration gas, ppm

Grace Consulting, Inc.

Sampling System Bias Check and Measured Value Correction

SDI

Columbia City - Unit EAF

Date: 211812003
Pollutant: C02
Monitor Span: 20

Run Number	Average Measured Percent	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Percent, Dry Basis
1	0.85	0.32	0.21	-0.56	11.05	11.00	-0.28	10.90	0.59
2	0.91	0.21	0.18	-0.13	11.00	11.03	0.18	10.90	0.72
3	1.20	0.18	0.15	-0.17	11.03	11.02	-0.03	10.90	1.04

$$Cgas = (Cavg - Co) \bullet Cma / (Cm - Co) \qquad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, percent
Cavg = Average gas concentraiton indicated by gas analyzer, dry basis, percent
Co = Average of initial and final system calibration bias check responses for the zero gas, percent
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, percent
Cma = Actual concentration of the upscale calibration gas, percent

Grace Consulting, Inc.

Sampling System Bias Check and Measured Value Correction

SDI
Columbia City - Unit EAF

Date: 2/18/2003
Pollutant: 0 2
Monitor Span: 25

Run Number	Average Measured Percent	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Percent, Dry Basis
1	19.96	0.60	0.55	-0.18	13.00	13.24	0.96	13.00	20.09
2	18.78	0.55	0.50	-0.21	13.24	13.17	-0.28	13.00	18.72
3	19.40	0.50	0.49	-0.06	13.17	13.14	-0.12	13.00	19.41

$$Cgas = (Cavg - Co) \bullet Cma / (Cm - Co) \quad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, percent
Cavg = Average gas concentraiton indicated by gas analyzer, dry basis, percent
Co = Average of initial and final system calibration bias check responses for the zero gas, percent
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, percent
Cma = Actual concentration of the upscale calibration gas, percent

RF Baghouse Outlet

Grace Consulting, Inc.

Sampling System Bias Check and Measured Value Correction

SDI
Columbia City - Unit Reheat Furnace

Date: *211912003*
Pollutant: NOx
Monitor Span: *50*

Run Number	Average Measured Value	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Value, Dry Basis
1	48.78	1.42	0.08	-2.68	27.29	26.58	-1.42	26.70	48.97
2	51.11	0.08	0.22	0.28	26.58	25.94	-1.28	26.70	52.11
3	51.80	0.22	0.65	0.86	25.94	26.03	0.18	26.70	53.68

Cgas = (Cavg - Co) * Cma / (Cm - Co) Eq. 6C-1

where:
Cgas = Effluent gas concentration, dry basis, ppm
Cavg = Average gas concentraiton indicated by gas analyzer, dry basis, ppm
Co = Average of initial and final system calibration bias check responses for the zero gas, ppm
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm
Cma = Actual concentration of the upscale calibration gas, ppm

Grace Consulting, Inc.

Sampling System Bias Check and Measured Value Correction

SDI
Columbia City - Unit Reheat Furnace

Date: *211912003*
Pollutant: CO
Monitor Span: 100

Run Number	Average Measured Value	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Value, Dry Basis
1	3.07	0.95	0.70	-0.25	30.72	31.43	0.71	30.52	2.27
2	4.04	0.70	0.34	-0.36	31.43	33.64	2.21	30.52	3.36
3	2.95	0.34	0.50	0.16	33.64	32.72	-0.92	30.52	2.36

$$Cgas = (Cavg - Co) * Cma / (Cm - Co) \qquad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, ppm
Cavg = Average gas concentraiton indicated by gas analyzer, dry basis, ppm
Co = Average of initial and final system calibration bias check responses for the zero gas, ppm
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm
Cma = Actual concentration of the upscale calibration gas, ppm

Grace Consulting, Inc.

Sampling System Bias Check and Measured Value Correction

SDI
Columbia City - Unit Reheat Furnace

Date: 2/19/2003
Pollutant: C02
Monitor Span: 20

Run Number	Average Measured Percent	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Percent, Dry Basis
1	6.18	0.23	0.20	-0.18	10.93	10.87	-0.31	10.90	6.09
2	6.08	0.20	0.18	-0.09	10.87	10.94	0.37	10.90	5.99
3	6.10	0.18	0.16	-0.07	10.94	11.01	0.35	10.90	5.98

$$Cgas = (Cavg - Co) \cdot Crna / (Cm - Co) \qquad \text{Eq. 6C-1}$$

where:
Cgas = Effluent gas concentration, dry basis, percent
Cavg = Average gas concentraiton indicated by gas analyzer, dry basis, percent
Co = Average of initial and final system calibration bias check responses for the zero gas, percent
Crn = Average of initial and final system calibration bias check responses for the upscale calibration gas, percent
Cma = Actual concentration of the upscale calibration gas, percent

Grace Consulting, Inc.

Sampling System Bias Check and Measured Value Correction

SDI
Columbia City - Unit Reheat Furnace

Date: *211912003*
Pollutant: *0 2*
Monitor Span: *25*

Run Number	Average Measured Percent	Initial Zero Gas Bias	Final Zero Gas Bias	Zero Gas Drift	Initial Upscale Gas Bias	Final Upscale Gas Bias	Upscale Gas Drift	Calibration Gas	Corrected Percent, Dry Basis
1	9.30	0.10	0.01	-0.33	12.80	12.75	-0.19	13.00	9.45
2	9.54	0.01	0.02	0.05	12.75	12.70	-0.21	13.00	9.74
3	9.73	0.02	0.08	0.20	12.70	12.78	0.32	13.00	9.92

Cgas = (Cavg - Co) * Cma ▌(Cm - Co) Eq. 6C-1

where:
Cgas = Effluent gas concentration, dry basis, percent
Cavg = Average gas concentraiton indicated by gas analyzer, dry basis, percent
Co = Average of initial and final system calibration bias check responses for the zero gas, percent
Cm = Average of initial and final system calibration bias check responses for the upscale calibration gas, percent
Cma = Actual concentration of the upscale calibration gas, percent

F ANALYSIS

SAMI

318 North Harmony
Medina, OH 44256

Project ID: Guenther / Shackelford

Total Fluoride

EPA Method 13B Analysis

Analytical Report
1426

el1

Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX:910-792-6853 e llab@hotmail.com

I have reviewed the following data for completeness, accuracy, adherence to method protocol, and compliance with quality assurance guidelines.

Quality assurgnce review by Bruce Hawks

Bruce Hawks 3/6/03

el1

SUMMARY OF RESULTS

el1

Summary of Total Fluoride Analysis

Element	SDI-R1 Total mg	SDI-R2 Total mg	SDI-R2 Total mg	SDI-R3 Total mg	SDI-Blank Total mg
Fluoride	18.1	19.3	18.7	20.8	13.7

Fluoride RPD and Spike Recoveries

Run Number	RPD	Run Number	Recovery
SDI-R2	3.2%	SDI-R3	107%

ANALYTICAL NARRATIVE

el1

Element One Analytical Narrative

Client	SAMI	Element One #:	1426
Client ID:	Guenther / Shackelford & Assoc.	Analyst:	IJJ
Date Received	2/25/03	Method:	13B
Analytes	Fluoride	Date Analyzed	2/27-3/6/03

Summary of Analysis

The samples were prepared and analyzed according to Method 13B protocol. Samples were analyzed for fluoride with a Accumet® AR25 pH/ion meter and a Symphony combination fluoride electrode.

Detection Limits

The instrument detection limit for fluoride was 0.1 µg/ml

Analysis QA/QC

Duplicate analysis relative percent difference (RPD) and spike sample recovery data are summarized with the summary of results. All QC was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. Nothing unusual was noticed with any of the samples or analyses.

SAMPLE CUSTODY

el1

sami
SAMPLING & ANALYTICAL MANAGEMENT, INC.

963 CONCORD DRIVE
MEDINA, OHIO 44256
(330) 723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Page 1 of 1

Please Print. Instructions on reverse side correspond with circled numbers

(1) Company Name: SAMI
Report Address:
Billing Address:
City: State: Zip:
Phone: Fax:
Report Attention: MICHELLE
Project Name: GNA 03-T-201
P.O. #: 03-T-201

Indicate state where samples were collected:

Compliance ☒ Non-Compliance ☐

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	Air (☐ Source ☐ Ambient ☐ IH)	Canisters*	(5) Analysis Requested: MI. EPA M13*	(6) Remarks	Temperature of samples upon receipt (if requested)
SDI-M13B-R1	2/20/03	0400	✓						✓		✓		
SDI-M13B-R2		0700	✓						✓		✓		
SDI-M13B-R3		1000	✓						✓		✓		
SDI-M13B-RLAB		1300	✓						✓		✓		

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to SAMI approval and surcharge.)
Date results are needed: _____
Rush results requested by (please circle): Fax Mail
Fax # _____

(8) **Notes:** (1) PLEASE RETURN SIGNED CHAIN OF CUSTODY W/ RESULTS
(2) PLEASE PROVIDE A LIST OF TYPE & MODEL NOS. OF ANALYTICAL EQUIPMENT W/ RESULTS
(3) PLEASE RETURN COOLER TO: GNA 3415 W. 106TH LANE CROWN POINT IN 46307

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	2/21/03	15:00	[signature]	2/21/03	1155
Relinquished by:	Date	Time	Received by: e 1424	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

(10) *Canister Pressure / Vacuum

Initial	Final	Receipt

WHITE - FILE • YELLOW - CLIENT • PINK - LAB

Analytical Data

el1

elementOne

Fluoride Method 13B Analysis

Lab # e1426

Client SAMI
Date(s) 2/27/03 - 3/6/03
Electrode Efficiency 97.4% 3/6/03 IJJ

Analyst IJJ

Sample	Initial Vol, ml	Crucible Number	Final Vol, ml	Dilution	Conc. ug/ml	Total mg	Spike ug/ml	Conc. ug/ml	RPD or Recovery
Blank		11	1000	1	< 0.1	< 0.1			
Blank Spike		12	1000	2			10.0	4.63	93%
1426-1	525	1	1000	10	1.81	18.10			
2/3	530	3	1000	10	1.93	19.30			
2/3-DUP	530	3	1000	10	1.87	18.70			3%
4/5	530	9	1000	10	2.08	20.80	5.0	7.41	107%
6	530	10	1000	10	1.37	13.70			
QC-DI Check	1st	0.211							
220ml DI	2cd	0.238							
distilled after									
every three									
samples									

Element One. Inc. Form 129 - Revision 0.0

GOC ANALYSIS

Research Triangle Park Laboratories, Inc.
5109 Ebenezer Church Road
Raleigh, NC 27612

919 510-0228 Telephone
919 510-0141 Fax

March 10, 3003

Sampling & Analytical Management, Inc.
963 Concord Drive
Medina, OH 44256

ATTN: Michelle Laliberte

Project Name: Steel Dynamics
Project #: G/SA 03-1-201
PO #: 03-T-201
RTP Tracking #: 048-03

Enclosed with this letter is the report on the analyses for the samples received February 21,2003 for a normal turn-around. Three tedlar bags and one audit sample in a gas cylinder were received in good condition with a chain of custody form completed. The samples were analyzed according to Method 18 by GC/FID for hexane, benzene, toluene, and naphthalene. The samples were analyzed on a Varian Star 3400 CX with a Supelco VOCOL 105m column. The lab spike was analyzed 4 days after it was spiked. Naphthalene did not meet the criteria for the calibration curve and lab spike because it is not stable in a Tedlar bag at the level analyzed. Naphthalene's stability in a Tedlar bag is unknown at other levels.

Please note that ND means not detected at the reporting limits expressed.

Amy M. Gordon
Chemist

Research Triangle Park Laboratories, Inc.
S109 Ebenezer Church Road
Raleigh, NC 27612

919 510-0228 Telephone
919 510-0141 Fax

Method 18 by GC/FID

Client Name:	Sampling & Analytical Management, Inc.		
Project Name:	Steel Dynamics		
RTP Tracking No:	048-03		
Matrix:	Tedlar Bags		
Sampled:	February 20,2003	Received:	February 21, 2003
Prepared:	February 24,2003	Analyzed:	February 21-27,2003

Sample Name	Hexane ppmv	Benzene ppmv	Toluene ppmv	Naphthalene ppmv
M18 R1	ND	ND	ND	ND
M18 R2	ND	ND	ND	ND
M18 R3	ND	ND	ND	ND
10 ppmv Lab Spike M18 R2	**11.7 (117%)**	**11.1 (111%)**	**9.0 (90%)**	ND **(0%)**
Audit Sample	**ND**	**27.0**	ND	ND
Estimated Reporting Limit	**2.1**	**5.3**	**5.4**	**5.0**
Instrument Detection Limit	**1**	**1**	**1**	**1**

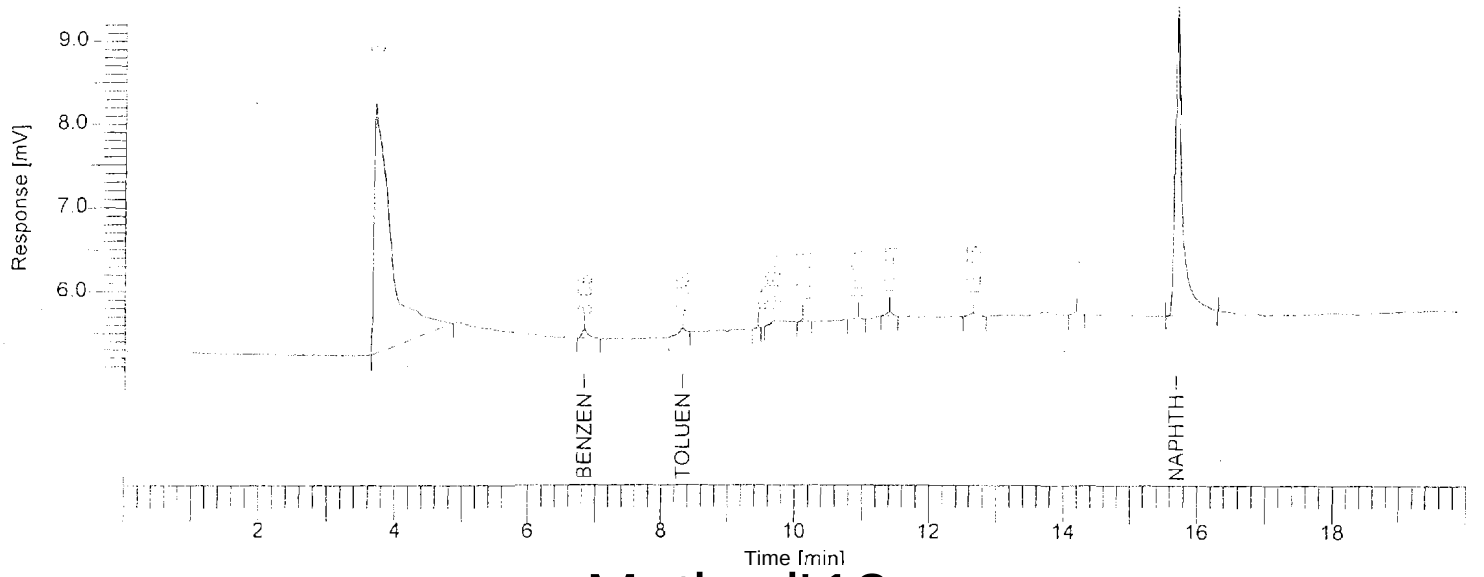
ND = Not detected at the reporting limits expressed.

Run 1

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:24:06 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 3:39:08 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803015.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method'18

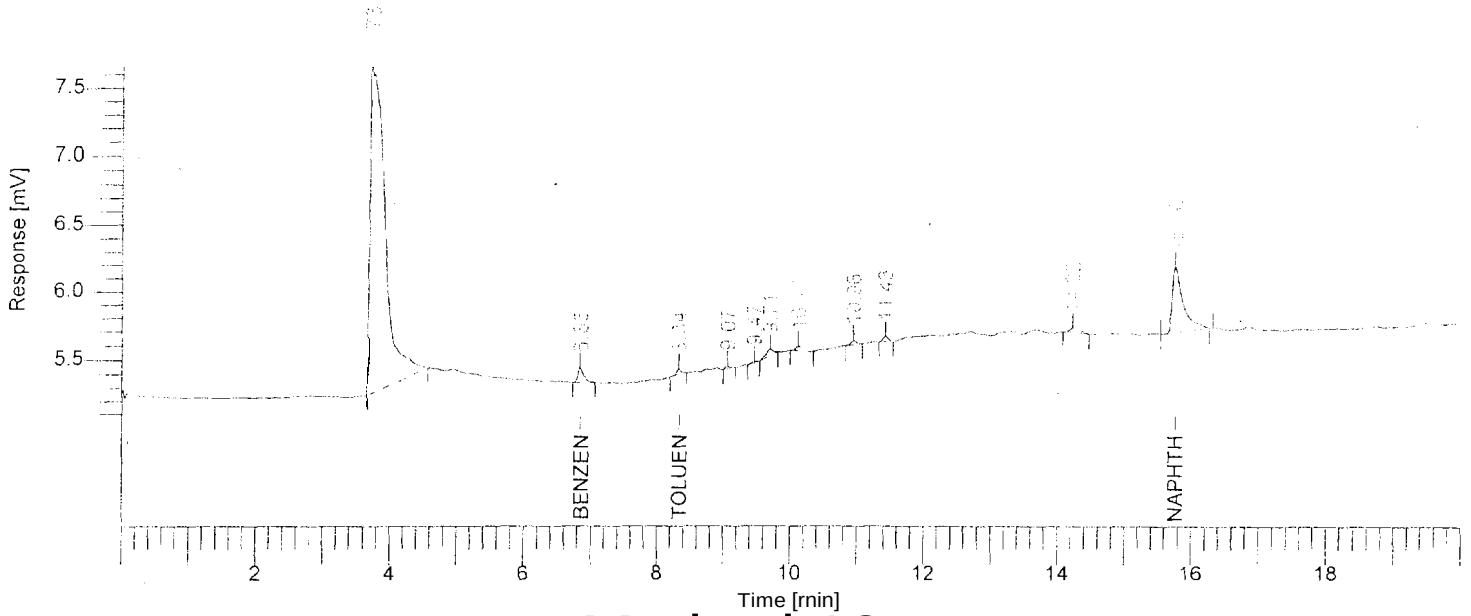
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.730	51601.00	1.2670
2	Benzene	6.845	651.00	0.5284
3	Toluene	8.329	370.00	0.7182
4		9.461	65.50	0.0016
5		9.693	145.00	0.0036
6		10.125	172.00	0.0042
7		10.945	147.00	0.0036
8		11.413	298.00	0.0073
9		12.661	403.00	0.0099
10		14.197	165.00	0.0041
11	Naphthalene	15.704	26218.14	2.7696
			80235.64	5.3175

Run 1

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:24:23 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 4:04:48 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803016.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

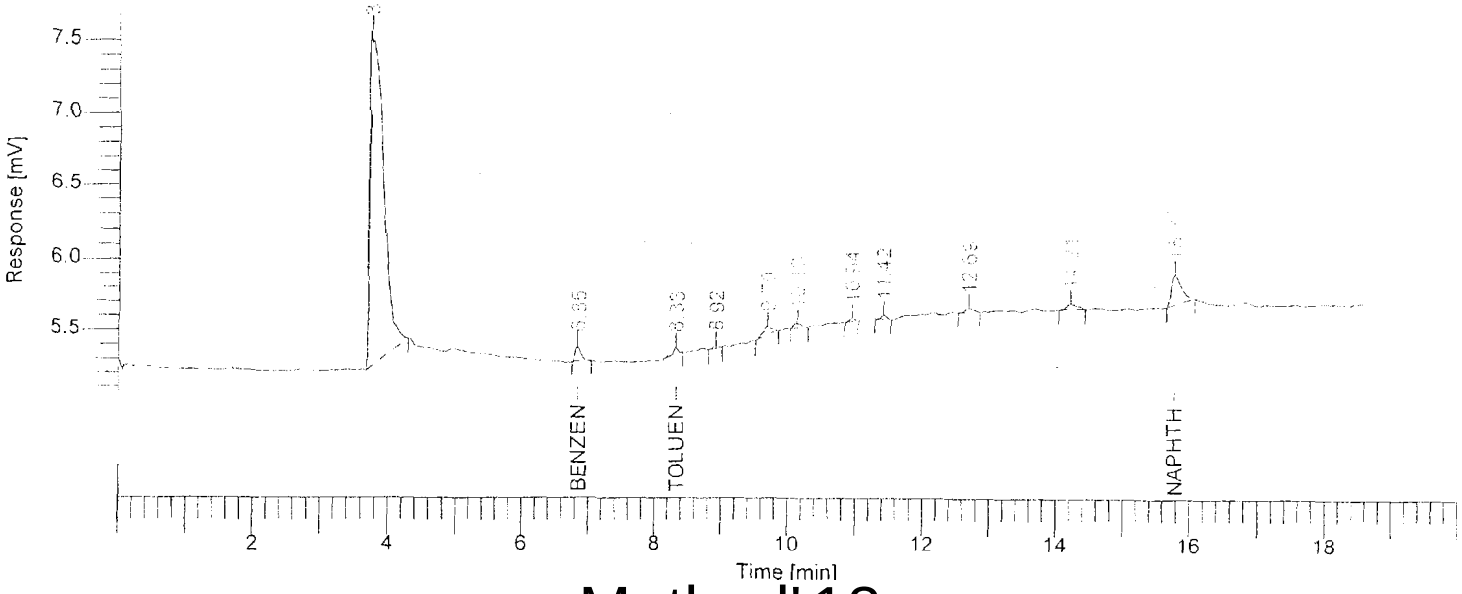
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.734	37804.00	0.9282
2	Benzene	6.854	. 669.50	0.5292
3	Toluene	8.336	185.00	0.7112
4		9.071	77.00	0.0019
5		9.470	59.00	0.0014
6		9.705	351.50	0.0086
7		10.128	314.00	0.0077
8		10.956	167.00	0.0041
9		11.431	235.00	0.0058
10		14.224	364.00	0.0089
11	Naphthalene	15.760	5344.95	0.5646
			45570.95	2.7717

Run 1

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 I:24:42 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 4:28:13 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 010	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803017.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method' 18

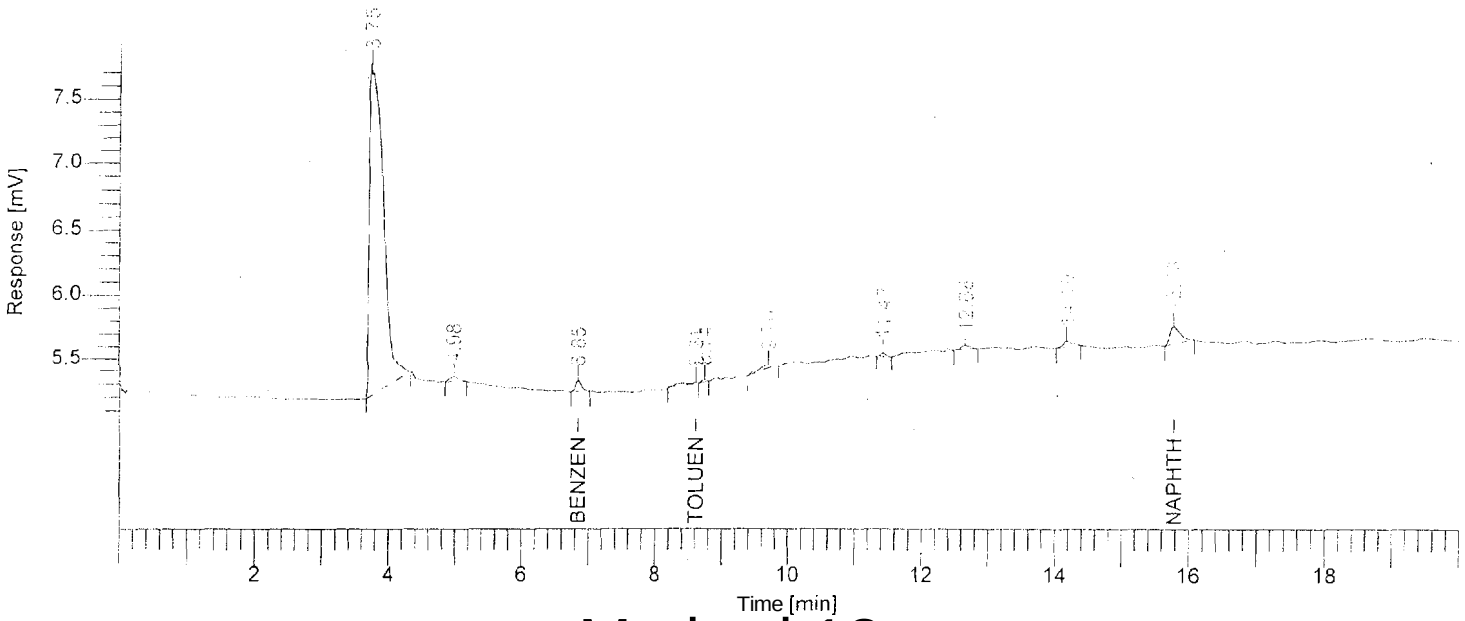
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.745	33382.50	0.8196
2	Benzene	6.847	611.50	0.5268
3	Toluene	8.327	267.00	0.7143
4		8.924	79.00	0.0019
5		9.700	525.00	0.0129
6		10.134	248.50	0.0061
7		10.944	132.00	0.0032
8		11.416	191.50	0.0047
9		12.686	225.00	0.0055
10		14.210	406.00	0.0100
11	Naphthalene	15.772	2177.00	0.2300
			38245.00	2.3351

Run 2

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:25:35 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 4:50:34 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803018.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

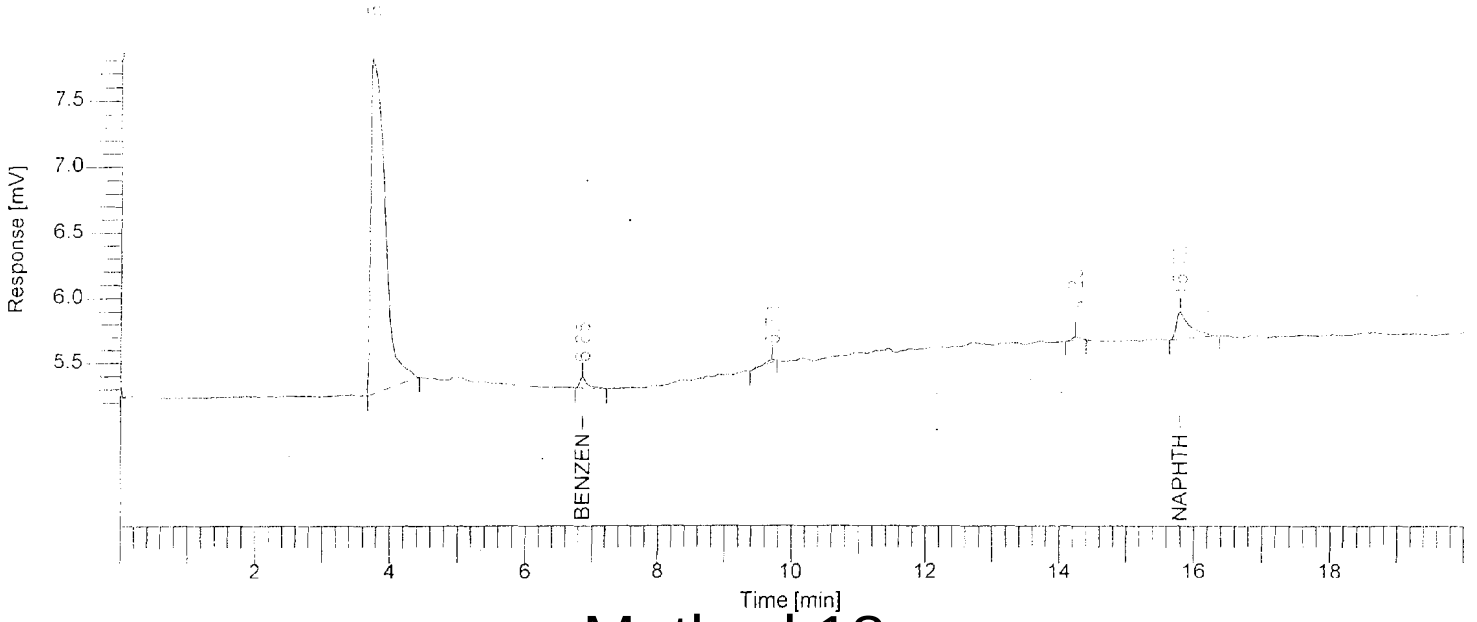
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.745	36676.50	0.9005
2		4.980	328.00	0.0081
3	Benzene	6.848	528.00	0.5233
4	Toluene	8.606	287.00	0.7151
5		8.736	86.00	0.0021
6		9.695	464.00	0.0114
7		11.419	152.00	0.0037
8		12.678	272.00	0.0067
9		14.191	417.50	0.0103
10	Naphthalene	15.776	1487.50	0.1571
			40698.50	2.3382

Rm 2

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:25:48 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 5:16:30 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803019.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

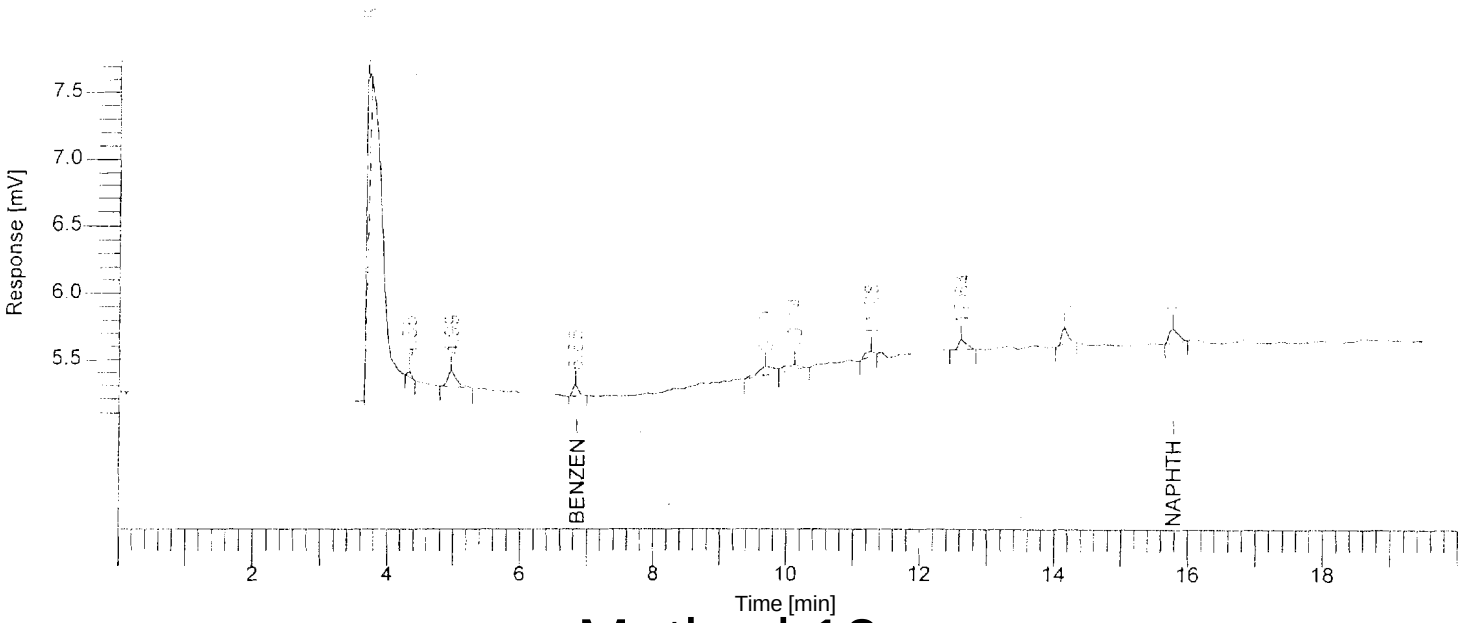
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.745	37477.00	0.9202
2	Benzene	6.855	690.00	0.5301
3		9.707	278.50	0.0068
4		14.232	231.00	0.0057
5	Naphthalene	15.789	2916.00	0.3080
			41592.50	1.7708

Run 2

1mL

Software Version : 6.1.2.0.1:D19		Date	: 3/7/03 1:26:04 PM
Sample Name :		Data Acquisition Time	: 2/24/03 5:38:24 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803020.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

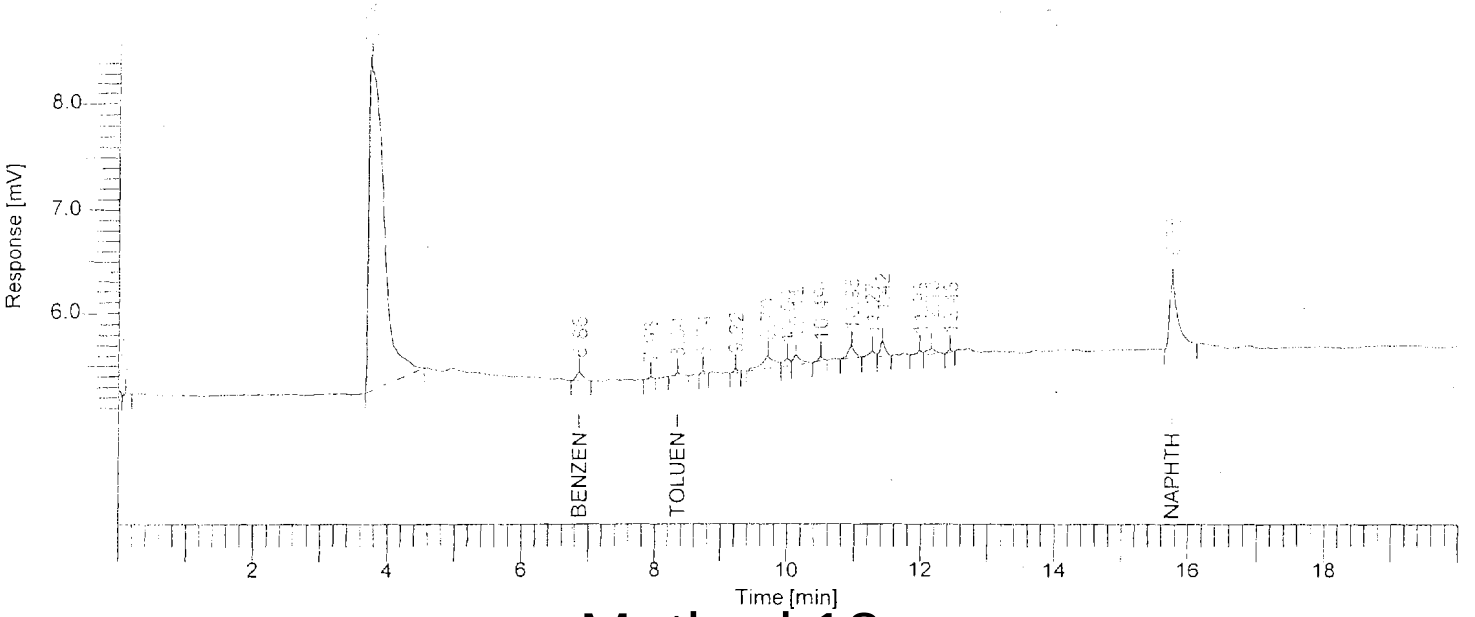
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.746	4445.50	0.1091
2		4.351	194.00	0.0048
3		4.986	1181.00	0.0290
4	Benzene	6.851	512.50	0.5226
5		9.702	1195.04	0.0293
6		10.138	809.46	0.0199
7		11.280	381.00	0.0094
8		12.641	583.00	0.0143
9		14.170	811.00	0.0199
10	Naphthalene	15.778	992.00	0.1048
			11104.50	0.8631

Run 3

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:26:26 PM
Sample Name	:	Data Acquisition Time	: 2/25/03 10:40:15 AM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803023.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

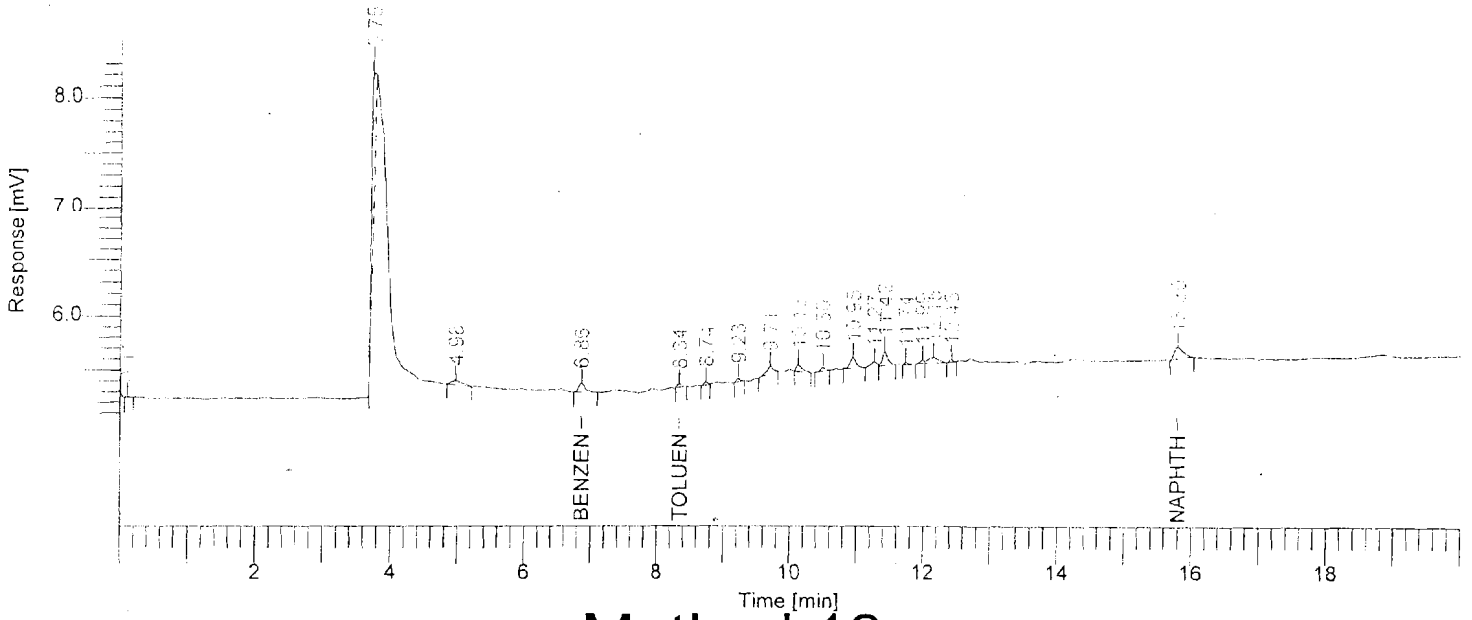
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.102	70.00	0.0017
2		3.744	49068.00	1.2048
3	Benzene	6.857	515.50	0.5228
4		7.930	76.00	0.0019
5	Toluene	8.343	185.00	0.7112
6		8.737	109.00	0.0027
7		9.223	194.03	0.0048
8		9.701	1684.46	0.0414
9		9.999	515.00	0.0126
10		10.123	747.23	0.0183
11		10.490	182.00	0.0045
12		10.951	835.51	0.0205
13		11.266	363.78	0.0089
14		11.419	767.21	0.0188
15		11.975	170.88	0.0042
16		12.154	513.12	0.0126
17		12.433	94.00	0.0023
18	Naphthalene	15.753	5251.00	0.5547
			61341.72	3.1486

Run 3

1mL

Software Version	: 6.1.2.0.1:DI9	Date	: 3/7/03 1:26:45 PM
Sample Name	:	Data Acquisition Time	: 2/25/03 11:04:37 AM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803024.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

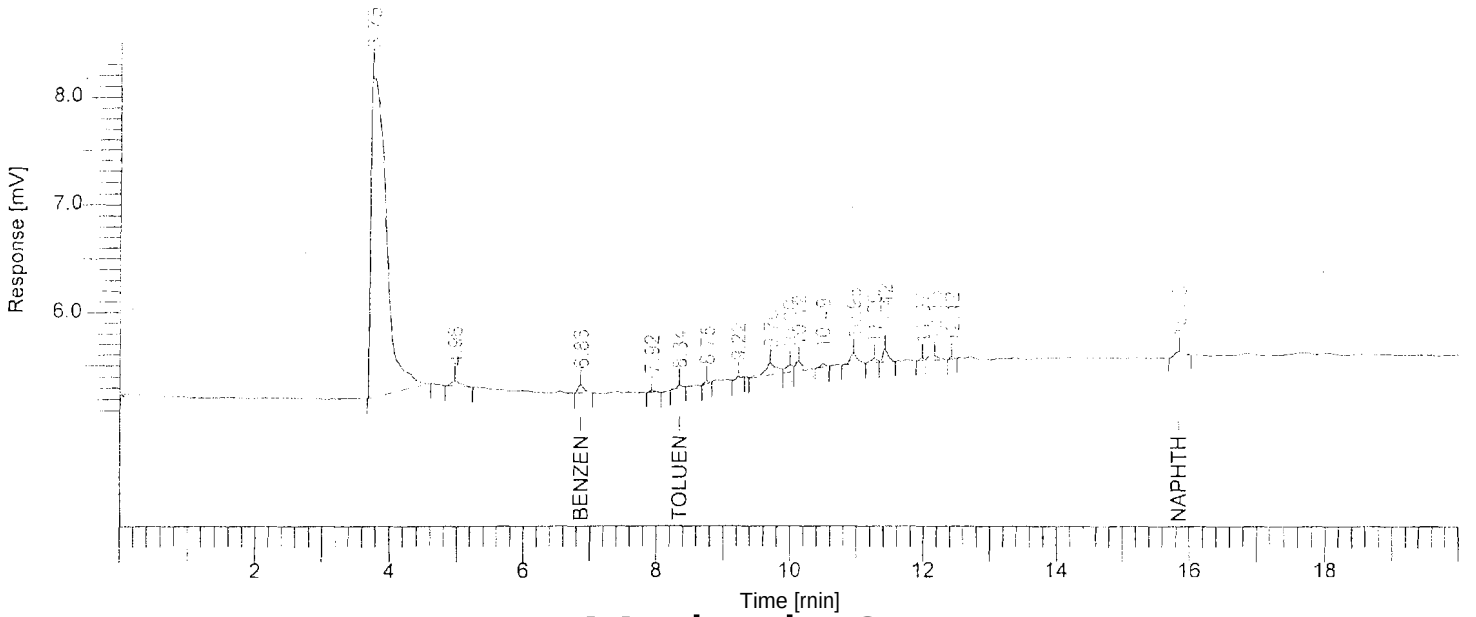
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.110	42.50	0.0010
2		3.747	4869.00	0.1195
3		4.975	453.00	0.0111
4	Benzene	6.865	545.00	0.5240
5	Toluene	8.345	139.00	0.7094
6		8.741	125.50	0.0031
7		9.227	125.00	0.0031
8		9.705	428.00	0.0105
9		10.128	408.00	0.0100
10		10.498	161.00	0.0040
11		10.954	648.28	0.0159
12		11.265	245.81	0.0060
13		11.423	716.91	0.0176
14		11.739	74.50	0.0018
15		11.986	146.26	0.0036
16		12.154	541.74	0.0133
17		12.426	95.00	0.0023
18	Naphthalene	15.796	968.00	0.1023
			10732.50	1.5587

Run 3

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:26:59 PM
Sample Name	:	Data Acquisition Time	: 2/25/03 11:26:46 AM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803025.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



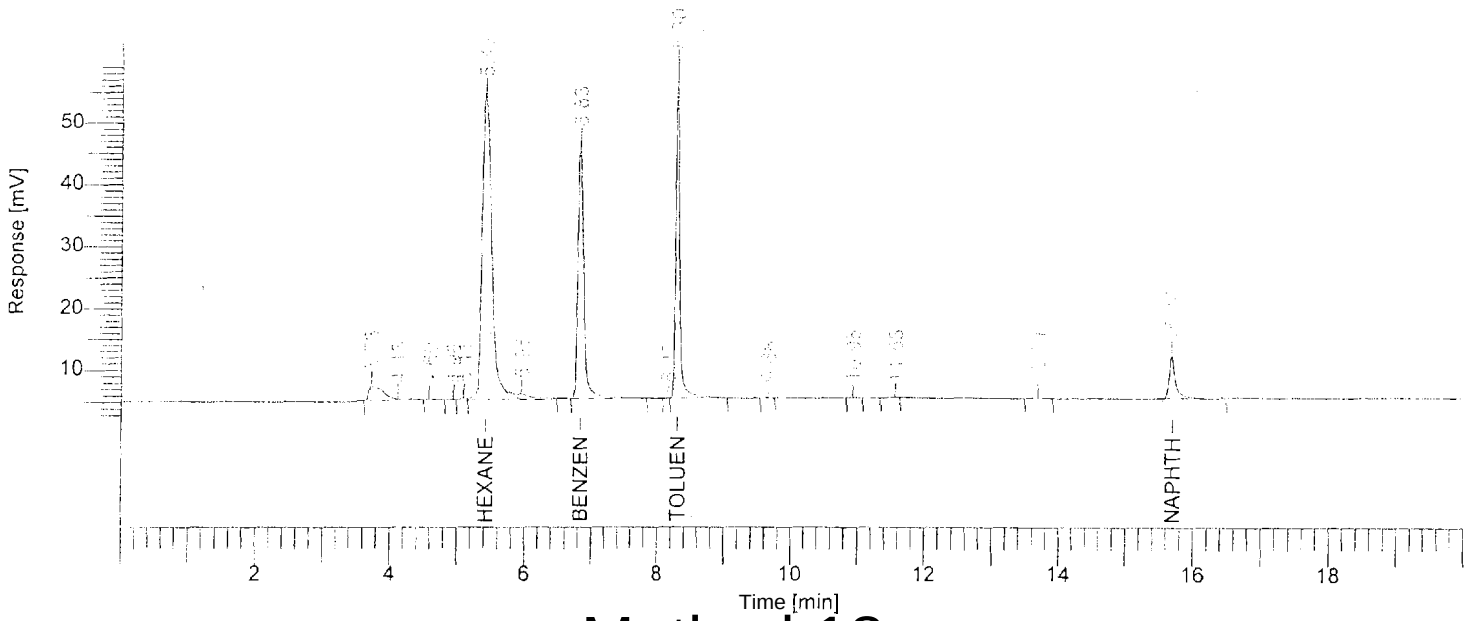
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.748	46097.00	1.1318
2		4.964	493.00	0.0121
3	Benzene	6.857	472.50	0.5210
4		7.924	111.00	0.0027
5	Toluene	8.340	116.00	0.7086
6		8.748	112.00	0.0027
7		9.223	88.00	0.0022
8		9.703	1337.26	0.0328
9		9.996	494.50	0.0121
10		10.121	761.24	0.0187
11		10.487	166.00	0.0041
12		10.948	836.84	0.0205
13		11.255	306.70	0.0075
14		11.419	701.45	0.0172
15		11.971	123.18	0.0030
16		12.157	520.32	0.0128
17		12.419	96.00	0.0024
18	Naphthalene	15.832	450.50	0.0476
			53283.50	2.5599

10ppm Lab Spike Run 2 1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:27:41 PM
Sample Name	:	Data Acquisition Time	: 2/28/03 12:00:36 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 11		

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803041.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

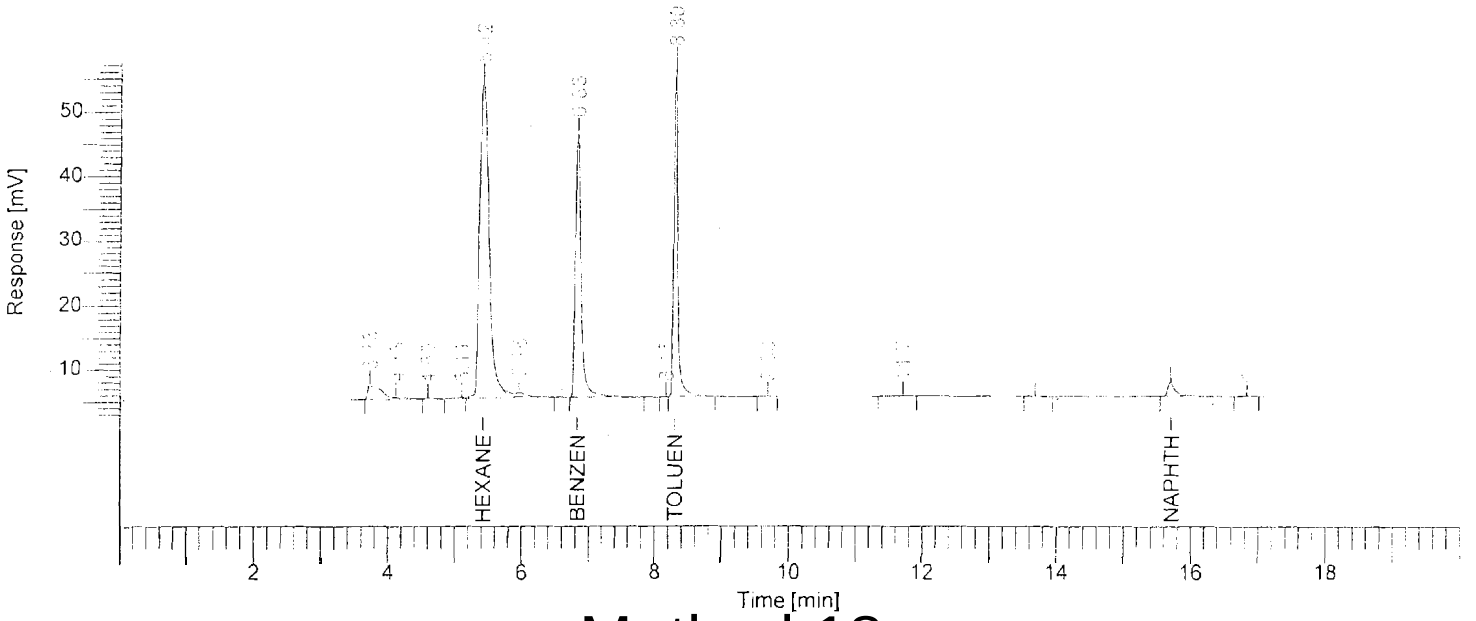
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount	ppm Avg
1		3.732	35620.37	0.8746	
2		4.132	4316.00	0.1060	
3		4.603	2435.38	0.0598	
4		4.958	868.75	0.0213	
5		5.107	2219.49	0.0545	
6	Hexane	5.422	486456.25	11.6254	11.7165
7		5.964	16882.00	0.4145	11.1479
8	Benzene	6.834	254892.82	11.1456	
9		8.169	173.45	0.0043	9.0053
10	Toluene	8.301	220438.55	9.0605	
11		9.676	293.00	0.0072	
12		10.946	141.00	0.0035	
13		11.581	311.00	0.0076	
14		13.706	1047.00	0.0257	
15	Naphthalene	15.697	44021.00	4.6503	2.6580
			1070116.06	38.0608	

10ppm Lab Spike Run 2

1mL

Software Version	: 6.1.2.0.1:D19	Date	: 3/7/03 1:27:56 PM
Sample Name	:	Data Acquisition Time	: 2/28/03 12:23:33 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803042.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

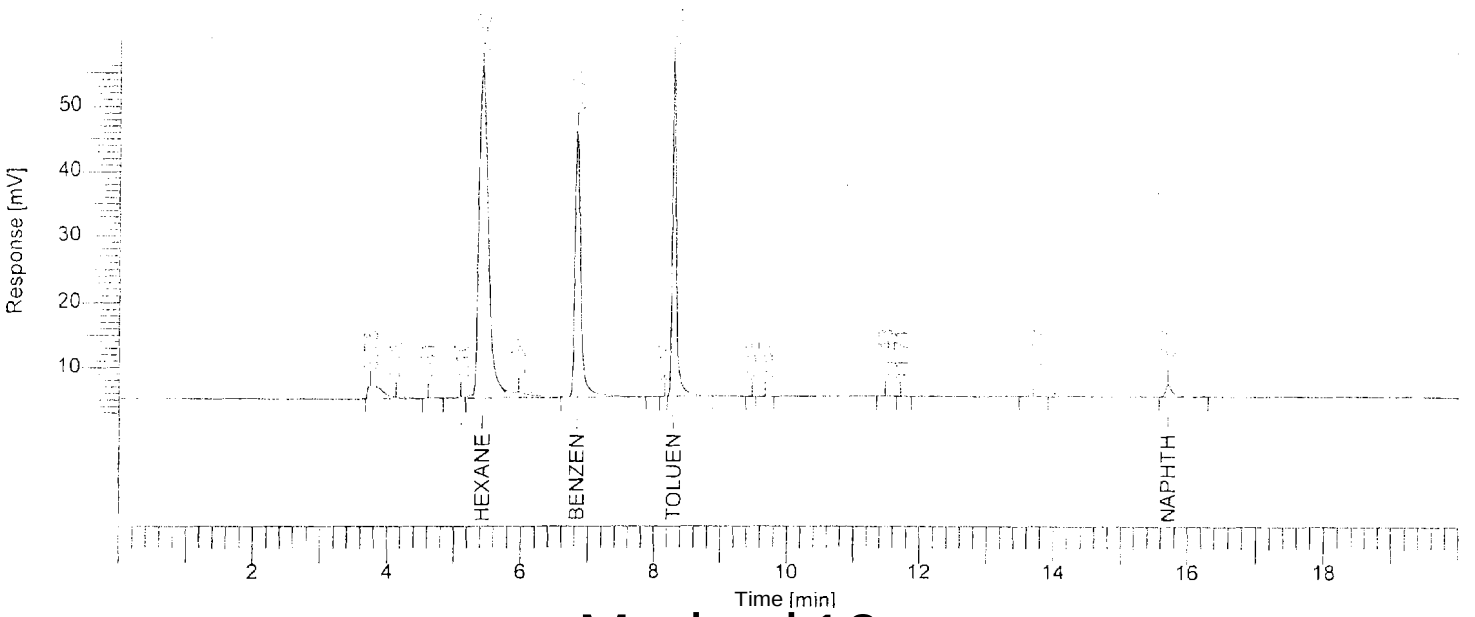
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.734	33925.13	0.8330
2		4.132	3457.00	0.0849
3		4.603	1240.87	0.0305
4		5.107	1740.08	0.0427
5	Hexane	5.422	486283.42	11.6192
6		5.963	11239.00	0.2759
7	Benzene	6.832	251789.00	11.0160
8		8.165	190.86	0.0047
9	Toluene	8.298	217007.64	8.9305
10		9.680	360.50	0.0089
11		11.708	987.00	0.0242
12		13.698	734.00	0.0180
13	Naphthalene	15.702	17090.00	1.8053
14		16.838	392.50	0.0096
			1026437.00	34.7035

10ppm Lab Spike Run 2

1mL

Software Version	: 6.1.2.0.1 D19	Date	: 3/7/03 1:28:04 PM
Sample Name	:	Data Acquisition Time	: 2/28/03 12:44:06 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803043.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



. Method 18

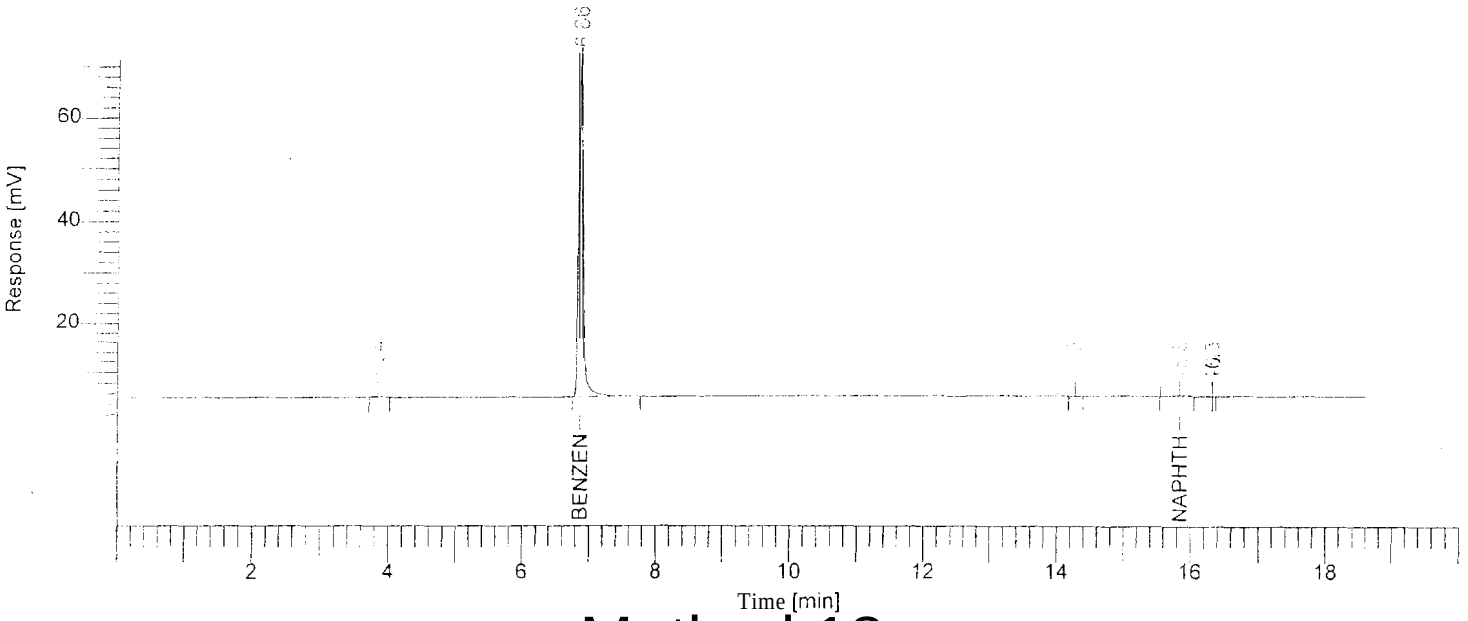
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.746	33320.67	0.8181
2		4.132	3386.00	0.0831
3		4.607	1695.64	0.0416
4		5.104	2275.90	0.0559
5	Hexane	5.419	494233.82	11.9050
6		5.957	19457.00	0.4777
7	Benzene	6.826	258157.97	11.2820
8		8.163	138.17	0.0034
9	Toluene	8.291	219500.33	9.0250
10		9.477	92.00	0.0023
11		9.670	262.50	0.0064
12		11.483	607.50	0.0149
13		11.713	336.50	0.0083
14		13.694	1099.50	0.0270
15	Naphthalene	15.701	14372.50	1.5183
			1048936.00	35.2690

Audit Sample

0.5mL
front an

Software Version	: 6.1.2.0.1:D19	Date	: 3/4/03 11:20:22 AM
Sample Name	:	Data Acquisition Time	: 2/25/03 12:43:40 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803027.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.838	1634.50	0.0401
2	Benzene	6.864	298910.00	12.9838
3		14.263	171.00	0.0042
4	Naphthalene	15.836	519.84	-23.3957
5		16.322	3.41	0.0001
			301238.76	-10.3675

ppm Avg dil. factor

13.5 x2

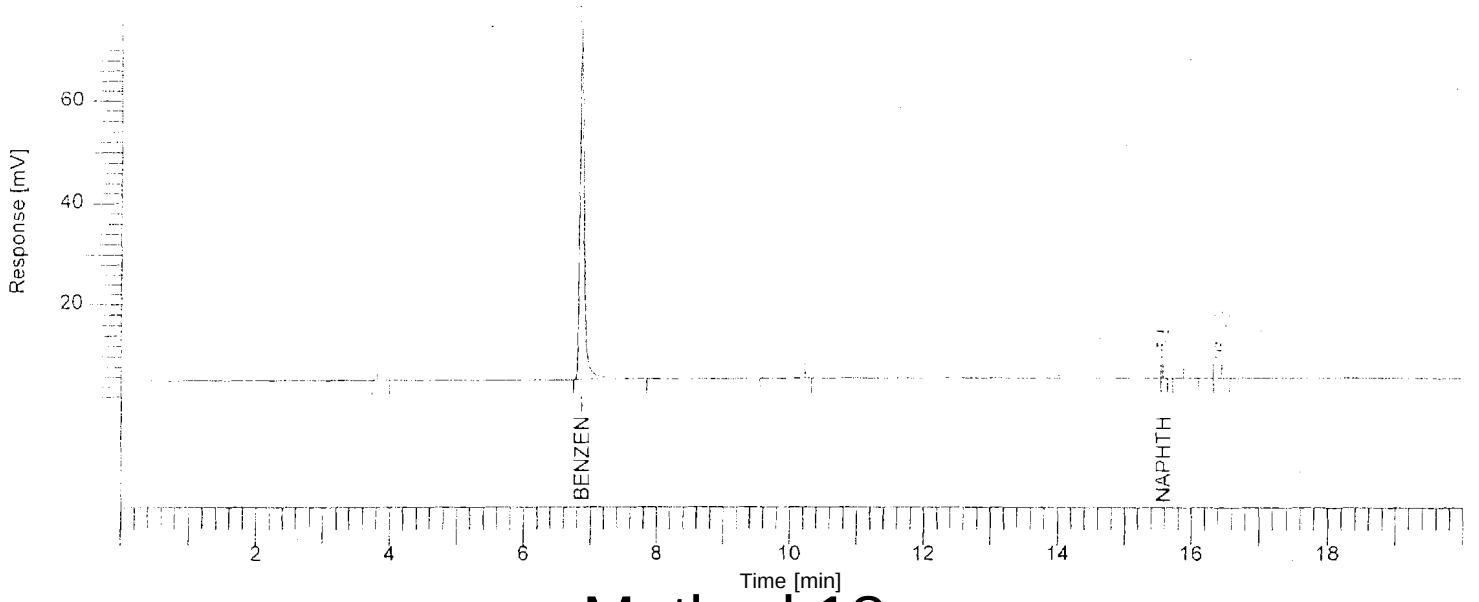
27 ppmv

Audit Sample

0.5mL 4mL

Software Version : 6.1.2.0.1:D19		Date	: 3/4/03 1▮:20:31 AM
Sample Name :		Data Acquisition Time	: 2/25/03 1:05:28 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 010		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803028.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

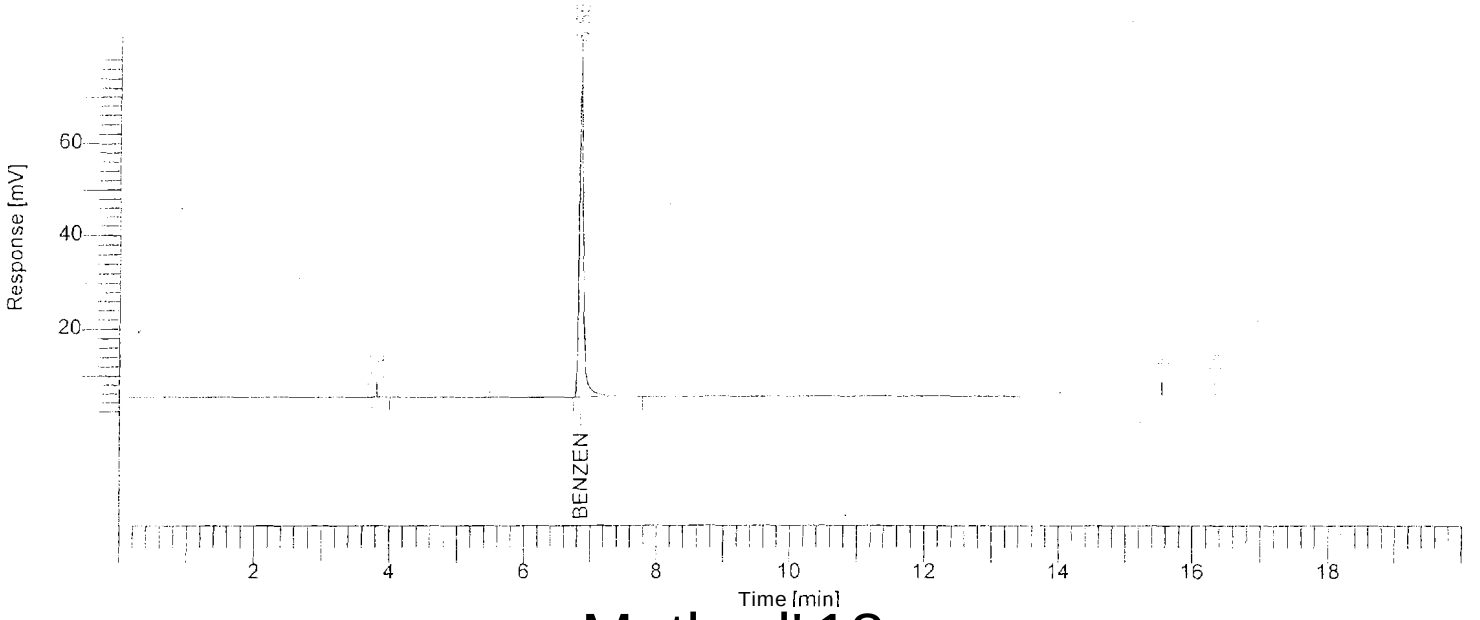
Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
▮		3.818	1729.00	0.0425
2	Benzene	6.863	305790.00	13.2711
3		10.222	564.50	0.0139
4	Naphthalene	15.569	8.94	-23.4658
5		15.873	395.00	0.0097
6		16.449	59.49	0.0015
			308546.94	-10.1272

Audit Sample

0.5mL

Software Version : 6.1.2.0.1D19		Date	: 3/4/03 11:20:45 AM
Sample Name :		Data Acquisition Time	: 2/25/03 1:31:25 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803029.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method' 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.811	1698.00	0.0417
2	Benzene	6.849	329113.00	14.2451
			330811.00	14.2868

Fit Analysis Output For Method File: C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH
Component Name : Hexane
Date : 3/4/03 11:16:48 AM

Curve Parameters:

Curve #1 : 1st Order
Weighting Factor = 1 (No Weighting) R-Squared = 0.997643
Calibration Curve : Y = (163009.459492) +(27822.328548) X

Curve #1

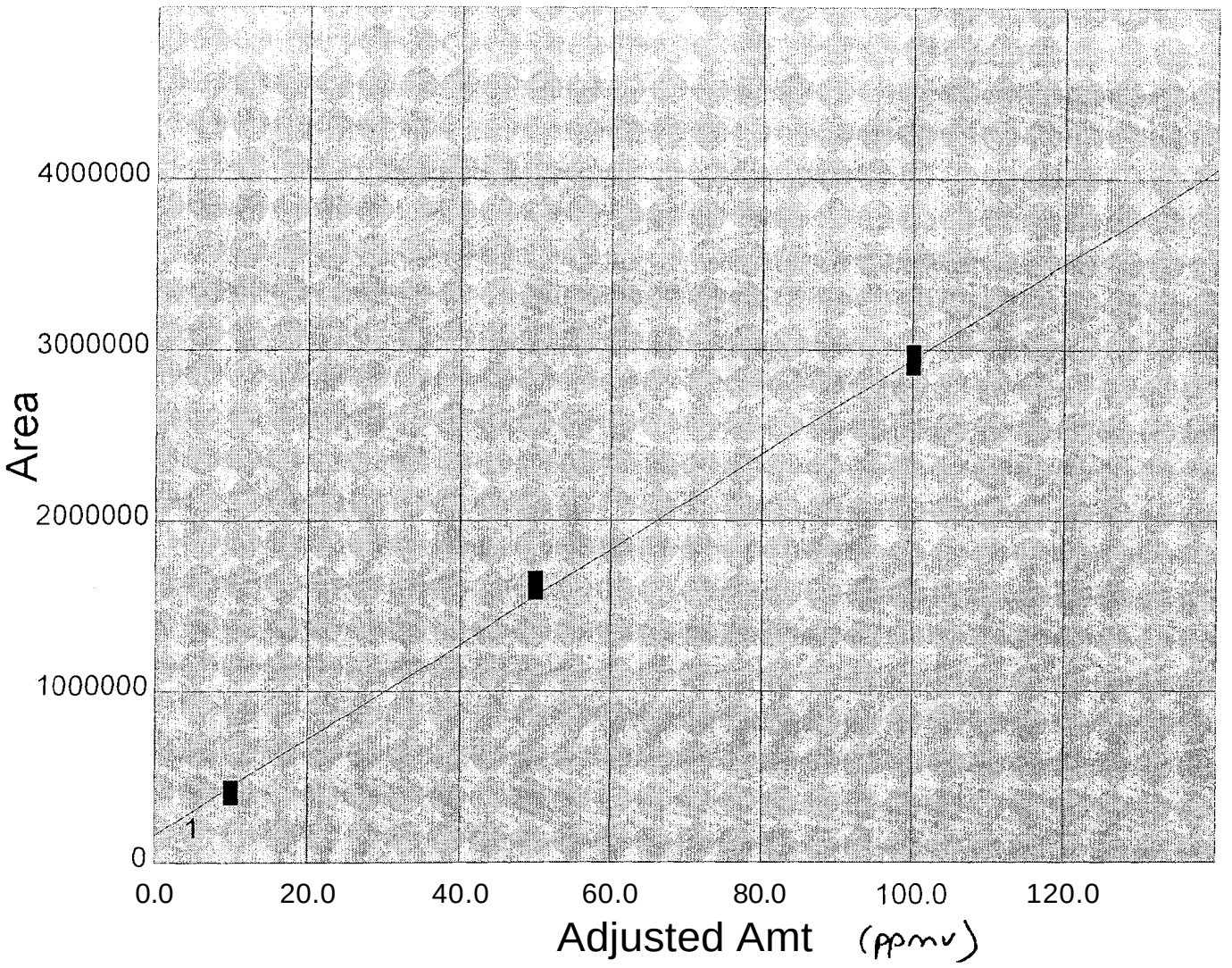
Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff	Observed Y-Value	Calculated Y-Value	Delta
1	10.000000	8.110442	1.889558	23.298	388660.838787	441232.745	-52571.906
1	10.000000	8.884923	1.115077	12.550	410208.715237	441232.745	-31024.030
1	10.000000	7.724943	2.275057	29.451	377935.374791	441232.745	-63297.370
1	10.000000	9.804790	0.195210	1.991	435801.559706	441232.745	-5431.185
1	10.000000	9.096309	0.903691	9.935	416089.969642	441232.745	-25142.775
1	10.000000	9.410632	0.589368	6.263	424835.146410	441232.745	-16397.599
2	50.000000	51.589144	-1.589144	-3.080	1598339.577412	1554125.887	44213.691
2	50.000000	50.592659	-0.592659	-1.171	1570615.037394	1554125.887	16489.150
2	50.000000	53.978026	-3.978026	-7.370	1664803.834852	1554125.887	110677.948
2	50.000000	51.488571	-1.488571	-2.891	1595541.385996	1554125.887	41415.499
2	50.000000	52.503098	-2.503098	-4.768	1623767.897279	1554125.887	69642.010
2	50.000000	52.390830	-2.390830	-4.563	1620644.345941	1554125.887	66518.459
3	100.000000	98.396849	1.603151	1.629	2900638.932154	2945242.314	-44603.382
3	100.000000	101.673896	-1.673896	-1.646	2991813.989206	2945242.314	46571.675
3	100.000000	98.780255	1.219745	1.235	2911306.173803	2945242.314	-33936.141
3	100.000000	98.195204	1.804796	1.838	2895028.687730	2945242.314	-50213.627
3	100.000000	98.699617	1.300383	1.318	2909062.643690	2945242.314	-36179.671
3	100.000000	98.679810	1.320190	1.338	2908511.567045	2945242.314	-36730.747

Curve #1 :

Level Name	%Diff.
1	-11.915
1	-7.031
1	-14.346
1	-1.231
1	-5.698
1	-3.716
2	2.845
2	1.061
2	7.122
2	2.665
2	4.481
2	4.280
3	-1.51'4
3	1.581
3	-1.152
3	-1.705
3	-1.228
3	-1.247

3/4/03 11:16:48 AM Fit Analysis Output For Method File:
C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH

Hexane



Fit Analysis Output For Method File: C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH
Component Name : Benzene
Date : 3/4/03 11:16:53 AM

Curve Parameters:

Curve #1 : 1st Order
Weighting Factor = 1 (No Weighting) R-Squared = 0.998323
Calibration Curve : Y = (-12002.838002) +(23946.172733) X

Curve #1 :

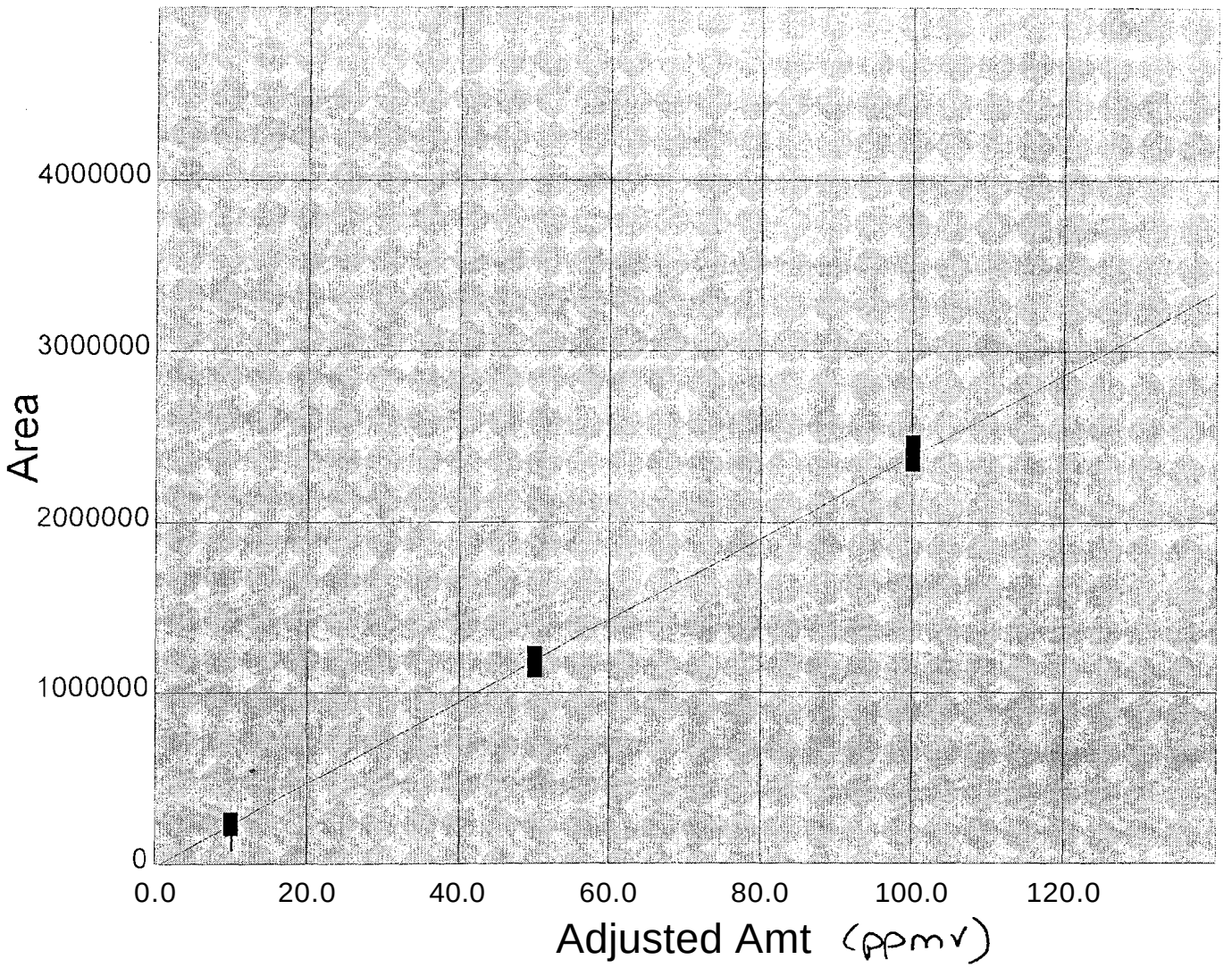
Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff.	Observed Y-Value	Calculated Y-Value	Delta
1	10.000000	9.190314	0.809686	8.810	208070.000000	227458.889	-19388.889
1	10.000000	9.928720	0.071280	0.718	225752.000000	227458.889	-1706.889
1	10.000000	9.228399	0.771601	8.361	208982.000000	227458.889	-18476.889
1	10.000000	11.304483	-1.304483	-11.540	258696.272652	227458.889	31237.383
1	10.000000	10.202250	-0.202250	-1.982	232302.000000	227458.889	4843.111
1	10.000000	10.710448	-0.710448	-6.633	244471.410567	227458.889	17012.521
2	50.000000	49.235329	0.764671	1.553	1166994.850701	1185305.799	-18310.948
2	50.000000	48.011681	1.988319	4.141	1137693.173104	1185305.799	-47612.626
2	50.000000	51.587033	-1.587033	-3.076	1223309.155329	1185305.799	38003.357
2	50.000000	47.756017	2.243983	4.699	1131571.000000	1185305.799	-53734.799
2	50.000000	50.639702	-0.639702	-1.263	1200624.205199	1185305.799	15318.407
2	50.000000	51.753933	-1.753933	-3.389	1227305.782555	1185305.799	41999.984
3	100.000000	103.511992	-3.511992	-3.393	2466713.191607	2382614.435	84098.756
3	100.000000	101.361055	-1.361055	-1.343	2415206.498373	2382614.435	32592.063
3	100.000000	98.293452	1.706548	1.736	2341749.145845	2382614.435	-40865.289
3	100.000000	99.505846	0.494154	0.497	2370781.343183	2382614.435	-11833.092
3	100.000000	99.911200	0.088800	0.089	2380488.010028	2382614.435	-2126.425
3	100.000000	97.868146	2.131854	2.178	2331564.700629	2382614.435	-51049.735

Curve #1 :

Level Name	%Diff.
1	-8.524
1	-0.750
1	-8.123
1	13.733
1	2.129
1	7.479
2	-1.545
2	-4.017
2	3.206
2	-4.533
2	1.292
2	3.543
3	3.530
3	1.368
3	-1.715
3	-0.497
3	-0.089
3	-2.143

3/4/03 11:16:53 AM Fit Analysis Output For Method File:
C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH

Benzene



Fit Analysis Output For Method File: C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH
component Name : Toluene
Date : 3/4/03 11:16:59 AM

Curve Parameters:

Curve #1 : 1st Order
Weighting Factor = 1 (No Weighting) R-Squared = 0.997672
Calibration Curve : Y = (-18576.060221) +(26379.737973) X

Curve #1 :

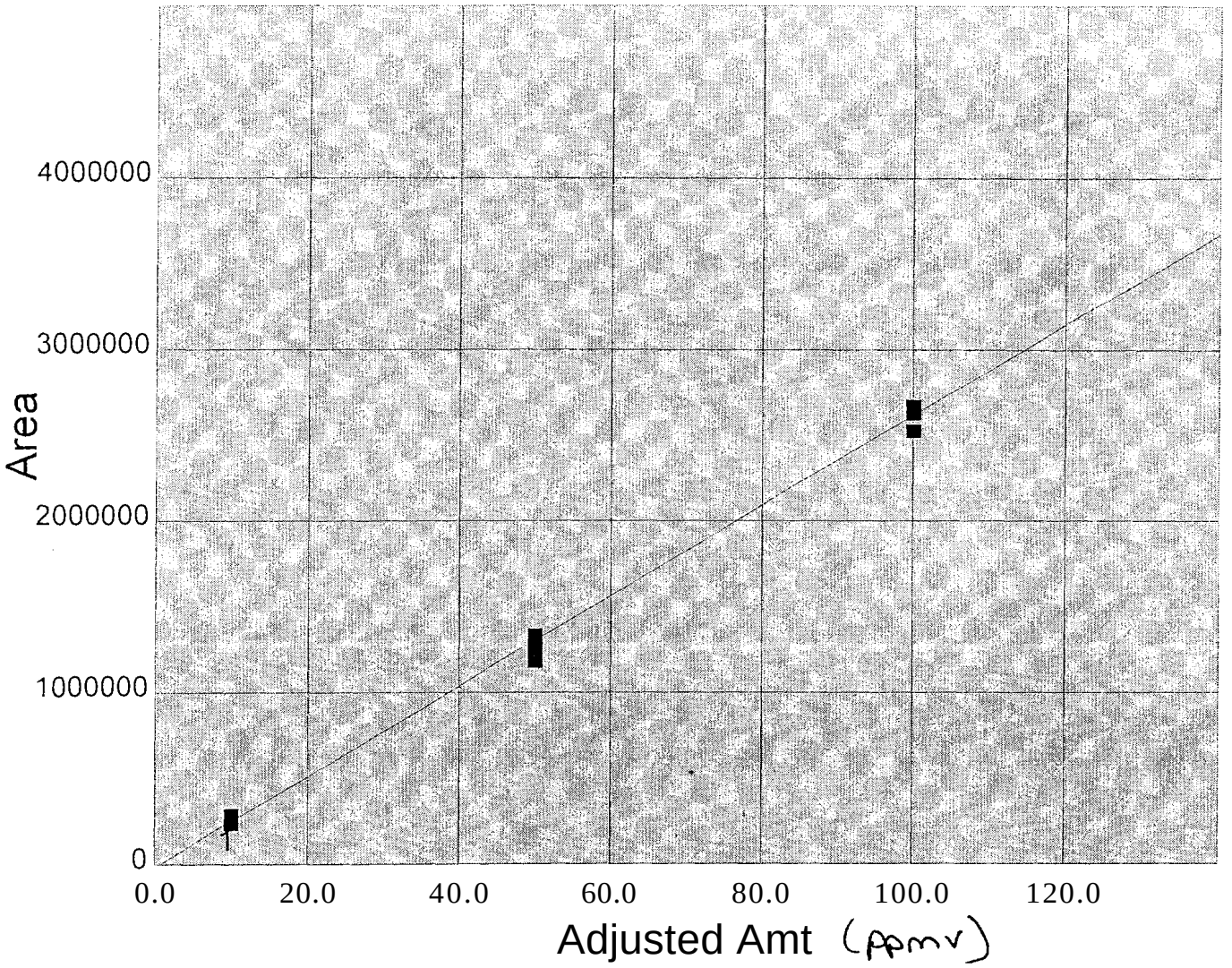
Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff	Observed Y-Value	Calculated Y-Value	Delta
1	10.000000	9.441036	0.558964	5.921	230476.000000	245221.320	-14745.320
1	10.000000	10.370803	-0.370803	-3.575	255003.000000	245221.320	9781 680
1	10.000000	9.393879	0.606121	6.452	229232.000000	245221.320	-15989.320
1	10.000000	11.403679	-1.403679	-12.309	282250.000000	245221.320	37028.680
1	10.000000	11.021492	-1.021492	-9.268	272168.000000	245221.320	26946.680
1	10.000000	10.901443	-0.901443	-8.269	269001.156258	245221.320	23779 837
2	50.000000	47.482221	2.517779	5.303	1233992.500000	1300410.838	-66418.338
2	50.000000	45.355949	4.644051	10.239	1177902.000000	1300410.838	-122508.838
2	50.000000	49.733021	0.266979	0 537	1293368.000000	1300410.838	-7042.838
2	50.000000	50.620046	-0.620046	-1.225	1316767.500000	1300410.838	16356.662
2	50.000000	51.064990	-1.064990	-2.086	1328505.000000	1300410.838	28094.162
2	50.000000	51.185575	-1.185575	-2.316	1331686.000000	1300410.838	31275.162
3	100.000000	101.803907	-1.803907	-1.772	2666984.333896	2619397.737	47586.597
3	100.000000	100.538165	-0.538165	-0.535	2633594.379939	2619397.737	14196.643
3	100.000000	96.373060	3.626940	3.763	2523720.000000	2619397.737	-95677.737
3	100.000000	100.347436	-0.347436	-0.346	2628563.000000	2619397.737	9165.263
3	100.000000	101.777605	-1.777605	-1.747	2666290.500000	2619397.737	46892.763
3	100.000000	101.185693	-1.185693	-1.172	2650676.000000	2619397.737	31278.263

Curve #1 :

Level Name	%Diff.
1	-6.013
1	3.989
1	-6.520
1	15.100
1	10.989
1	9.697
2	-5.107
2	-9.421
2	-0.542
2	1.258
2	2.160
2	2.405
3	1.817
3	0.542
3	-3.653
3	0.350
3	1.790
3	1.194

3/4/03 11:16:59 AM Fit Analysis Output For Method File:
C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH

Toluene



Fit Analysis Output For Method File: C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH
Component Name : Naphthalene
Date : 3/7/03 1:13:11 PM

Curve Parameters:

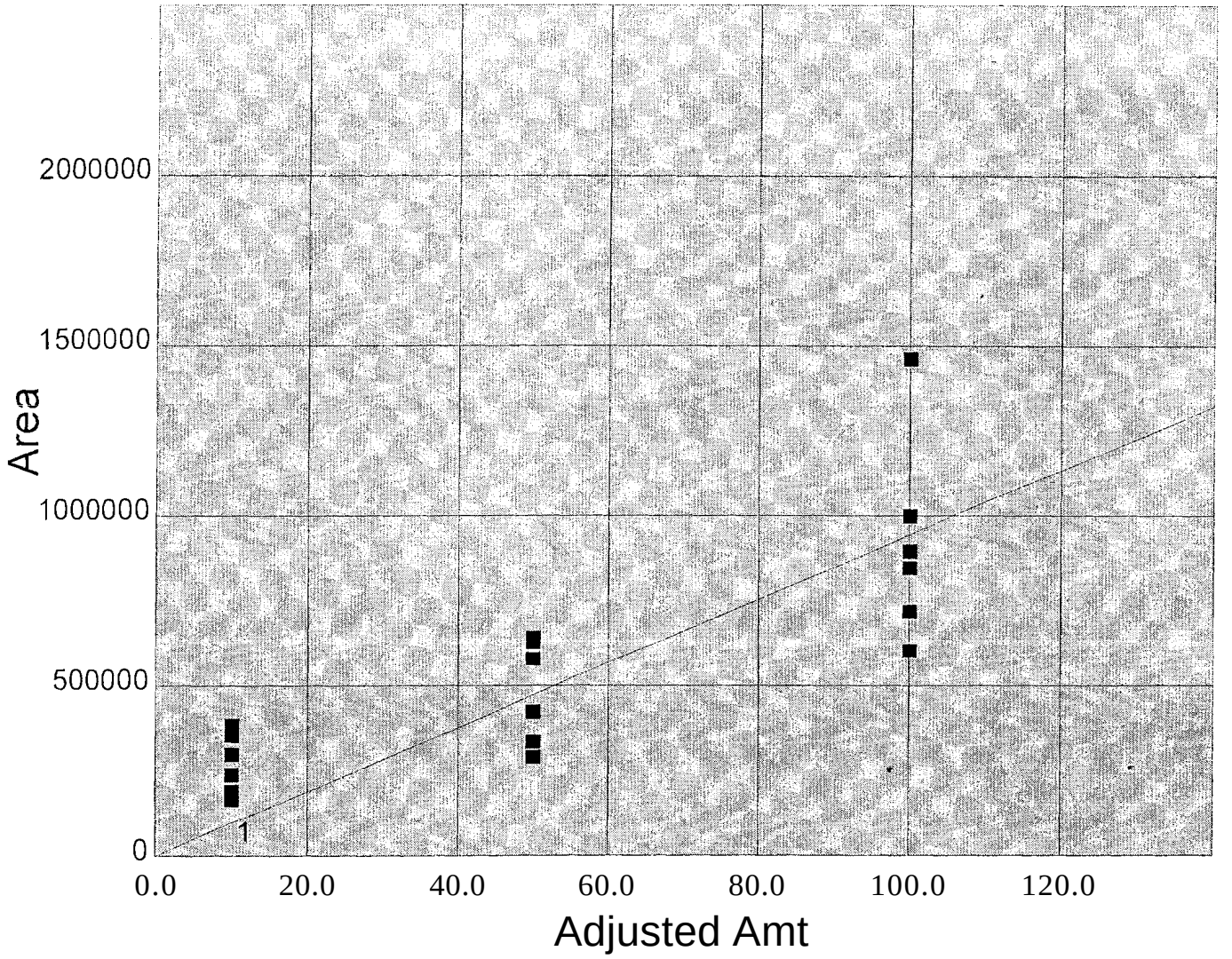
Curve #1 : 1st Order - Force Origin
Weighting Factor = 1 (No Weighting) R-Squared = 0.585665
Calibration Curve : Y = (9466.365874) X

Curve #1 Level Name	Observed X-Value	Calculated X-Value	Delta	%Diff.	Observed Y-Value	Calculated Y-Value	Delta
1	10.000000	20.192015	-10.192015	-50.475	191145.000000	94663.659	96481.341
1	10.000000	25.379116	-15.379116	-60.598	240248.000000	94663.659	145584.341
1	10.000000	17.490609	-7.490609	-42.826	165572.500000	94663.659	70908.841
1	10.000000	40.822623	-30.822623	-75.504	386441.887688	94663.659	291778.229
1	10.000000	31.581555	-21.581555	-68.336	298962.554180	94663.659	204298.895
1	10.000000	37.476032	-27.476032	-73.316	354761.831817	94663.659	260098.173
2	50.000000	35.526305	14.473695	40.741	336305.000000	473318.294	-137013.294
2	50.000000	30.836015	19.163985	62.148	291905.000000	473318.294	-181413.294
2	50.000000	44.893046	5.106954	11.376	424974.000000	473318.294	-48344.294
2	50.000000	61.170331	-11.170331	-18.261	579060.736705	473318.294	105742.443
2	50.000000	66.408614	-16.408614	-24.709	628648.238381	473318.294	155329.945
2	50.000000	67.936018	-17.936018	-26.401	643107.202616	473318.294	169788.909
3	100.000000	76.256883	23.743117	31.136	721875.557938	946636.587	-224761.029
3	100.000000	89.891043	10.108957	11.246	850941.500000	946636.587	-95695.087
3	100.000000	63.881114	36.118886	56.541	604722.000000	946636.587	-341914.587
3	100.000000	95.079113	4.920887	5.176	900053.668510	946636.587	-46582.919
3	100.000000	105.518110	-5.518110	-5.230	998873.035179	946636.587	52236.448
3	100.000000	154.694377	-54.694377	-35.356	1464393.572719	946636.587	517756.985

Curve #1 : Level Name	%Diff.
1	101.920
1	153.791
1	74.906
1	308.226
1	215.816
1	274.760
2	-28.947
2	-38.328
2	-10.214
2	22.341
2	32.817
2	35.872
3	-23.743
3	-10.109
3	-36.119
3	-4.921
3	5.518
3	54.694

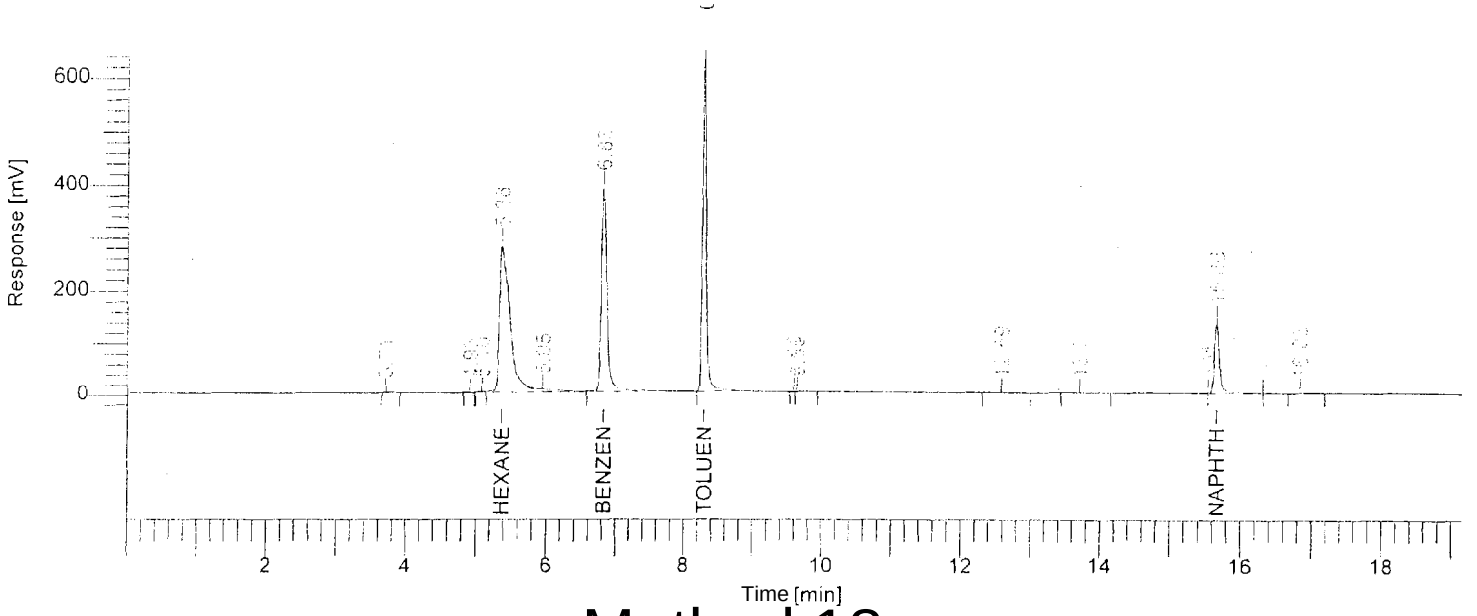
3/7/03 1:13:11 PM Fit Analysis Output For Method File:
C:\PENEXE\TCWS\VER6.1.2\METHODS\M18HBTN.MTH

Naphthalene



Software Version	: 6.1.2.0.1:D19	Date	: 2/24/03 11:06:00 AM
Sample Name	: 100ppm	Data Acquisition Time	: 2/21/03 2:34:20 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 1		

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803001.raw
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

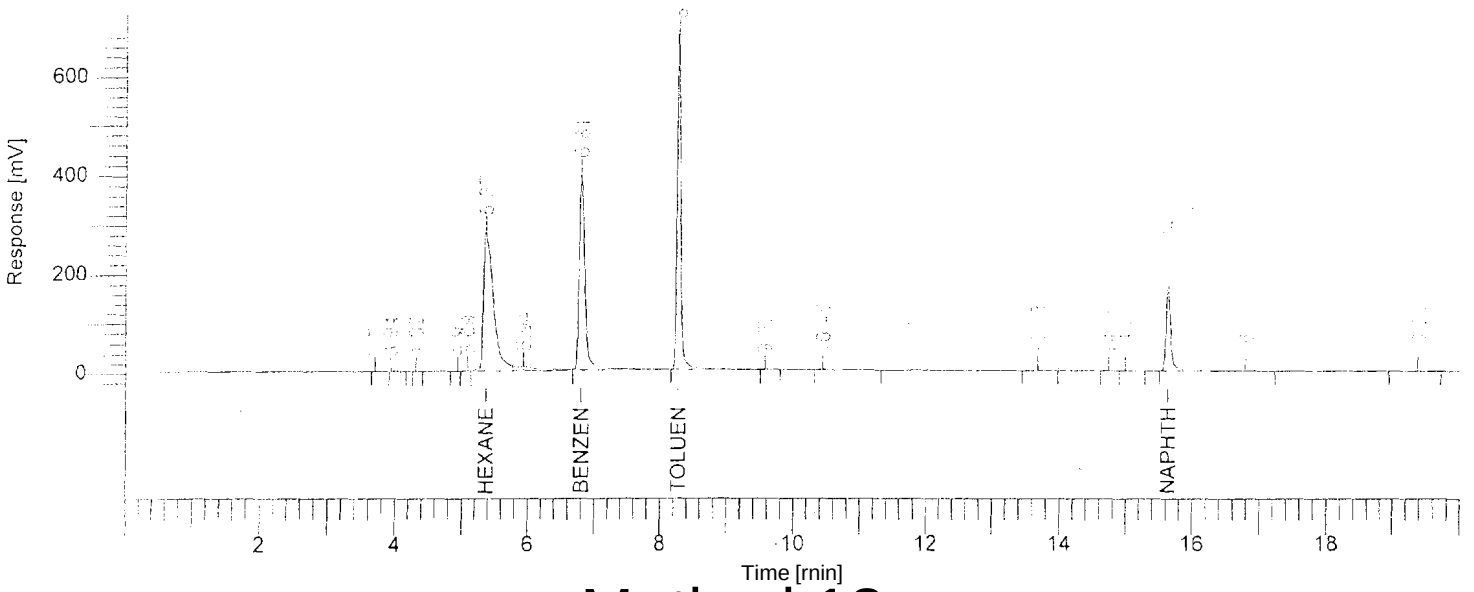


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.710	3764.00	0.0924
2		4.929	217.00	0.0053
3		5.100	10115.37	0.2484
4	Hexane	5.381	2885472.35	96.4929
5		5.954	159295.00	3.9111
6	Benzene	6.825	2329231.79	97.9545
7	Toluene	8.296	2522046.00	98.5134
8		9.601	327.67	0.0080
9		9.649	917.83	0.0225
10		12.593	3987.00	0.0979
11		13.709	3880.00	0.0953
12	Naphthalene	15.665	697015.17	100.6275
13		16.834	3965.00	0.0974
			8620234.17	398.1666

Software Version : 6.1.2.0.1:D19		Date	: 2/21/03 3:18:46 PM
Sample Name	: 100ppm	Data Acquisition Time	: 2/21/03 2:58:34 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 2		

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803002.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

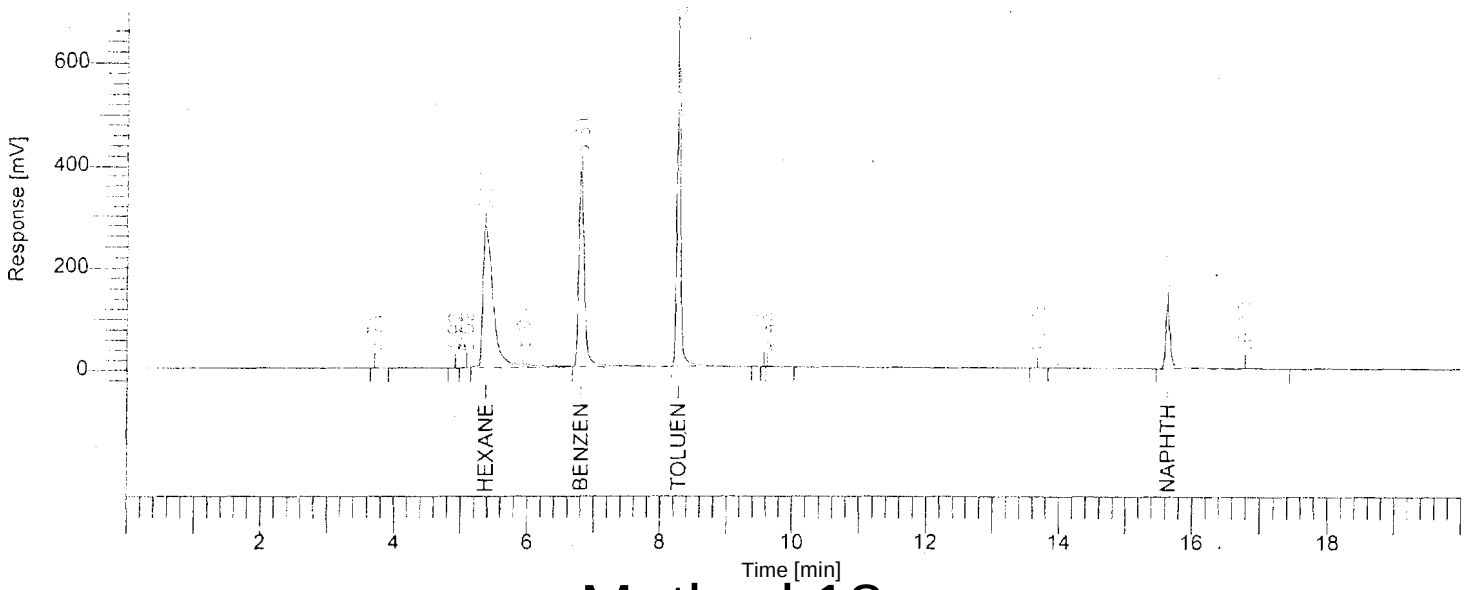


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.710	4315.68	0.1060
2		3.938	1180.32	0.0290
3		4.319	143.00	0.0035
4		4.939	259.00	0.0064
5		5.089	9994.51	0.2454
6	Hexane	5.372	2991813.99	111.4286
7		5.938	199926.00	4.9087
8	Benzene	6.807	2415206.50	13.1806
9	Toluene	8.272	2633594.38	27.1026
10		9.571	1647.12	0.0404
11		10.447	3753.00	0.0921
12		13.681	1803.50	0.0443
13		14.745	534.96	0.0131
14		14.990	661.04	0.0162
15	Naphthalene	15.636	850941.50	111.4286
16		16.800	6571.00	0.1613
17		19.385	1931.50	0.0474
			9124277.00	268.8543

Software Version : 6.1.2.0.1:D19		Date	: 2/21/03 3:42:12 PM
Sample Name : 100ppm		Data Acquisition Time	: 2/21/03 3:22:01 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle : 3			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803003.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

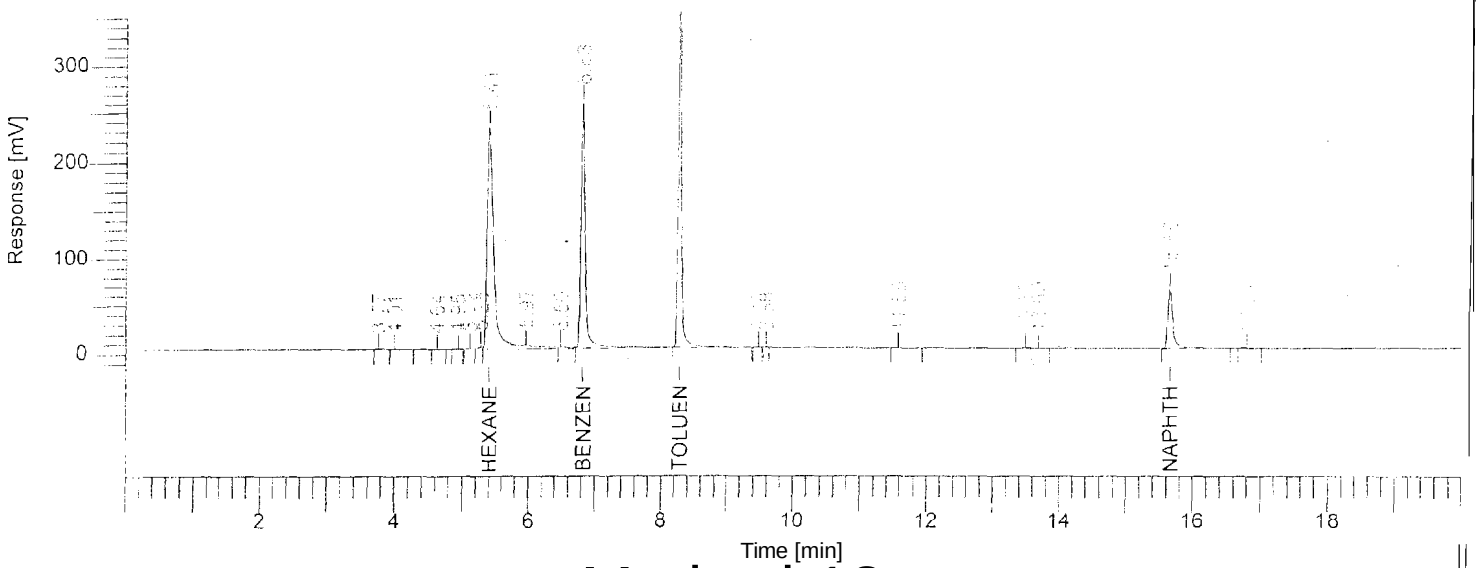


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.709	4019.50	0.0987
2		4.920	208.00	0.0051
3		5.091	10145.68	0.2491
4	Hexane	5.374	2911306.17	104.6037
5		5.939	186000.00	4.5668
6	Benzene	6.807	2341749.15	-10.9768
7	Toluene	8.271	2523720.00	15.0509
8		9.576	580.73	0.0143
9		9.629	1882.27	0.0462
10		13.678	612.00	0.0150
11	Naphthalene	15.635	604722.00	91.9410
12		16.789	9182.00	0.2254
			8594127.50	205.8395

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 4:10:07 PM
Sample Name	: 50ppm	Data Acquisition Time	: 2/21/03 3:49:55 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 4		

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803004.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

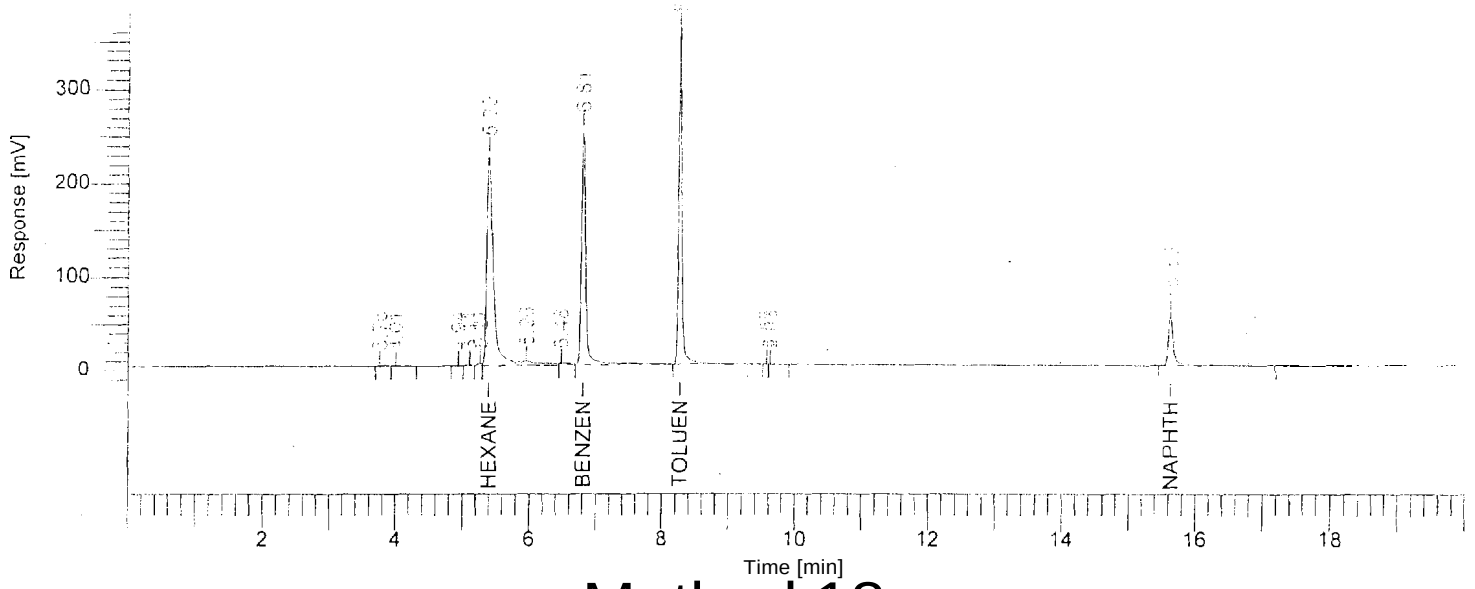


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.770	3744.65	0.0919
2		4.009	1275.35	0.0313
3		4.635	121.00	0.0030
4		4.947	201.50	0.0049
5		5.121	6423.35	0.1577
6		5.284	10501.80	0.2578
7	Hexane	5.409	1598339.58	56.3541
8		5.973	99265.00	2.4372
9		6.500	23085.41	0.5668
10	Benzene	6.830	1166994.85	27.1598
11	Toluene	8.290	1233992.50	30.8586
12		9.484	95.50	0.0023
13		9.600	107.00	0.0026
14		11.584	653.00	0.0160
15		13.496	257.34	0.0063
16		13.690	647.16	0.0159
17	Naphthalene	15.658	336305.00	51.1315
18		16.809	1246.00	0.0306
			4483256.00	169.1285

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 4:32:11 PM
Sample Name	: 50ppm	Data Acquisition Time	: 2/21/03 4:12:02 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 5		

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803005.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

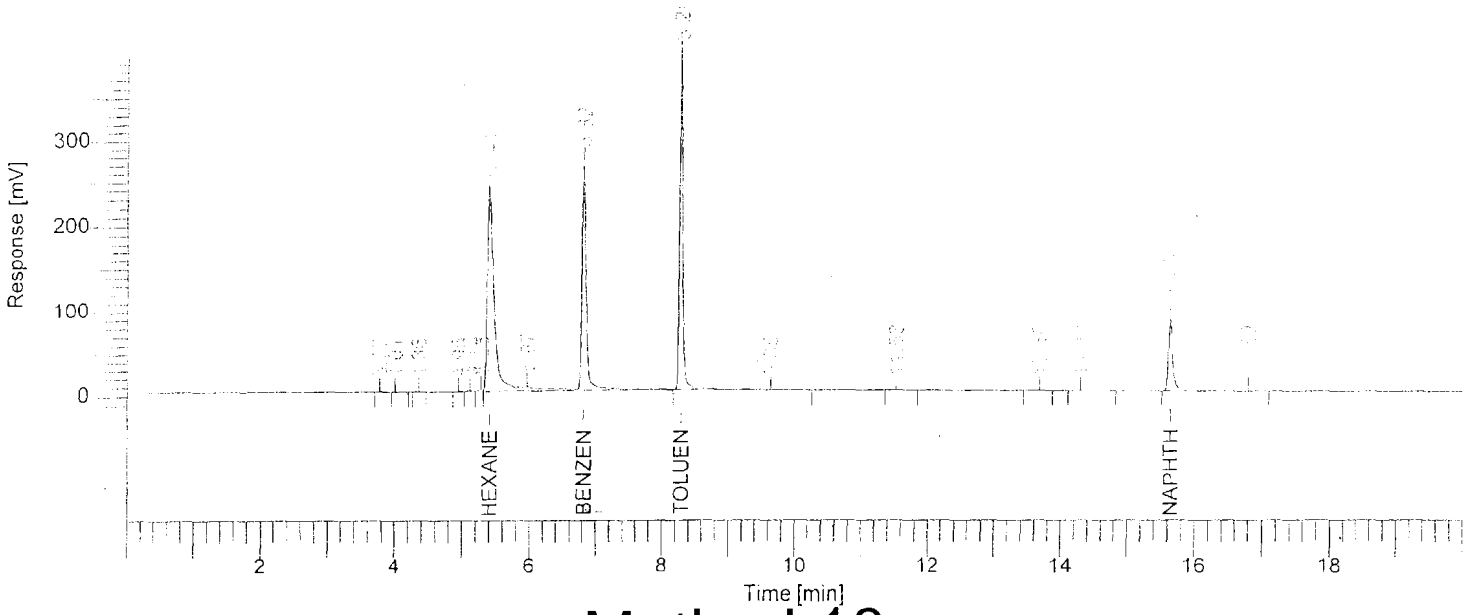


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.764	4088.44	0.1004
2		4.007	1907.56	0.0468
3		4.940	189.00	0.0046
4		5.108	6377.81	0.1566
5		5.269	10202.55	0.2505
6	Hexane	5.394	1570615.04	54.3048
7		5.955	100627.00	2.4707
8		6.477	22740.42	0.5583
9	Benzene	6.807	1137693.17	31.8605
10	Toluene	8.268	1177902.00	33.5278
11		9.575	260.88	0.0064
12		9.629	937.13	0.0230
13	Naphthalene	15.632	291905.00	46.6320
14		16.792	3161.00	0.0776
			4328607.00	170.0200

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 4:54:36 PM
Sample Name	: 50ppm	Data Acquisition Time	: 2/21/03 4:34:24 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 6		

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803006.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

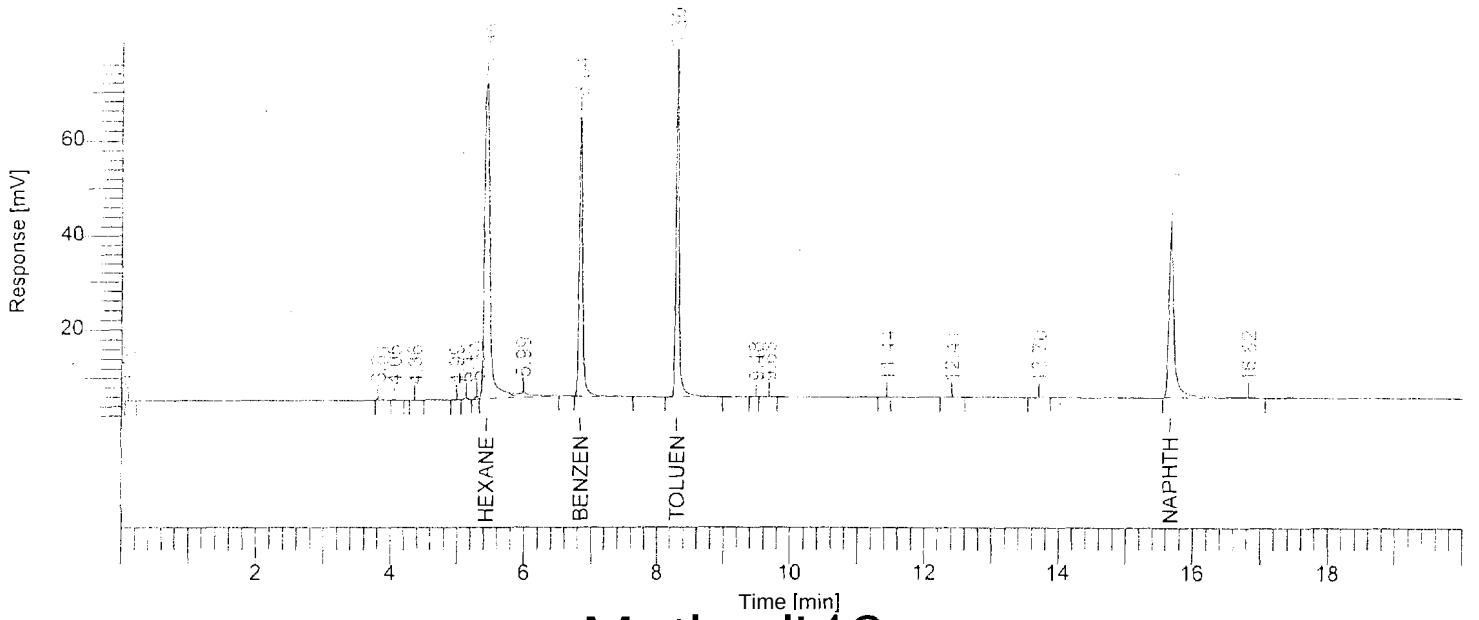


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.773	2534.39	0.0622
2		4.010	776.61	0.0191
3		4.363	145.50	0.0036
4		4.956	271.00	0.0067
5		5.119	6593.84	0.1619
6		5.282	11058.67	0.2715
7	Hexane	5.406	1664803.83	56.0165
8		5.970	141224.00	3.4674
9	Benzene	6.823	1223309.16	39.2331
10	Toluene	8.285	1293368.00	41.6174
11		9.648	4902.00	0.1204
12		11.532	1143.00	0.0281
13		13.683	952.00	0.0234
14		14.298	1222.00	0.0300
15	Naphthalene	15.650	424974.00	60.8596
16		16.801	2364.00	0.0580
			4779642.00	201.9788

Software Version	: 6.1.2.0.1 D19	Date	: 2/21/03 5:20:12 PM
Sample Name	: 10ppm	Data Acquisition Time	: 2/21/03 5:00:00 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 7		

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803007.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

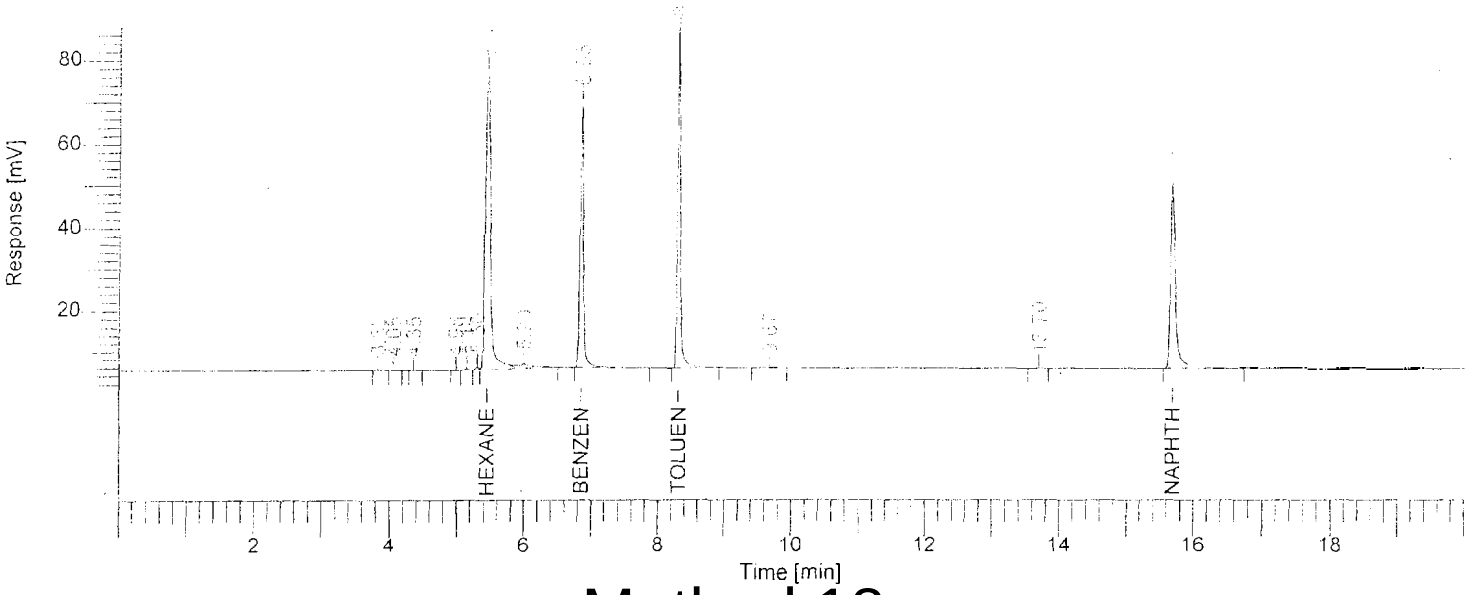


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.096	84.50	0.0021
2		3.809	1920.46	0.0472
3		4.054	420.04	0.0103
4		4.364	163.00	0.0040
5		4.989	182.15	0.0045
6		5.135	1399.85	0.0344
7		5.296	2171.66	0.0533
8	Hexane	5.436	388660.84	7.7674
9		5.985	17036.00	0.4183
10	Benzene	6.838	208070.00	11.2169
11	Toluene	8.299	230476.00	11.1135
12		9.483	94.03	0.0023
13		9.682	294.97	0.0072
14		11.440	85.50	0.0021
15		12.410	338.50	0.0083
16		13.700	394.50	0.0097
17	Naphthalene	15.669	191145.00	19.2757
18		16.823	2042.00	0.0501
			1044979.00	50.0272

Software Version : 6.1.2.0.1:D19		Date	: 2/21/03 5:51:02 PM
Sample Name : 10ppm		Data Acquisition Time	: 2/21/03 5:30:55 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle : 8			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803008.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

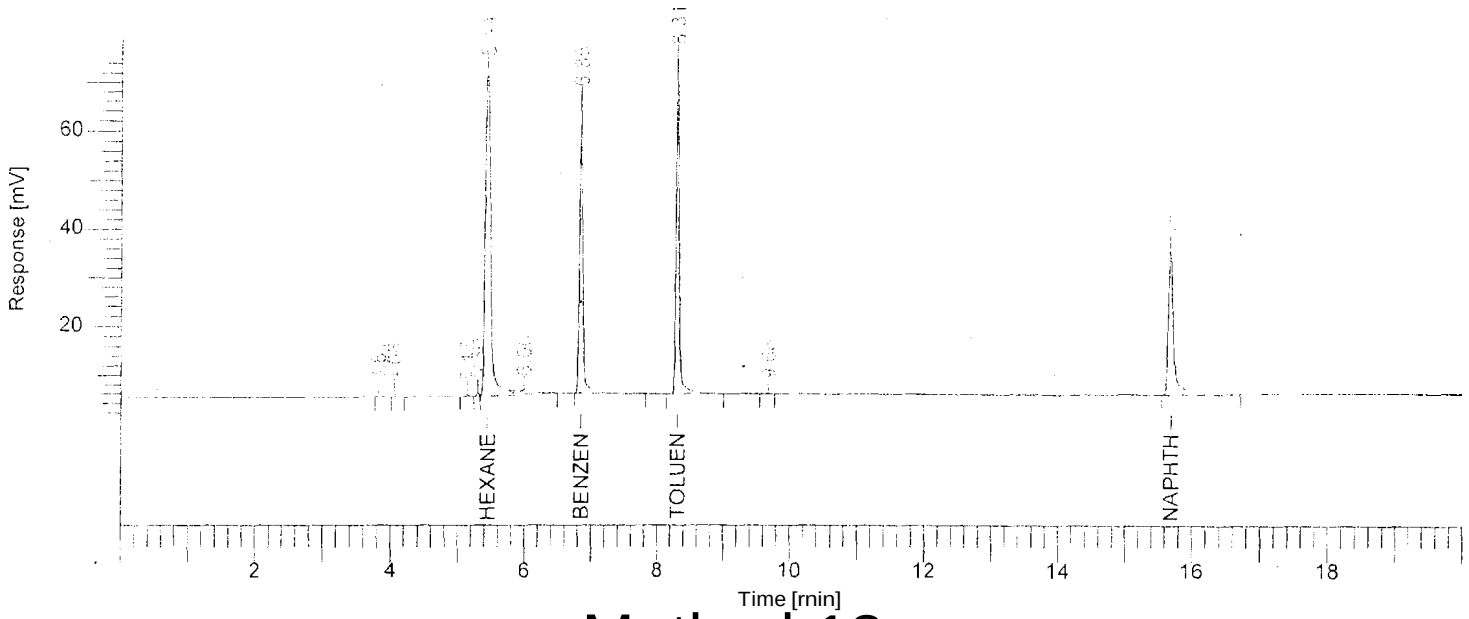


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.824	1712.35	0.0420
2		4.056	362.65	0.0089
3		4.354	112.00	0.0027
4		4.979	133.02	0.0033
5		5.141	1473.98	0.0362
6		5.301	2347.78	0.0576
7	Hexane	5.442	410208.72	9.0820
8		5.994	15985.00	0.3925
9	Benzene	6.847	225752.00	11.2340
10	Toluene	8.303	255003.00	11.3066
11		9.669	1111.00	0.0273
12		13.698	290.00	0.0071
13	Naphthalene	15.682	240248.00	21.7925
			1154739.50	53.9929

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 6:24:35 PM
Sample Name	: 10ppm	Data Acquisition Time	: 2/21/03 6:04:29 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 9		

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803009.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



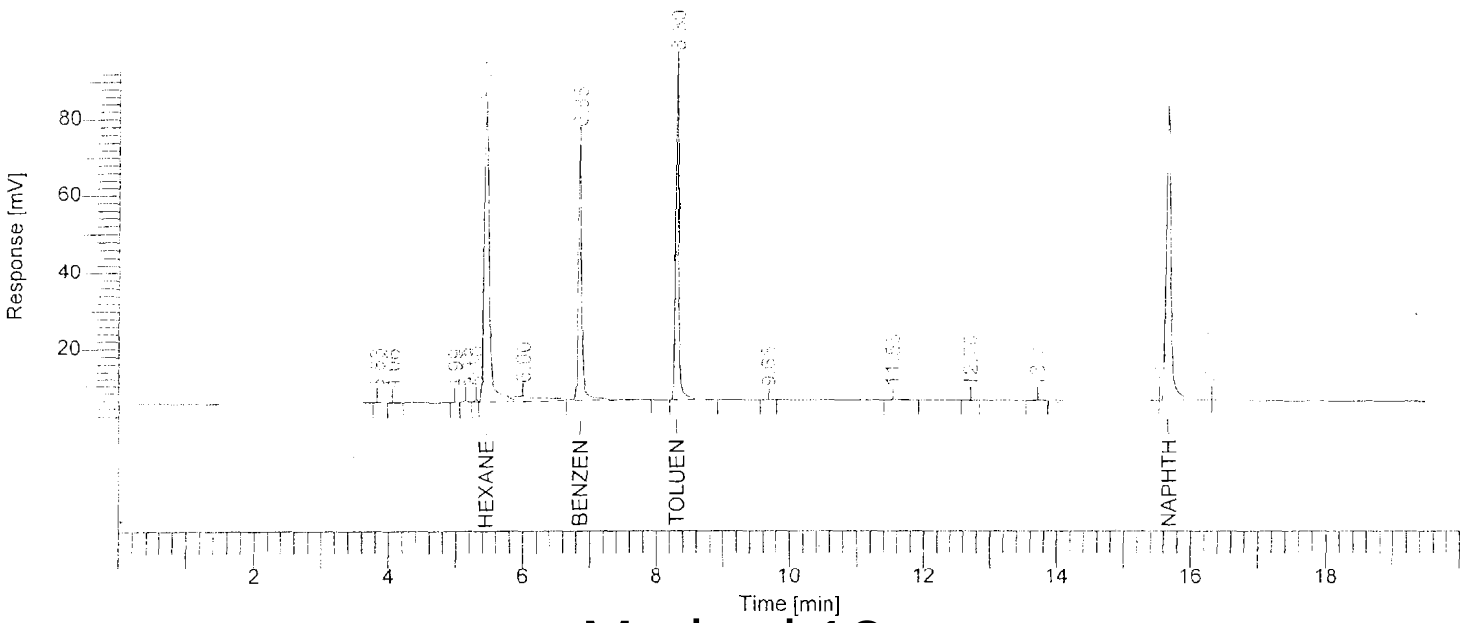
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.815	1865.45	0.0458
2		4.057	419.05	0.0103
3		5.145	1338.00	0.0329
4		5.302	2178.63	0.0535
5	Hexane	5.444	377935.37	8.5069
6		5.997	14025.00	0.3444
7	Benzene	6.849	208982.00	10.4187
8	Toluene	8.305	229232.00	10.2309
9		9.685	205.00	0.0050
10	Naphthalene	15.687	165572.50	9.1920
			1001753.00	38.8404

Post

Software Version	: 6.1.2.0.1D19	Date	: 2/25/03 6:19:51 PM
Sample Name	: 10ppm	Data Acquisition Time	: 2/25/03 5:59:49 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803038.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



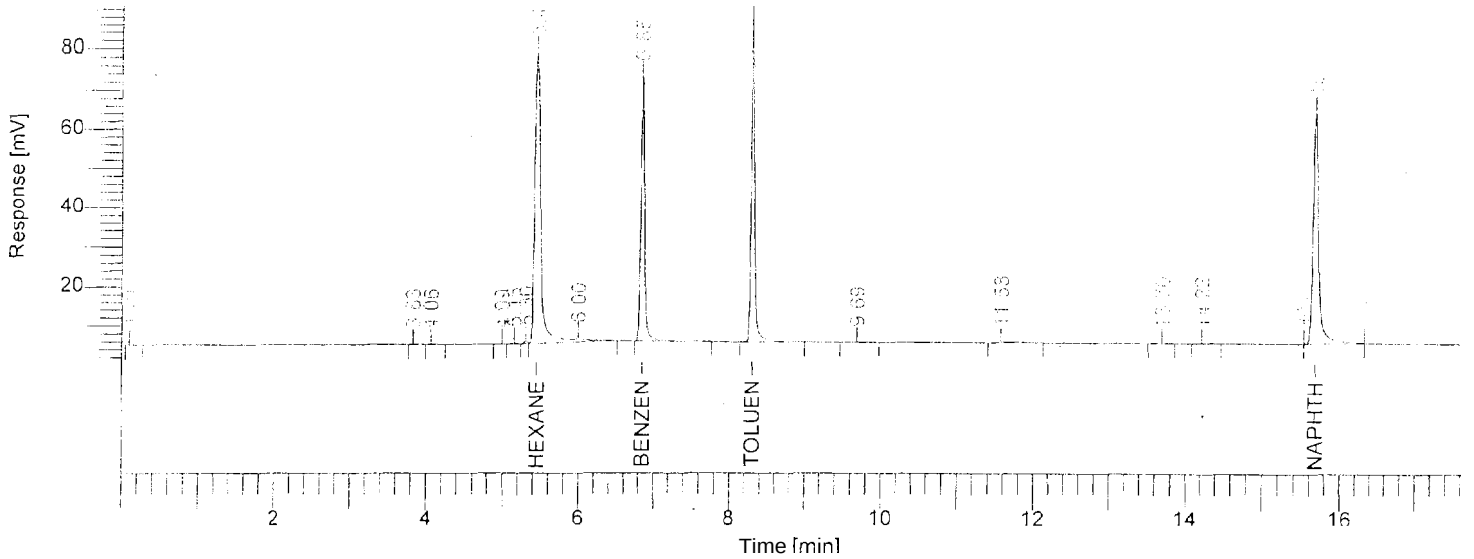
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.828	1161.11	0.0285
2		4.064	525.89	0.0129
3		4.987	114.44	0.0028
4		5.146	1507.56	0.0370
5		5.303	2485.17	0.0610
6	Hexane	5.446	435801.56	10.3504
7		5.996	45317.00	1.1127
8	Benzene	6.848	258696.27	11.7515
9	Toluene	8.303	282250.00	12.2036
10		9.679	215.00	0.0053
11		11.528	2030.00	0.0498
12		12.703	242.00	0.0059
13		13.701	452.00	0.0111
14	Naphthalene	15.672	386441.89	47.1381
			1417239.89	82.7707

post

Software Version	: 6.1.2.0.1:D19	Date	: 2/25/03 5:58:1▮ PM
Sample Name	: 10ppm	Data Acquisition Time	: 2/25/03 5:40:29 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803037.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



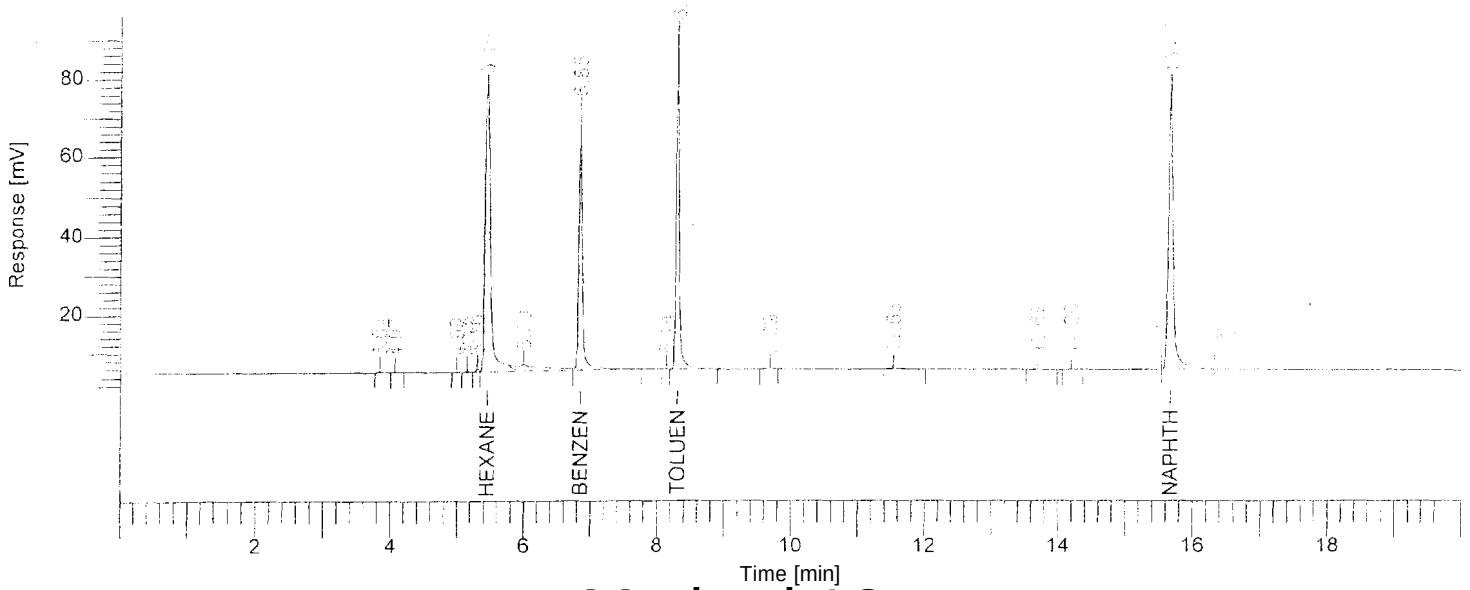
Method' 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.102	141.00	0.0035
2		3.831	1208.25	0.0297
3		4.061	401.75	0.0099
4		4.990	114.41	0.0028
5		5.146	1450.59	0.0356
6		5.303	2277.03	0.0559
7	Hexane	5.446	416089.97	9.6494
8		5.997	16983.00	0.4170
9	Benzene	6.850	232302.00	10.6452
10	Toluene	8.304	272168.00	11.8132
11		9.693	681.00	0.0167
12		11.577	1758.50	0.0432
13		13.702	366.00	0.0090
14		14.221	396.00	0.0097
15	Naphthalene	15.680	298962.55	32.1232
			1245300.05	64.8638

post

Software Version : 6.1.2.0.1:D19		Date	: 2/25/03 5:30:04 PM
Sample Name : 10ppm		Data Acquisition Time	: 2/25/03 5:10:00 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803036.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



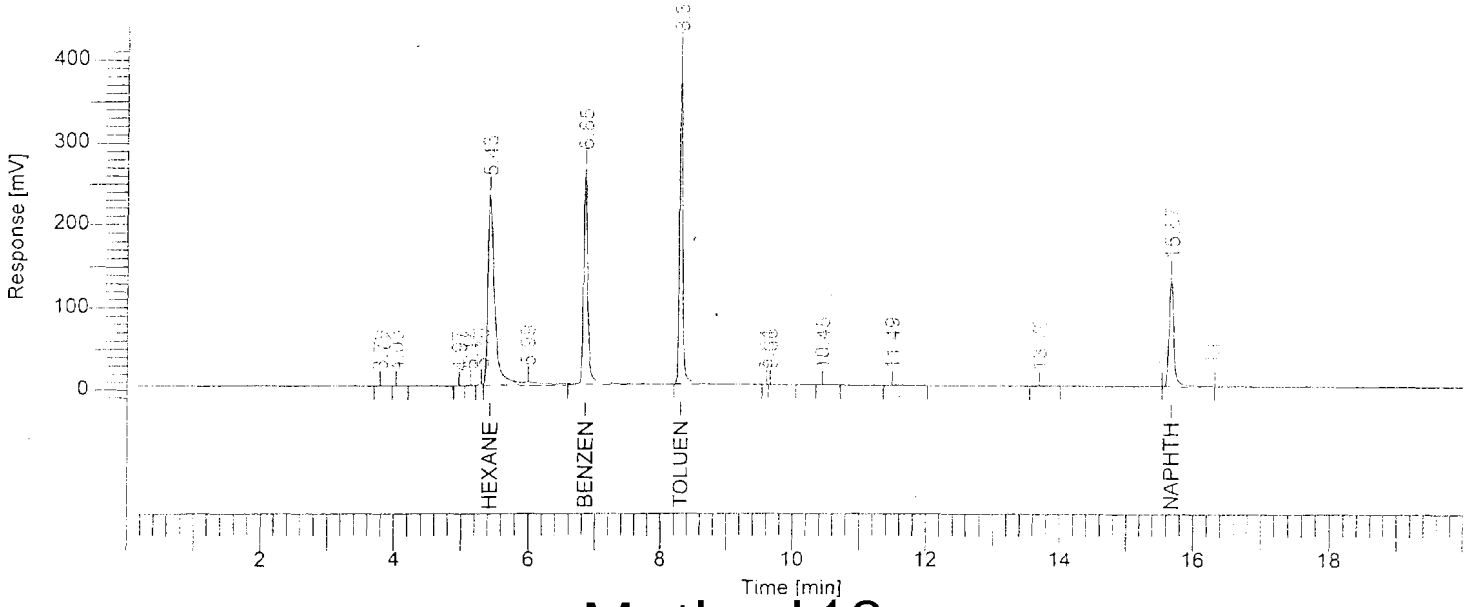
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.841	1625.82	0.0399
2		4.071	400.18	0.0098
3		4.990	117.00	0.0029
4		5.148	1406.00	0.0345
5		5.304	2380.94	0.0585
6	Hexane	5.447	424835.15	9.9604
7		5.996	47066.00	1.1556
8	Benzene	6.848	244471.41	11.1553
9		8.138	207.84	0.0051
10	Toluene	8.301	269001.16	11.6905
11		9.687	308.00	0.0076
12		11.532	2044.00	0.0502
13		13.694	611.00	0.0150
14		14.198	169.00	0.0041
15	Naphthalene	15.667	354761.83	41.7005
			1349405.33	75.8899

post

Software Version	: 6.1.2.0.1:D19	Date	: 2/25/03 5:07:33 PM
Sample Name	: 50ppm	Data Acquisition Time	: 2/25/03 4:47:28 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803035.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



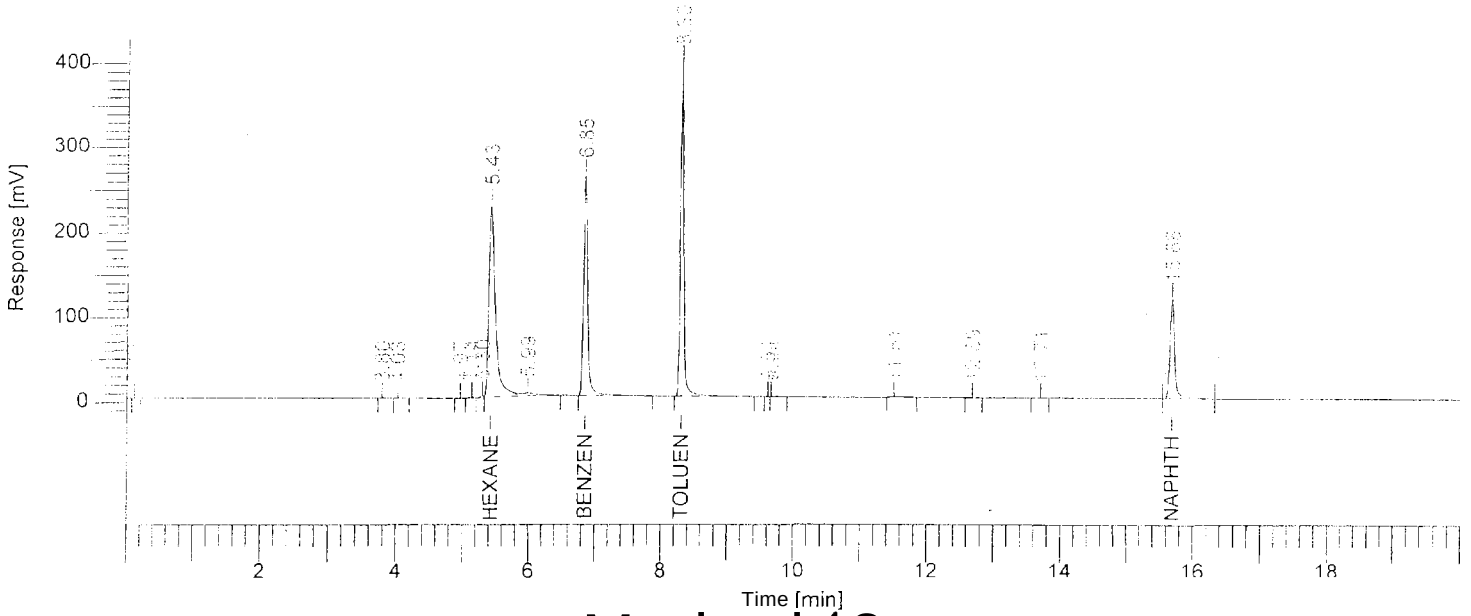
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.793	2117.44	0.0520
2		4.030	722.06	0.0177
3		4.970	244.50	0.0060
4		5.139	6213.39	0.1526
5		5.301	10088.48	0.2477
6	Hexane	5.426	1620644.35	52.4902
7		5.991	130746.00	3.2102
8	Benzene	6.846	1227305.78	52.3496
9	Toluene	8.301	1331686.00	52.8421
10		9.606	362.55	0.0089
11		9.661	865.45	0.0212
12		10.446	487.00	0.0120
13		11.492	3554.00	0.0873
14		13.700	622.00	0.0153
15	Naphthalene	15.671	643107.20	91.1920
			4978766.20	252.7047

post

Software Version : 6.1.2.0.1:D19		Date	: 2/25/03 4:44:48 PM
Sample Name : ***SoW –***		Data Acquisition Time	: 2/25/03 4:24:43 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803034.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



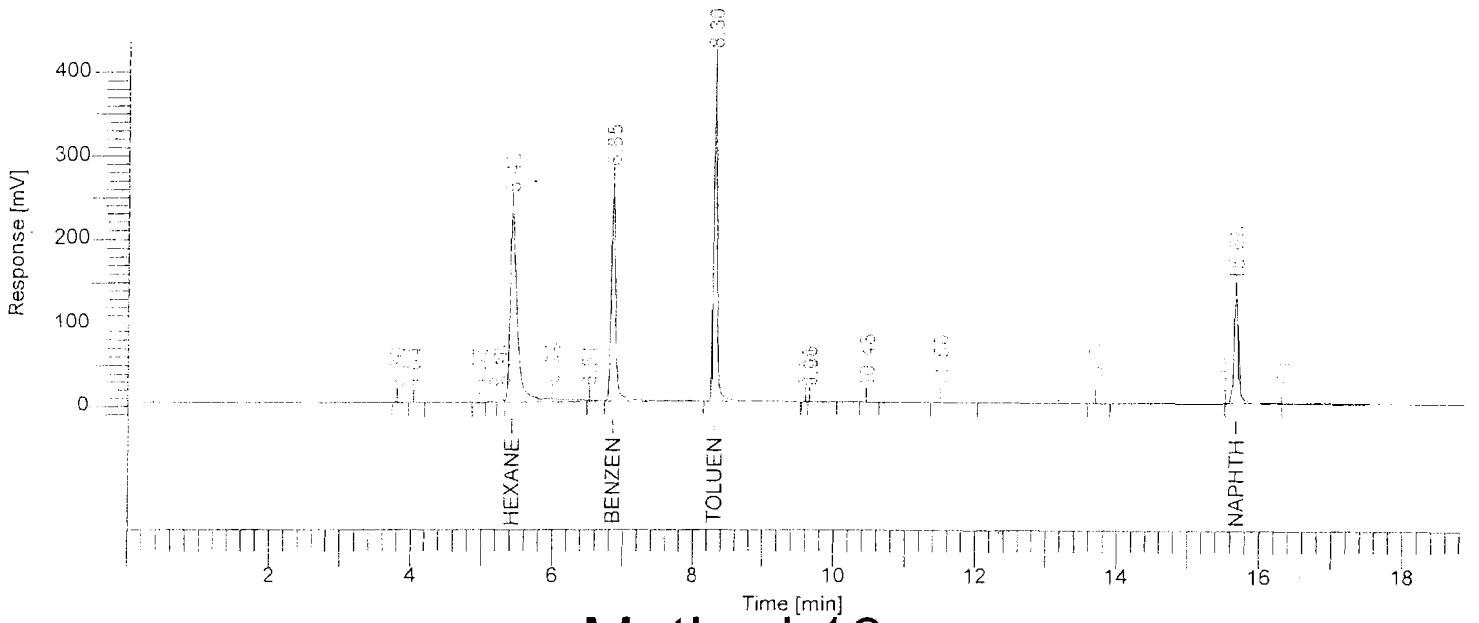
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.114	59.00	0.0014
2		3.795	2233.84	0.0548
3		4.032	685.16	0.0168
4		4.972	256.00	0.0063
5		5.141	5228.50	0.1284
6		5.302	7914.61	0.1943
7	Hexane	5.428	1595541.39	51.5974
8		5.993	54557.00	1.3395
9	Benzene	6.848	1131571.00	48.3370
10	Toluene	8.303	1316767.50	52.2644
11		9.607	266.94	0.0066
12		9.662	518.06	0.0127
13		11.507	2444.00	0.0600
14		12.694	313.00	0.0077
15		13.711	380.50	0.0093
16	Naphthalene	15.679	579060.74	80.1991
			4697797.24	234.2358

post

Software Version : 6.1.2.0.1:D19		Date	: 2/25/03 4:22:45 PM
Sample Name : 50 ppm		Data Acquisition Time	: 2/25/03 4:03:50 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803033.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



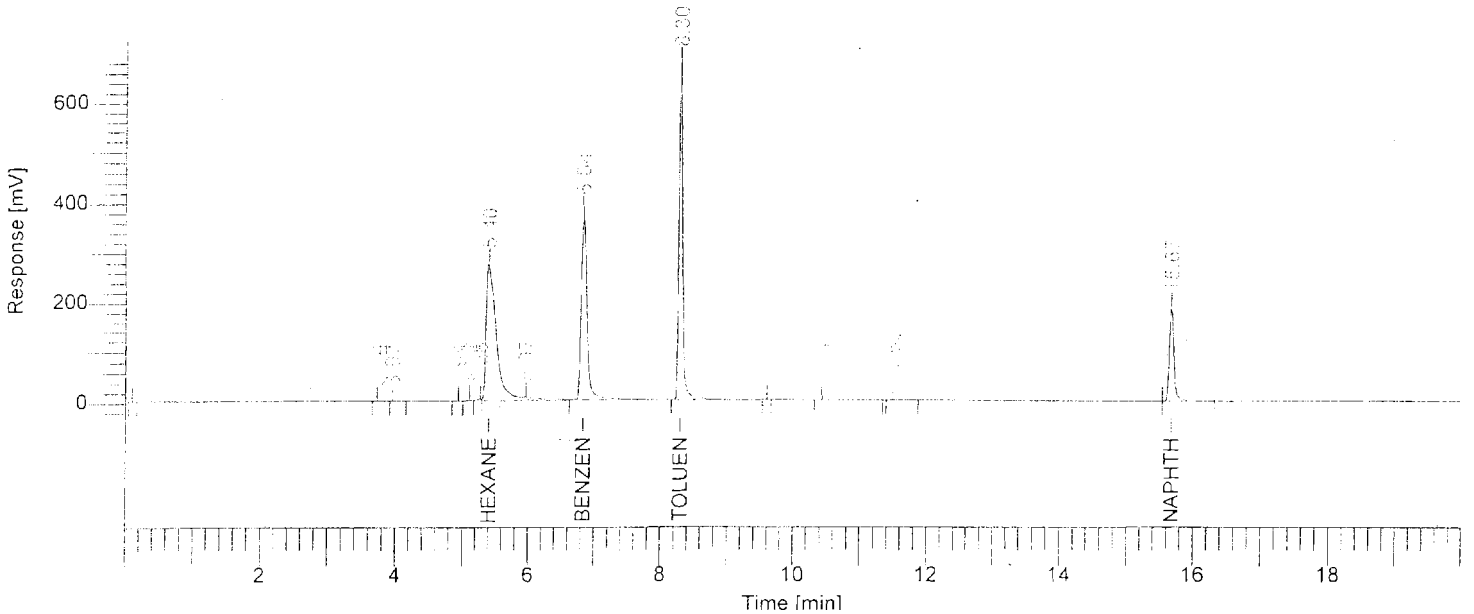
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.803	1884.56	0.0463
2		4.037	662.44	0.0163
3		4.971	264.00	0.0065
4		5.141	6278.45	0.1542
5		5.302	9984.71	0.2452
6	Hexane	5.428	1623767.90	52.6013
7		5.993	114617.00	2.8142
8		6.513	27196.24	0.6677
9	Benzene	6.848	1200624.21	51.2313
10	Toluene	8.302	1328505.00	52.7190
11		9.608	288.46	0.0071
12		9.662	728.04	0.0179
13		10.463	200.50	0.0049
14		11.505	2658.00	0.0653
15		13.701	348.00	0.0085
16	Naphthalene	15.679	628648.24	88.7103
			4946655.74	249.3157

post

Software Version	: 6.1.2.0.1:D19	Date	: 2/25/03 4:01:26 PM
Sample Name	: 100ppm	Data Acquisition Time	: 2/25/03 3:41:24 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803032.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



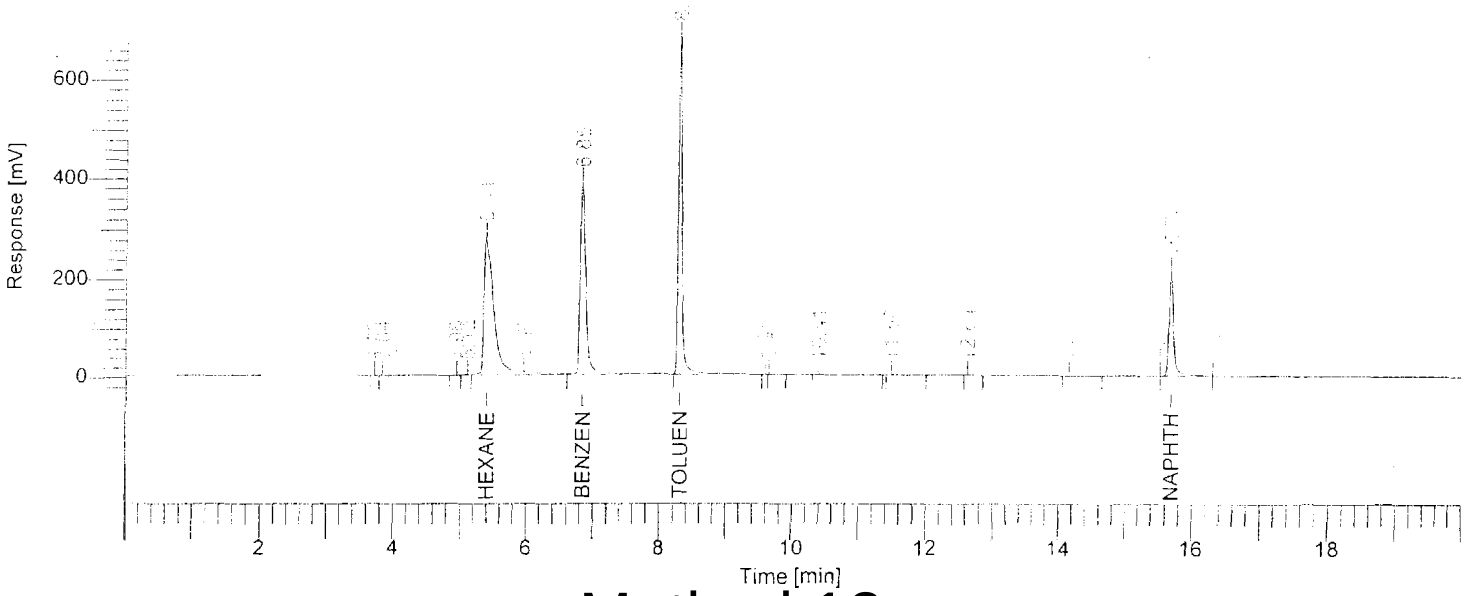
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.098	55.00	0.0014
2		3.740	2611.02	0.0641
3		3.972	771.48	0.0189
4		4.943	235.00	0.0058
5		5.118	9214.43	0.2262
6		5.280	16175.54	0.3972
7	Hexane	5.403	2895028.69	97.8146
8		5.968	181090.00	4.4463
9	Benzene	6.837	2370781.34	100.2769
10	Toluene	8.299	2628563.00	103.0627
11		9.604	239.00	0.0059
12		10.437	2207.00	0.0542
13		11.503	1493.00	0.0367
14	Naphthalene	15.673	900053.67	135.2941
			9008518.17	441.7049

post

Software Version	: 6.1.2.0.1:D19	Date	: 2/25/03 3:39:37 PM
Sample Name	: 100 ppm	Data Acquisition Time	: 2/25/03 3:19:36 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803031.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



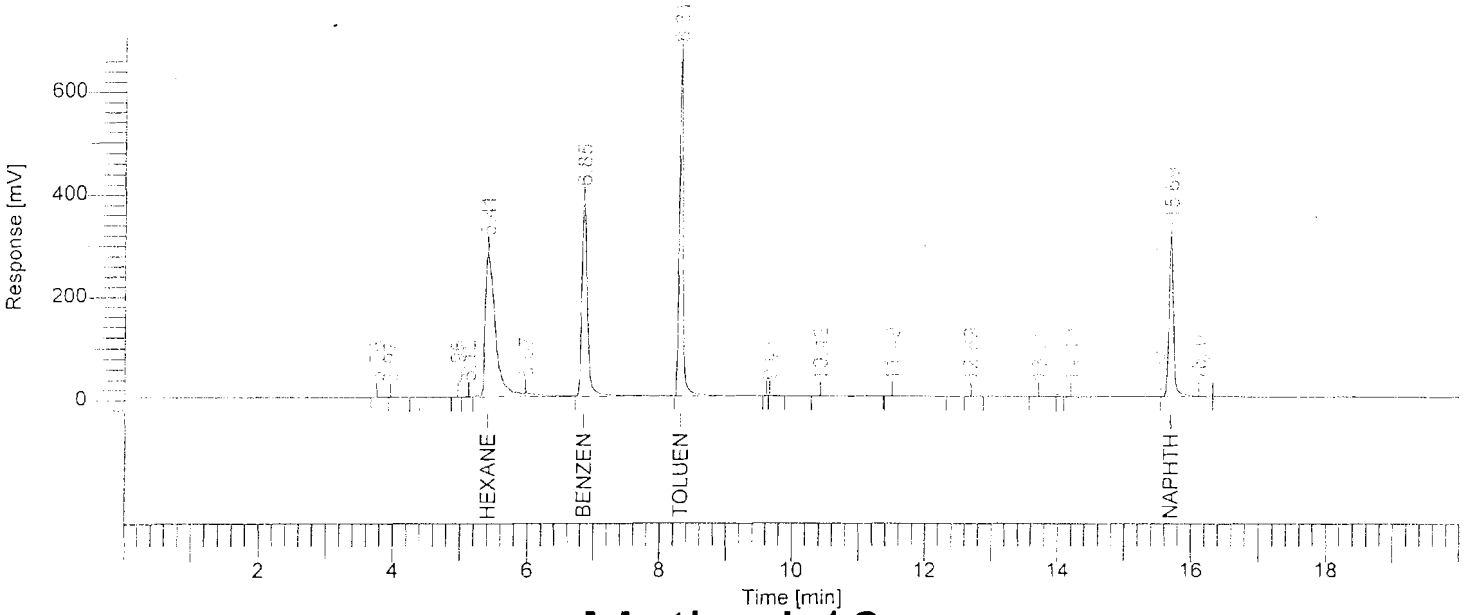
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.731	1089.41	0.0267
2		3.844	797.59	0.0196
3		4.957	235.50	0.0058
4		5.121	9553.35	0.2346
5	Hexane	5.407	2909062.64	98.3137
6		5.974	169740.00	4.1676
7	Benzene	6.849	2380488.01	100.6838
8	Toluene	8.313	2666290.50	104.5236
9		9.607	531.68	0.0131
10		9.661	843.82	0.0207
11		10.409	1854.00	0.0455
12		11.500	1604.00	0.0394
13		12.640	364.00	0.0089
14		14.170	868.00	0.0213
15	Naphthalene	15.699	998873.04	152.2554
			9142195.54	460.3798

post

Software Version : 6.1.2.0.1D19		Date	: 2/25/03 2:08:53 PM
Sample Name : 100 ppm		Data Acquisition Time	: 2/25/03 1:48:49 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803030.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.756	2795.84	0.0686
2		3.971	720.16	0.0177
3		4.963	200.00	0.0049
4		5.123	9860.73	0.2421
5	Hexane	5.408	2908511.57	98.2941
6		5.974	186246.00	4.5729
7	Benzene	6.848	2331564.70	98.6332
8	Toluene	8.312	2650676.00	103.9190
9		9.609	527.28	0.0129
10		9.662	790.22	0.0194
11		10.421	3456.00	0.0849
12		11.491	5067.50	0.1244
13		12.687	279.00	0.0069
14		13.714	362.00	0.0089
15		14.183	188.00	0.0046
16	Naphthalene	15.688	1464393.57	232.1571
17		16.103	14747.00	0.3621
			9580385.57	538.5337

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 6:24:35 PM
Operator	: amg	Sample Name	: 10ppm
Sample Number	: 009	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: I168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 6:04:29 PM	Cycle	: 9

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803009.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803009.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803009.rst
Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803009.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803009.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 1
Values will be averaged with previous runs in the method
Retention times in the method will be updated
Reported response values are the method averages.

calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	135494.448537	28499.284087	---	---	0.997369	18
Benzene	-53053.685835	25150.467354	---	---	0.991541	18
Toluene	-36477.341992	25971.333200	---	---	0.997477	18
Naphthalene	112146.455128	5812.214103	---	---	0.856375	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 5:51:02 PM
Operator	: amg	Sample Name	: 10ppm
Sample Number	: 008	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 5:30:55 PM	Cycle	: 8

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803008.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803008.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803008.rst
Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803008.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803008.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 1
Values will be averaged with previous runs in the method
Retention times in the method will be updated
Reported response values are the method averages.

Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	153411.044166	28275.326642	---	---	0.997180	18
Benzene	-57360.047742	25201.360722	---	---	0.989851	18
Toluene	-39001.977780	26002.891147	---	---	0.996996	18
Naphthalene	114123.758772	5787.497807	---	---	0.831654	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 5:20:11 PM
Operator	: amg	Sample Name	: 10ppm
Sample Number	: 007	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	. Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 5:00:00 PM	Cycle	: 7

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803007.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803007.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803007.rst
Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803007.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803007.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 1
Values will replace previous averages in the method
Retention times in the method will be updated
Reported response values are the method averages.

Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	170714.774398	28059.030014	—	—	0.996342	18
Benzene	-77248.585287	25436.407074	—	—	0.986724	18
Toluene	-61652.688653	26286.025033	—	—	0.996452	18
Naphthalene	68624.250000	6356.241667	—	—	0.835192	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 4:54:36 PM
Operator	: amg	Sample Name	: 50ppm
Sample Number	: 006	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 4:34:24 PM	Cycle	: 6

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803006.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803006.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
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Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
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Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803006.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 2
Values will be averaged with previous runs in the method
Retention times in the method will be updated
Reported response values are the method averages.

Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	-88392.451460	31297.870337	—	—	0.978526	18
Benzene	486966.924567	18768.405594	—	—	0.850013	18
Toluene	482476.644681	19484.408366	—	—	0.870086	18
Naphthalene	-58805.750000	7949.116667	—	—	0.903445	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 4:32:11 PM
Operator	: amg	Sample Name	: 50ppm
Sample Number	: 005	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 4:12:02 PM	Cycle	: 5

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803005.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803005.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
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Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803005.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803005.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 2
Values will be averaged with previous runs in the method
Retention times in the method will be updated
Reported response values are the method averages.

Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	-149879.070055	31682.161704	—	—	0.985710	18
Benzene	556386.677856	18245.380056	—	—	0.852310	18
Toluene	535808.583618	19151.083748	—	—	0.875226	18
Naphthalene	-86993.151361	8125.287925	—	—	0.925179	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 4:10:07 PM
Operator	: amg	Sample Name	: 50ppm
Sample Number	: 004	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 3:49:55 PM	Cycle	: 4

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803004.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803004.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803004.rst
Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803004.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803004.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 2
Values will replace previous averages in the method
Retention times in the method will be updated
Reported response values are the method averages.

Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	-207304.763644	32041.072288			0.989587	18
Benzene	701058.911694	17155.383774			0.879555	18
Toluene	668634.171413	18320.923824			0.914392	18
Naphthalene	-75470.521930	8053.271491			0.923947	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 3:42:12 PM
Operator	: amg	Sample Name	: 100ppm
Sample Number	: 003	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 3:22:01 PM	Cycle	: 3

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803003.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803003.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803003.rst
Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803003.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803003.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 3
Values will be averaged with previous runs in the method
Retention times in the method will be updated
Reported response values are the method averages.

Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	-880289.848870	36247.229071	---	---	0.859329	18
Benzene	2390352.654657	4427.828176	---	---	0.015899	18
Toluene	2411965.477582	7425.103161	---	---	0.032165	18
Naphthalene	-217072.627193	8938.284649	---	---	0.813122	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 3:18:46 PM
Operator	: amg	Sample Name	: 100ppm
Sample Number	: 002	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 20.00 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 2:58:34 PM	Cycle	: 2

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803002.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803002.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803002.rst
Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803002.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803002.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 3
Values will be averaged with previous runs in the method
Retention times in the method will be updated
Reported response values are the method averages.

Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	-833784.226500	34332.291679	---	---	0.803279	18
Benzene	2317075.746334	7445.112636	---	---	0.039158	18
Toluene	2236181.076075	14663.284399	---	---	0.091209	18
Naphthalene	-237147.631148	9764.902459	---	---	0.803279	18

Calibration Status Explanations
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 2:53:42 PM
Operator	: amg	Sample Name	: 100ppm
Sample Number	: 001	Study	: 04803
AutoSampler	: NONE	Rack/Vial	: 0/0
Instrument Name	: Varian 4	Channel	: A
Interface Serial #	: 1168573805	A/D mV Range	: 1000
Delay Time	: 0.00 min	End Time	: 19.17 min
Sampling Rate	: 1.0000 pts/s		
Volume Injected	: 1.000000 mL	Area Reject	: 0.000000
Sample Amount	: 1.0000	Dilution Factor	: 1.00
Data Acquisition Time	: 2/21/03 2:34:20 PM	Cycle	: 1

Raw Data File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803001.raw
Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803001.rst
Inst Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803001.rst
Proc Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803001.rst
Calib Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn from
C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803001.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

AUTO-CALIBRATION REPORT

Updating Method : C:\PenExe\TcWS\Ver6.1.2\Methods\m18hbtn.mth
Calibration performed at level: 3
Values will replace previous averages in the method
Retention times in the method will be updated
Reported response values are the method averages.

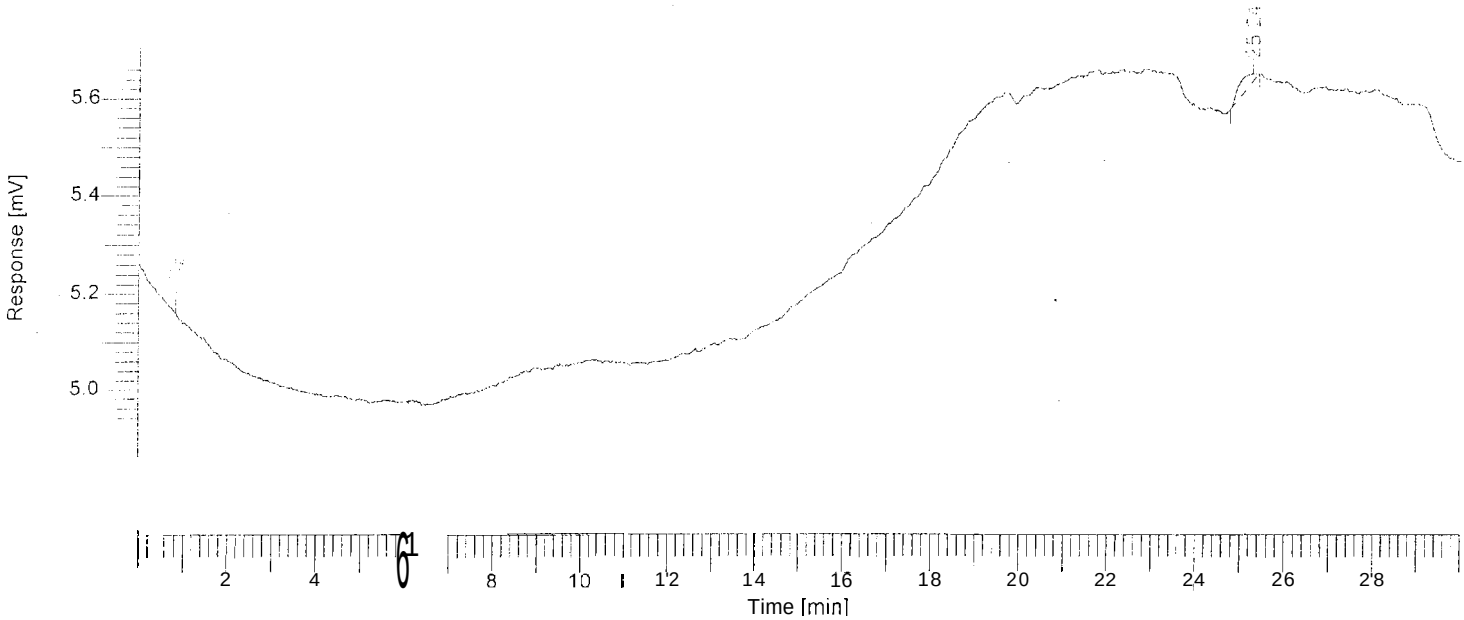
Calibration Status

Component	C0	C1	C2	C3	r^2	Status
Hexane	0.000000	0.000000	---	---	0.000000	2
Benzene	2136936.915237	14862.593917	---	---	0.114142	18
Toluene	1136242.028787	59954.892229	---	---	0.863160	2
Naphthalene	0.000000	0.000000	---	---	0.000000	2

Calibration Status Explanations
2 = Component not calibrated: Was not found in peak/group list
18 = Component calibrated successfully

Software Version	: 6.1.2.0.1:D19	Date	: 2/21/03 12:50:05 PM
Sample Name	:	Data Acquisition Time	: 2/21/03 12:21:28 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\011503\02903031.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\02903.seq



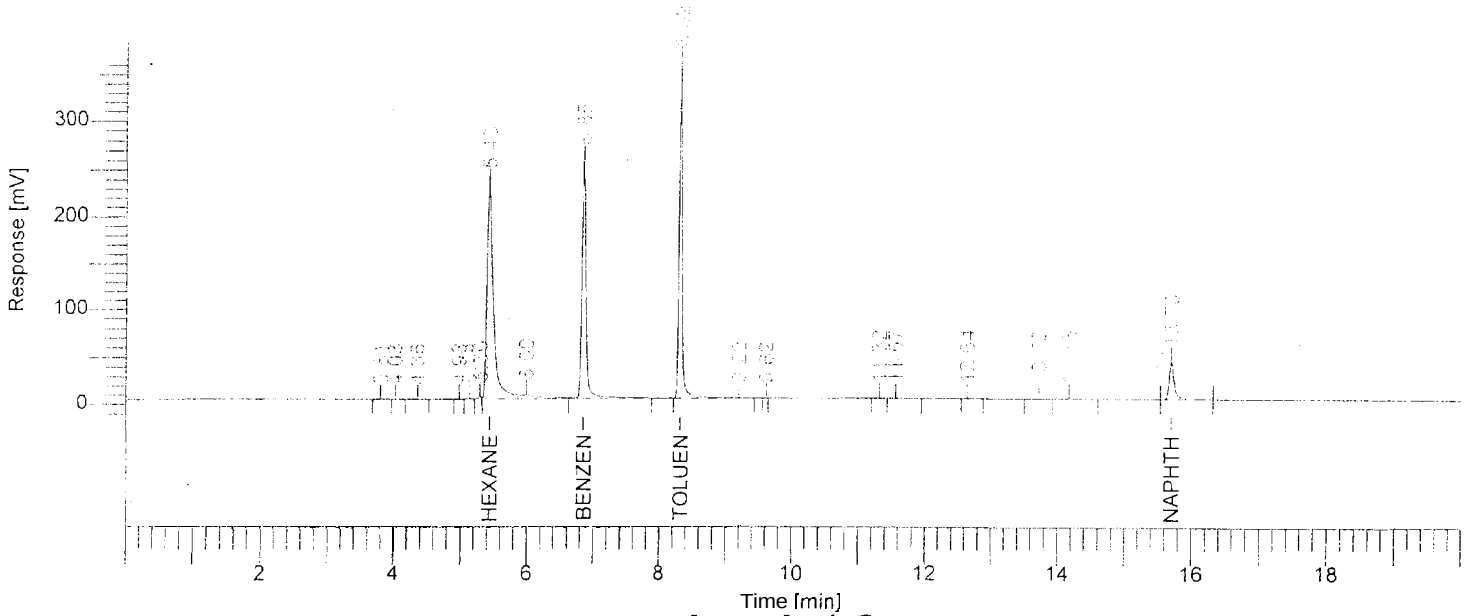
THC as Toluene

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		25.241	721.00	0.0177
			721.00	0.0177

cal check

Software Version	: 6.1.2.0.1:D19	Date	: 2/25/03 10:34:29 AM
Sample Name	: 50ppm	Data Acquisition Time	: 2/25/03 10:14:26 AM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803022.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



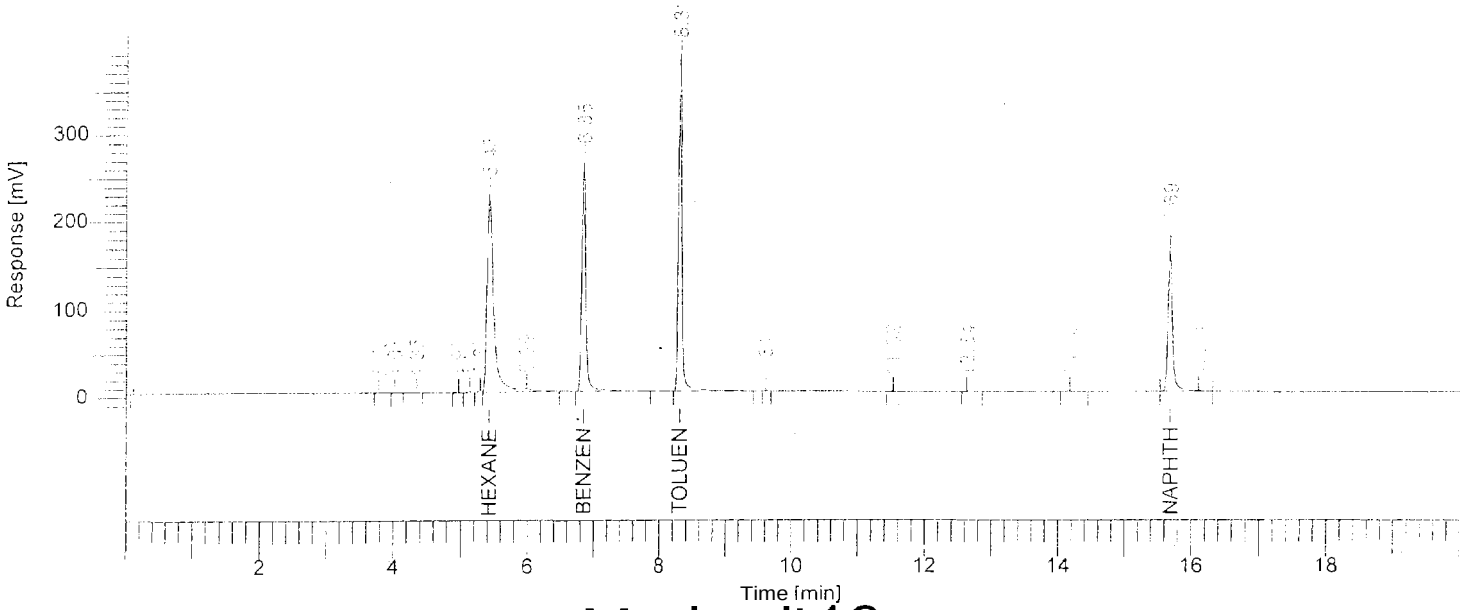
Method'18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.806	1950.95	0.0479
2		4.028	732.18	0.0180
3		4.357	759.87	0.0187
4		4.982	428.00	0.0105
5		5.142	6132.10	0.1506
6		5.304	9698.95	0.2381
7	Hexane	5.435	1602706.15	51.8522
8		5.996	100323.00	2.4632
9	Benzene	6.853	1095422.80	46.8219
10	Toluene	8.315	1187633.00	47.2638
11		9.215	2848.00	0.0699
12		9.620	91.00	0.0022
13		11.318	414.82	0.0102
14		11.566	1218.18	0.0299
15		12.643	1256.50	0.0309
16		13.720	638.29	0.0157
17		14.176	3600.21	0.0884
18	Naphthalene	15.703	206102.97	16.1848
			4221956.97	165.3168

Calcheck

Software Version	: 6.1.2.0.1:D19	Date	: 2/28/03 11:53:32 AM
Sample Name	: 50ppm	Data Acquisition Time	: 2/28/03 11:33:22 AM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle	: 10		

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803040.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



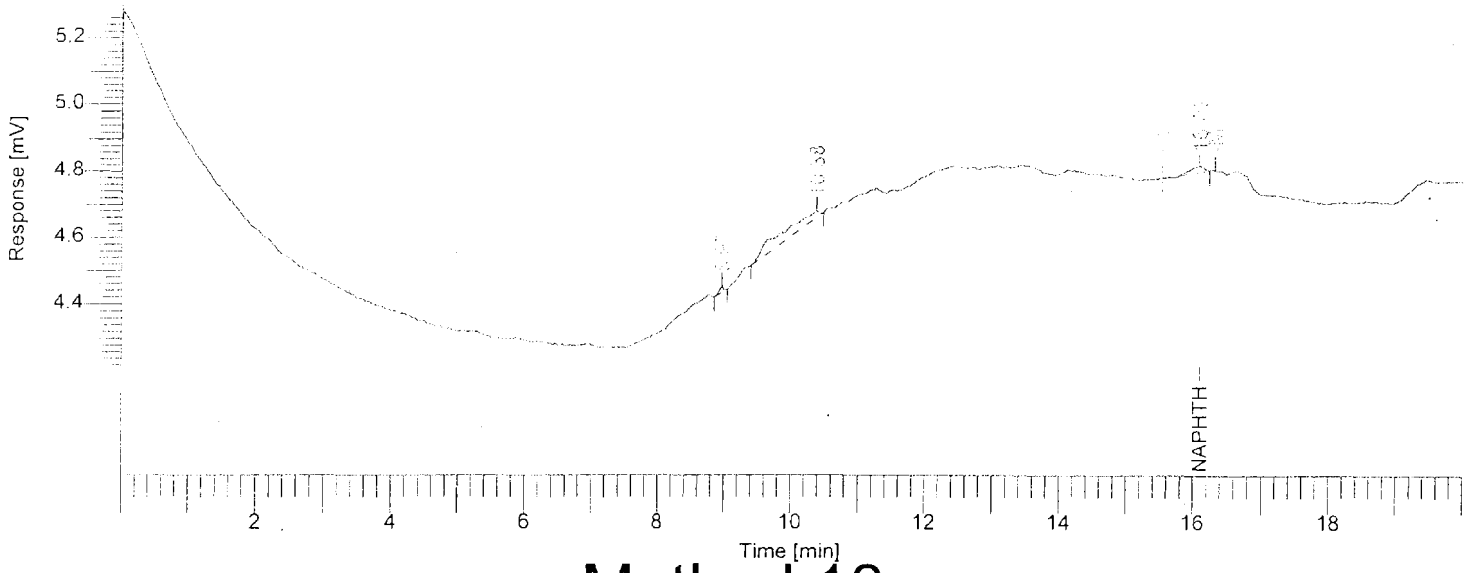
Method'18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.111	153.00	0.0038
2		3.791	1124.69	0.0276
3		4.025	132.31	0.0032
4		4.348	223.99	0.0055
5		4.973	255.00	0.0063
6		5.136	5710.67	0.1402
7		5.299	9338.35	0.2293
8	Hexane	5.425	1595502.47	51.6285
9		5.988	50220.00	1.2330
10	Benzene	6.847	1133147.00	47.9264
11	Toluene	8.305	1314948.00	50.6213
12		9.606	123.00	0.0030
13		11.523	96.00	0.0024
14		12.637	211.00	0.0052
15		14.177	420.00	0.0103
16	Naphthalene	15.686	760634.72	81.6341
17		16.106	7999.00	0.1964
			4880239.22	233.6765

system blank

Software Version	: 6.1.2.0.1:D19	Date	: 2/28/03 10:24:39 AM
Sample Name	: ~~10ppm~~ amg	Data Acquisition Time	: 2/28/03 10:05:24 AM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803039.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



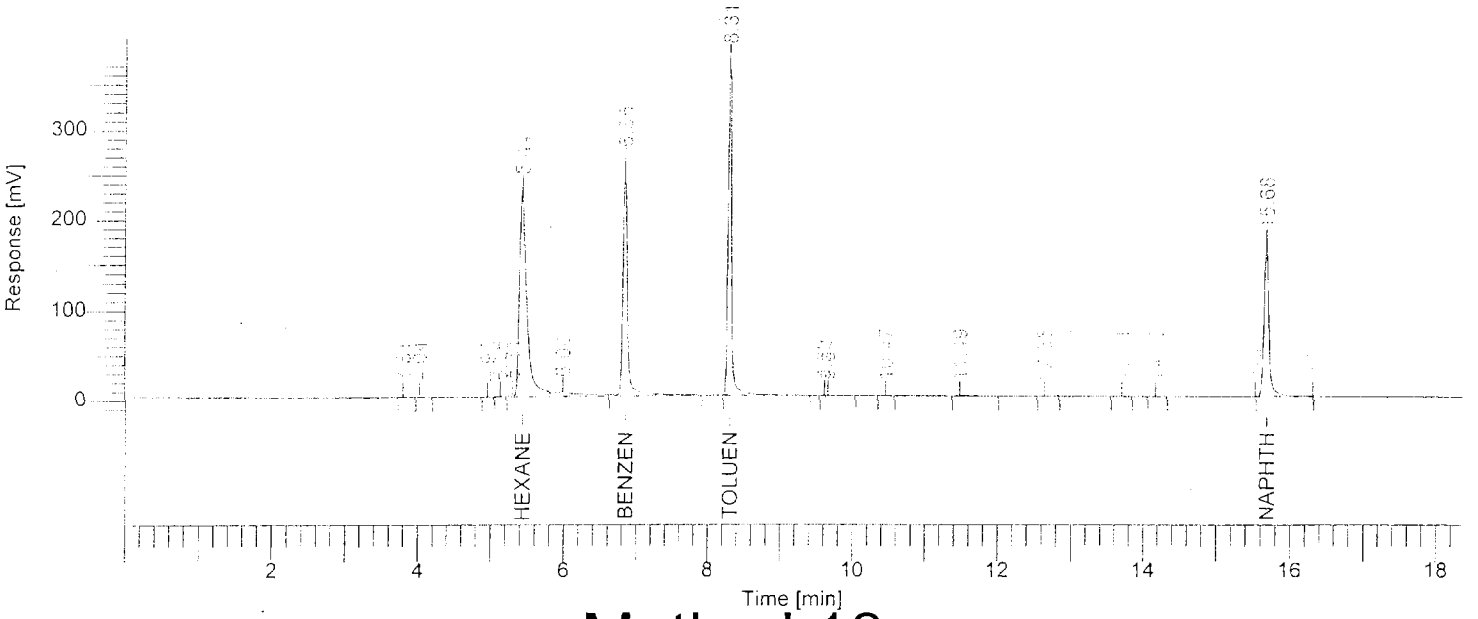
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		8.966	73.50	0.0018
2		10.376	1537.00	0.0377
3	Naphthalene	16.094	274.56	-11.2953
			1885.06	-11.2557

Cal check

Software Version : 6.1.2.0.1:D19		Date	: 2/24/03 3:36:46 PM
Sample Name : 50ppm		Data Acquisition Time	: 2/24/03 3:18:12 PM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803014.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



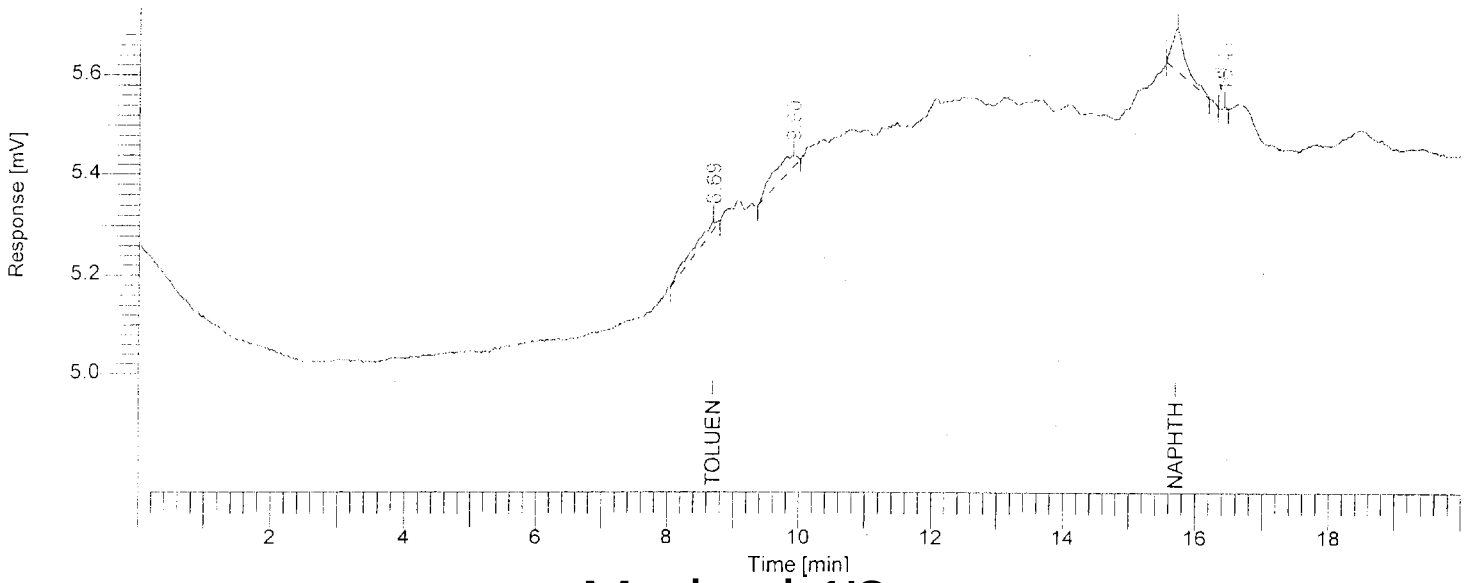
Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.811	2945.90	0.0723
2		4.037	1119.60	0.0275
3		4.971	359.50	0.0088
4		5.146	6053.91	0.1486
5		5.305	9280.48	0.2279
6	Hexane	5.435	1615812.19	52.3183
7		5.997	120348.00	2.9549
8	Benzene	6.851	1162913.43	49.6507
9	Toluene	8.306	1302241.50	51.7019
10		9.625	280.92	0.0069
11		9.672	1306.58	0.0321
12		10.467	324.50	0.0080
13		11.494	4025.50	0.0988
14		12.649	549.00	0.0135
15		13.711	353.00	0.0087
16		14.187	398.50	0.0098
17	Naphthalene	15.684	803763.22	118.7669
			5032075.72	276.0556

Sys BIK

Software Version : 6.1.2.0.1:D19		Date	: 2/25/03 10:02:50 AM
Sample Name :		Data Acquisition Time	: 2/25/03 9:42:48 AM
Instrument Name : Varian 4		Channel	: A
Rack/Vial : 0/0		Operator	: amg
Sample Amount : 1.000000		Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803021.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

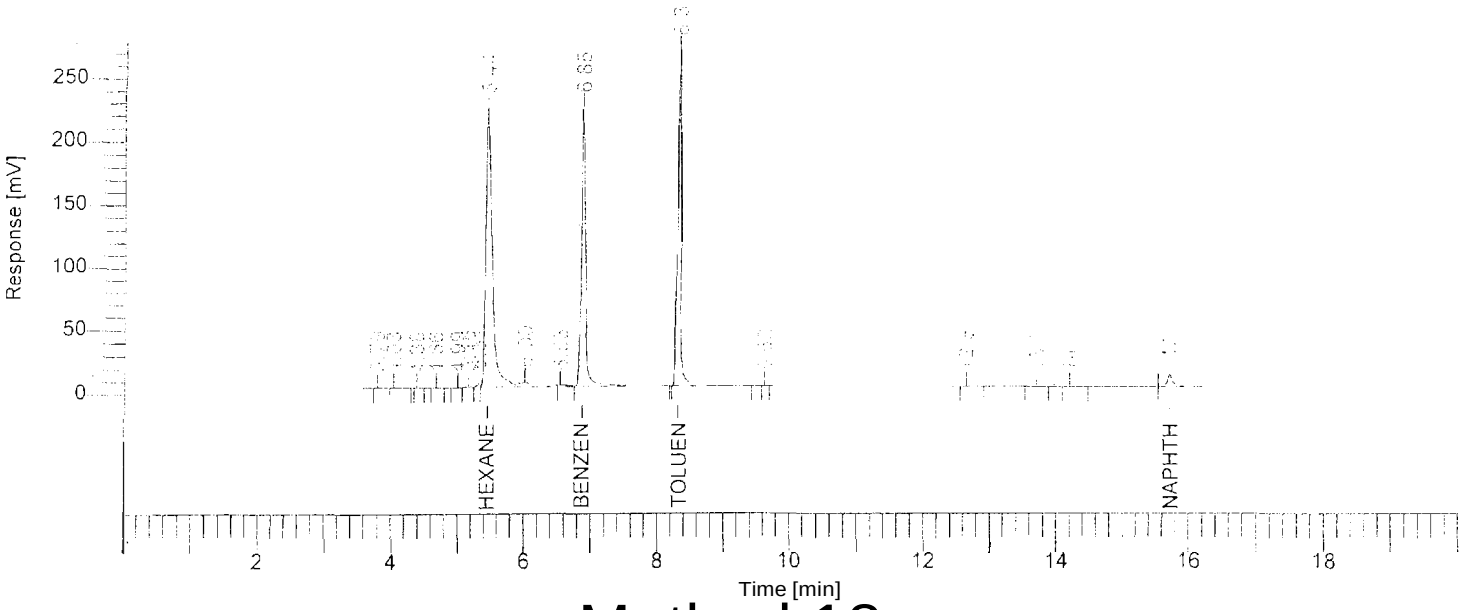


Method 1'8

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1	Toluene	8.687	635.00	1.2983
2		9.897	927.00	0.0228
3	Naphthalene	15.700	1183.21	-18.9875
4		16.413	26.67	0.0007
			2771.87	-17.6659

Software Version	: 6.1.2.0.1:D19	Date	: 2/24/03 1:15:01 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 12:54:52 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803012.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

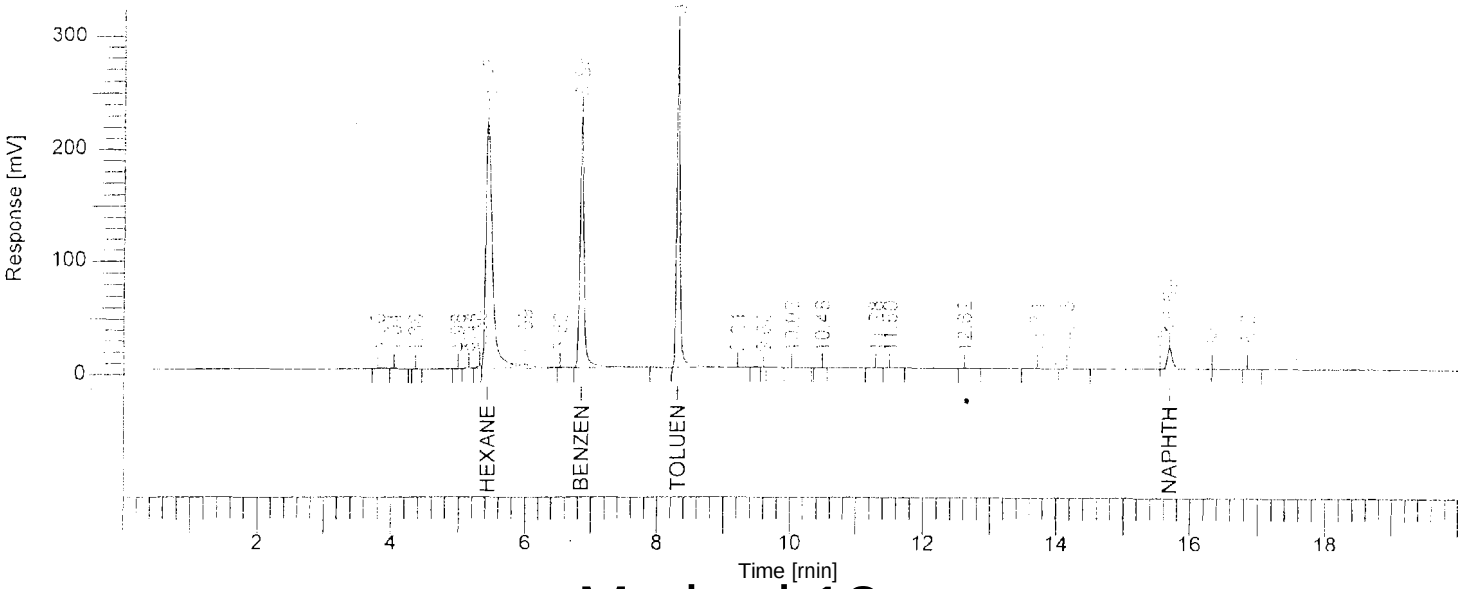


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.791	4192.41	0.1029
2		4.033	1226.59	0.0301
3		4.375	91.00	0.0022
4		4.661	127.50	0.0031
5		4.986	242.50	0.0060
6		5.147	6192.20	0.1520
7		5.306	9393.80	0.2306
8	Hexane	5.437	1495735.42	48.0477
9		6.000	78371.00	1.9242
10		6.529	15721.37	0.3860
11	Benzene	6.854	971598.72	41.6319
12	Toluene	8.313	925912.50	37.1289
13		9.617	106.00	0.0026
14		12.653	407.00	0.0100
15		13.712	455.00	0.0112
16		14.203	701.00	0.0172
17	Naphthalene	15.707	60278.96	-8.8444
			3570752.96	120.8425

Software Version	: 6.1.2.0.1D19	Date	: 2/24/03 12:42:41 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 12:22:33 PM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803011.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq

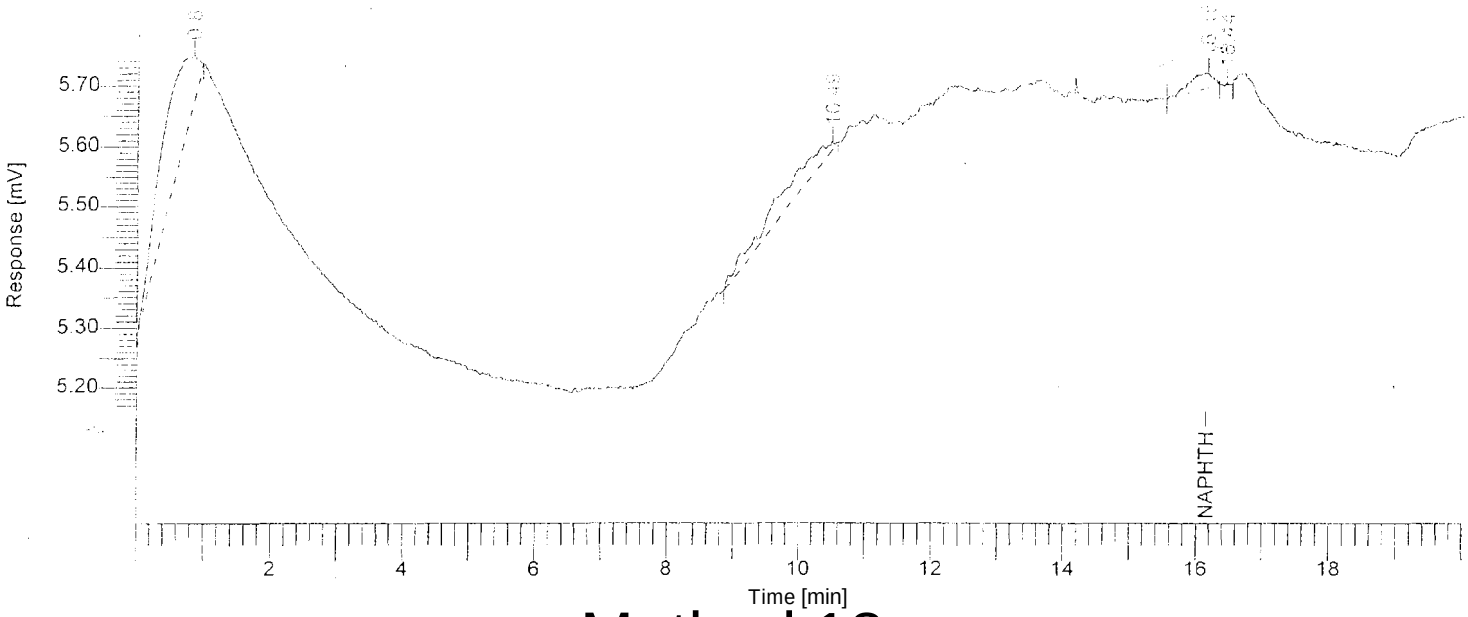


Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		3.796	4763.53	0.1170
2		4.038	1420.47	0.0349
3		4.358	200.00	0.0049
4		4.984	652.52	0.0160
5		5.140	6364.56	0.1563
6		5.302	10185.39	0.2501
7	Hexane	5.431	1545606.61	49.8214
8		5.990	66765.00	1.6393
9		6.523	10261.61	0.2520
10	Benzene	6.847	992442.32	42.5056
11	Toluene	8.301	989181.00	39.5789
12		9.206	1866.00	0.0458
13		9.602	67.00	0.0016
14		10.022	653.00	0.0160
15		10.483	178.00	0.0044
16		11.283	389.00	0.0096
17		11.500	970.00	0.0238
18		12.617	1575.50	0.0387
19		13.705	1521.89	0.0374
20		14.150	3789.61	0.0930
21	Naphthalene	15.686	108659.56	-0.5403
22		16.843	340.00	0.0083
			3747852.56	134.1146

Software Version	: 6.1.2.0.1:D19	Date	: 2/24/03 12:20:09 PM
Sample Name	:	Data Acquisition Time	: 2/24/03 11:59:59 AM
Instrument Name	: Varian 4	Channel	: A
Rack/Vial	: 0/0	Operator	: amg
Sample Amount	: 1.000000	Dilution Factor	: 1.000000
Cycle			

Result File : C:\PenExe\TcWS\Ver6.1.2\data\amg\GC4\022103\04803010.rst
Sequence File : C:\PenExe\TcWS\Ver6.1.2\sequence\04803.seq



Method 18

Peak #	Component Name	Time [min]	Area [uV*sec]	ppm Amount
1		0.833	5807.00	0.1426
2		10.489	2522.00	0.0619
3	Naphthalene	16.152	678.82	-19.0741
4		16.439	9.09	0.0002
			9016.92	-18.8694

Chain-Of-Custody

sami
SAMPLING & ANALYTICAL MANAGEMENT, INC
963 CONCORD DRIVE
MEDINA, OHIO 44256
(330)723-0552
FAX (330)723-0645

Analysis Request / Environmental Services Chain of Custody

Please Print. Instructions on reverse side correspond with circled numbers

(1) Company Name: SAMI
Report Address:
Billing Address:
City: State: Zip:
Phone: Fax:
Report Attention: MICHELLE
Project Name: G/SA 03-T-201
P.O. #: 03-T-201
Indicate state where samples were collected:
Compliance ☒ Non-Compliance ☐

Sample Identification (2)	Date Collected	Time Collected	(3) Grab	Composite	Matrix (4): Soil	Potable / NPDES Water	Other	Total # of Containers	Source / IH Air	Canisters*	Analysis Requested (5): U.S. EPA m (3)	Hexane (solvent)	Benzene	Naphthalene	Remarks (6)
M18R1	2/27/03	0400	✓						✓		✓	✓	✓		4803-1
M18R2	2/27/03	0700	✓						✓		✓	✓	✓		2
M18R3	2/27/03	1000	✓						✓		✓	✓	✓		3

Temperature of samples upon receipt (if requested)

(7) Turnaround Time Requested (TAT) (please circle) Normal Rush
[Rush TAT is subject to SAMI approval and surcharge.]
Date results are needed: 3/10/03
Rush results requested by (please circle) Fax Mail
Fax #:

(8) Notes: (1) PLEASE SEND RESULTS W/ SIGNED CHAIN OF CUSTODY
(2) PLEASE INCLUDE MAKE & MODELS OF ANALYTICAL EQUIPMENT W/ RESULTS
(3) PLEASE RETURN SHIPPING CONTAINER TO:
G/SA
3915 W. 106TH LANE
CROWN POINT, IN 46307

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
Paul W Zell	2/27/03	17:00	Debra English	2-21-03	10:37 AM
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

(10) *Canister Pressure / Vacuum

Initial	Final	Receipt

WHITE - FILE • YELLOW - CLIENT • PINK - LAB

sami
SAMPLING & ANALYTICAL MANAGEMENT, INC
963 CONCORD DRIVE
MEDINA, OHIO 44256
(330)723-0552
FAX (330)723-0645

Analysis Request / Environmental Services Chain of Custody

Please Print. Instructions on reverse side correspond with circled numbers

Page 1 of

(1)
Company Name: SAMI
Report Address:
Billing Address:
City: State: Zip:
Phone: For:
Report Attention: MICHELLE
Project Name: G/SA 03-T-201
P.O. #: 03-T-201
Indicate state where samples were collected:
Compliance ☒ Non-Compliance ☐

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Potable NPDES	Water	Other	Total # of Containers	Source ☐ IH ☐ Ambient	Air	Canisters*	(5) Analysis Requested: U.S. EPA TO-13	Hexane, Toluene	Benzene	Naphthalene	(6) Remarks	Temperature of samples upon receipt (if requested)
M18 R1	2/20/03	0400	✓								✓		✓	✓	✓		48-03 4803-1	
M18 R2	2/20/03	0700	✓								✓		✓	✓	✓		2	
M18 R3	2/20/03	1000	✓								✓		✓	✓	✓		3	

(7) **Turnaround Time Requested** (TAT) (please circle) Normal Rush
(Rush TAT is subject to SAMI approval and surcharge.)
Dole results ore needed 3/10/03
Rush results requested by (pleose circle) Fox Mail
Fax #

(8) **Notes:** (1) PLEASE SEND RESULTS W/ SIGNED CHAIN OF CUSTODY
(2) PLEASE INCLUDE MAKE & MODELS OF ANALYTICAL EQUIPMENT W/ RESULTS
(3) PLEASE RETURN SHIPPING CONTAINER TO:
G/SA
3915 W. 106TH LANE
CROWN POINT IN 46307

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
Fred W Sall	2/21/03	17:00	Debra English	2-21-03	10:39 AM
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by	Date	Time
Relinquished by	D o ~	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by	Date	Time

(10) 'Canister Pressure / Vacuum

Initial	Final	Recei

WHITE - LAB · YELLOW CLIENT · PINK LAB

METALS ANALYSIS

DATA CHEM LABORATORIES
A SORENSON COMPANY

Submitted To: Michelle LaLiberty
SAMI
318 N. Harmony Street
Medina, OH 44256

Reference Data:	**Metals**
Client Sample No.:	SDI-M29-R1A,B,C,F through SDI-M29-Blank#1,2,3,4
P.O. No.:	03-T-201
Sample Location:	G/SA 03-T-201
Sample Type:	Filter/Residue/Liquid
Method Reference:	Method 29
DCL Set ID No.:	03-S-0856
DCL Sample ID No.:	03-05199 through 03-05202
Sample Receipt Date:	2/25/2003
Preparation Date:	03/04-07/03
Analysis Date:	03/04-10/03
Analytical Instruments:	Metals: Perkin Elmer 3000XL ICP Mercury: CETAC Mercury Analyzer M-6000A

The samples were prepared and analyzed in accordance with method 29 Sample condition was acceptable upon receipt except where noted.

The results are provided in the enclosed data table. Results relate only to the items tested and are not blank corrected.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Chris Baugues
Stephanie Wilcox
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336. FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

Container Volumes (mL)

Client #	DCL #	Container 2	Container 3	Container 4	Container 5A	Container 5B
SDI-M29-R1A,B,C,F	03-05199	-	-	425.	234.	415.
SDI-M29-R2A,B,C,F	03-05200	-	-	460.	206.	420.
SDI-M29-R3A,B,C,F	03-05201	-	-	475.	228.	410.
SDI-M29-Blank#1,2,3,4	03-05202	-	240.	200.	228.	200.

Fraction 1 Results

µg/sample

Client #	SDI-M29-R1A,B,C,F	SDI-M29-R2A,B,C,F	SDI-M29-R3A,B,C,F	SDI-M29-Blank#1,2,3,4		
DCL #	03-05199	03-05200	03-05201	03-05202		**RPL**
Antimony	ND	ND	ND	ND		**10.**
Arsenic	ND	ND	ND	ND		**10.**
Barium	ND	ND	ND	ND		10.
Beryllium	ND	ND	ND	ND		10.
Cadmium	ND	ND	ND	ND		**10.**
Chromium	ND	ND	ND	ND		**10.**
Cobalt	ND	ND	ND	ND		**10.**
Copper	ND	ND	ND	ND		**10.**
Lead	ND	ND	ND	ND		10.
Manganese	ND	ND	ND	ND		**10.**
Mercury	ND	ND	ND	ND		**0.1**
Nickel	ND	ND	ND	ND		**10.**
Phosphorus	ND	ND	ND	ND		**10.**
Selenium	ND	ND	ND	ND		**10.**
Silver	ND	ND	ND	ND		**10.**
Thallium	ND	ND	ND	ND		**10.**
Zinc	**32.**	**30.**	**37.**	**14.**		10.

ND indicates not detected at or above the Reporting Limit (RPL).

Fraction 1 QC Results

µg/sample

Client #	.	% Recovery				
DCL #	Lab Blank	LCS				**RPL**
Antimony	ND	102.				10.
Arsenic	ND	99.				**10.**
Barium	ND	100.				**10.**
Beryllium	ND	*97.*				**10.**
Cadmium	ND	102.				**10.**
Chromium	ND	*99.*				**10.**
Cobalt	ND	101.				**10.**
Copper	ND	101.				**10.**
Lead	ND	101.				**10.**
Manganese	ND	*99.*				**10.**
Mercury	ND	112.				**0.1**
Nickel	ND	102.				**10.**
Phosphorus	ND	-				**10.**
Selenium	ND	*97.*				**10.**
Silver	ND	50.				**10.**
Thallium	ND	108.				**10.**
Zinc	ND	112.				**10.**

ND indicates not detected at or above the Reporting Limit (RPL).
LCS = laboratory control sample.

Fraction 2 Results

µg/sample

Client #	SDI-M29-R1A,B,C,F	SDI-M29-R2A,B,C,F	SDI-M29-R3A,B,C,F	SDI-M29-Blank#1,2,3,4		
DCL #	03-05199	03-05200	03-05201	03-05202		**RPL**
Antimony	ND	ND	ND	ND		**30.**
Arsenic	ND	ND	ND	ND		**50.**
Barium	ND	ND	ND	ND		**100.**
Beryllium	ND	ND	ND	ND		**4.0**
Cadmium	ND	ND	ND	ND		**5.0**
Chromium	ND	ND	ND	ND		**10.**
Cobalt	ND	ND	ND	ND		**50.**
Copper	ND	ND	ND	ND		**25.**
Lead	**11.**	**19.**	**13.**	ND		**10.**
Manganese	**61.**	110.	**88.**	ND		**15.**
Mercury	***19.***	**22.**	**43.**	ND		**5.**
Nickel	ND	ND	ND	ND		**40.**
Phosphorus	ND	ND	ND	ND		**50.**
Selenium	ND	ND	ND	ND		**30.**
Silver	ND	ND	ND	ND		**10.**
Thallium	ND	ND	ND	ND		**30.**
Zinc	**190.**	**200.**	**120.**	ND		**50.**

ND indicates not detected at or above the Reporting Limit (RPL).

Fraction 2 QC Results

µg/sample

Client #		% Recovery	% Recovery	% Recovery		
DCL #	Lab Blank	LCS	03-05199MS	03-05199MSD		RPL
Antimony	ND	99.	103.	105.		30.
Arsenic	ND	95.	101.	102.		50.
Barium	ND	95.	102.	104.		100.
Beryllium	ND	94.	98.	101.		4.0
Cadmium	ND	96.	103.	104.		5.0
Chromium	ND	93.	100.	101.		10.
Cobalt	ND	95.	102.	103.		50.
Copper	ND	95.	105.	107.		25.
Lead	ND	95.	102.	104.		10.
Manganese	ND	93.	97.	103.		15.
Mercury	ND	96.	96.	91.		10.
Nickel	ND	95.	100.	102.		40.
Phosphorus	ND	-	-	-		50.
Selenium	ND	98.	98.	99.		30.
Silver	ND	94.	101.	103.		10.
Thallium	ND	99.	94.	100.		30.
Zinc	ND	97.	103.	104.		50.

ND indicates not detected at or above the Reporting Limit (RPL).
LCS stands for laboratory control sample; MS stands for matrix spike; MSD stands for matrix spike duplicate.

Fraction 3A Results

µg/sample

Client #	SDI-M29-R1A,B,C,F	SDI-M29-R2A,B,C,F	SDI-M29-R3A,B,C,F	SDI-M29-Blank#1,2,3,4		
DCL #	03-05199	03-05200	03-05201	03-05202		**RPL**
Mercury	ND	ND	ND	ND		**1.0**

ND indicates not detected at or above the Reporting Limit (RPL).

Fraction 3A QC Results

µg/sample

Client #		% Recovery				
DCL #	Lab Blank	LCS				**RPL**
Mercury	ND	96.				**1.0**

ND indicates not detected at or above the Reporting Limit (RPL).
LCS = laboratory control sample.

Fraction 3B Results

µg/sample

Client #	SDI-M29-R1A,B,C,F	SDI-M29-R2A,B,C,F	SDI-M29-R3A,B,C,F	SDI-M29-Blank#1,2,3,4		
DCL #	03-05199	03-05200	03-05201	03-05202		**RPL**
Mercury	ND	**3.3**	ND	ND		**2.0**

ND indicates not detected at or above the Reporting Limit (RPL).

Fraction 3B QC Results

µg/sample

Client #		% Recovery				
DCL #	Lab Blank	LCS				**RPL**
Mercury	ND	96.				**10.**

ND indicates not detected at or above the Reporting Limit (RPL).
LCS = laboratory control sample.

Fraction 3C Results

µg/sample

Client #	SDI-M29-R1A,B,C,F	SDI-M29-R2A,B,C,F	SDI-M29-R3A,B,C,F	SDI-M29-Blank#1,2,3,4		
DCL #	03-05199	03-05200	03-05201	03-05202		RPL
Mercury	**1.4**	5.5	**3.1**	ND		**1.0**

ND indicates not detected at or above the Reporting Limit (RPL).

Fraction 3C QC Results

µg/sample

Client #		% Recovery				
DCL #	Lab Blank	LCS				RPL
Mercury	ND	96.				**1.0**

ND indicates not detected at or above the Reporting Limit (RPL).
LCS = laboratory control sample.

Chris Baugues
Stephanie Wilcox
Analyst

Reviewer

Chain-Of-Custody

sami
SAMPLING & ANALYTICAL MANAGEMENT, INC.

963 CONCORD DRIVE
MEDINA, OHIO 44256
(330) 723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Please Print. Instructions on reverse side correspond with circled numbers

Page 1 of 2

(1) Company Name: SAMI
Report Address:
Billing Address:
City | State | Zip
Phone | Fax
Report Attention: Michelle
Project Name: GNA 03-T-201
P.O. #: 03-T-201
Indicate state where samples were collected:
Compliance ☒ Non-Compliance ☐

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	Air (☐ Source ☐ IH ☐ Ambient)	Canisters*	Analysis Requested: Ug/gram 25	(6) Remarks
SDI-M25-R1A	3/17/06	800	✓						✓	✓	03-05199	Sample in 3 Part.
SDI-M25-R1B		900	✓						✓	✓		
SDI-M25-R1C		900	✓						✓	✓		
SDI-M25-R2A		1100	✓						✓	✓	05200	
SDI-M25-R2B		1100	✓						✓	✓		Sample in 3 Part
SDI-M25-R2C		1100	✓						✓	✓		
SDI-M25-R3A		1500	✓						✓	✓	05201	
SDI-M25-R3B		1500	✓						✓	✓		Sample in 3 Part
SDI-M25-R3C		1500	✓						✓	✓		
SDI-M25-Blank #1		1500	✓						✓	✓	05202	+ Blank in 4 Part.

(7) **Turnaround Time Requested** (TAT) (please circle): (Normal) Rush
(Rush TAT is subject to SAMI approval and surcharge.)
Date results are needed: 3/13/06
Rush results requested by (please circle): Fax Mail
Fax #:

(8) **Notes:** (1) PLEASE RETURN SIGNED CHAIN OF CUSTODY W/REPORT
(2) PLEASE PROVIDE A LIST OF TYPE & MODEL NOS. OF ANALYTICAL EQUIPMENT
3) PLEASE RETURN COOLERS TO GNA
3511 466/106TH LANE
CROWN PT IN 46307

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	3/24/06	1500	[signature]	3/25/06	1054
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

(10) **Canister Pressure / Vacuum**

Initial	Final	Receipt

CASE

sami
SAMPLING & ANALYTICAL MANAGEMENT, INC.

963 CONCORD DRIVE
MEDINA, OHIO 44256
(330)723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Page 2 of 3

Please Print. Instructions on reverse side correspond with circled numbers

(1) Company Name: SAMI
Report Address:
Billing Address:
City | State | Zip:
Phone | Fax:
Report Attention: MCGUIRE
Project Name: G/A 03-T-201
P.O. #: 03-T-201
Indicate state where samples were collected:
Compliance ☒ Non-Compliance ☐

(2) Sample Identification	Date Collected	Time Collected	(3) Grab	Composite	(4) Matrix: Soil	Water	Other	Total # of Containers	Air	Canisters*	(5) Analysis Requested: U.S. EPA M25	U.S. EPA M316	(6) Remarks	Temperature of samples upon receipt (if requested)
SDI-M25-BLANK #2	2/19/03	1100	✓						✓		✓		BLANKS 4 PAGE	
SDI-M25-BLANK #3	"	1200	✓						✓		✓			
SDI-M25-BLANK #4	"	1200	✓						✓		✓			
SDI-M316-R1	2/20/03	0400	✓						✓			✓ 05203		
SDI-M316-R2	"	0800	✓						✓			✓ 05204		
SDI-M316-R3	"	1000	✓						✓			✓ 05205		
SDI-M316-BLANK	"	1100	✓						✓			✓ 05206		

(7) **Turnaround Time Requested** (TAT) (please circle) Normal Rush
(Rush TAT is subject to SAMI approval and surcharge.)
Date results are needed: _____
Rush results requested by (please circle) Fax Mail
Fax # _____

(8) **Notes:**
SEE PAGE 1

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	2/24/03	1530	[signature]	2/25/03	1054
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by	Date	Time
Relinquished by	Date	Time	Received by:	Date	Time

(10) *Canister Pressure / Vacuum

Initial	Final	Receipt

sami

SAMPLING & ANALYTICAL MANAGEMENT, INC.

0856

963 CONCORD DRIVE
MEDINA, OHIO 44256
(330) 723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Page 3 of 3

Please Print. Instructions on reverse side correspond with circled numbers

Company Name: Michelle / SAMI
Address:
City | State | Zip
Phone | Fax
Report Attention: MICHELLE
Project Name: G/JA 03-T-201
P.O. #: 03-T-201
Indicate state where samples were collected:
Compliance ☒ Non-Compliance ☐

Sample Identification (2)	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Water: ☐ Potable ☐ NPDES	Other	Total # of Containers	Air: ☐ Source ☐ Ambient	Canisters*	Analysis Requested (5): Ni Cr PCB M25	Remarks (6)	Temperature of samples upon receipt (if requested)
SDI - M29-R1-F	2/19/03	800	✓						✓		✓	05199	
SDI - M29-R2-F		1100	✓						✓		✓	05200	
SDI - M29-R3-F		1500	✓						✓		✓	05201	
SDI - M29-BLANK-F	↓	1300	✓						✓		✓	05202	

(7) **Turnaround Time Requested** (TAT) (please circle): Normal Rush
(Rush TAT is subject to SAMI approval and surcharge.)
Date results are needed: _____
Rush results requested by (please circle): Fax Mail
Fax # _____

(8) **Notes:**
SEE PAGE 1

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	2/19/03	1500	[signature]	2/19/03	1054
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

(10) *Canister Pressure / Vacuum

Initial	Final	Receipt

WHITE - FILE • YELLOW - CLIENT • PINK - LAB

HCHO ANALYSIS

DATA CHEM LABORATORIES
A SORENSON COMPANY

Submitted To:
Michelle LaLiberty
SAMI
318 N. Harmony Street
Medina, OH
44256

Reference Data:	**Formaldehyde**
Sample Location:	G/SA 03-T-201
Sample Type:	Water
Client Sample No.:	SDI-M316-R1 through SDI-M316-Blank
PO #:	03-T-201
Method Reference:	EPA 316
Sample Set ID#:	03-W-0856
DATACHEM Lab No.:	03-05203 through 03-05206
Sample Receipt Date:	2/25/2003
Analysis Date:	3/7/2003

Sample condition was acceptable upon receipt except were noted.

The samples were prepared in accordance with EPA method 316 and analyzed using a Milton Roy Spectronic 21D spectrophotometer at a wavelength of 570 nm.

The results are provided in the enclosed data table. Results relate only to the items tested and are blank corrected where noted.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Rob Nieman
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-3071, FAX 415 893-9469

Results
Formaldehyde

Client #	**DCL** #	**Sample Volume** (ml)	µg/ml
SDI-M316-R1	03-05203	470.	ND
SDI-M316-R2	03-05204	460.	ND
SDI-M316-R3	03-05205	480.	ND
SDI-M316-Blank	03-05206	460.	ND
EQL			**0.25**

ND indicates not detected at or above the estimated quantitation limit (EQL).

Rob Nieman
Analyst

Reviewer

0856

sami
SAMPLING & ANALYTICAL MANAGEMENT, INC.

963 CONCORD DRIVE
MEDINA, OHIO 44256
(330) 723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Please Print. Instructions on reverse side correspond with circled numbers

Company Name: SAIC
Report Address:
Invoice Address:
City | State | Zip
Phone | Fax
Report Attention: Michelle
Project Name: GSA 03-T-201
P.O. #: 03-T-201
Indicate state where samples were collected:
Compliance ☒ Non-Compliance ☐

Sample Identification (2)	Date Collected	Time Collected	Grab (3)	Composite	Matrix (4): Soil	Water (☐ Potable ☐ NPDES)	Other	Total # of Containers	Air (☐ Source ☐ Ambient ☐ IH)	Canisters*	Analysis Requested (5): U.S. EPA M25	U.S. EPA M316	Remarks (6)	Temperature of samples upon receipt (if requested)
SOI-M25-Blank #2	2/19/03	1100	✓						✓		✓		Blanks 4 pages	
SOI-M25-Blank #3	"	1200	✓						✓		✓			
SOI-M25-Blank #4	"	1200	✓						✓		✓			
SOI-M316-R1	2/20/03	0400	✓						✓			✓ 05203		
SOI-M316-R2	"	0700	✓						✓			✓ 05204		
SOI-M316-R3	"	1000	✓						✓			✓ 05205		
SOI-M316-Blank	"	1100	✓						✓			✓ 05206		

(7) Turnaround Time Requested (TAT) (please circle): Normal Rush
(Rush TAT is subject to SAMI approval and surcharge.)
Date results are needed: _____
Rush results requested by (please circle): Fax Mail
Fax # _____

(8) Notes:
SEE PAGE 1

(9)

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	2/24/03	15:30	[signature] 2/25/03	2/25/03	1054
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

(10) *Canister Pressure / Vacuum

Initial	Final	Receipt

APPENDIX D

REAGENT CERTIFICATIONS AND MATERIAL SAFETY DATA

ACETONE

CMS Chempure® Brand

Certificate of Lot Analysis

ITEM : ACETONE (ACS/HPLC/GC)
CATALOG #: 830-033
LOT : M009 KXAE

TESTS	LIMITS
ASSAY	99.5% Min.
COLOR	APHA 10 Max.
TITRATABLE ACID	0.0003 meq/g Max.
TITRATABLE BASE	0.0006 meq/g Max.
RESIDUE AFTER EVAPORATION	0.0001% Max.
SOLUBILITY IN WATER	To Pass Test
ALDEHYDE	0.002% Max.
OPTICAL ABSORBANCE	
330 nm	1.00 Max.
340 nm	0.06 Max.
400-350 nm	0.01 Max.
SUBSTANCES REDUCING $KMnO_4$	To Pass Test
ISOPROPYL ALCOHOL	0.05% Max.
METHANOL	0.05% Max.
WATER	0.5% Max.
REFRACTIVE INDEX AT 25°C	1.3565 - 1.3590
EXTRACTION-CONCENTRATION SUITABILITY	
GC-ECD	10 ng/L single impurity Max.
FLUORESCENCE IMPURITIES	1.0 ppb Max.

Signed _____
Quality Control Dept.

Manufactured for
Curtin Matheson Scientific, Inc.
9999 Veterans Memorial Drive
Houston Texas 77038

CMS Chempure® Brand

Material Safety Data Sheet

Emergency Phone Number: 314-982-5000

CMS provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

CMS makes no representations, or warranties, either express or implied, of merchantability, fitness for particular purpose with respect to the information set forth herein or to the product to which the information refers. Accordingly, CMS will not be responsible for damages resulting from use of or reliance upon this information.

Manufactured for
Curtin Matheson Scientific, Inc.
9999 Veterans Memorial Drive
P.O. Box 1546, Houston, TX 77251
We keep the best company FISONS

ACETONE

PRODUCT IDENTIFICATION:

Synonyms: Dimethylketone; 2-propanone

Formula CAS No.: 67-64-1

Molecular Weight: 58.08

Chemical Formula: CH_3COCH_3

Hazardous Ingredients: Acetone

PRECAUTIONARY MEASURES

DANGER! EXTREMELY FLAMMABLE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

Keep away from heat, sparks and flame
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.

EMERGENCY/FIRST AID

Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. In all cases call a physician.
SEE SECTION 5.

SECTION 1 Physical Data

Appearance: Clear, colorless, volatile liquid

Odor: Fragrant, mint-like

Solubility: Miscible in all proportions in water

Boiling Paint: 56.5°C (133.7°F)

Melting Point: -95°C (-139°F)

Specific Gravity: 0.8

Vapor Density (Air= 1): 2.0

Vapor Pressure (mm Hg): 400 @ 39.5°C (103°F)

Evaporation Rate. (Butyl Acetate = 1) ca. 7.7

SECTION 2 Fire and Explosion Information

Fire:
flammable liquid!
Flash piat:-18°C (0°F) closed cup
Autoignition temperature: 465°C (869°F)
flammable limits in air, % by volume:
lel: 2.6 uel:12.8.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces ro distant ignition source and flash back.

Fire Extinguishing Media:
Water, dry chemical. foam or carbon dioxide Water spray may be used to keep fire exposed containers cool.

Special **Information:**
In the event ot a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water may be used to flush spills away from exposures and to dilute spills lo non-flammable mixtures.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Oxidizing materials, chloroform, alkalies, acids, potassium t-butoxide

SECTION 4 Leak/Spill Disposal Information

Isolate or enclose the area of the leak or spill. Remove all sources of ignition Clean-up personnel require protective clothing and respiratory protection from vapors. Contain and recover liquid for reclamation when possible Larger spills and lot sizes can be collected as hazardous waste and atomized in a suitable RCRA approved combustion chamber, or absorbed with vermiculite, dry sand, earth or similar material for disposal as hazardous waste in a RCRA approved facility Do not flush to sewer!

Reportable Quantity (RQ)(CWA/CERCLA) : 5000 lbs

Ensure compliance with local, state and federal regulations

NFPA Ratings: Health: 1 Flammability: 3 Reactivity: 0

CMS Chempure® Brand

Material Safety Data Sheet

Emergency Phone Number: 314-982-5000

CMS provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgement in determining its appropriateness for a particular purpose.

CMS makes no representations, or warranties, either express or implied, or merchantability, fitness for particular purpose with respect to the information set forth herein or to the product to which the information refers. Accordingly, CMS will not be responsible for damages resulting from use of or reliance upon this information.

Manufactured for
Curtin Matheson Scientific, Inc.
9999 Veterans Memorial Drive
P.O. Box 1546, Houston, TX 77251
We keep the best company.

SECTION 3 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.

Ingestion:
Swallowing small amounts is not likely to produce harmful effects. Larger amounts may produce narcotic effects with other symptoms paralleling those from inhalation exposure.

Skin Contact:
Irritating; due to defatting action on skin. May cause redness, pain, drying and cracking of the skin.

Eye Contact:
Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.

Chronic Exposure:
Prolonged or repeated skin contact may produce severe irritation or dermatitis.

Aggravation of Pre-existing Conditions:
Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Aspiration hazard. If swallowed, DO NOT induce vomiting. Give large quantities of water or milk if available. Call a physician immediately. Never give anything by mouth to an unconscious person.

Skin Exposure:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1994)

Oral rat LD50: 5800 mg/kg; skin rabbit LD50: 20 gm/kg; irritation eye rabbit 20 mg severe; investigated as a tumorigen, mutagen, reproductive effector.

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
750 ppm (TWA), 1000 ppm (STEL)

-ACGIH Threshold Limit Value (TLV):
750 ppm (TWA), 1000 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded a full facepiece chemical cartridge respirator may be worn, in general, up to the maximum use concentration specified by the respirator supplier. Alternatively, a supplied air full facepiece respirator or airlined hood may be worn.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-dreech facilities in work area.

SECTION 7 Storage and Special Information

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment.

ACCET

CMS Chempure® Brand

Material Safety Data Sheet

Emergency Phone Number: 314-982-5000

CMS provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

CMS makes no representations, or warranties, either express or implied, or merchantability, fitness for particular purpose with respect to the information set forth herein or to the product to which the information refers. Accordingly, CMS will not be responsible for damages resulting from use of or reliance upon this information.

Manufactured for
Curtin Matheson Scientific, Inc.
9999 Veterans Memorial Drive
P.O. Box 1546, Houston, TX 77251
We keep the best company.

Addendum to Material Safety Data Sheet

REGULATORY STATUS

This Addendum Must Not Be Detached from the MSDS

Identifies SARA 313 substance(s)

Any copying or redistribution of the MSDS must include a copy of this addendum

(Chem.Key: ACCET)

Hazard Categories for SARA Section 311/312 Reporting

Acute	Chronic	Fire	Pressure	Reactive
X		X		

Product or Components of Product.	SARA EHS Sect. 302 RQ (lbs.)	SARA EHS Sect. 302 TPQ (lbs.)	SARA Section 313 Chemicals Name List	SARA Section 313 Chemicals Chemical Category	CERCLA Sec.103 RQ (lbs.)	RCRA Sec. 261.33
ACETONE (67-64-1)	No	No	Yes	No	5000	U002

SARA Section 302 EHS RQ: Reportable Quantity of Extremely Hazardous Substance, listed at 40 CFR 355.
SARA Section 302 EHS TPQ: Threshold Planning Quantity of Extremely Hazardous Substance. An asterisk (*) following a Threshold Planning Quantity signifies that if the material is a solid and has a particle size equal to or larger than 100 micrometers, the Threshold Planning Quantity = 10,000 LBS.
SARA Section 313 Chemicals: Toxic Substances subject to annual release reporting requirements listed at 40 CFR 372.65.
CERCLA Sec. 103: Comprehensive Environmental Response, Compensation and Liability Act (Superfund). Releases to air, land or water of these hazardous substances which exceed the Reportable Quantity (RQ) must be reported to the National Response Center, (800-424-8802); Listed at 40 CFR 302.4
RCRA: Resource Conservation and Recovery Act. Commercial chemical product wastes designated as acute hazards or toxic under 40 CFR 261.33

D.I. WATER

CMS Chempure® Brand

Certificate of Lot Analysis

ITEM : WATER HPLC
CATALOG #: 832-433
LOT : M332 KTPY

TESTS	LIMITS
RESIDUE AFTER EVAPORATION	0.0001% Max.
pH	5.0 - 8.0
FLUORESCENCE	0.1 ppb Quinine Equivalent Max.
SUITABILITY FOR HPLC	To Pass Test

Signed _____
Quality Control &$.

Manufactured for
Curtin Matheson Scientific, Inc.
9999 Veterans Memorial Drive
Houston Texas 77038

METHYLENE CHLORIDE

(DICHLOROMETHANE)

FROM: Fisher Scientific **TO:** **Extension** **PAGES:** 2 2

FISHER SCIENTIFIC CHEMICAL DIVISION
One Reagent Lane, Fair Lawn, NJ 07410

ANALYTICAL CONTROL LABORATORY ANALYSIS

Name & Grade:
METHYLENE CHLORIDE, A.C.S
Catalog Number: D37
Lot Number: 963556
P.O. / Other Customer ID:

This is to certify that units of the above mentioned lot number were tested and found to comply with the specifications of the grade listed. The following are the actual analytical results obtained:

Test	Unit	Result
APPEARANCE	PASS/FAIL	PASS-CLEAR, COLORLESS LIQUID
ASSAY	%	99.9000
COLOR	APHA	5
DENSITY	GM/ML	1.3160
EVAPORATION RESIDUE	%	0.000'4
FREE HALOGENS	PASS/FAIL	PASS
IDENTIFICATION		PASS
TITRATABLE ACID	MEQ/GM	0.00006
WATER (H2O)	%	0.004

Approved by: Frederick H. Turk, FL Liquid Supv. Robert Dowd FL Dry Supv. Edgar E. Hess, BPF Lab Supv.

NOTE: The data listed is valid for all package sizes of this lot of product, expressed as a extension of the catalog number listed above. If there are any questions with this certificate, please call Chemical Services (option 5) at (800) 388-8355.

**** MATERIAL SAFETY DATA SHEET ****

Dichloromethane
14930

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Dichloromethane
Catalog Numbers:
S71971, S71971-1, S80084, S80084-1, S80084-2SPEC, S80084HPLC, S80084SPEC, 01424LOT013, 01424LOT014, 0142RS50, 0143RS115, 0143RS200, 0143RS28, 0143RS50, BP1186 4, BP1186-4, BP11864, BP11864 001, BP1186400l, BP1186RS115 BP1186RS200, BP1186RS28, BP1186RS50, BP1186SS 115, BP1186SS 200, BP1186SS 30, BP1186SS 50, BP1186SS115, BP1186SS200, BP1186SS28, BP1186SS30, BP1186SS50, BPD143RS-115, BPD143RS-200, BPD143RS-28, BPD143RS-50, BW4250RT50, D123-1, D142 4, D142-4, D1424, D1424LOT011, D1424LOT012, D142SS115, D142SS200, D142SS28, D142SS50, D143 1, D143 4, D143-1, D143-4, D1431, D1434, D1434LC, D1434LOT002, D143SK 1, D143SK 4, D143SK-1, D143SK-4, D143SK1, D143SK4, D143SK4001, D143SS-11, D143SS-115, D143SS-20, D143SS-200, D143SS-30, D143SS-50, D143SS115, D143SS28, D143SS50, D150 1, D150 4, D150-1 D150-4, D1501, D1504, D150J4, D150SK 1, D150SK 4, D150SK-1, D150SK-4, D150SK1, D150SK4, D150SS 200, D150SS 30, D150SS 50, D150SS-11, D150SS-115, D150SS-20, D150SS-200, D150SS-30, D150SS-50, D150SS200, D150SS30, D150SS50, D151 1, D151 4, D151-1, D151-4, D1511, D1514, D1514002, D1514003, D1514004, D1514LC, D1514LOT029, D1514LOT030, D1514LOT038, D1514LOT039, D1514LOT040, D1514LOT043, D1514LOT044, D1514LOT046, D1514LOT047, D1514LOT049, D1514LOT052, D1514LOT053, D1514LOT054, D1514LOT062, D151RS200, D151RS28, D151SS115, D151SS200, D151SS28, D151SS50, D152-4, D154 4, D1544, D1544LOT009, D1544LOT031, D1544LOT038, D1544LOT039, D35 1, D35 4, D35-1, D35-4, D351, D354, D37 1, D37 20, D37 200, D37 200 001, D37 200 002, D37 4, D37 500, D37-1, D37-20, D37-200, D37-4, D37-500, D371, D3720, D37200, D37200 001, D37200 002, D37200001, D37200002, D37200004, D374, D37500, D37FB115, D37FB19, D37FB200, D37FB50, D37RB115, D37RB19, D37RB200, D37RB50, D37RS115, D37RS200, D37RS28, D37RS50, D37SK 4, D37SK-4, D37SK4, D37SS 115, D37SS-115, D37SS-200, D37SS-30, D37SS-50, D37SS115, D37SS200, D37SS28, D37SS50, FLBP1186RS-115, FLBP1186RS-200, FLBP1186RS-28, FLBP1186RS-50, FLD142RS-115, FLD142RS-200, FLD142RS-28, FLD142RS-50, O142RS115, O142RS200, O142RS28, O142RS50, S80084-1MF*, S80084SPEC, S80084MF*
Synonyms:
Methylene chloride, methylene dichloride, freon30
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
75-09-2	Methane, dichloro-	100	200-838-9

Hazard Symbols: XN
Risk Phrases: 40

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: colourless.
Caution! May cause respiratory tract irritation. May cause digestive tract irritation. May be harmful if swallowed. May cause central nervous system depression. May be absorbed through the skin. May cause fetal effects based upon animal studies. May cause reproductive effects based upon animal studies. May cause severe eye and skin irritation with possible burns. May cause cancer based on animal studies. May be harmful if inhaled.
Target Organs: Blood, central nervous system.

Potential Health Effects
Eye:
Contact with eyes may cause severe irritation, and possible eye burns.
Skin:
May be absorbed through the skin. Causes irritation with burning pain, itching, and redness. Prolonged exposure may result in skin burns.
Ingestion:
May cause irritation of the digestive tract. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.
Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause blood changes.

Overexposure may cause an increase in carboxyhemoglobin levels in the blood.
Chronic:
Possible cancer hazard based on tests with laboratory animals. Prolonged or repeated skin contact may cause dermatitis. May cause fetal effects.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.
Skin:
Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.
Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors mixed with air in proper proportion will propagate a flame.
Extinguishing Media:
In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam. Use water spray to cool fire-exposed containers.
Autoignition Temperature: 1033 deg F (556.11 deg C)
Flash Point: Not applicable.
NFPA Rating: health-2; flammability-1; reactivity-0
Explosion Limits, Lower: 15.1 @ 103 C
Upper: 17.3 @ 148 C

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage:
Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Methane, dichloro-	50 ppm ; 174 mg/m3	Reduce exposure to lowest feasible concentration	25 ppm TWA (effective 4-10-1997, previously 500ppm)

OSHA Vacated PELs:
Methane, dichloro-:
500 ppm TWA; 2000 ppm STEL (5 min in any 3 hrs); C 1000 ppm

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical

safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Liquid
Appearance: colourless
Odor: ethereal odor
pH: Not available.
Vapor Pressure: 350 mm Hg @ 20
Vapor Density: 2.9 (Air=1)
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 104 deg F
Freezing/Melting Point: -142 deg F
Decomposition Temperature: Not available.
Solubility: Moderately soluble in water
Specific Gravity/Density: 1.33 (Water=1)
Molecular Formula: CH2Cl2
Molecular Weight: 84.92

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable.
Conditions to Avoid:
Incompatible materials, strong oxidants.
Incompatibilities with Other Materials:
Incompatible with strong oxidizers. Can react dangerously with nitrogen tetroxide, liquid oxygen, potassium, sodium, sodium-potassium alloys, lithium, potassium hydroxide with N-methyl-N-nitroso urea, potassium t-butoxide, and finely powdered aluminum and magnesium. occurred with with mixtures of this materials and liquid ammonia or dimethylaminopropylamine.
Hazardous Decomposition Products:
Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 75-09-2: PA8050000
LD50/LC50:
CAS# 75-09-2: Inhalation, mouse: LC50 =14400 ppm/7H; Inhalation, rat: LC50 =88 gm/m3/30M; Oral, rat: LD50 = 1600 mg/kg.
Carcinogenicity:
Methane, dichloro- -
ACGIH: A2-suspected human carcinogen
California: carcinogen
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology:
An historical cohort study of persons occupationally exposed to methylene chloride revealed no significantly increased cancer or ischemic heart disease mortality compared to a group of nonexposed employees as well as general population controls. The most recent update and expansion of this study demonstrated no unusual mortality patterns for hypothesized causes of death and no evidence of a dose-response relationship with respect to career exposure and latency. See IARC volume 41 for a more detailed discussion.
Teratogenicity:
Specific developmental abnormalities (musculoskeletal/urogenital): Inl-mus TCLo:1250ppm/1H Stunted fetus, Oral-rat, TDLo=1260 mg/kg (6-15D preg) Developmental abnormalities: Craniofacial, Inl-mouse, TCLo=100 ppm/7H (female 6-15D post); Musculoskeletal, Oral-rat, TDLo=1260 mg/kg (6-15D preg)
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
This chemical has a moderate potential to affect some aquatic organisms. It is resistant to biodegradation, and has a low potential to persist in the aquatic environment. 96-hr. EC50 (loss of equilibrium); Fathead minnow: 99mg/L; 96-hr. EC10: 66.3 mg/L. Bluegill sunfish: 96-hr. LC50=220 mg/L; Water flea: 24-hr. LC50=2270 mg/L; No observed effect level:1550 mg/L.
Environmental Fate:
This material is not likely to bioconcentrate.
Physical/Chemical:
Not available.
Other:
Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: waste number U080
This material is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN Number: UN1593
Packing Group: III
IMO
No information available.
IATA
No information available.
RID/ADR
No information available.
Canadian TDG
Shipping Name: METHYLENE CHLORIDE
Hazard Class: 6.1
UN Number: UN1593

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 75-09-2 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 75-09-2: Effective Date: October 4, 1982
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 75-09-2: acute, chronic.
Section 313
This material contains Methane, dichloro- (CAS# 75-09-2, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 75-09-2 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 75-09-2 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Methane, dichloro- can be found on the following state right to know lists: California, Florida, Pennsylvania, Minnesota, Massachusetts.
The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:
WARNING: This product contains Methane, dichloro-, a chemical known to the state of California to cause cancer.

California No Significant Risk Level:
CAS# 75-09-2: no significant risk level = 50 ug/day
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN
Risk Phrases:
R 40 Possible risks of irreversible effects.
Safety Phrases:
S 23 Do not Inhale gas/fumes/vapour/spray.
S 24/25 Avoid contact with skin and eyes.
S 36/37 Wear suitable protective clothing and gloves.
WGK (Water Danger/Protection)
CAS# 75-09-2: 2
Canada
CAS# 75-09-2 Is listed on Canada's DSL/NDSL List.
This product has a WHMIS classification of D1B, D2A.
CAS# 75-09-2 Is listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 75-09-2:, OEL-AUSTRALIA:TWA 100 ppm (350 mg/m3);Carcinogen. OEL-AUSTRIA:TWA 100 ppm (360 mg/m3). OEL-BELGIUM:TWA 50 ppm (174 mg/m3);Carcinogen. OEL-CZECHOSLOVAKIA:TWA 500 mg/m3;STEL 2500 mg/m3. OEL-DENMARK:TWA 50 ppm (175 mg/m3);Skin;Carcinoge. OEL-FINLAND:TWA 100 ppm (350 mg/m3);STEL 250 ppm (870 mg/m3). OEL-FRANCE:TWA 100 ppm (360 mg/m3);STEL 500 ppm (1800 mg/m3). OEL-GERMANY:TWA 100 ppm (360 mg/m3);Carcinogen. OEL-HUNGARY:STEL 10 mg/m3;Carcinogen. OEL-JAPAN:TWA 100 ppm (350 mg/m3). OEL-THE NETHERLANDS:TWA 100 ppm (350 mg/m3);STEL 500 ppm. OEL-THE PHILIPINES:TWA 500 ppm (1740 mg/m3). OEL-POLAND:TWA 50 mg/m3. OEL-RUSSIA:TWA 100 ppm;STEL 50 mg/m3. OEL-SWEDEN:TWA 35 ppm (120 mg/m3);STEL 70 ppm (25 mg/m3);Skin. OEL-SWITZERLAND:TWA 100 ppm (360 mg/m3);STEL 500 ppm. OEL-THAILAND:TWA 500 mg/m3;STEL 1000 mg/m3. OEL-TURKEY:TWA 500 ppm (1740 mg/m3). OEL-UNITED KINGDOM:TWA 100 ppm (350 mg/m3);STEL 250 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 1/11/1995 Revision #32 Date: 9/30/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

SULFURIC ACID

**** MATERIAL SAFETY DATA SHEET ****

Sulfuric Acid
22350

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Sulfuric Acid
Catalog Numbers:
S71211, S71211SC, S71826, S79200, S80213, S80213-1, A298 212, A298212, A300 212, A300 225LB, A300 500, A300 612GAL, A300 700LB, A300212, A300225LB A300500, A300612GAL, A300700LB, A300C 212, A300C212, A300C212001, A300C212002, A300C212003, A300C212004, A300C212005, A300C212006, A300C212007, A300C212008, A300C212009, A300C212010, A300C212LC, A300FP 500, A300FP500, A300J500, A300P 500, A300P500, A300S 212, A300S 500, A300S212, A300S212LC, A300S500, A300SI 212, A300SI212, A468-1, A468-250, A468-500, A4682, A484 212, A484212, A510-212, A510-500, A510SK212, AC3000S212002, MAR7701B068, NC9466102, NC9499595, NC9755547, NC9825433, NC9826713, S71211MF, S71211MF*, S71211SCMF, S71211SCMF*, S79200MF, S79200MF* DHAZ, S79200MF*DHAZ, S79200SCMF, SA174 212, SA174 4, SA174212, SA1744, SA176 4, SA1764, SA196 500, SA196500
Synonyms:
Hydrogen Sulfate; Oil of Vitriol; Vitriol Brown Oil; Matting Acid; Battery Acid; Sulphuric Acid.
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7664-93-9	Sulfuric acid	95-98.0	231-639-5

Hazard Symbols: C
Risk Phrases: 35 8

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear colorless - oily liquid.
Danger! Strong oxidizer. Contact with other material may cause a fire. Corrosive. Hygroscopic. May cause kidney damage. May cause fetal effects based upon animal studies. May cause lung damage. Causes eye and skin burns. Cancer hazard. May be fatal if inhaled. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause severe eye, skin and respiratory tract irritation with possible burns.
Target Organs: Kidneys, heart, lungs, respiratory system, cardiovascular system, teeth, eyes.

Potential Health Effects

Eye:
Causes severe eye burns. May cause irreversible eye injury. May cause conjunctivitis. May cause permanent corneal opacification.

Skin:
Causes skin burns. Continued contact can cause tissue necrosis. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.

Ingestion:
May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause systemic toxicity with acidosis.

Inhalation:
May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Causes corrosive action on the mucous membranes.

Chronic:
Prolonged or repeated inhalation may cause kidney and lung damage. Prolonged or repeated skin contact may cause dermatitis. Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis. Prolonged or repeated eye contact may cause conjunctivitis. May cause fetal effects. May cause cancer in humans. Effects may be delayed. Laboratory experiments have resulted in mutagenic effects. May cause ischemic heart lesions.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician:
Monitor arterial blood gases, chest x-ray, and pulmonary function tests if respiratory tract irritation or respiratory depression is evident. Treat dermal irritation or burns with standard topical therapy. Effects may be delayed. Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

Antidote:
Do NOT use oils or ointments in eye.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with combustible materials may cause a fire. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Will react with water to form toxic and corrosive fumes. Contact with water can cause violent liberation of heat and splattering of the material. Some oxidizers may react explosively with hydrocarbons(fuel). Contact with metals may evolve flammable hydrogen gas. May accelerate burning if involved in a fire. Containers may explode when heated or if contaminated with water. Runoff from fire control or dilution water may cause pollution.

Extinguishing Media:
Do NOT use water directly on fire. Use carbon dioxide or dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out.

NFPA Rating: (est.) Health: 3; Flammability: 0; Reactivity: 2

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation. Use water spray to reduce vapors, do not put water directly on leak, spill area or inside container. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Do not allow contact with water. Use only in a chemical fume hood. Discard contaminated shoes. Keep from contact with moist air and steam.

Storage:
Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from water. Corrosives area. Do not store near alkaline substances. Store protected from moisture.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs

Sulfuric acid	(1 mg/m3); (3 mg/m3) STEL	1 mg/m3 TWA 15 mg/m3 IDLH	1 mg/m3 TWA

OSHA Vacated PELs:
Sulfuric acid:
1 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

hysical State:	Liquid
ppearance:	clear colorless - oily liquid
dor:	odorless
H:	0.3 (1N Solution)
apor Pressure:	1 mm Hg @ 145.8 C
apor Density:	3.38
vaporation Rate:	Slower than ether.
iscosity:	21 mPas @ 25 C
oiling Point:	340 deg C
reezing/Melting Point:	10.35 deg C
utoignition Temperature:	Not available.
lash Point:	Not available.
xplosion Limits, lower:	Not available.
xplosion Limits, upper:	Not available.
ecomposition Temperature:	340 deg C
olubility:	Soluble.
pecific Gravity/Density:	1.841
olecular Formula:	H2SO4
oleoular Weight:	98.0716

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Combines vigorously with water with the evolution of heat. Reported to have exploded when in a sealed container. This was most likely due to pressure of hydrogen by reduction of water.
Conditions to Avoid:
Incompatible materials, ignition sources, metals, excess heat, combustible materials, organic materials, reducing agents, exposure to moist air or water, oxidizers, amines, bases.
Incompatibilities with Other Materials:
Bases, strong dehydrating agents, organic materials, finely powdered metals, moisture, carbides, chlorates, cyanides (e.g. potassium cyanide, sodium cyanide), azides, fulminates, picrates, nitrates, alkali halides, zinc, iodides, permanganates, hydrogen peroxides, perchlorates, nitromethane, phosphorus, nitrites, cyclopentadiene, cyclpentanone oxime, nitroaryl amines, lithium silicides, iron, mercuric nitride, benzene, potassium chlorates, steel, cesium acetylene carbide, trihydroxydiamino phosphate, phosphorus trioxide, reducing agents.
Hazardous Decomposition Products:
Oxides of sulfur, irritating and toxic fumes and gases.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7664-93-9: WS5600000
LD50/LC50:
CAS# 7664-93-9: Draize test, rabbit, eye: 250 ug Severe; Inhalation, mouse: LC50 = 320 mg/m3/2H; Inhalation, rat: LC50 = 510 mg/m3/2H; Oral, rat: LD50 = 2140 mg/kg.
Carcinogenicity:
Sulfuric acid -
ACGIH: A2 - Suspected Human Carcinogen (contained in strong inorg
OSHA: Select carcinogen
IARC: Group 1 carcinogen
Epidemiology:
No data available.
Teratogenicity:

No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fish: Bluegill/Sunfish: 49 mg/L; 48Hr; TLm (tap water @ 20C)Fish: Bluegill/Sunfish: 24.5 ppm; 48Hr; TLm (fresh water)

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: SULFURIC ACID
Hazard Class: 8
UN Number: UN1830
Packing Group: II
Canadian TDG
Shipping Name: SULFURIC ACID
Hazard Class: 8(9.2)
UN Number: UN1830

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7664-93-9 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 7664-93-9: final RQ = 1000 pounds (454 kg)
Section 302 (TPQ)
CAS# 7664-93-9: TPQ = 1000 pounds; RQ = 1000 pounds
SARA Codes
CAS # 7664-93-9: acute, chronic, reactive.
Section 313
This material contains Sulfuric acid (CAS# 7664-93-9, 95 98 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7664-93-9 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Sulfuric acid can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: C
Risk Phrases:
R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire.

Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of Water and seek medical advice.
S 30 Never add water to this product.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)

WOK (Water Danger/Protection)
CABS 7664-93-9: a

United Kingdom Occupational Exposure Limits
CASQ 7664-93-9: OES- United Kingdom, TWA 1 mg/m3 TWA

Canada
CAS# 7664-93-9 is listed on Canada's DSL List.
This product has a WHMIS classification of E, D1A.
CASQ 7664-93-9 in listed on Canada's Ingredient Disclosure List.

Exposure Limits
CAS# 7664-93-9: OEL-ARAB Republic of Egypt:TWA 1 mg/m3
OEL-AUSTRALIA:TWA 1 mg/m3
OEL-BELGIUM:TWA 1 mg/m3;STEL 3 mg/m3
OEL-CZECHOSLOVAKIA:TWA 1 mg/m3;STEL 2 mg/m3
OEL-DENMARK:TWA 1 mg/m3
OEL-FINLAND:TWA 1 mg/m3;STEL 3 mg/m3;Skin
OEL-FRANCE:TWA 1 mg/m3;STEL 3 mg/m3
OEL-GERMANY:TWA 1 mg/m3
OEL-HUNGARY:STEL 1 mg/m3
OEL-JAPAN:TWA 1 mg/m3
OEL-THE NETHERLANDS:TWA 1 mg/m3
OEL-THE PHILIPPINES:TWA 1 mg/m3
OEL-POLAND:TWA 1 mg/m3
OEL-RUSSIA:STEL 1 mg/m3;Skin
OEL-SWEDEN:TWA 1 mg/m3;STEL 3 mg/m3
OEL-SWITZERLAND:TWA 1 mg/m3;STEL 2 mg/m3
OEL-THAILAND:TWA 1 mg/m3
OEL-TURKEY:TWA 1 mg/m3
OEL-UNITED KINGDOM:TWA 1 mg/m3
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACCIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACCI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS creation Date: 4/22/1999 Revision #7 Date: 11/20/2000

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its us-. Users should make their own investigations to determine the suitability of &-- information for their particular purposes. In no way shall the company be liable for any claims, lorrrs, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howeorvrr arising, oven if the company has been advised of the possibility of such damages.

POTASSIUM PERMANGANATE

**** MATERIAL SAFETY DATA SHEET ****

Potassium Permanganate
9520

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

SDS Namn: Potassium Permanganate
atalog Numbers:
AC196750250, AC207740250, S71982-1, S77642, S77645, NC9556435, NC9648879, NC9667433, P279-212, P279-3, P279-500, P287-212, P287-500, S72224B, XXP27910KG, XXP28750KG
ynonyms:
Permanganic Acid Potaaaium salt; Purple Salt; Chameleon Mineral; Permanganate of Potash.
ompany Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
or information, call: 201-796-7100
mergency Number: 201-796-7100
or CHEMTREC asniatance, call: 800-424-9300
or International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7722-64-7	Permanganic Acid (HMnO4), Potassium Salt	100	231-760-3

Hazard Symbols: XN O N
Risk Phrases: 22 8 50/53

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

ppearance: dark purple.
anger! Strong oxidizer. Contact with other material may cause a ire. May be harmful if swallowed. May cause kidney damage. May cause evere respiratory and digestive tract irritation with possible urns. May cause severe eye and skin irritation with possible burns. arget Organs: Kidneys.

otential Health Effects

Eye:
Contact with eyes may cause severe irritation, and possible eye burns.

Skin:
Exposure may cause irritation and possible burns. Skin contact can cause brown stains in the area. and possible hardening of the outer skin layer.

Ingestion:
Harmful if swallowed. May cause kidney damage. May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns.

Inhalation:
Causes respiratory tract irritation.

Chronic:
Prolonged or repeated skin contact may cause defatting and dermatitis.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Oat medical aid immediately. Do NOT allow victim to rub or keep eyes closed.

Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Wash exposed skin throughly with soap and water.

Ingestion:
Do NOT induca vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious per-on. Get medical aid immediately.

Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mamk.

Notes to Physician:
Treat symptomatically and

**** BECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Some oxidizers may react explosively with hydrocarbons(fuel). May accelerate burning if involved in a fire. Containers may explode when heated.

Extinguishing Media:
Cool containers with flooding quantities of water until well after fire is out. For small fires, do NOT use dry chemicals, carbon dioxide, halon or foams. UQB WATER ONLY. For large fires, flood fire area with water from a distance.

NFPA Rating: (est.) Health: 1; Flammability: 0; Reactivity: 1

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES *-*-

General Information: U s proper Dersonal protective equipment as indicated in Section 8.

Spills/Leaks:
Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Do not get water inside containers. Do not use combustible material- such as paper towels to clean up spill.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Use with adequate ventilation. Minimize duet generation. and accumulation. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Do not store near combustible materials.

Storage:
Keep away from oources of ignition. Do not store near combustible materials. store in a tightly closed container. store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Permanganic Acid (HMnO4), Potassium Salt	0.2 mg/m3 TWA (listed under ** no name **).	a- Mn: I mg/m3 TWA (listed under ** no name **).as Mn: 500 mg/m3 IDLH (listed under ** no name **).	C 5 mg/m3 (fume) (listed under ** no name **).

OSHA Vacated PEL-:
Permanganic Acid (HMnO4), Potassium Salt: fume, as Mn: 1 mg/m3 TWA (listed under ** no name **)compounds, As Mn: C 5 mg/m3 (listed under ** no name **)

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:
Clothing:
Wear appropriate gloves to prevent akin exposure.
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulation- found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Solid
Appearance: dark purple

dor:	odorless
H:	Not available.
apor Pressure:	Not available.
apor Density:	Not available.
vaporation Rate:	Not available.
iscosity:	Not available.
oiling Point:	Not available.
reezing/Melting Point:	464 deg F
utoignition Temperature:	Not applicable.
lash Point:	Not applicable.
xplosion Limits, lower:	Not available.
xplosion Limits, upper:	Not available.
ecomposition Temperature:	Not available.
olubility:	Moderately soluble in water.
pecific Gravity/Density:	2.703
olecular Formula:	KMnO4
olecular Weight:	158.0339

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
High temperatures, incompatible materials, combustible materials, reducing agents.
Incompatibilities with Other Materials:
Explodes on contact with some acids such as acetic acid, concentrated hydrochloric acid, and formaldehyde, ammonium nitrate, dimethylformamide. Forms sensitive explosive mixtures with ammonium perchlorate, titanium, arsenic, phosphorus, slag wool, and sulfur. React with reducing agents.
Hazardous Decomposition Products:
Irritating and toxic fumes and gases, oxides of potassium.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7722-64-7: SD6475000
LD50/LC50:
CAS# 7722-64-7: Oral, mouse: LD50 = 2157 mg/kg; Oral, rat: LD50 = 1090 mg/kg.
Carcinogenicity:
Permanganic Acid (HMnO4), Potassium Salt -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No information available.
Teratogenicity:
No information available.
Reproductive Effects:
No information available.
Neurotoxicity:
No information available.
Mutagenicity:
No information available.
Other Studies:
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fish: Bluegill/Sunfish: 2.7-3.6 mg/lFish: Goldfish: 3.6mg/l; 96 HR.Fish: Channel catfish: 0.75 mg/l; 96 HR..

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

hemical waste generators must determine whether a discarded chemical s classified as a hazardous waste.
S EPA guidelines for the classification determination are listed in 0 CFR Parts 261.3. Additionally, waste generators must consult state nd local hazardous waste regulations to ensure complete and accurate lassification.
CRA P-Series: None listed.
CRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: POTASSIUM PERMANGANATE
Hazard Class: 5.1
UN Number: 1490
Packing Group: II
Canadian TDG
Shipping Name: POTASSIUM PERMANGANATE
Hazard Class: 5.1(9.2)
UN Number: UN1490

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7722-64-7 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
Section 302 (RQ)
CAS# 7722-64-7: final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 7722-64-7: acute, flammable.
Section 313
This material contains Permanganic Acid (HMnO4), Potassium Salt (listed as ** undefined **), 100%, (CAS# 7722-64-7) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
CAS# 7722-64-7 listed as ** no name ** is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7722-64-7 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Permanganic Acid (HMnO4), Pota can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, (listed as ** no name **), Minnesota, (listed as ** no name **), Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: XN O N
Risk Phrases:
R 22 Harmful if swallowed.
R 8 Contact with combustible material may cause fire.
R 50/53 Very toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.
Safety Phrases:
S 60 This material and/or its container must be disposed of as hazardous waste.
S 61 Avoid release to the environment. Refer to special instructions/Safety data sheets.
WGK (Water Danger/Protection)
CAS# 7722-64-7: 2
United Kingdom Occupational Exposure Limits
CAS# 7722-64-7: OES-United Kingdom, TWA (listed as ** undefined **): as Mn: 5 mg/m3 TWA
CAS# 7722-64-7: OES-United Kingdom, STEL (listed as ** undefined **): fume, as Mn: 3 mg/m3 STEL
Canada
CAS# 7722-64-7 is listed on Canada's DSL List.
This product has a WHMIS classification of C, E.
CAS# 7722-64-7 is listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 7722-64-7: OEL-AUSTRALIA:TWA 5 mg(Mn)/m3 JANUARY 1993
OEL-BELGIUM:TWA 5 mg(Mn)/m3 JANUARY 1993
OEL-CZECHOSLOVAKIA:TWA 2 mg(Mn)/m3;STEL 6 mg(Mn)/m3 JANUARY 1993
OEL-DENMARK:TWA 2.5 mg(Mn)/m3 JANUARY 1993
OEL-FINLAND:TWA 2.5 mg(Mn)/m3 JANUARY 1993
OEL-HUNGARY:TWA 0.3 mg(Mn)/m3;STEL 0.6 mg(Mn)/m3 JANUARY 1993
OEL-JAPAN:TWA 0.3 mg(Mn)/m3 JANUARY 1993
OEL-THE NETHERLANDS:TWA 1 mg(Mn)/m3 JANUARY 1993
OEL-POLAND:TWA 0.3 mg(Mn)/m3 JANUARY 1993
OEL-SWEDEN:TWA 1 mg(Mn)/m3;STEL 2.5 mg(Mn)/m3 (resp. dust)
OEL-SWEDEN:TWA 2.5 mg(Mn)/m3;STEL 5 mg(Mn)/m3 (total dust)
OEL-UNITED KINGDOM:TWA 5 mg(Mn)/m3 JANUARY 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 3/02/1999 Revision #3 Date: 10/06/2000

The information above in believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information. and we assume no liability resulting from its uee. Users should make their own investigations to determine the suitability of the information for their particular purposes. In NO way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special. indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of much damages.

30% HYDROGEN PEROXIDE

CONTACT HAZARD | REACTIVE

2.5 L **VW3690-5**

Hydrogen Peroxide

30% Solution, Reagent, A.C.S. H_2O_2 FW 34.02

Hydrogen Peroxide CAS 7722-84-1; Water CAS 7732-18-5

NOTE: This container is designed to vent pressure and should be stored in an upright position in a cool place. The assay requirement applies to material stored properly for a reasonable time.

Maximum Impurities and Specifications

Contains less than 1 ppm Tin as a stabilizer.

Assay (H_2O_2)	29.0-32.0%	Iron	0.5 ppm
Ammonium	5 ppm	Nitrate	2 ppm
Chloride	3 ppm	Phosphate	2 ppm
Color (APHA)	10 max.	Residue After Evaporation	0.002%
Heavy Metals (as Pb)	1 ppm	Sulfate	5 ppm
		Titratable Acid	0.0006 meq/g

VWR CHEMICAL REAGENT

VWR Scientific

A VWR COMPANY

MEDIA, PA 19063

Packaged By: EM SCIENCE, Norwood, Ohio

3132520 1

NFPA

DANGER!

STRONG OXIDIZER. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. CAUSES BURNS. CAN BE TOXIC BY INGESTION. HARMFUL IF INHALED. MAY CONTAIN GAS UNDER PRESSURE.

Do not get in eyes, on skin or on clothing. Do not store near and avoid contact with combustible materials. Do not breathe mist or vapor. Do not take internally. Explosion-proof refrigerator recommended for storage. For additional information, see Material Safety Data Sheet (MSDS) for this material. Absorb spills with inert material, then place in a chemical waste container. Flush residual spill area with water.FOR LABORATORY USE ONLY. NOT FOR DRUG USE. KEEP FROM CHILDREN. FIRST AID: Call A Physician. IF CONTACTED: Immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes get medical attention. IF SWALLOWED: Do not induce vomiting. Give cold water freely if patient is conscious.

Store In A Cool Place Less Than 72°F.

Printed in USA 0 90

+#351VW369051P

HYDROCHLORIC ACID

**** MATERIAL SAFETY DATA SHEET ****

Hydrochloric Acid 37% Solution
155

**** SECTION 1 - CHEMICAL PRODUCT *AND* COMPANY IDENTIFICATION ****

DS Name: Hydrochloric Acid 37% solution
talog Numbers:
S71942, S71943, S74853, S74853SC, S80038, 144J212, A142-212, A142P-20, A144-20, A144-212, A144-500, A144-500LB, A144-612GAL, A1440212LC, A144500LB02, A144500LDLC, A1445212LC, A144612GAL, A144C-2.5, A144C-212, A144C212001, A144FP 500, A144FP500, A144P 500, A144P-1GA, A144P-1GAL, A144P-20, A144P-500, A144S-212, A144S-500, A144S212EA, A144SI-21, A144SI-212, A466-1, A466-2, A466-250, A466-500, A466250LC, A4662LC, A481-212, A481212LC, A482-200L, A482-20L, A482-212L, A482-500, A485-212, A485SAM1, A485SAM2, A485SAM3, A508-212, A508-500, A508212 001, A508212 002, A508212001, A508212002, A508212003, A508212004, A508212LC, A5084, A508SK212 CRNA481 212, CRNA481212, NC9525793, NC9532181, NC9631527, S71942CMF, S71942CND, S71943ND, SA431-500, SA48-1, SA48-20, SA48-4, SA48-500, XXA142200LI, XXA144STEST, XXA481EP212
nonyms:
Muriatic acid; Chlorohydric acid; Hydrogen chloride; Spirits of aalt
mpany Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
r information, call: 201-796-7100
ergency Number: 201-796-7100
r CHEMTREC assistance, call: 800-424-9300
r International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7647-01-0	Hydrogen chloride	36-38	231-595-7
7732-18-5	Water	62-64	231-791-2

Hazard Symbols: C
Risk Phrases: 34 37

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

pearance: colorless to slight yellow.
nger! Corrosive. Hygroscopic. May be harmful if swallowed. May use fetal effects bared upon animal studies. Causes eye and akin urns. May caure severe respiratory tract irritation with possible urns. May cause severe digestive tract irritation with possible irns. Possible sensitizer.
rget Organs: Teeth, circulatory system.

tential Health Effects
Eye:
May cause irreversible eye injury. Vapor or mirt may caure irritation and severe burns. Contact with liquid is corrosive to the eyes and caueee severs burns. May cause painful sensitization to light.
Skin:
May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic rraction, which becomes evident upon re-exposure to this material. contact with liquid ie corroaivr and causes severe burns and ulceration.
Ingestion:
May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive trace. May be harmful if swallowed.
Inhalation.
May cause severe irritation of thr respiratory tract with roro throat, coughing. shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Exposure to the mist and vapor may erode exposed teeth. Causes corroaivr action on the mucous membranes.
Chronic:
Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause fetal effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause conjunctivitis, photosensitization, and possible blindness.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Get medical aid immediately. Do NOT allow victim to rub or kaap eyes closed. Extensive irrigation with water is required (at least 30 minutes). SPEEDY ACTION IS CRITICAL!

skin:
Get medical aid immediately. Immediately flush rkin with plenty of soap and water for at lrart 15 minutes while removing contaminated clothing and shoes. Warh clothing brforr reuse. Destroy contaminated shoes.
Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give a-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notae to Physician:
Do NOT use sodium bicarbonate in an attempt to neutralize, the acid
Antidote:
Do NOT use oils Or ointments in eye.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
Ae in any fir-, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight firs. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to krop fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Reaction with water may generate much heat which will increase the concentration of fumes in the air. Containers may explode when heated.
Extinguishing Media:
For large firer, use water rpray, tog, or alcohol-resistant foam. Substance is noncombustible; use agent moat appropriate to extinguish surrounding fire. Do NOT get water inside containers Do NOT use straight streams of watrr. Mort foams will react with the material and rrlearr corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out For small fires, use carbon dioxide (except for cyanides), dry chemical, dry sand, and alcohol-resistant foam.
NFPA Rating: (est.) Health: 3; Flammability: 0; Reactivity: 1

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Large spills may be neutralized with dilute alkaline solutions of soda ash, or lime. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation. Do not get water inside containers. A vapor suppressing foam may be used to reduce vapors. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. DO not breathe duet, vapor, mist, or gas. Do not get in eyes, on rkin, or on clothing Keep container tightly clored. Do not ingest or inhale. Discard contaminated shoes. Use caution when opening. Keep from contact with moist air and steam.
Storage:
Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Store protected from moirture. Do not store near flammable or oxidizing substances (especially nitric acid or chlorates).

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACCIH	NIOSH	OSHA - Final PELs

Hydrogen chloride	C 5 ppm	50 ppm IDLH	C 5 ppm; C 7 mg/m3
Water	none listed	none listed	none listed

OSHA Vacated PELs:
Hydrogen chloride:
C 5 ppm; C 7 mg/m3
Water:
No OSHA Vacated PELs are listed for this chemical,

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard, EN166.

skin:
Wear neoprene or polyvinyl chloride gloves to prevent exposure.

Clothing:
Wear appropriate protective clothing to prevent akin exposure.

Respirators:
A respiratory protection program Chat meets OSHA's 29 CPR :1910.134 and ANSI 288.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

**** SECTION 9 - PHYSICAL. AND CHEMICAL PROPERTIES ****

hysical state:	Clear liquid
ppearance:	colorless to alight yellow
ior:	strong, pungent
H:	0.01
apor Pressure:	5.7 mm Hg @ 0 deg C
apor Density:	1.26
vaporation Rater	> 1.00 (N-butyl acetate)
iscosity:	Not available.
oiling Point:	81.5-110 deg C @ 760 mmHg
reezing/Melting Point:	-74 deg C
utoignition Temperature:	Not applicable.
lash Point:	Not applicable.
xplosion Limits, lower:	Not available.
xplosion Limits, upper:	Not available.
ecomposition Temperature:	
olubility:	Miscible.
pecific Gravity/Density:	1.0-1.2
olecular Formula:	HCl.H2O
olecular Weight:	36.46

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Condition. to Avoid:
Mechanical shock. incompatible materials, metals, excess heat, exposure to moist air or Watu, bases.
Incompatibilities with Other Materials:
Bases, acetic anhydride, alkali metals, aluminum, amines, copper, copper alloys, fluorine, iron, sodium hydroxide, steel, sulfuric acid, vinyl acetate. zinc, potassium permanganate, cesium acetylene carbide, rubidium acetylene carbide, rubidium carbide. sodium, chlorosulfonic acid. oleum, carbonates, perchloric acid. calcium phosphide, metal oxides, acetates, cerium carbide, beta-propiolactone, ethylenaimine, propylene oxide, lithium silicides, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbidr, 1,1-difluoroethylene, ethylene diamine, magnesium boride, mercuric sulfate, silver perchlorate + carbon tetrachloride, uranium phosphide.
Hazardour Decomposition Products:
Hydrogen chloride. chlorine, carbon monoxide, carbon dioxide, hydrogen gar.
Hazardous Polymerization: Will not occur.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7647-01-0: MW4025000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7647-01-0: Inhalation. mouse: LC50 = 1108 ppm/1H; Inhalation, rat: LC50 = 3124 ppm/1H; Oral. rabbit: LD50 = 900 mg/kg.
CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg.
Carcinogenicity:
Hydrogen chloride -

IARC: Group 3 carcinogen
Water -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
Experimental reproductive effects have been reported.
Teratogenicity:
Embryo or Fetus: Stunted fetus, Inhalation, rat TCL0=450 mg/m3/1H
Specific Developmental Abnormalities: homeostatis, Inhalation. rat TCL0=450 mg/m3/1H (female 1 days pre-mating).
Reproductive Effects:
No information available.
Neurotoxicity:
No information available.
Mutagenicity:
Cytogenetic analysis: Hamrtnr, lung = 30 mmol/L.; Cytogenetic analysis: Hamrter, ovary = 8 mmol/L.
Other studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Fish: Bluegill/Sunfish: 3.6 mg/L; 48Hr; Lethal (unspecified)Fish: Bluegill/Sunfish: LC50; 96 Hr; pH 3.0-3.5

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines For the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators murk consult state and local hazardouo waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: Nonr listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Namr: HYDROCHLORIC ACID
Hazard Clase: 8
UN Number: UN1789
Packing Group: II
Canadian TDG
Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8(9.2)
UN Number: UN1789

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7647-01-0 is listed an the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
Nonr of tho chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemical. in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TPCA Sicnificant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA Section 303 (RQ)
CASY 7647-01-0: final RQ = 5000 pounds (2270 kg)
Section 302 (TPQ)
CAS# 7647-01-0: TPQ = 500 pounds; RQ = 5000 pounds (does not meet toxicity criteria but because of high production volume and recognized toxicity is considered a chrmical of concern)
SARA Codes
CAS # 7647-01-0: acute.
Section 313
This material contains Hydrogen chloride (CAS# 7647-01-0, 36 38%),which is subject to the reporting requirements of section 313 of SARA Title 111 and 40 CFR Part 372.
Clean Air Act:
CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP)
This material doer not contain. any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
CASY 7647-01-0 is considered highly hazardous by OSHA.
STATE
Hydrogen chloride can be found on the following state right to know

lists: California, New Jersey. Florida, Pennsylvania, Minnesota, Massachusetts.
water is not present on stat* lists from CA, PA. MN, MA, PL, or NJ
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulation-
European Labeling in Accordance with EC Directives
Hazard Symbols: C
Risk Phrases:
R 34 Causes burn-. .
R 37 Irritating to respiratory system.
Safety Phrases:
S 26 In case of contact with ryes, rinse immediately with plenty of water and seek medical advice.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
WGK (Water Danger/Protection)
CASY 7647-01-0: 1
CAS# 7732-18-5: No information available.
United Kingdom Occupational Exposure Limits
CASY 7647-01-0: OES-United Kingdom, TWA 1 ppm TWA; 3 mg/m3 TWA
CASY 7647-01-0: OES-United Kingdom, BTEL 5 ppm STEL; 8 mg/m3 STEL
CASY 7647-01-0: OES-United Kingdom, STEL 5 ppm STEL; 8 mg/m3 STEL

Canada
CAS# 7647-01-0 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.
This product hae a WHMIS classification of D2A; E.
CAS# 7647-01-0 is listed on Canada's Ingredient Disclosure List.
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 7647-01-0: OEL-AUSTRALIA:TWA 5 ppm (7 mg/m3)
OEL-AUSTRIA:TWA 5 ppm (7 mg/m3)
OEL-BELGIUM:STEL 5 ppm (7.7 mg/m3)
OEL-DENMARK:STEL 5 ppm (7 mg/m3)
OEL-FINLAND:STEL 5 ppm (7 mg/m3);Skin
OEL-FRANCE:STEL 5 ppm (7.5 mg/m3)
OEL-GERMANY:TWA 5 ppm (7 mg/m3)
OEL-HUNGARY:STEL 5 mg/m3
OEL-JAPAN:STEL 5 ppm (7.5 mg/m3)
OEL-THE NETHERLANDS:TWA 5 ppm (7 mg/m3)
OEL-THE PHILIPPINES:TWA 5 ppm (7 mg/m3)
OEL-POLAND:TWA 5 mg/m3
OEL-RUSSIA:STEL 5 ppm (5 mg/m3)
OEL-SWEDEN:STEL 5 ppm (8 mg/m3)
OEL-SWITZERLAND:TWA 5 ppm (7.5 mg/m3);STEL 10 ppm (15 mg/m3)
OEL-THAILAND:TWA 5 ppm (7 mg/m3)
OEL-TURKEY:TWA 5 ppm (7 mg/m3)
OEL-UNITED KINGDOM:TWA 5 ppm (7 mg/m3);STEL 5 ppm (7 mg/m3)
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION.16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 7/06/1999 Revision #2 Date: 8/02/2000

The information above is believed to be accurate and represents the baet information currently available to us. However, we make no Warranty of merchantability or any other warranty, express or implied, with respect to such inlormation, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoevsr arising, oven if the company has been advised of the possibility of such damages.

APPENDIX E

CALIBRATION AND CERTIFICATION DATA

PM/CPM INSTRUMENTATION

Pretest Calibrations

ORIFICE CALIBRATION SPREADSHEET - APEX INSTRUMENTS

DATE: 10/13/94 CALIBRATION METER S/N: 707179 LEAK CHECK: OK

MODEL: AQ47-81 METEIZ CONSTANT, Yc: 1.015

OPERATOR: VHJ BAROMETRIC PRESSURE IN. HG: 29.85

RUN NUMBER	ORIFICE IDENT.	AMBIENT TEMP. (deg. F)	ACTUAL VACUUM (in. Hg)	CRITICAL VACUUM (in. Hg)	DRY GAS METER READINGS INITIAL (cu. ft.)	FINAL (cu. ft.)	NET (cu. ft.)	DRY GAS METER AVG. INITIAL (deg. F)	FINAL (deg. F)	TEMP. AVG. (deg. F)	MFTER DCLTAH (in. H20)	TEST DURATION (minutes)	ENGLISH K FACTOR VALUE	ENGLISH K FACTOR VARIATION (percent)
1	AQ47	75	24	14	185.446	191.699	6.253	73	75	74	0.30	15	0.3235	-0.1
2	AQ47	75	24	14	191.699	197.137	5.438	75	75	75	0.30	13	0.3240	-0.3
3	AQ47	75	24	14	197.137	205.868	8.731	75	75	75	0.30	21	0.3221	0.4
AVG.												AVG.	0.3232	
1	AQ55	75	22	14	205.868	216.053	10.185	75	75	75	0.40	18	0.4384	-0.5
2	AQ55	75	22	14	216.053	221.685	5.632	75	75	75	0.40	10	0.4364	-0.1
3	AQ55	75	22	14	221.685	228.439	6.754	75	81	78	0.40	12	0.4337	0.6
AVG.												AVG.	0.4362	
1	AQ63	75	21	14	228.439	234.294	5.855	75	75	75	0.50	8	0.5672	0.1
2	AQ63	76	21	14	234.294	246.705	12.411	75	75	75	0.50	17	0.5664	0.3
3	AQ63	76	21	14	246.705	251.855	5.150	75	76	76	0.50	7	0.5702	-0.4
AVG.												AVG	0.5679	
1	AQ73	76	19	14	251.855	257.695	5.840	76	76	76	0.55	6	0.7538	0.1
2	AQ73	76	19	14	257.695	264.508	6.813	76	76	76	0.55	7	0.7537	0.1
3	AQ73	76	19	14	264.508	270.369	5.861	76	76	76	0.55	6	0.7565	-0.2
AVG.												AVG	0.7546	
1	AQ81	81	18	14	270.369	276.189	5.820	76	77	77	0.75	5	0.9052	0.1
2	AQ81	81	18	14	276.189	282.021	5.832	77	77	77	0.75	5	0.9062	0.0
3	AQ81	81	18	14	282.021	287.864	5.843	77	77	77	0.75	5	0.9079	-0.2
AVG.												AVG	0.9065	

I certify that orifice set number AQ 47-81 was tested in accordance with the US EPA Method 5 standards.

See the Code of Federal Regulations, title 40, part 60, Appendix A, Method 5, Item 7.2.

Signature Vance H Jones VANCE H JONES Date 10/19/94

S.A.T., *LLC* Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	507123
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ47
Technician	T. Shackelford	Critical Orifice K' Factor	0.3232

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	616.997	619.498	621.797
Initial Reading	CF	614.900	617.400	619.700
Difference (Vm)	CF	2.097	2.098	2.097
Average Meter Temperature				
Initial	°F	73.0	74.0	74.0
Final	°F	74.0	74.0	74.0
Average (Tm)	°F	73.5	74.0	74.0
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.53	0.53	0.53
Barometric Pressure (Pbar)	In. Hg	29.09	29.09	29.09
Ambient Temperature (Tamb)	°F	70.7	70.9	70.9
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

	1	2	3
–	2.021	2.020	2.019

$$Vcr,std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

	1	2	3
–	2.041	2.040	2.040

$$Y = \frac{Vcr,std}{Vm,std}$$

Where: $0.98Y < Y,avg < 1.02Y$

	1	2	3
–	1.010	1.010	1.011
Trial 1 –	0.99	1.01	1.03
Trial 2 –	0.99	1.01	1.03
Trial 3 –	0.99	1.01	1.03

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

	1	2	3
–	1.734	1.733	1.733

RESULTS

Average DGM Flow Rate	CFM	0.419
Average DGM Y Factor	Unitless	1.010
Average DGM dH@	In. H20	1.734

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	507123
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ55
Technician	T. Shackelford	Critical Orifice K' Factor	0.4362

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	631.582	634.783	638.583
Initial Reading	CF	628.700	631.900	635.700
Difference (Vm)	CF	2.882	2.883	2.883
Average Meter Temperature				
Initial	°F	75.0	75.0	75.0
Final	°F	75.0	75.0	76.0
Average (Tm)	°F	75.0	75.0	75.5
Run Time (Ø)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H2O	1.03	1.03	1.03
Barometric Pressure (Pbar)	In. Hg	29.09	29.09	29.09
Ambient Temperature (Tamb)	°F	71.1	71.2	71.4
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	2.773	2.774	2.771

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times Ø}{(Tamb + 460)^{1/2}}$$

=	2.753	2.753	2.752

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

=	0.993	0.992	0.993
Trial 1 –	0.97	0.99	1.01
Trial 2 –	0.97	0.99	1.01
Trial 3 –	0.97	0.99	1.01

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.851	1.852	1.850

RESULTS

Average DGM Flow Rate	CFM	0.577
Average DGM Y Factor	Unitless	0.993
Average DGM dH@	In. H2O	1.851

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PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	507123
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ63
Technician	T. Shackelford	Critical Orifice K' Factor	0.5679

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	645.162	649.562	653.962
Initial Reading	CF	641.400	645.800	650.200
Difference (Vm)	CF	3.762	3.762	3.762
Average Meter Temperature				
Initial	°F	75.0	76.0	76.0
Final	°F	76.0	76.0	76.0
Average (Tm)	°F	75.5	76.0	76.0
Run Time (Ø)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H2O	1.79	1.79	1.79
Barometric Pressure (Pbar)	In. Hg	29.06	29.06	29.06
Ambient Temperature (Tamb)	°F	71.6	71.6	71.8
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	3.620	3.616	3.616

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times Ø}{(Tamb + 460)^{1/2}}$$

=	3.579	3.579	3.578

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y, avg < 1.02Y$

=	0.989	0.990	0.989
Trial 1 -	0.97	0.99	1.01
Trial 2 -	0.97	0.99	1.01
Trial 3 -	0.97	0.99	1.01

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.907	1.905	1.906

RESULTS

Average DGM Flow Rate	CFM	0.752
Average DGM Y Factor	Unitless	0.989
Average DGM dH@	In. H2O	1.906

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PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	507123
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ73
Technician	T. Shackelford	Critical Orifice K' Factor	0.7546

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	665.232	671.535	677.533
Initial Reading	CF	660.100	666.400	672.400
Difference (Vm)	CF	5.132	5.135	5.133
Average Meter Temperature				
Initial	°F	77.0	77.0	77.0
Final	°F	77.0	77.0	77.0
Average (Tm)	°F	77.0	77.0	77.0
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	3.27	3.27	3.27
Barometric Pressure (Pbar)	In. Hg	29.06	29.06	29.06
Ambient Temperature (Tamb)	°F	71.8	71.3	71.2
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	4.942	4.945	4.943

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	4.755	4.757	4.757

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

=	0.962	0.962	0.962
Trial 1 –	0.94	0.96	0.98
Trial 2 –	0.94	0.96	0.98
Trial 3 –	0.94	0.96	0.98

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.983	1.981	1.981

RESULTS

Average DGM Flow Rate	CFM	1.027
Average DGM Y Factor	Uriitless	0.962
Average DGM dH@	In. H20	1.982

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PRETEST DRY GAS METER CALIBRATION

Client	SDI–CCI	Date Calibrated	02–01–03
Location	Columbia City, IN	Control Unit ID No.	507123
Project No.	G/SA 03–T–201	Critical Orifice ID No.	AQ81
Technician	T. Shackelford	Critical Orifice K' Factor	0.9065

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	691.073	698.972	707.472
Initial Reading	CF	684.900	692.800	701.300
Difference (Vm)	CF	6.173	6.172	6.172
Average Meter Temperature				
Initial	°F	77.0	77.0	78.0
Final	°F	77.0	78.0	78.0
Average (Tm)	°F	77.0	77.5	78.0
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	4.75	4.75	4.75
Barometric Pressure (Pbar)	In. Hg	29.06	29.06	29.06
Ambient Temperature (Tamb)	°F	71.4	71.8	72.0
Pump Vacuum	In. Hg	15.0	15.0	15.0

CALCULATIONS

$$Vm, std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

	1	2	3
–	5.967	5.960	5.955

$$Vcr, std = K' Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

	1	2	3
–	5.714	5.712	5.711

$$Y = \frac{Vcr, std}{Vm, std}$$

Where: $0.98Y < Y, avg < 1.02Y$

	1	2	3
–	0.958	0.958	0.959
Trial 1 –	0.94	0.96	0.98
Trial 2 –	0.94	0.96	0.98
Trial 3 –	0.94	0.96	0.98

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

	1	2	3
–	2.010	2.009	2.008

RESULTS

Average DGM Flow Rate	CFM	1.234
Average DGM Y Factor	Unitless	0.958
Average DGM dH@	In. H20	2.009

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PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	03-01-03
Location	Columbia City, IN	Control Unit ID No.	609198
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ47
Technician	T. Shackelford	Critical Orifice K' Factor	0.3232

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	237.679	239.980	242.280
Initial Reading	CF	235.600	237.900	240.200
Difference (Vm)	CF	2.079	2.080	2.080
Average Meter Temperature				
Initial	°F	69.0	70.0	71.0
Final	°F	70.0	71.0	72.0
Average (Tm)	°F	69.5	70.5	71.5
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.46	0.46	0.46
Barometric Pressure (Pbar)	In. Hg	29.03	29.03	29.03
Ambient Temperature (Tamb)	°F	66.6	66.6	66.7
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	2.014	2.011	2.008

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	2.044	2.044	2.044

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

=	1.015	1.016	1.0181
Trial 1 –	0.99	1.02	1.04
Trial 2 –	1.00	1.02	1.04
Trial 3 –	1.00	1.02	1.04

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.507	1.505	1.502

RESULTS

Average DGM Flow Rate	CFM	0.416
Average DGM Y Factor	Unitless	1.017
Average DGM dH@	In. H20	1.505

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PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	609198
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ55
Technician	T.' Shackelford	Critical Orifice K' Factor	0.4362

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	246.359	249.659	253.060
Initial Reading	CF	243.500	246.800	250.200
Difference (Vm)	CF	2.859	2.859	2.860
Average Meter Temperature				
Initial	°F	72.0	73.0	73.0
Final	°F	73.0	73.0	74.0
Average (Tm)	°F	72.5	73.0	73.5
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.88	0.88	0.88
Barometric Pressure (Pbar)	In. Hg	29.03	29.03	29.03
Ambient Temperature (Tamb)	°F	66.7	66.7	67.1
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	1	2	3
	2.757	2.755	2.753

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	1	2	3
	2.759	2.759	2.758

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

=	1	2	3
	1.001	1.002	1.002
Trial 1 =	0.98	1.00	1.02
Trial 2 =	0.98	1.00	1.02
Trial 3 =	0.98	1.00	1.02

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times \Delta^2}{Pbar \times (Y \times Vm)^2}$$

=	1	2	3
	1.578	1.576	1.576

RESULTS

Average DGM Flow Rate	CFM	0.572
Average DGM Y Factor	Unitless	1.001
Average DGM dH@	In. H20	1.577

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PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	609198
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ63
Technician	T. Shackelford	Critical Orifice K' Factor	0.5679

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	260.145	264.445	268.945
Initial Reading	CF	256.400	260.700	265.200
Difference (Vm)	CF	3.745	3.745	3.745
Average Meter Temperature				
Initial	°F	74.0	75.0	76.0
Final	°F	75.0	76.0	76.0
Average (Tm)	°F	74.5	75.5	76.0
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	1.56	1.56	1.56
Barometric Pressure (Pbar)	In. Hg	29.03	29.03	29.03
Ambient Temperature (Tamb)	°F	68.2	68.2	68.5
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)} =$$

1	2	3
3.604	3.597	3.594

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}} =$$

1	2	3
3.587	3.587	3.586

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$ Where: $0.98Y < Y,\ avg < 1.02Y$ =

	1	2	3
	0.995	0.997	0.998
Trial 1 –	0.98	1.00	1.02
Trial 2 –	0.98	1.00	1.02
Trial 3 –	0.98	1.00	1.02

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times \Theta^2}{Pbar \times (Y \times Vm)^2} =$$

1	2	3
1.654	1.651	1.651

RESULTS

Average DGM Flow Rate	CFM	0.749
Average DGM Y Factor	Unitless	0.997
Average DGM dH@	In. H20	1.652

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PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	609198
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ73
Technician	T. Shackelford	Critical Orifice K' Factor	0.7546

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	276.265	282.370	289.170
Initial Reading	CF	271.200	277.300	284.100
Difference (Vm)	CF	5.065	5.070	5.070
Average Meter Temperature				
Initial	°F	76.0	77.0	78.0
Final	°F	77.0	78.0	79.0
Average (Tm)	°F	76.5	77.5	78.5
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	2.87	2.87	2.87
Barometric Pressure (Pbar)	In. Hg	29.03	29.03	29.03
Ambient Temperature (Tamb)	°F	69.1	69.4	69.8
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	4.872	4.868	4.859

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	4.762	4.760	4.759

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

=	0.977	0.978	0.979
Trial 1 –	0.96	0.98	1.00
Trial 2 –	0.96	0.98	1.00
Trial 3 –	0.96	0.98	1.00

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times \varnothing^2}{Pbar \times (Y \times Vm)^2}$$

=	1.732	1.730	1.728

RESULTS

Average DGM Flow Rate	CFM	1.014
Average DGM Y Factor	Unitless	0.978
Average DGM dH@	In. H20	1.730

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PRETEST DRY GAS METER CALIBRATION

Client	SDI-CCI	Date Calibrated	02-01-03
Location	Columbia City, IN	Control Unit ID No.	609198
Project No.	G/SA 03-T-201	Critical Orifice ID No.	AQ81
Technician	T. Shackelford	Critical Orifice K' Factor	0.9065

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	300.360	307.465	314.370
Initial Reading	CF	294.200	301.300	308.200
Difference (Vm)	CF	6.160	6.165	6.170
Average Meter Temperature				
Initial	°F	79.0	80.0	80.0
Final	°F	80.0	80.0	81.0
Average (Tm)	°F	79.5	80.0	80.5
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H2O	4.20	4.20	4.20
Barometric Pressure (Pbar)	In. Hg	29.03	29.03	29.03
Ambient Temperature (Tamb)	°F	69.8	70.2	70.7
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

	1	2	3
=	5.913	5.912	5.911

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

	1	2	3
=	5.716	5.714	5.712

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

	1	2	3
=	0.967	0.967	0.966
Trial 1 -	0.95	0.97	0.99
Trial 2 -	0.95	0.97	0.99
Trial 3 -	0.95	0.97	0.99

$$dH@ = 0.032 \times dH \times \frac{(Tm + 460) \times \text{Ø}^2}{Pbar \times (Y \times Vm)^2}$$

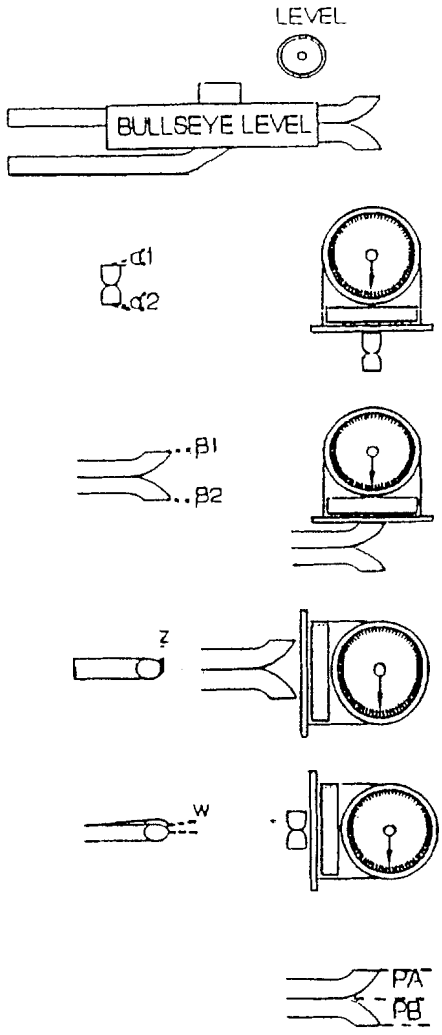
	1	2	3
=	1.760	1.760	1.760

RESULTS

Average DGM Flow Rate	CFM	1.233
Average DGM Y Factor	Unitless	0.967
Average DGM dH@	In. H2O	1.760

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Pitot-1

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0 °
$-10° < \alpha 2 < +10°$	0 °
$-5° < \beta 1 < +5°$	0 °
$-5° < \beta 2 < +5°$	1.5 °
$\gamma =$	-0.5 °
$\theta =$	0 °
$A =$	0.752 "
$Z = A \sin \gamma \leq \frac{1}{8}''$	0.007 "
$W = A \sin \theta \leq \frac{1}{32}''$	0 "
PA =	0.370 "
PB =	0.380 "
Tube Dia. (D_T) =	0.251 "
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number P9-1 **meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84. See 40 CFR** 60, **Vol. 42,** No. 160, EPA **Method** 2

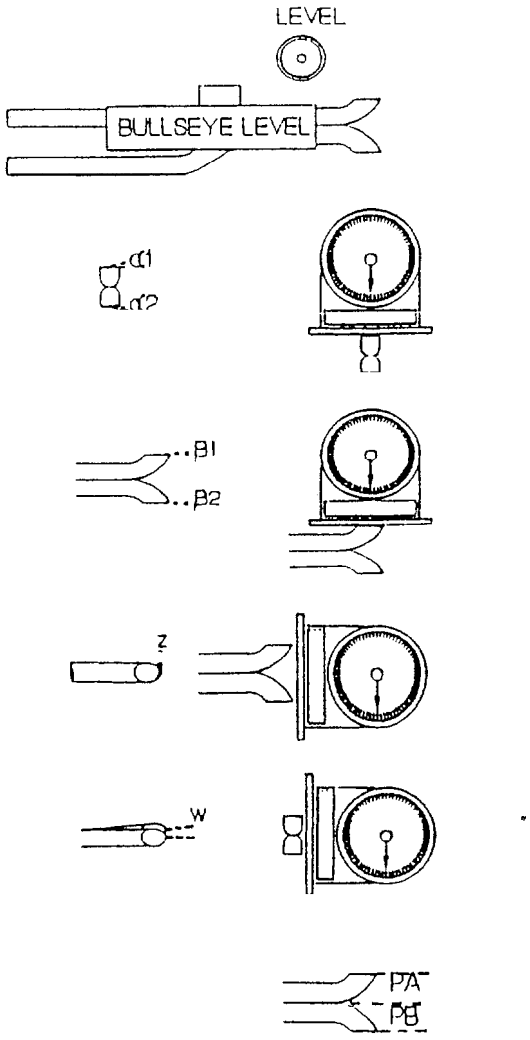
Signature: T. Shackelford

Date: 2-3-03

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Notes
From Nozzle Opening, **>0.75"**	(Yes) / No	
Gas Line & Stack **T/C, >0.75"**	(Yes) / No	
"Z" Clear, Side to **T/C,** 2.0"	(Yes) / No	
"W" Clear, Rear to **T/C,** 2.0"	(Yes) / No	
"Y" Clear to Union, 3.0"	(Yes) / No	

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot inspection Form



Pretest

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0.3
$-10° < \alpha 2 < +10°$	-0.1°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	0.5°
$\gamma =$	0.2°
$\theta =$	0°
$A =$	0.765"
$Z = A \sin \gamma \leq \frac{1}{8}''$	0.003"
$W = A \sin \theta \leq \frac{1}{32}''$	0"
$PA =$	0.384"
$PB =$	0.381"
Tube Dia. (D_T) =	0.25"
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number 29-2 **meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84. See 40 CFR 60, Vol. 42, No. 160, EPA Method 2**

Signature: T. Stanfield

Date: 2-3-03

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Notes
From Nozzle Opening, >0.75"	(Yes) / No	
Gas Line & Stack T/C, >0.75"	(Yes) / No	
"Z" Clear, Side to T/C, 2.0"	(Yes) / No	
"W" Clear, Rear to T/C, 2.0"	(Yes) / No	
"Y" Clear to Union, 3.0"	(Yes) / No	

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PRETEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	SDI-CCI	Control Unit ID No.	507123
Location	Columbia City, IN	Umbilical ID No.	U90-1
Project No.	G/SA 03-T-201	Sample Probe ID No.	P9-1
Date	02-01-03	Filter Oven ID No.	1011
Auditor	T. Shackelford	Filter Holder OTS ID No.	FH-1
Checked By	F. Guenther	Impinger OTS ID No.	I-1

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 – 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 – 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe ("F)	Filter ("F)	Auxiliary* ("F)	Meter ("F)	Exit* (°F)
70	32	68	68	31	71	32

* Ice Bath

Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack ("F)	Probe ("F)	Filter ("F)	Auxiliary ("F)	Exit ("F)
0 °F	0	0	0	-1	0
100 °F	97	97	97	92	98
200 °F	200	200	200	195	
300 °F	298	298	298	293	
400 °F	396	395	396	391	
500 °F	495				
600 °F	598				
700 °F	698				
800 °F	799				
900 °F	897				
1000 °F	998				
1100 °F	1097				
1200 °F	1195				
1300 °F	1296				
1400 °F	1393				
1500 °F	1495				
1600 °F	1596				
1700 °F	1695				
1800 °F	1794				
1900 °F	1895				
2000 °F	1997				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

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PRETEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	SDI-CCI	Control Unit ID No.	609198
Location	Columbia City, IN	Umbilical ID No.	U90-2
Project No.	G/SA 03-T-201	Sample Probe ID No.	P9-2
Date	02-01-03	Filter Oven ID No.	1012
Auditor	T. Shackelford	Filter Holder OTS ID No.	FH-2
Checked By	F. Guenther	Impinger OTS ID No.	1-2

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter °F	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
71	34	71	74	34	73	34

* Ice Bath

Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	1	1	3	3	2
100 °F	100	99	100	101	100
200 °F	202	199	203	204	
300 °F	301	300	302	303	
400 °F	397	398	399	400	
500 °F	497				
600 °F	598				
700 °F	697				
800 °F	799				
900 °F	898				
1000 °F	997				
1100 °F	1099				
1200 °F	1200				
1300 °F	1299				
1400 °F	1401				
1500 °F	1498				
1600 °F	1599				
1700 °F	1697				
1800 °F	1795				
1900 °F	1897				
2000 °F	1996				
2100 °F	N.A.				

Tolerance Range

Stack . . . . . ±1.5 % Absolute
Probe . . . . . ±5.4 °F
Filter . . . . . ±5.4 °F
Auxiliary . . . . . ±5.4 °F
Meter . . . . . ±5.4 °F
Exit . . . . . k2.0 °F

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: **Altek Industries Corp.** Recommend Recalibration: **Annually**

Model Number K2100F Factory Calibration Date 9May00

Calibration Due _____ Calibration Technician _____

Serial N 10184805 In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The above signature for **Akek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 U.S.A.**
Declares that the equipment specified complies with standards EN50081-1 and EN50082-1.
The product complies with the essential requirements of the EMC Directive 89/336/EEC

916000-005 REV:A

Field Calibrations

G/SA , LTD. P.O. Box 807, Crown Point, IN 46308 Tel/Fax (219) 662-7037

METER ORIFICE CHECK. Yc

Client	STEEL Dynamics	Date	02-18-03
Project No.	03-T-201	Control Unit ID No.	507123
Facility	EAST Baghouse Outlet	Checked By	A-PERDUE
Project Site	Columbia City	Observed By	DAVE HARRISON

INPUT DATA

Dry **Gas Meter Parameters**	**Units**	**Trials** 1	2	3
Total Metered Gas Volume				
Finai Reading	CF	715.635		
Initial Reading	CF	708.00		
Difference (Vm)	CF	7.635		
Average Meter Temperature				
Initial	°F	38		
Final	°F	42		
Average (Tm)	°F	40.0		
Run Time	Minutes	10	10	10
Barometric Pressure (Pbar)	In. Hg	28.98		
DGM Y Factor	Dimensionless	.989		
DGM Delta H@	In. H20	1.406		

CALCULATIONS

Trial 1

Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 10 / 7.635 [0.0319 (40.0 +460) / 28.98]½

Yc = 0.972

Where: 0.97Y < Yc < 1.03Y = 0.959 < .972 < 1.019

Trial 2

Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 10 / _____ [0.0319 (_____ +460) / _____]½

Yc =

Where 0 97Y < Yc < 1.03Y = _____ < _____ < _____

Trial 3

Yc = 10 / Vm [0.0319 (Tm + 460) 1 Pbar]½

Yc = 101 _____ [0.0319 (_____ +460) / _____]½

Yc =

Where: 0.97Y < Yc < 1.03Y = _____ < _____ < _____

Comments: See Section 4.4.1, Method 5, Appendix A, 40 CFR 60

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METER ORIFICE AUDIT, Yc

Client Steel Dynamics
Project No. 03-T-201
Facility EAF Baghouse Outlet
Project Site Columbia City

Date 02-13-03
Control Unit ID No. 609198
Audited By A. PERDUE
Observed By Dave Harrison

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	863.118		
Initial Reading	CF	855.500		
Difference (Vm)	CF	7.618		
Average Meter Temperature				
Initial	°F	58		
Final	°F	60		
Average (Tm)	°F	59.0		
Run Time	Minutes	10	10	10
Barometric Pressure (Pbar)	In. Hg	28.98		
DGM Y Factor	Dimensionless	0.997		
DGM Delta H@	In. H20	1.652		

33.V2

CALCULATIONS

Trial 1 $Yc = 10 / Vm\,[0.0319\,(Tm + 460) / Pbar]^{1/2}$

$Yc = 10 /$ 7.618 $[0.0319\,($ 59.0 $+460) /$ 28.98 $]^{1/2}$

$Yc =$ 0.992 0.992

Where: $0.97Y < Yc < 1.03Y$ = .907 < _____ < 1.027

Trial 2 $Yc = 10 / Vm\,[0.0319\,(Tm + 460) / Pbar]^{1/2}$

$Yc = 10 /$ _____ $[0.0319\,($ _____ $+460) /$ _____ $]^{1/2}$

$Yc =$

Where: $0.97Y < Yc < 1.03Y$ = _____ < _____ < _____

Trial 3 $Yc = 10 / Vm\,[0.0319\,(Tm + 460) / Pbar]^{1/2}$

$Yc = 10 /$ _____ $[0.0319\,($ _____ $+460) /$ _____ $]^{1/2}$

$Yc =$

Where: $0.97Y < Yc < 1.03Y$ = _____ < _____ < _____

Comments: See Section 4.4.1, Method 5, Appendix A, 40 CFR 60

ALTERNATIVE METHOD 5 POST-TEST CALIBRATION

INTRODUCTION AND BACKGROUND

EPA Method 5 requires the calibration of the metering system after each field use. Because the post-test calibration requires the use of a spirometer or wet test meter, the calibration is often conducted in the laboratory. However, a field calibration procedure is highly desirable for two reasons: (1) it eliminates questions about the possibility of the damage to the metering system occurring during transport and (2) it eliminates travel costs for a retest if the metering system fails the post-test calibration.

The alternative post-test calibration procedure described below is based on the principles of the optional pretest orifice meter coefficient check in Section 4.4.1 of Method 5. Since the orifice meter coefficient check will not detect leakages between the inlet of the metering system and the dry gas meter, the alternative procedure includes two additional steps: (1) a leak check from either the inlet of the sampling train or the inlet of the metering system and (2) a leak check of that portion of the sampling train from the pump to the orifice meter.

PROCEDURE

The alternative to the post-test calibration in Section 5.3.2 of Method 5 is as follows:

After each test run, do the following:

1. Ensure that the metering system has passed the post-test leak-check. If not, conduct a leak-check of the metering system from its inlet.

2. Conduct the leak-check of that portion of the train from the pump to the orifice meter as described in Section 5.6 of Method 5.

3. Calculate Y_{qa} for each test run using the following equation:

$$Y_{qa} = \frac{\theta}{V_m}\sqrt{\frac{0.0319 T_m}{\Delta H_@ \left(P_b + \Delta \frac{H_{avg}}{13.6}\right)} \frac{29}{M_d}}\ (\sqrt{\Delta H})_{avg}$$

where:

Y_{qa} = dry gas meter calibration check value, dimensionless.
θ = total run time, min.
V_m = total sample volume measured by dry gas meter, dcf.
T_m = absolute average dry gas meter temp., °R.
P_b = barometric pressure, in. Hg.
0.0319 = (29.921528) (0.75)^2 (in. Hg/°/R) cfm^2.
Δh_{avg} = average orifice meter differential, in. H_2O.
$\Delta H@$ = orifice meter calibration coefficient, in. H_2O.
M_d = dry molecular weight of stack gas, lb/lb-mole.
29 = dry molecular weight of air, lb/lb-mole.
13.6 = specific gravity of mercury.

After each test run series, do the following:

4. Average the three or more Y_{qa}'s obtained from the test run series and compare this average Y_{qa} with the dry gas meter calibration factor, Y. The average Y_{qa} must be within 5 percent of Y.

5. If the average Y_{qa} does not meet the $\pm$5 percent criterion, recalibrate the meter over the full range of orifice settings, as detailed in Section 5.3.1 of Method 5. Then follow the procedure in Section 5.3.3 of Method 5.

REFERENCE

1. Roger T. Shigehara, P.G. Royals, and E.W. Steward, "Alternative Method 5 Post-Test Calibration", Entropy, Inc, contained in the EMTIC TSAR Library.

Post-Test Calibrations

Dry Gas Meter Post–Test Calibration Data

Client:	SDI–CCI	Operator:	B. Peyton	Calibrated By:	T. Shackelford
Project #:	G/SA 03–T–201	DGM #:	507123	DGM C Factor, Y:	0.989
Date(s) Used:	02/18/ – 02/20/03	Date Calibrated:	02/01/03	DGM Delta H@:	1.906

Trial #1

O, Total (Minutes):	60.0	DGM Sample Volume, Total (Ft^3):	47.450
DGM Temperature, Average (°F):	48.7	Pbar (" Hg):	29.22
Delta H, Average (" H_2O):	2.150	SGMW, Dry (Lb/Lb–Mole):	28.84

DGM Yqa* = **1.001**

Trial #2

O, Total (Minutes):	60.0	DGM Sample Volume, Total (Ft^3):	43.840
DGM Temperature, Average (°F):	58.6	Pbar (" Hg):	29.22
Delta H, Average (" H_2O):	1.945	SGMW, Dry (Lb/Lb–Mole):	28.84

DGM Yqa* = **1.041**

Trial #3

O, Total (Minutes):	60.0	DGM Sample Volume, Total (Ft^3):	44.052
DGM Temperature, Average (°F):	70.8)	Pbar (" Hg):	29.22
Delta H, Average (" H_2O):	2.013	SGMW, Dry (Lb/Lb–Mole):	28.84

DGM Yqa* = **1.066**

DGM Yqa, Average* = **1.036**

where:	**0.95Y**	**<**	**Yqa, Avg.**	**<**	**1.05Y**
therefore:	**0.940**	**<**	**1.036**	**<**	**1.038**

'**See** EMTIC GD–026, **Alternative Method** *5* **Post–Test Calibration**

Dry Gas Meter Post–Test Calibration Data

Client:	SDI–CCI	Operator:	A. Perdue	Calibrated By:	T. Shackelford
Project #:	G/SA 03–T–201	DGM #:	609198	DGM C Factor, Y:	0.997
Date(s) Used:	02/18/ – 02/20/03	Date Calibrated:	02/01/03	DGM Delta H@:	1.652

Trial #I

O, Total (Minutes): 60.0

DGM Sample Volume, Total (Ft³): 53.9901

DGM Temperature, Average (°F): 62.0

Pbar (" Hg): 29.22

Delta H, Average (" H2O): 2.130

SGMW, Dry (Lb/Lb–Mole): 28.84

DGM Yqa* = 0.953

Trial #2

O, Total (Minutes): 60.0

DGM Sample Volume, Total (Ft³): 52.086

DGM Temperature, Average (°F): 69.8

Pbar (" Hg): 29.22

Delta H, Average (" H2O): 2.025

SGMW, Dry (Lb/Lb–Mole): 28.84

DGM Yqa = 0.970

Trial #3

O, Total (Minutes): 60.0

DGM Sample Volume, Total (Ft³): 56.351

DGM Temperature. Average (°F): 91.7

Pbar (" Hg): 29.221

Delta H, Average (" H2O): 2.405

SGMW, Dry (Lb/Lb–Mole): 28.84

DGM Yqa* = 0.997

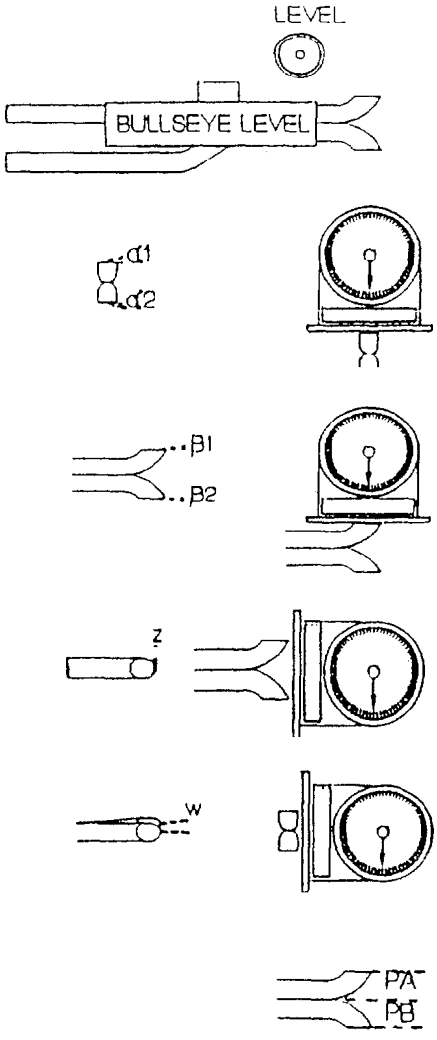
DGM Yqa, Average* = 0.973

where:	**0.95Y**	<	Yqa, Avg.	<	**1.05Y**
therefore:	0.947	<	0.973	<	1.047

***See** EMTIC *GD–026,* **Alternative Method *5* Post–Test Calibration**

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection form



Post-test

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0.2 °
$-10° < \alpha 2 < +10°$	0 °
$-5° < \beta 1 < +5°$	0 °
$-5° < \beta 2 < +5°$	1.3 °
$\gamma =$	-0.5 °
$\theta =$	0.1 °
$A =$	0.751 "
$Z = A \sin \gamma \leq \frac{1}{8}''$	0.007 "
$W = A \sin \theta \leq \frac{1}{32}''$	0.001 "
PA =	0.372"
PB =	0.379"
Tube Dia. (D_T) =	0.251"
$P_A = P_B +/- (.083)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number 99-1 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84. See 40 CFR 60, Vol. 42, No. 160, EPA Method 2

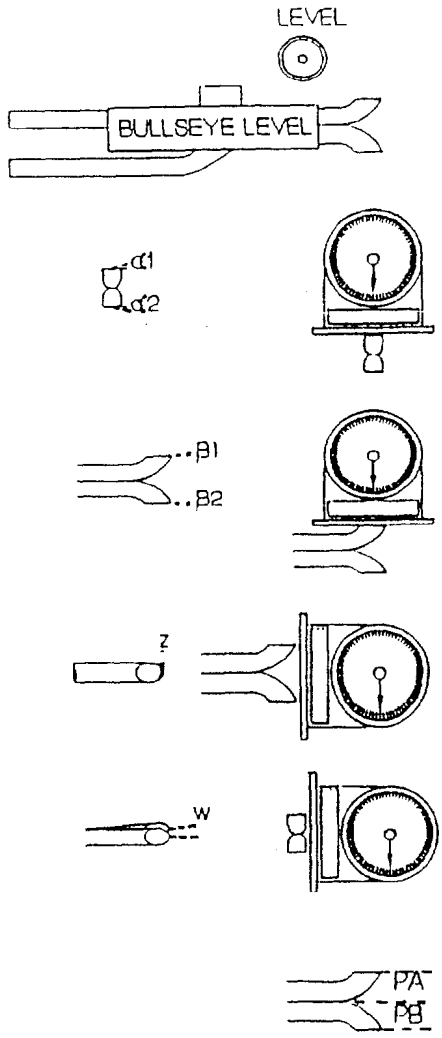
Signature: [signature]

Date: 3-25-02

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Notes
From Nozzle Opening, >0.75"	Yes / No	
Gas Line & Stack T/C, >0.75"	Yes / No	0.746"
"Z" Clear, Side to T/C, 2.0"	Yes / No	
"W" Clear, Rear to T/C, 2.0"	Yes / No	
"Y" Clear to Union, 3.0"	Yes / No	

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Post-test

Tube Assembly Level?	yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0.3
$-10° < \alpha 2 < +10°$	0
$-5° < \beta 1 < +5°$	0
$-5° < \beta 2 < +5°$	0.4
$\gamma =$	0.2
$\theta =$	0.1
$A =$	0.760"
$Z = A \sin \gamma \leq \frac{1}{8}''$	0.003"
$W = A \sin \theta \leq \frac{1}{32}''$	0.001"
PA =	0.384"
PB =	0.382"
Tube Dia. (D_T) =	0.255"
$P_A = P_B +/- (.063)$	yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tubelprobe number 29-2 meets or exceeds all specifications, criteria and/or applicable design features and in hereby assigned a pitot tube caibratlon factor of 0.84. See 40 CFR 60, Vol. 42, No. 160, EPA Method 2

Signature: T. Ellis Lofton

Date: 3-25-03

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Notes
From Nozzle Opening, >0.75"	(Yes) / No	
Gas Line & Stack T/C, >0.75"	(Yes) / No	
"Z" Clear, Side to T/C, 2.0"	(Yes) / No	
"W" Clear, Rear to T/C, 2.0"	(Yes) / No	
"Y" Clear to Union, 3.0"	(Yes) / No	

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POST-TEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	SDI-CCI	Control Unit ID No.	507123
Project No.	G/SA 03-T-201	Umbilical ID No.	U90-1
Location	Columbia City, IN	Sample Probe ID No.	P9-1
Date	03-24-03	Filter Oven ID No.	1011
Auditor	T. Shackelford	Filter Holder OTS ID No.	N/A
Checked By	F. Guenther	Impinger OTS ID No.	I-1

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* ("F)	Probe ("F)	Filter ("F)	Auxiliarv* ("F)	Meter (°F)	Exit* (°F)
72	31	71	72	N/A	71	32

* Ice Bath

Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter ("F)	Auxiliary ("F)	Exit (°F)
0 °F	0	-1	0	N/A	0
100 °F	98	97	96	"	99
200 °F	197	197	197	"	
300 °F	N/A	298	297	"	
400 °F	"	N/A	N/A	"	
500 °F	"				
600 °F	"				
700 °F	"				
800 °F	"				
900 °F	"				
1000 °F	"				
1100 °F	"				
1200 °F	"				
1300 °F	"				
1400 °F	"				
1500 °F	"				
1600 °F	"				
1700 °F	"				
1800 °F	"				
1900 °F	"				
2000 °F	"				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5% Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

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POST-TEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	SDI-CCI	Control Unit ID No.	609198
Project No.	G/SA 03-T-201	Umbilical ID No.	U90-2
Location	Columbia City, IN	Sample Probe ID No.	P9-2
Date	03-24-03	Filter Oven ID No.	1012
Auditor	T. Shackelford	Filter Holder OTS ID No.	N/A
Checked By	F. Guenther	Impinger OTS ID No.	1-2

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* ("F)	Probe ("F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
72	34	73	74	N/A	74	31

* Ice Bath

Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	2	1	1	N/A	1
100 °F	100	98	101	"	102
200 °F	199	199	200	"	
300 °F	N/A	300	297	"	
400 °F	"	N/A	N/A	"	
500 °F	"				
600 °F	"				
700 °F	"				
800 °F	"				
900 °F	"				
1000 °F	"				
1100 °F	"				
1200 "F					
1300 °F					
1400 "F					
1500 °F					
1600 °F	"				
1700 °F	"				
1800 °F	"				
1900 °F	"				
2000 °F	"				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: **Attek Industries Corp.** Recommend Recalibration: **Annually**

Model Number K2100F Factory Calibration Date 9May00

Calibration Due _____ Calibration Technician _____

Serial N  In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The above signature for **Ahek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 U.S.A.**
Declares that the equipment specified complies with standards EN50081-1 and EN50082-1.
The product complies with the essential requirements of the EMC Directive 89/336/EEC

916000-005 REV:A

IAP INSTRUMENTATION

EAF Baghouse Outlet

Client	SDI	Test Date	211812003
	Columbia City	Project #	03-024
Source Identification	EAF	Operator	Teague

Calibration Data For Sampling Runs: Gas Type: Span:	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		0.00	0.50	0.50	1.000	
Mid-Range Gas		26.70	26.90	0.20	0.400	
High-Range Gas		45.70	45.30	-0.40	-0.800	

Run #: 1 Gas Type: NOx Span: 50	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.50	0.09	-0.82	0.08	-0.84	-0.02
Upscale Gas	26.90	26.98	0.16	26.85	-0.10	-0.26

Run #: 2 Gas Type: NOx Span: 50	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.50	0.08	-0.84	0.11	-0.78	0.06
Upscale Gas	26.90	26.85	-0.10	26.43	-0.94	-0.84

Run #: 3 Gas Type: NOx Span: 50	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.50	0.11	-0.78	0.18	-0.64	0.14
Upscale Gas	26.90	26.43	-0.94	26.39	-1.02	-0.08

Client	SDI	Test Date	2/18/2003
	Columbia City	Project #	03-024
Source Identification	EAF	Operator	Teague

Calibration Data For Sampling Runs: 1- Gas Type: SO2 Span: 50	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		**0.00**	0.20	0.20	0.400	
Low-Range Gas				0.00	0	
Mid-Range Gas		**28.30**	27.80	-0.50	-1.000	
High-Range Gas		**40.20**	39.50	-0.70	-1.400	

Run #: 1 Gas Type: SO2 Span: 50	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.20	0.05	-0.30	1.00	1.60	1.90
Upscale Gas	27.80	27.40	-0.80	27.59	-0.42	0.38

Run #: 2 Gas Type: SO2 Span: 50	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.20	1.00	1.60	0.61	0.82	-0.78
Upscale Gas	27.80	27.59	-0.42	27.98	0.36	0.78

Run #: 3 Gas Type: SO2 Span: 50	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.20	0.61	0.82	0.58	0.76	-0.06
Upscale Gas	27.80	27.98	0.36	27.75	-0.10	-0.46

Client	SDI	Test Date	211812003
	Columbia City	Project #	03-024
Source Identification'	EAF	Operator	Teague

Calibration Data For Sampling Runs: 1- Gas Type: C02 Span: 20	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		***0.00***	0.20	0.20	1.000	
Low-Range Gas				0.00	0	
Mid-Range Gas		**10.90**	10.80	-0.10	-0.500	
High-Range Gas		**16.50**	16.40	-0.10	-0.500	

Run #: 1 Gas Type: CO2 Span: 20	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.20	0.320	0.60	0.209	0.04	-0.56
Upscale Gas	10.80	11.050	1.25	10.995	0.97	-0.28

Run #: 2 Gas Type: CO2 Span: 20	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.20	0.209	0.04	0.184	-0.08	-0.13
Upscale Gas	10.80	10.995	0.97	11.030	1.15	0.18

Run #: 3 Gas Type: C02 Span: 20	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.20	0.184	-0.08	0.150	-0.25	-0.17
Upscale Gas	10.80	11.030	1.15	11.023	1.11	-0.03

Client	SDI	Test Date	211812003
	Columbia City	Project #	03-024
Source Identification	EAF	Operator	Teague

Calibration Data For Sampling Runs: 1- Gas Type: 02 Span: 25	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		0.00	0.20	0.20	0.800	
Low-Range Gas				0.00	0	
Mid-Range Gas		**13.00**	13.10	0.10	0.400	
High-Range Gas		**21.50**	21.40	-0.10	-0.400	

Run #: 1 Gas Type: 02 Span: 25	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.20	0.600	1.60	0.554	1.42	-0.18
Upscale Gas	13.10	13.000	-0.40	13.240	0.56	0.96

Run #: 2 Gas Type: 02 Span: 25	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.20	0.554	1.42	0.502	1.21	-0.21
Upscale Gas	13.10	13.240	0.56	13.170	0.28	-0.28

Run #: 3 Gas Type: 02 Span: 25	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.20	0.502	1.21	0.486	1.14	-0.06
Upscale Gas	13.10	13.170	0.28	13.140	0.16	-0.12

RF Exhaust Stack

Client	SDI	Test Date	2/19/2003
	Columbia City	Project #	03-024
Source Identification	Reheat Furnace	Operator	Teague

Calibration Data For Sampling Runs: 1- Gas Type: NOx Span: 50	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		**0.00**	0.42	0.42	0.840	
Mid-Range Gas		**26.70**	26.55	-0.15	-0.300	
High-Range Gas		**45.70**	45.55	-0.15	-0.300	

Run #: 1 Gas Type: NOx Span: 50	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.42	1.42	2.00	0.08	-0.68	-2.68
Upscale Gas	26.55	27.29	1.48	26.58	0.06	-1.42

Run #: 2 Gas Type: NOx Span: 50	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.42	0.08	-0.68	0.22	-0.40	0.28
Upscale Gas	26.55	26.58	0.06	25.94	-1.22	-1.28

Run #: 3 Gas Type: NOx Span: 50	Analyzer Response	Initial Values		Final Values		Drift % of Span
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	
Zero Gas	0.42	0.22	-0.40	0.65	0.46	0.86
Upscale Gas	26.55	25.94	-1.22	26.03	-1.04	0.18

Client	SDI	Test Date	211912003
	Columbia City	Project #	03-024
Source Identification	Reheat Furnace	Operator	Teague

Calibration Data For Sampling Runs: 1- Gas Type: CO Span: 100	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		**0.00**	0.16	0.16	0.160	
Low-Range Gas		**89.60**	87.61	-1.99	-1.99	
Mid-Range Gas		**30.52**	30.27	-0.25	-0.250	
High-Range Gas		**59.60**	59.47	-0.13	-0.130	

Run #: 1 Gas Type: CO Span: 100	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.16	0.95	0.79	0.70	0.54	*-0.25*
Upscale Gas	30.27	30.72	0.45	31.43	1.16	0.71

Gas Type: Span: 100	Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.16	0.70	0.54	0.34	0.18	-0.36
Upscale Gas	30.27	31.43	1.16	33.64	3.37	2.21

Run #: 3 Gas Type: CO Span: 100	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.16	0.34	0.18	0.50	0.34	0.16
Upscale Gas	30.27	33.64	3.37	32.72	2.45	-0.92

Co2 Cal Sheet 1

Client	SDI	Test Date	2/19/2003
	Columbia City	Project #	03-024
Source Identification	Reheat Furnace	Operator	Teague

Calibration Data For Sampling Runs: 1- Gas Type: C02 Span: 20	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		0.00	0.062	0.062	0.310	
Low-Range Gas				0	0	
Mid-Range Gas		10.90	10.936	0.036	0.180	
High-Range Gas		16.50	16.43	-0.07	-0.350	

Run #: 1 Gas Type: C02 Span: 20	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.062	0.230	0.84	0.195	0.67	-0.18
Upscale Gas	10.936	10.930	-0.03	10.867	-0.34	-0.31

Run #: 2 Gas Type: C02 Span: 20	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.062	0.195	0.67	0.177	0.58	-0.09
Upscale Gas	10.936	10.867	-0.34	10.942	0.03	0.37

Run #: 3 Gas Type: C02 Span: 20	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.062	0.177	0.58	0.163	0.51	. -0.07
Upscale Gas	10.936	10.942	0.03	11.012	0.38	0.35

Client	SDI	Test Date	2/19/2003
	Columbia City	Project #	03-024
Source Identification	Reheat Furnace	Operator	Teague

Calibration Data For Sampling Runs: 1- Gas Type: 0 2 Span: 25	Cylinder Number	Cylinder Value % or PPM	Analyzer Response	Absolute Difference % or PPM	Difference % of Span	
Zero Gas		0.00	0.023	0.023	0.092	
Low-Range Gas				0	0	
Mid-Range Gas		13.00	12.982	-0.018	-0.072	
High-Range Gas		21.50	21.402	-0.098	-0.392	

Run #: 1 Gas Type: 0 2 Span: 25	Anaivzer Response	Initial Values		Final Values		
		System Response	Svstem Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.023	0.095	0.29	0.012	-0.04	-0.33
Upscale Gas	12.982	12.800	-0.73	12.752	-0.92	-0.19

Run #: 2 Gas Type: 0 2 Span: 25	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.023	0.012	-0.04	0.024	0.00	0.05
Upscale Gas	12.982	12.752	-0.92	12.700	-1.13	-0.21

Run #: 3 Gas Type: 0 2 Span: 25	Analyzer Response	Initial Values		Final Values		
		System Response	System Cal. Bias % of Span	System Response	System Cal. Bias % of Span	Drift % of Span
Zero Gas	0.023	0.024	0.00	0.075	0.21	0.20
Upscale Gas	12.982	12.700	-1.13	12.780	-0.81	0.32

CALIBRATION GAS CERTIFICATIONS

AGA
Member of the Linde Gas Group

Linde

Certificate of Analysis

EPA Protocol

Performed according to EPA-6001R-971121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:

AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:

AGA GAS INC
AGA TWINSBURG INTERBRANCH
2045 E AURORA RD
TWINSBURG OH 44087-1959
800-424-2427

Material:	6232	**Blend Tolerance:**	5 % Relative
EPA NO/N2 2-49 PPM		**Store/Use Temp:**	35 to 90 F
Production #:	100055976	**Blend Type:**	EPA Protocol
Batch #:	02499H2190BF	**Cyl. Pressure:**	2000 psig
Cylinder #:	CC98182	**Balance Gas:**	Nitrogen
Expiration Date:	813012004	**CGA:**	660
Shelf Life:	24 months	**Analytical Accuracy:**	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
10102-43-9	Nitric Oxide	20 to 30	26.7 +/- 0.3 ppm	08/30/2002
7727-37-9	Nitrogen		Balance	08/30/2002

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
N/A 2	NOx	26.8 ppm	08/30/2002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
-10102-43-9	Nitric Oxide	CC128850 , GMIS	98.4 ppm	1210312003
10102-43-9	Nitric Oxide	CC29532 , GMIS	20.49 ppm	0612512004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba CLA-510SS	568093024	Chemiluminescence	08/28/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

679

Analytical report approved by Jim Healy

HiQ Analysis Certificate

BOC GASES

Assay Laboratory
BOC GASES
2009 Bellaire Avenue
Royal Oak,MI 48067
(248) 399 9150

CERTIFICATE OF ANALYSIS
EPA Protocol Gas

CUSTOMER
BOC ANN ARBOR MI PLT
780 STATE CIRCLE
ANN ARBOR, MI 481080000

CUSTOMER PO NO: T#127681 1OE MEYER

Previous Certification Date(s):

CYLINDER NO	:	XC026559B
EXPIRATION DATE	:	03118104
CERTIFICATION DATE	:	03/19/02
CYLINDER PRESSURE	:	2200 psig
PRODUCT ID NO	:	02000163
LOT NUMBER	:	489782

ANALYTICAL INFORMATION

This calibration standard has been certified per the 1997 EPA Traceability Protocol Document EPA-600/97/121, Using Prcceaure G1. All Values certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder below 150 psig. i.e. 1.0 Megapascal

Analytical Results

Components	Requested Mixture	Certified Concentration	Analytical Uncertainty	Assay Dates
NITRIC OXIDE	45.00 ppm	45.5 ppm	+/-1.00% NIST Traceable	03/11/02 & 03/18/02
TOTAL OXIDES OF NITROGEN		45.7 ppm		
ROGEN	BALANCE GAS			

CALIBRATION STANDARDS USED IN ASSAY

Type	LOT ID	Cylinder No	Concentration	Expiration
SRM 1683B	45-T-61	FF20667	47.60 ppm NITRIC OXIDE	09/01/06

ANALYTICAL INSTRUMENTS USED IN ASSAY

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Rosemount 951A L7	Chemiluminescence	02/18/02

520

QA Approved R Palmer

AGA
Member of the Linde Gas Group

Linde

Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used 'when pressure is under 150 psig.

Manufactured and certified at:

AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:

AGA GAS INC
AGA TWINSBURG INTERBRANCH
2045 E AURORA RD
TWINSBURG OH 44087-1959
800-424-2427

Material:	6655	Blend Tolerance:	5 % Relative
EPA SO2/N2 15-99 PPM		**Store/Use** Temp:	35 to 90 F
Production #:	100062582	Blend Type:	EPA Protocol
Lot #:	02499A3200JD	Cyl. Pressure:	2000 psig
Cylinder #:	CC136358	Balance Gas:	Nitrogen
Expiration Date:	2/5/2005	CGA:	660
Shelf Life:	24 months	Analytical Accuracy:	1OO % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
7446-09-5	Sulfur Dioxide	25 to 30	28.3 +/- 0.3 ppm	02/05/2003
7727-37-9	Nitrogen		Balance	02/05/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7446-09-5	Sulfur Dioxide	CC3957 , LS	10.1 ppm	05/01/2007
7446-09-5	Sulfur Dioxide	CC76126 , GMIS	101.8 ppm	07/26/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568279012	Non-Dispersive Infrared	01/06/2003

This product is manufactured using equipment which has been calibrated with NZST traceable, or equivalent, standards, weights, or equipment.

747

Analytical report approved by Jim Healy

HiQ Analysis Certificate

Assay Laboratory
BOC GASES
2009 Bellaire Avenue
Royal Oak,MI 48067
(248) 399 9150

BOC GASES

CERTIFICATE OF ANALYSIS
EPA Protocol Gas

CUSTOMER
OE MEYER
3303 TIFFIN AVE
ROUTE 101
SANDUSKY, OH 44870
CUSTOMER PO NO: FOR TICK#183029
Previous Certification Date(s):

CYLINDER NO : XC004380B
EXPIRATION DATE : 07126103
CERTIFICATION DATE : 07/26/01
CYLINDER PRESSURE : 2000 psig
PRODUCT ID NO : 02001313
LOT NUMBER : 455368

ANALYTICAL INFORMATION

This calibration standard has been certified per the 1997 EPA Traceability Protocol, Document EPA-600/97/121, Using Procedure G1. All Values certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder below 150 psig. i.e. 1.0 Megapascal

Analytical Results

Components	Requested Mixture	Certified Concentration	Analytical Uncertainty	Assay Dates
SULFUR DIOXIDE	45.00 ppm	40.2 ppm	+/-1.00% NIST Traceable	07/16/01 & 07/23/01
TROGEN	BALANCE GAS			

CALIBRATION STANDARDS USED IN ASSAY

Type	LOT ID	Cylinder No	Concentration	Expiration
GMIS 1693	455303	CC14547	44.40 ppm SULFUR DIOXIDE	07/14103

ANALYTICAL INSTRUMENTS USED IN ASSAY

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Bovar 721-M 93721M80647	NonDispersive Ultraviolet	07/23/01

402

QA Approved A. F. Muhammad

Assay Laboratory
BOC GASES
2009 Bellaire Avenue
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(248) 399 9150

BOC GASES

CERTIFICATE OF ANALYSIS
EPA Protocol Gas

CUSTOMER
OE MEYER
3303 TIFFIN AVE
ROUTE 101
SANDUSKY, OH 44870

CUSTOMER PO NO: FOR TICK#183029

Previous Certification Date(s):

CYLINDER NO	:	CC6609
EXPIRATION DATE	:	07/23/04
CERTIFICATION DATE	:	07/24/01
CYLINDER PRESSURE	:	2000 psig
PRODUCT ID NO	:	02000838
LOT NUMBER	:	452083

ANALYTICAL INFORMATION

This calibration standard has been certified per the 1997 EPA Traceability Protocol, Document EPA-600/97/121, Using Procedure G1 All Values certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder below 150 psig. i.e. 1.0 Megapascal

Analytical Results

Components	Requested Mixture	Certified Concentration	Analytical Uncertainty	Assay Dates
CARBON MONOXIDE	30.00 ppm	30.52 ppm	+/-1.00% NIST Traceable	07/16/01 & 07/23/01
ROGEN	BALANCE GAS			

CALIBRATION STANDARDS USED IN ASSAY

Type	LOT ID	Cylinder No	Concentration	Expiration
NTRM 81678	98060211	XC013128B	49.59 +/- 0.40 ppm COIN2	02/01/02

ANALYTICAL INSTRUMENTS USED IN ASSAY

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Rosemount 880A L1 2000258	NonDispersive Infrared	07116/01

405

QA Approved A. F. Muhammad

BOC GASES

Assay Laboratory
BOC GASES
2009 Bellaire Avenue
Royal Oak,MI 48067
(248) 399 9150

CERTIFICATE OF ANALYSIS
EPA Protocol Gas

CUSTOMER
OE MEYER
3303 TIFFIN AVE
ROUTE 101
SANDUSKY, OH 44870
CUSTOMER PO NO: FOR TICK#183029
Previous Certification Date(s):

CYLINDER NO : XC025033B
EXPIRATION DATE : 07/23/04
CERTIFICATION DATE : 07/24/01
CYLINDER PRESSURE : 2000 psig
PRODUCT ID NO : 02002588
LOT NUMBER : 452084

TICAL INFORMATION

This calibration standard has been certified per the 1997 EPA Traceability Protocol, Document EPA-600/97/121, Using Procedure G1 All Values certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder below 150 psig. i.e. 1.0 Megapascal

Analytical Results

Components	Requested Mixture	Certified Concentration	Analytical Uncertainty	Assay Dates
CARBON MONOXIDE	60.00 ppm	59.6 ppm	+/-1.00% NIST Traceable	07/17/01 & 07/24/01
NITROGEN	BALANCE GAS			

CALIBRATION STANDARDS USED IN ASSAY

Type	LOT ID	Cylinder No	Concentration	Expiration
NTRM 81679	980608	CC18027	98.00 +/- 0.70 ppm CO/N2	05/01/02

ANALYTICAL INSTRUMENTS USED IN ASSAY

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Rosemount 880A L1 2000258	NonDispersive Infrared	07/17/01

399

QA Approved L. Zaccarelli

BOC GASES

Assay Laboratory
BOC GASES
2009 Bellaire Avenue
Royal Oak,MI 48067
(248) 399 9150

CERTIFICATE OF ANALYSIS
EPA Protocol Gas

CUSTOMER
BOC ANN ARBOR MI
780 STATE CIRCLE
ANN ARBOR, MI 481080000

CUSTOMER PO NO:

Previous Certification Date(s):

CYLINDER NO	:	CC10946
EXPIRATION DATE	:	09-Jul-2003
CERTIFICATION DATE	:	18-Jul-2002
CYLINDER PRESSURE	:	2200 psig
PRODUCT ID NO	:	24010312
LOT NUMBER	:	510765

ANALYTICAL INFORMATION

This calibration standard has been certified per the 1997 EPA Traceability Protocol. Document EPA-600/97/121, Using Procedure G1. All Values certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder below 150 psig. i.e. 1.0 Megapascal

Analytical Results

Components	Requested Mixture	Certified Concentration	Analytical Uncertainty	
CARBON MONOXIDE	95.00 ppm	89.6 ppm	+/-1.00% NIST traceable	07/08/02 & 07/18/02
NITROGEN	BALANCE GAS			

CALIBRATION STANDARDS USED IN ASSAY

Type	LOT ID	Cylinder No	Concentration	Expiration
GMIS 81679	446790	HA5314	95.30 ppm CARBON MONOXIDE	05/08/03

ANALYTICAL INSTRUMENTS USED IN ASSAY

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Rosemount 880A L1 2000258	NonDispersive Infrared	07/08/02

642

QA Approved L. Zaccarelli

AGA
Member of the Linde Gas Group

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Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:

AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:

AGA GAS INC
AGA TWINSBURG INTERBRANCH
2045 E AURORA RD
TU'INSBURG OH 44087-1959
800-424-2427

Material:	2179	Blend Tolerance:	1 % Relative
MISC 3 COMPONENT EPA		Store/Use Temp:	35 to 90 F
Production #:	100053336	Blend Type:	EPA Protocol
Batch #:	02499F2240MA	Cyl. Pressure:	2000 psig
Cylinder #:	CC3817	Balance Gas:	Nitrogen
Expiration Date:	6/27/2005	CGA:	590
Shelf Life:	36 months	Analytical Accuracy:	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
124-38-9	Carbon Dioxide	11	10.9 +/- 0.1 %	06/27/2002
7782-44-7	Oxygen	13	13.0 +/- 0.1 %	06/27/2002
7727-37-9	Nitrogen		Balance	06/27/2002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7782-44-7	Oxygen	CC73286 , NTRM	20.89 %	09/01/2002
124-38-9	Carbon Dioxide	CC59146 , NTRM	6.900 %	09/01/2002
124-38-9	Carbon Dioxide	CC59162 , NTRM	13.78 %	10/01/2002
7782-44-7	Oxygen	CC73617 , NTRM	9.90 %	12/31/2003

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568849043	Non-Dispersive Infrared	0512912002
Rosemount 755R	1000559	Paramagnetic	06101/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Roy Yoder

Roy Yoder

HiQ Analysis Certificate

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Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:

AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:

AGA GAS INC
AGA TWINSBURG INTERBRANCH
2045 E AURORA RD
TWINSBURG OH 44087-1959
800-424-2427

Material:	2179	**Blend Tolerance:**	1 % Relative
MISC 3 COMPONENT EPA		**Store/Use Temp:**	35 to 90 F
Production #:	100056708	**Blend Type:**	EPA Protocol
Batch #:	02499J2040UA	**Cyl. Pressure:**	2000 **psig**
Cylinder #:	CC307	**Balance Gas:**	Nitrogen
Expiration Date:	9/10/2005	**CGA:**	590
Shelf Life:	36 months	**Analytical Accuracy:**	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
124-38-9	Carbon Dioxide	16 to 18	16.5 +/- 0.2 %	09/10/2002
7782-44-7	Oxygen	20 to 23	21.5 +/- 0.2 %	0911012002
7727-37-9	Nitrogen		Balance	0911012002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7782-44-7	Oxygen	CC73286 , GMIS	20.89 %	1213112002
124-38-9	Carbon Dioxide	CC59230 , NTRM	19.91 %	0810112005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568849043	Non-Dispersive Infrared	08/27/2002
Rosemount 755R	1000559	Paramagnetic	0812712002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

744

Analytical report approved by Roy Yoder

Roy Yoder

HiQ Analysis Certificate

APPENDIX F

SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS

SAMPLE CALCULATIONS

USEPA Method *51202*

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 5/202 (PM/CPM).

To continue, PAGE DOWN for data entry, Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round–off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G/SA 03–T–201

Location: Electric Arc Furnace – Baghouse Outlet (ES)

Run #: 1

Total Sampling Time, min (Ø)	240.0
Average Process Rate, TPH (Rp)	175.8
Stack Area, ft² (A)	314.16
Barometric Pressure, in. Hg (Pbar)	28.98
Static Pressure, in. H20 (Ps)	–0.35
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.989
Nozzle Area, ft² (An)	0.000349
Metered Gas Volume, ft³ (Vm)	215.883
Average Meter Temperature, °F (Tm)	62.8
Stack Gas Temperature, °F (Ts)	141.8
Meter Orifice Pressure, in. H20 (dH)	2.808
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.816
Volume of H2O Collected, ml (Vlc)	39.0
% Carbon Dioxide (%CO2)	0.0
% Oxygen (%O2)	20.9
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Particulate Matter Concentration, g (Mn)	0.0109
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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Location: Electric Arc Furnace – Baghouse Outlet (ES) Client: SDI-CCI
Run #: 1 Project #: G/SA 03-T-201

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 28.98 + (−0.35 ÷ 13.6)

Pa = 28.95

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 x Vlc

Vw, std = 0.04707 x 39.0

Vw, std = 1.836

Volume of Dry Metered Gas, Standard Conditions (DSCF):

Vm, std = {17.65 x Vm x Y x [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$\text{Vm, std} = \frac{\{17.65 \times 215.88 \times 0.989 \times [28.98 + (2.808 \div 13.6)]\}}{(62.8 + 460)}$$

Vm, std = 210.380

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 1.836 ÷ (210.38 + 1.836)

Bws = 0.009

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 × %CO2 + 0.32 × %O2 + [0.28 × (%CO + %N2)]

Md = 0.44 × 0 + 0.32 × 20.9 + [0.28 × (0.0 + 79)

Md = 28.84

EPA Method 51202 (PM/CPM) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 x Bws + [Md x (1 – Bws)]

Ms = 18 x 0.009 + [28.84 x (1 – 0.009)]

Ms = 28.74

Velocity of Stack Gas (FPS):

Vs = 85.49 x Cp x sqrt dP x sqrt [(Ts + 460) ÷ (Ms x Pa)]

$$Vs = 85.49 \times 0.84 \times 0.816 \times \text{sqrt}\left[\frac{(141.8 + 460)}{(28.74 \times 28.95)}\right]$$

Vs = 49.8

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A x Vs x 60

Qa = 314.16 x 49.8 x 60

Qa = 938,710

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (OSCFM):

Qstd = [17.65 x Qa x Pa x (1 – Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 9E+05 \times 28.95 \times (1 - 0.009)]}{(141.8 + 460)}$$

Qstd = 789,853

Isokinetic Sampling (%):

%I = [0.0945 x Vm, std x (Ts + 460)] ÷ [Ø x Vs x Pa x An x (1 – Bws)]

$$\%I = \frac{[0.0945 \times 210.38 \times (141.8 + 460)]}{[240 \times 49.8 \times 29.0 \times 0.0003 \times (1 - 0.009)]}$$

%I = 99.9

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

TPM10 Emissions Concentration (Gr/DSCF):

Gr/DSCF = 15.435 x Mn ÷ Vm, std

Gr/DSCF = 15.435 × 0.0109 ÷ 210.38

Gr/DSCF = 0.00080

TPM10 Emissions Concentration (Lb/DSCF):

Lb/DSCF = Gr/DSCF ÷ 7000

Lb/DSCF = 0.0008 ÷ 7000

Lb/DSCF = 1.14E-07

TPM10 Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF x Qstd x 60

Lb/Hr = 1.14E-07 x 8E+05 x 60

Lb/Hr = 5.41

TPM10 Emissions Concentration (Lb/TPW):

Lb/TPW = Lb/Hr ÷ Rp

Lb/TPW = 5.41 ÷ 175.8

Lb/TPW = 0.0308

USEPA Method 6C

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 6C (SO2–CEM).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round–off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G/SA 03–T–201

Location: Electric Arc Furnace – Baghouse Outlet (ES)

Run #: 1

Total Sampling Time, min (Ø)	60.0
Average Process Rate, TPH (Rp)	165.5
Stack Area, ft² (A)	314.16
Barometric Pressure, in. Hg (Pbar)	28.98
Static Pressure, in. H20 (Ps)	–0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.997
Nozzle Area, ft² (An)	NA
Metered Gas Volume, ft³ (Vm)	44.385
Average Meter Temperature, °F (Tm)	63.4
Stack Gas Temperature, °F (Ts)	140.8
Meter Orifice Pressure, in. H20 (dH)	1.652
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.908
Volume of H2O Collected, ml (Vlc)	8.7
% Carbon Dioxide (%CO2)	0.6
% Oxygen (%O2)	20.1
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.3
Analyte Concentration, ppmv (Ca)	2.92
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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EPA Method 6C (SO2) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Absolute Stack Gas Pressure (In. Hg):

$$Pa = Pbar + (\pm Ps \div 13.6)$$

$$Pa = 28.98 + (-0.30 \div 13.6)$$

$$Pa = 28.96$$

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

$$Vw,std = 0.04707 \times Vlc$$

$$Vw,std = 0.04707 \times 8.7$$

$$Vw,std = 0.410$$

Volume of Dry Metered Gas, Standard Conditions (DSCF):

$$Vm,std = \{17.65 \times Vm \times Y \times [Pbar + (dH \div 13.6)]\} \div (Tm + 460)$$

$$Vm,std = \frac{\{17.65 \times 44.385 \times 0.997 \times [28.98 + (1.652 \div 13.6)]\}}{(63.4 + 460)}$$

$$Vm,std = 43.427$$

Moisture Fraction (Dimensionless):

$$Bws = Vw,std \div (Vm,std + Vw,std)$$

$$Bws = 0.410 \div (43.427 + 0.410)$$

$$Bws = 0.009$$

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

$$Md = 0.44 \times \%CO2 + 0.32 \times \%02 + [0.28 \times (\%CO + \%N2)]$$

$$Md = 0.44 \times 0.6 + 0.32 \times 20.1 + [0.28 \times (0.0 + 79)$$

$$Md = 28.90$$

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 × Bws + [Md × (1 – Bws)]

Ms = 18 × 0.009 + [28.90 × (1 – 0.009)]

Ms = 28.80

Velocity of Stack Gas (FPS):

Vs = 85.49 x Cp x sqrt dP x sqrt [(Ts + 460) ÷ (Ms x Pa)]

$$Vs = 85.49 \times 0.84 \times 0.908 \times \text{sqrt}\left[\frac{(140.8 + 460)}{(28.80 \times 28.96)}\right]$$

vs = 55.3

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A x Vs x 60

Qa = 314.16 × 55.3 × 60

Qa = 1,042,383

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 x Qa x Pa x (1 – Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 1E{+}06 \times 28.96 \times (1 - 0.009)]}{(140.8 + 460)}$$

Qstd = 878,849

Location: Electric Arc Furnace – Baghouse Outlet (ES) Client: SDI-CCI
Run #: 1 Project #: G/SA 03-T-201

SO2 Emissions Concentration (Lb/DSCF):

Lb/DSCF = Ca x 1.16635E-07

Lb/DSCF = 2.92 × 2E-07

Lb/DSCF = 4.86E-07

SO2 Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF × Qstd × 60

Lb/Hr = 4.86E-07 × 9E+05 × 60

Lb/Hr = 25.61

SO2 Emissions Concentration (Lb/TPW):

Lb/TPW = Lb/Hr ÷ Rp

Lb/TPW = 25.61 ÷ 165.5

Lb/TPW = 0.155

USEPA Method 7E

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 7E (NOx–CEM).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round–off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G/SA 03–T–201

Location: Electric Arc Furnace – Baghouse Outlet (ES)

Run #: 1

Total Sampling Time, min (Ø)	60.0
Average Process Rate, TPH (Rp)	165.5
Stack Area, ft² (A)	314.16
Barometric Pressure, in. Hg (Pbar)	28.98
Static Pressure, in. H20 (Ps)	–0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.997
Nozzle Area, ft² (An)	NA
Metered Gas Volume, ft³ (Vm)	44.385
Average Meter Temperature, °F (Tm)	63.4
Stack Gas Temperature, °F (Ts)	140.8
Meter Orifice Pressure, in. H20 (dH)	1.652
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.908
Volume of H2O Collected, ml (Vlc)	8.7
% Carbon Dioxide (%CO2)	0.6
% Oxygen (%O2)	20.1
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.3
Analyte Concentration, ppmv (Ca)	6.00
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

EPA Method 7E (NOx) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 28.98 + (−0.30 ÷ 13.6)

Pa = 28.96

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 x Vlc

Vw, std = 0.04707 x 8.7

Vw, std = 0.410

Volume of Dry Metered Gas, Standard Conditions (DSCF):

Vm, std = (17.65 x Vm x Y x [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$\text{Vm, std} = \frac{(17.65 \times 44.39 \times 0.997 \times [\,28.98 + (\,1.652 \div 13.6\,)\,]\}}{(\,63.4 + 460\,)}$$

Vm, std = 43.427

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 0.410 ÷ (43.43 + 0.410)

Bws = 0.009

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 × %CO2 + 0.32 × %O2 + [0.28 × (%CO + %N2)]

Md = 0.44 × 0.6 + 0.32 × 20.1 + [0.28 × (0.0 + 79)]

Md = 28.90

Location: Electric Arc Furnace – Baghouse Outlet (ES) Client: SDI-CCI
Run #: 1 Project #: G/SA 03-T-201

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

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

$$Ms = 18 \times 0.009 + [28.90 \times (1 - 0.009)]$$

$$Ms = 28.80$$

Velocity of Stack Gas (FPS):

$$Vs = 85.49 \times Cp \times \text{sqrt } dP \times \text{sqrt } [(Ts + 460) \div (Ms \times Pa)]$$

$$Vs = 85.49 \times 0.84 \times 0.908 \times \text{sqrt } \left[\frac{(140.8 + 460)}{(28.80 \times 28.96)}\right]$$

$$vs = 55.3$$

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

$$Qa = A \times Vs \times 60$$

$$Qa = 314.16 \times 55.3 \times 60$$

$$Qa = 1{,}042{,}383$$

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

$$Qstd = [17.65 \times Qa \times Pa \times (1 - Bws)] \div (Ts + 460)$$

$$Qstd = \frac{[17.65 \times 1E+06 \times 28.96 \times (1 - 0.009)]}{(140.8 + 460)}$$

$$Qstd = 878{,}849$$

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EPA Method 7E (NOx) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

NOx Emissions Concentration (Lb/DSCF):

Lb/DSCF = Ca x 1.1946E-07

Lb/DSCF = 6.00 x 1E-07

Lb/DSCF = 7.17E-07

NOx Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF x Qstd x 60

Lb/Hr = 7.17E-07 x 9E+05 x 60

Lb/Hr = 37.80

NOx Emissions Concentration (Lb/TPW):

Lb/TPW = Lb/Hr ÷ Rp

Lb/TPW = 37.80 ÷ 165.5

Lb/TPW = 0.228

USEPA Method 10

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 10 (CO–CEM).

To continue, PAGE DOWN for data entry, Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

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Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G/SA 03–T–201

Location: Reheat Furnace – Exhaust Stack

Run #: 1

Total Sampling Time, min (Ø)	60.0
Stack Area, ft² (A)	NA
Barometric Pressure, in. Hg (Pbar)	"
Static Pressure, in. H20 (Ps)	"
Pitot Tube Coefficient, dimensionless (Cp)	"
Dry Gas Meter Corr. Factor, dimensionless (Y)	"
Nozzle Area, ft² (An)	"
Metered Gas Volume, ft³ (Vm)	"
Average Meter Temperature, °F (Tm)	"
Stack Gas Temperature, °F (Ts)	"
Meter Orifice Pressure, in. H20 (dH)	"
Average Sqrt. of Velocity Head, in. H20 (dP½)	"
Volume of H2O Collected, ml (Vlc)	"
% Carbon Dioxide (%CO2)	"
% Oxygen (%O2)	9.5
% Carbon Monoxide (%CO)	NA
% Nitrogen, Calculated (%N2)	90.5
Analyte Concentration, ppmv (Ca)	2.27
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	8710

To add more parameters, PAGE DOWN

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EPA Method 10 (CO- CEM) Sample Calculations

Location:	Reheat Furnace – Exhaust Stack	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

CO Emissions Concentration (Lb/DSCF):

Lb/DSCF = Ca × 7.2736E-08

Lb/DSCF = 2.27 × 7E-08

Lb/DSCF = 1.65E-07

CO Emissions Concentration Per F Factor (Lb/mmBtu):

Lb/mmBtu=Lb/DSCF ***x Fd*** x [20.9 ÷ (20.9 – %O2)]

Lb/mmBtu=1.65E-07 x 8710 x [20.9 ÷ (20.9 _ 9.5)]

Lb/mmBtu= 0.003

USEPA Method 13B

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 13B (Fluoride).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round–off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G/SA 03–T–201

Location: Electric Arc Furnace – Baghouse Outlet (ES)

Run #: 1

Total Sampling Time, min (Ø)	60.0
Average Process Rate, TPH (Rp)	231.8
Stack Area, ft² (A)	314.16
Barometric Pressure, in. Hg (Pbar)	29.22
Static Pressure, in. H20 (Ps)	–0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.997
Nozzle Area, ft² (An)	0.000344
Metered Gas Volume, ft³ (Vm)	53.990
Average Meter Temperature, °F (Tm)	62.0
Stack Gas Temperature, °F (Ts)	138.9
Meter Orifice Pressure, in. H20 (dH)	2.130
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.829
Volume of H2O Collected, ml (Vlc)	17.2
% Carbon Dioxide (%CO2)	0.0
% Oxygen (%O2)	20.9
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Fluoride Concentration, mg (Mn)	4.4
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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EPA Method 13B (F) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 29.22 + (−0.30 ÷ 13.6)

Pa = 29.20

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 x Vlc

Vw, std = 0.04707 x 17.2

Vw, std = 0.810

Volume of Dry Metered Gas, Standard Conditions (DSCF):

Vm, std = (17.65 x Vm x Y x [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$Vm,\ std = \frac{\{17.65 \times 53.990 \times 0.997 \times [\ 29.22 + (\ 2.130 \div 13.6\ )\ ]\}}{(\ 62.0 + 460\ )}$$

Vm, std = 53.467

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 0.810 ÷ (53.467 + 0.810)

Bws = 0.015

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 x %CO2 + 0.32 x %02 + [0.28 x (%CO + %N2)]

Md = 0.44 x 0 + 0.32 x 20.9 + [0.28 x (0.0 + 79)]

Md = 28.84

Location: Electric Arc Furnace – Baghouse Outlet (ES) Client: SDI-CCI
Run #: 1 Project #: G/SA 03-T-201

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 x Bws + [Md x (1 – Bws)]

Ms = 18 x 0.015 + [28.84 x (1 – 0.015)]

Ms = 28.67

Velocity of Stack Gas (FPS):

Vs = 85.49 x Cp x sqrt dP x sqrt [(Ts + 460) ÷ (Ms x Pa)]

$$Vs = 85.49 \times 0.84 \times 0.829 \times \sqrt{\left[\frac{(138.9 + 460)}{(28.67 \times 29.20)}\right]}$$

Vs = 50.4

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A x Vs x 60

Qa = 314.16 x 50.4 x 60

Qa = 950,020

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 x Qa x Pa x (1 – Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 1E+06 \times 29.20 \times (1 - 0.015)]}{(138.9 + 460)}$$

Qstd = 805,271

Isokinetic Sampling (%):

%I = [0.0945 x Vm, std x (Ts + 460)] a [Ø x Vs x Pa x An x (1 – Bws)]

$$\%I = \frac{[0.0945 \times 53.47 \times (138.9 + 460)]}{[60 \times 50.4 \times 29.2 \times 0.0003 \times (1 - 0.015)]}$$

%I = 101.2

EPA Method 13B (F) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

F Emissions Concentration (Gr/DSCF):

Gr/DSCF = 15.435E-03 x Mn ÷ Vrn, std

Gr/DSCF = 0.015435 x 4.4 ÷ 53.467

Gr/DSCF = 0.00127

F Emissions Concentration (Lb/DSCF):

Lb/DSCF = Gr/DSCF ÷ 7000

Lb/DSCF = 0.0013 ÷ 7000

Lb/DSCF = 1.81E-07

F Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF x Qstd x 60

Lb/Hr = 1.81E-07 x 8E+05 x 60

Lb/Hr = 8.767

F Emissions Concentration (Lb/TPW):

Lb/TPW = Lb/Hr ÷ Rp

Lb/TPW = 8.767 ÷ 231.8

Lb/TPW = 0.038

USEPA Method 18

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 18 (GOC).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

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Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G/SA 03–T–201

Location: Electric Arc Furnace – Baghouse Outlet (ES)

Run #: 1

Total Sampling Time, min (Ø)	60.0
Average Process Rate, TPH (Rp)	231.8
Stack Area, ft² (A)	314.16
Barometric Pressure, in. Hg (Pbar)	29.22
Static Pressure, in. H20 (Ps)	–0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.997
Nozzle Area, ft² (An)	NA
Metered Gas Volume, ft³ (Vm)	53.990
Average Meter Temperature, °F (Tm)	62.0
Stack Gas Temperature, °F (Ts)	138.9
Meter Orifice Pressure, in. H20 (dH)	2.130
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.829
Volume of H2O Collected, ml (Vlc)	17.2
% Carbon Dioxide (%CO2)	0.0
% Oxygen (%O2)	20.9
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Analyte Concentration, ppmv (Ca)	ND
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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EPA Method 18 (GOC) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Absolute Stack Gas Pressure (In. Hg):

$$Pa = Pbar + (\pm Ps \div 13.6)$$

$$Pa = 29.22 + (-0.30 \div 13.6)$$

$$Pa = 29.20$$

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

$$Vw, std = 0.04707 \times Vlc$$

$$Vw, std = 0.04707 \times 17.2$$

$$Vw, std = 0.810$$

Volume of Dry Metered Gas, Standard Conditions (DSCF):

$$Vm, std = (17.65 \times Vm \times Y \times [Pbar + (dH \div 13.6)]\} \div (Tm + 460)$$

$$Vm, std = \frac{(17.65 \times 53.990 \times 0.997 \times [29.22 + (2.130 \div 13.6)]\}}{(62.0 + 460)}$$

$$Vm, std = 53.467$$

Moisture Fraction (Dimensionless):

$$Bws = Vw, std \div (Vm, std + Vw, std)$$

$$Bws = 0.810 \div (53.467 + 0.810)$$

$$Bws = 0.015$$

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

$$Md = 0.44 \times \%CO2 + 0.32 \times \%O2 + [0.28 \times (\%CO + \%N2)]$$

$$Md = 0.44 \times 0 + 0.32 \times 20.9 + [0.28 \times (0.0 + 79)$$

$$Md = 28.84$$

Location: Electric Arc Furnace – Baghouse Outlet (ES) Client: SDI-CCI
Run #: 1 Project #: G/SA 03-T-201

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

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

$$Ms = 18 \times 0.015 + [28.84 \times (1 - 0.015)]$$

$$Ms = 28.67$$

Velocity of Stack Gas (FPS):

$$Vs = 85.49 \times Cp \times \text{sqrt } dP \times \text{sqrt } [(Ts + 460) \div (Ms \times Pa)]$$

$$Vs = 85.49 \times 0.84 \times 0.829 \times \text{sqrt } \left[\frac{(138.9 + 460)}{(28.67 \times 29.20)}\right]$$

$$Vs = 50.4$$

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

$$Qa = A \times Vs \times 60$$

$$Qa = 314.16 \times 50.4 \times 60$$

$$Qa = 950{,}020$$

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

$$Qstd = [17.65 \times Qa \times Pa \times (1 - Bws)] \div (Ts + 460)$$

$$Qstd = \frac{[17.65 \times 1E+06 \times 29.20 \times (1 - 0.015)]}{(138.9 + 460)}$$

$$Qstd = 805{,}271$$

EPA Method 18 (GOC) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Hexane Emissions Concentration (Lb/DSCF):

Lb/DSCF = 2.2384E-07 × Ca

Lb/DSCF = 2E-07 × ND

Lb/DSCF = 0.00E+00

Hexane Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF x Qstd x 60

Lb/Hr = 0.00E+00 x 8E+05 x 60

Lb/Hr = 0.000

Hexane Emissions Concentration (Lb/TPW):

Lb/TPW = Lb/Hr ÷ Rp

Lb/TPW = 0.000 ÷ 231.8

Lb/TPW = 0.000

USEPA Method *29*

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 29 (Metals).

To continue, PAGE DOWN for data entry, Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

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Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G/SA 03–T–201

Location: Electric Arc Furnace – Baghouse Outlet (ES)

Run #: 1

Total Sampling Time, min (Ø)	120.0
Average Process Rate, TPH (Rp)	170.6
Stack Area, ft² (A)	314.16
Barometric Pressure, in. Hg (Pbar)	29.02
Static Pressure, in. H20 (Ps)	–0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.989
Nozzle Area, ft² (An)	0.000294
Metered Gas Volume, ft³ (Vm)	93.199
Average Meter Temperature, °F (Tm)	66.4
Stack Gas Temperature, °F (Ts)	141.0
Meter Orifice Pressure, in. H20 (dH)	2.126
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.811
Volume of H2O Collected, ml (Vlc)	28.8
% Carbon Dioxide (%CO2)	0.0
% Oxygen (%O2)	20.9
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Analyte Mass Concentration, µg (Mc)	11.0
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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EPA Method 29 (Metals) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI–CCI
Run #:	1	Project #:	G/SA 03–T–201

Absolute Stack Gas Pressure (In. Hg):

$$Pa = Pbar + (\pm Ps \div 13.6)$$

$$Pa = 29.02 + (-0.30 \div 13.6)$$

$$Pa = 29.00$$

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

$$Vw, std = 0.04707 \times Vlc$$

$$Vw, std = 0.04707 \times 28.8$$

$$Vw, std = 1.356$$

Volume of Dry Metered Gas, Standard Conditions (SCF):

$$Vm, std = (17.65 \times Vm \times Y \times [Pbar + (dH \div 13.6))) \div (Tm + 460)$$

$$Vm, std = \frac{\{17.65 \times 93.199 \times 0.9890 \times [29.02 + (2.126 \div 13.6)]\}}{(66.4 + 460)}$$

$$Vm, std = 90.171$$

Moisture Fraction (Dimensionless):

$$Bws = Vw, std \div (Vm, std + Vw, std)$$

$$Bws = 1.356 \div (90.171 + 1.356)$$

$$Bws = 0.015$$

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

$$Md = 0.44 \times \%CO2 + 0.32 \times \%02 + [0.28 \times (\%CO + \%N2)]$$

$$Md = 0.44 \times 0 + 0.32 \times 20.9 + [0.28 \times (0.0 + 79)]$$

$$Md = 28.84$$

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 x Bws + [Md x (1 – Bws)]

Ms = 18 x 0.015 + [28.84 x (1 – 0.015)]

Ms = 28.68

Velocity of Stack Gas (FPS):

Vs = 85.49 x Cp x sqrt dP x sqrt [(Ts + 460) ÷ (Ms x Pa)]

$$Vs = 85.49 \times 0.84 \times 0.811 \times \sqrt{\left[\frac{(141 + 460)}{(28.68 \times 29.00)}\right]}$$

Vs = 49.5

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A x Vs x 60

Qa = 314.16 x 49.5 x 60

Qa = 933,055

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 x Qa x Pa x (1 – Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 9E+05 \times 29.00 \times (1 - 0.015)]}{(141.0 + 460)}$$

Qstd = 782,730

Isokinetic Sampling (%):

%I = [0.0945 x Vm, std x (Ts + 460)] ÷ [Ø x Vs x Pa x An x (1 – Bws)]

$$\%I = \frac{[0.0945 \times 90.171 \times (141.0 + 460)]}{[120 \times 49.5 \times 29.0 \times 0.0003 \times (1 - 0.015)]}$$

%I = 102.6

EPA Method 29 (Metals) Sample Calculations

Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G/SA 03-T-201

Lead Emissions Concentration (Gr/DSCF):

Gr/DSCF = 15.435E-06 x Ca ÷ Vm, std

Gr/DSCF = 15.435E-06 × 11.0 ÷ 90.2

Gr/DSCF = 1.9E-06

Lead Emissions Concentration (Lb/DSCF):

Lb/DSCF = Gr/DSCF ÷ 7000

Lb/DSCF = 1.88E-06 ÷ 7000

Lb/DSCF = 2.69E-10

Lead Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF x Qstd x 60

Lb/Hr = 2.69E-10 × 782730 × 60

Lb/Hr = 0.0126

Lead Emissions Concentration (Lb/TPW):

Lb/TPW = Lb/Hr ÷ Rp

Lb/TPW = 0.0126 ÷ 170.6

Lb/TPW = 0.000074

USEPA Method 316

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 316 (Formaldehyde).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

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Sample Calculations Data Entry Section

Client: SDI–CCI Project #: G\SA 03–T–201

Location: Electric Arc Furnace – Baghouse Outlet (ES)

Run #: 1

Total Sampling Time, min (Ø)	60.0
Average Process Rate, TPH (RP)	261.4
Stack Area, ft² (A)	314.16
Barometric Pressure, in. Hg (Pbar)	29.22
Static Pressure, in. H20 (Ps)	–0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.989
Nozzle Area, ft² (An)	0.000276
Metered Gas Volume, ft³ (Vm)	47.450
Average Meter Temperature, °F (Tm)	48.7
Stack Gas Temperature, °F (Ts)	145.0
Meter Orifice Pressure, in. H20 (dH)	2.150
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.864
Volume of H2O Collected, ml (Vlc)	9.4
% Carbon Dioxide (%CO2)	0.0
% Oxygen (%O2)	20.9
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Analyte Mass Concentration, µg (Mc)	ND
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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EPA Method 316 (HCHO) Sample Calculations

Location: Electric Arc Furnace – Baghouse Outlet (ES) Client: SDI-CCI
Run #: 1 Project #: G\SA 03-T-201

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 29.22 + (-0.30 ÷ 13.6)

Pa = 29.20

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 x Vlc

Vw, std = 0.04707 x 9.4

Vw, std = 0.442

Volume of Dry Metered Gas, Standard Conditions (SCF):

Vm, std = (17.65 x Vm x Y x [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$Vm,\ std = \frac{(17.65 \times 47.450 \times 0.9890 \times [\ 29.22 + (2.150 \div 13.6)\ ]\}}{(\ 48.7 + 460\ )}$$

Vm, std = 47.834

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 0.442 ÷ (47.834 + 0.442)

Bws = 0.009

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 x %CO2 + 0.32 x %02 + [0.28 x (%CO + %N2)]

Md = 0.44 x 0 + 0.32 x 20.9 + [0.28 x (0.0 + 79)

Md = 28.84

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Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G\SA 03-T-201

Molecular Weighf of Sfack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 × Bws + [Md × (1 – Bws)]

Ms = 18 × 0.009 + [28.84 × (1 – 0.009)]

Ms = 28.74

Velocity of Stack Gas (FPS):

Vs = 85.49 x Cp x sqrt dP x sqrt [(Ts + 460) ÷ (Ms x Pa)]

$$vs = 85.49 \times 0.84 \times 0.864 \times \text{sqrt}\left[\frac{(145 + 460)}{(28.74 \times 29.20)}\right]$$

vs = 52.7

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A × Vs × 60

Qa = 314.16 × 52.7 × 60

Qa = 993,374

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 x Qa x Pa x (1 – Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 1E+06 \times 29.20 \times (1 - 0.009)]}{(145 + 460)}$$

Qstd = 838,607

Isokinetic Sampling (%):

%I = [0.0945 x Vm, std x (Ts + 460)] ÷ [Ø x Vs x Pa x An x (1 – Bws)]

$$\%I = \frac{[0.0945 \times 47.834 \times (145 + 460)]}{[60 \times 52.7 \times 29.2 \times 0.0003 \times (1 - 0.009)]}$$

%I = 108.3

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Location:	Electric Arc Furnace – Baghouse Outlet (ES)	Client:	SDI-CCI
Run #:	1	Project #:	G\SA **03-T-201**

HCHO Emission Concentration (Gr/DSCF):

Gr/DSCF = 15.435E-06 x Ca ÷ Vm, std

Gr/DSCF = 15.435E-06 x ND ÷ 47.8

Gr/DSCF = 0.00E+00

HCHO Emission Concentration (Lb/DSCF):

Lb/DSCF = Gr/DSCF ÷ **7000**

Lb/DSCF = 0.00E+00 ÷ **7000**

Lb/DSCF = 0.00E+00

HCHO Emission Rate (Lb/Hr):

Lb/Hr = Lb/DSCF x Qstd x **60**

Lb/Hr = 0.00E+00 x **83,8607** x **60**

Lb/Hr = **0.000**

HCHO Emission Concentration (Lb/TPW):

Lb/TPW = Lb/Hr ÷ Rp

Lb/TPW = **0.000** ÷ **261.4**

Lb/TPW = 0.000

NOMENCLATURE

NOMENCLATURE

acf	= actual cubic feet
acfm	= actual cubic feet per minute
A	= inside cross-sectional area of stack or duct (ft^2)
A_n	= inside cross-sectional area of sampling nozzle (ft^2)
%AM	= percent ash moisture content
Btu	= British thermal units
B_{ws}	= water vapor (moisture) in gas stream, proportion by volume
C	= mass conentration of effluent
C_a	= concentration of gaseous analyte (ppmv or %)
C_m	= average of initial and final bias check responses for upscale cal gases
C_{ma}	= actual concentration of upscale cal gases
C_o	= average of initial and final bias check responses for zero or low level cal gases
C_{oa}	= actual concentration of low level cal gases
C_p	= pitot tube coefficient (unitless)
C_s	= sample concentration
C_{s7}	= sample concentration corrected to 7% **0,**
C_{s12}	= sample concentration corrected to 12% CO_2
C_{s50}	= sample concentration corrected to 50% excess air
$C_{s50/rga}$	= sample concentration corrected to 50% excess air per raw gas analysis
CEM	= continuous emission monitor
$C_{(1+2)}$	= corrected **TGNMO** concentration for 1 trap and 2 tanks
%C	= percent carbon by weight, dry basis
%CO	= percent carbon monoxide by volume, dry basis
$\%CO_2$	= percent carbon dioxide by volume, dry basis
dcf	= dry cubic feet
dscf	= dry standard cubic feet
dscfm	= dry standard cubic feet per minute
dsm^3	= dry standard cubic meters
%EA	= percent excess air
F_d	= ratio factor of dry gas volume to heat value of combusted fuel (dscf/mmBtu)
fps	= feet per second
ft^2	= square feet
ft^3	= cubic feet
°F	= degrees Fahrenheit
G_{mfr}	= mass flow rate of stack gas (lb/hr)
gr	= grains
g	= grams
H_c	= heat of combustion, dry basis (Btu/lb)
hr	= hour
ΔH	= average orifice meter pressure differential (in. H_2O)
$\Delta H_@$	= orifice meter calibration factor (in. H_2O)

NOMENCLATURE, Continued

%H	= percent hydrogen by weight, dry basis
%I	= percent of isokinetic sampling
in. Hg	= inches of mercury
in. H_2O	= inches of water
lb	= pounds
lbllb-mole	= pound per pound-mole
m	= thousand
mm	= million
M_b	= mass concentration of media blank
M_c	= mass concentration of target analyte collected (mg, pg, ng or ppmC)
M_n	= mass concentration of **PM** collected (g)
Mg	= megagrams
Mg C	= megagram of charge
Mg P	= megagram of pour
μg	= micrograms
meq	= milliequivalents
mg	= milligrams
ml	= milliliters
MW	= molecular weight of analyte (lbllb-mole)
M_d	= molecular weight of stack gas, dry basis (lb/lb-mole)
M_s	= molecular weight of stack gas, wet basis (lb/lb-mole)
ng	= nanograms
N	= normality of barium perchlorate titrant (meq/ml)
%N	= percent nitrogen by weight, dry basis
$\%N_2$	= percent nitrogen by difference, dry basis
%O	= percent oxygen by weight, dry basis
$\%O_2$	= percent oxygen by volume, dry basis
pg	= picograms
PPH	= pounds per hour
PPW	= pound of process weight
ppmC	= parts per million concentration equivalent
ppmv	= parts per million by volume
P_l	= particulate loading per heat input in lb/mmBtu per F_d constant
$P_{l'}$	= particulate loading per heat input in lb/mmBtu per F_d calculated
P_a	= absolute stack gas pressure (in. Hg)
P_{bar}	= barometric pressure at sampling site (in. Hg)
P_s	= static stack gas pressure (in. H_2O)
ΔP	= stack gas velocity head (in. H_2O)
$\sqrt{\Delta P}$	= average square root of stack gas velocity head (in. H_2O)
Q_a	= volumetric stack gas flow rate at actual conditions (acfm)
Q_{std}	= volumetric stack gas flow rate corrected to dry standard conditions (dscfm)

NOMENCLATURE, Continued

R_{gu} = natural or propane gas usage rate (mscfh)
R_{ho} = stack gas density (lb/ft^3)
R_p = process rate (tph)
std = standard conditions at 29.92 in. Hg and 68°F
scf = standard cubic feet
scfh = standard cubic feet per hour
%S = percent sulfur by weight, dry basis
T_m = average dry gas meter temperature (°F)
T_s = average stack gas temperature (°F)
TC = ton of charge
TEQ = toxicity equivalent
TGNMO = total gaseous nonmethane organic
TP = ton of pour
TPH = tons per hour
TPW = ton of process weight
V_a = volume of sample aliquot titrated (ml)
V_{lc} = total volume of liquid condensed in impingers and collected in silica gel (ml)
V_m = total volume of dry metered gas (dcf)
$V_{m,\ std}$ = volume of dry metered gas corrected to standard conditions (scf)
V_s = stack gas velocity (fps)
V_{soln} = total volume of sample solution (ml)
V_t = average volume of titrant used for sample titration (ml)
V_{tb} = average volume of titrant used for blank titration (ml)
$V_{w,\ std}$ = volume of water vapor in sampled gas corrected to standard conditions (scf)
Y = dry gas meter calibration (correction) factor (unitless)
θ = total sampling time (minutes)

EQUATIONS

EQUATIONS

1) Absolute Stack Gas Pressure (in. Hg):

$$P_a = P_{bar} + (\pm P_s \div 13.6)$$

2) Volume of Water Vapor in Sampled Gas, Standard Conditions (scf):

$$V_{w,\,std} = 0.04707 \times V_{lc}$$

3) Volume of Dry Metered Gas, Standard Conditions (scf):

$$V_{m,\,std} = \{17.65 \times V_m \times Y \times [P_{bar} + (\Delta H \div 13.6)]\} \div (T_m + 460)$$

4) Moisture Fraction (unitless):

$$B_{ws} = V_{w,\,std} \div (V_{m,\,std} + V_{w,\,std})$$

5) Molecular Weight of Stack Gas, Dry Basis (lb/lb-mole):

$$M_d = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + (0.28 \times (\%CO + \%N_2)]$$

6) Molecular Weight of Stack Gas, Wet Basis (lb/lb-mole):

$$M_s = 18 \times B_{ws} + [M_d \times (1 - B_{ws})]$$

7) Velocity of Stack Gas (fps):

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P} \times \sqrt{[(T_s + 460) \div (M_s \times P_a)]}$$

8) Volumetric Stack Gas Flow Rate, Actual Conditions (acfm):

$$Qa = A \times V_s \times 60$$

9) Volumetric Stack Gas Flow Rate, Dry Standard Conditions (dscfm):

$$Q_{std} = (17.65 \times Q_a \times P_a \times (1 - B_{ws})] \div (T, + 460)$$

10) Isokinetic Sampling (%):

$$\%I = [0.0945 \times V_{m,\,std} \times (T_s + 460)] \div [\theta \times V_s \times P_a \times A_n \times (1 - B_{ws})]$$

EQUATIONS, Continued

11) PM Concentrations:

$gr/dscf = 15.435 \times M_n \div V_{m,\,std}$

$lb/dscf = gr/dscf \div 7000$

$lblhr = lb/dscf \times Q_{std} \times 60$

$lb/mmscf = lb/hr \div (R_{gu} \times 1E\text{-}03)$

$lb/tpw = lb/hr \div R_p$

$\mu g/Mg\ pw = lb/tpw \times 5.0E+08$

$lb/mmBtu = 20.9 \times lb/dscf \times F_d \div (20.9 - \%O_2)$

12) Flue Gas Density (lb/ft^3):

$R_{ho} = 0.0458 \times M_s \times P_a \div (T_s + 460)$

13) Gas Mass Flow Rate (lb/hr):

$G_{mfr} = R_{ho} \times acfm \times 60$

14) Excess Combustion Air Per Raw Gas Analysis (%):

$$\%EA = \frac{[\%O_2 - (0.5 \times \%CO)]}{\{0.264 \times \%N_2 - [\%O_2 - (0.5 \times \%CO)]\}} \times 100$$

15) Ash Moisture Content (%):

$\%AM = (net\ loss\ after\ heating) \times 100 \div (net\ loss\ after\ drying)$

16) Target Analyte Concentrations:

$lb/dscf = mg \times 2.205E\text{-}06 \div V_{m,\,std}$

$" = \mu g \times 2.205E\text{-}09 \div V_{m,\,std}$

$" = ng \times 2.205E\text{-}12 \div V_{m,\,std}$

$" = pg \times 2.205E\text{-}15 \div V_{m,\,std}$

" $= ppmC \times V_{soln} \times 2.205E\text{-}09 \div V_{m,\,std}$

lb/hr $= lb/dscf \times Q_{,,} \times 60$

17) TGNMO Concentrations:

lb/dscf $= mg\ C/dsm^3 \times 6.243E\text{-}08$

lb/hr $= lb/dscf \times Q_{std} \times 60$

18) TGNMO Concentration Correction for 1 Trap and 2 Tanks:

$$C_{(1+2)} = \frac{[conc.\ (1) \times vol.\ sampled\ (1)] + [conc.\ (2) \times vol.\ sampled\ (2)]}{[vol.\ sampled\ (1) + vol.\ sampled\ (2)]}$$

19) Collection Vessel/CEM Gaseous Analyte Concentrations:

$$lb/dscf = ppmv \times \frac{Molecular\ Weight\ of\ Analyte,\ lb/lb\text{-}mole}{385.3\ dscf/lb\text{-}mole \times 10^6}$$

lb/hr $= lb/dscf \times Q_{std} \times 60$

20) Sample Concentration Corrections:

12% CO_2 (lb/ft^3) -

$C_{s12} = C_s \times 12 \div \%CO_2$

7% O_2 (lb/ft^3) -

$C_{s7} = C_s \times (20.9 - 7) \div (20.9 - \%O_2)$

50% excess air (lb/ft^3) -

$C_{s50} = C_s \times (100 + \%EA) \div 150$

50% excess air per raw gas analysis (lb/ft^3) -

$C_{s50/rga} = C_s \div \{1 - ((1.5 \times \%CO_2) - (0.13 \times \%N_2) - (0.75 \times \%CO)] \div 20.9)$

EQUATIONS, Continued

21) Weighted Analyte Concentrations Per Two Ducts:

$lb/dscf_{avg}$ = *(lb/dscf, duct 1* + *lb/dscf, duct* 2) ÷ 2

lb/hr_{total} = *lb/hr, duct 1* + *lb/hr, duct 2*

$lb/mmbtu_{avg}$ = *(lb/mmbtu, duct 1* + *lb/mmbtu, duct* 2) ÷ *2*

APPENDIX G

CORRESPONDENCE

REQUEST FOR REPORT SUBMISSION EXTENSION

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	MR. BRAD BROWN
organization:	STEEL DYNAMICS, INC. - COLUMBIA CITY FACILITY
fax/phone:	(260) 625-8950 / (260) 625-8852
from:	TERRY SHACKELFORD
date/time:	WEDNESDAY, APRIL 2, 2003 / 04:16 PM CST
subject:	REPORT DUE DATE EXTENSION - FINAL TEST RESULTS
pages:	23 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTIAL ☐ PLEASE REPLY ASAP
comments:	PLEASE FIND ATTACHED FOR YOUR REVIEW A REQUEST TO IDEM FOR A REPORT DUE DATE EXTENSION, AND A SUMMARY OF THE FINAL TEST RESULTS FROM THE SOURCE EMISSIONS COMPLIANCE TESTING CONDUCTED ON THE ELECTRIC ARC FURNACE (EAF) AND THE REHEAT FURNACE (RF) - EXHAUST STACKS FROM TUESDAY, FEBRUARY 18,2003 THROUGH THURSDAY, FEBRUARY 20, 2003 AT THE STEEL DYNAMICS FACILITY NEAR COLUMBIA CITY, INDIANA. IF YOU HAVE ANY QUESTIONS OR COMMENTS, PLEASE ADVISE.

If there is any difficulty with this transmission, please call the number below.

RT. 2, BOX 2165 • WHEATLAND, MO 65779-9803

TEL/FAX (417) 282-6140

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	MR. ED SURLA
organization:	IDEM - IGCN 1001
fax/phone:	(317) 233-6865 / (317) 232-8443
from:	TERRY SHACKELFORD
date/time:	WEDNESDAY, APRIL 2, 2003 / 04:00 PM CST
subject:	REQUEST FOR TEST REPORT DUE DATE EXTENSION
pages:	03 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☐ CONFIDENTIAL ☒ PLEASE REPLY ASAP
comments:	PLEASE FIND ATTACHED A TEST REPORT DUE DATE EXTENSION REQUEST FOR THE SOURCE EMISSIONS COMPLIANCE TESTING CONDUCTED ON THE ELECTRIC ARC FURNACE (EAF) AND THE REHEAT FURNACE (RF) - EXHAUST STACKS FROM TUESDAY, FEBRUARY 18, 2003 THROUGH THURSDAY, FEBRUARY 20, 2003 AT THE STEEL DYNAMICS FACILITY NEAR COLUMBIA CITY, INDIANA. AN EXTENSION WOULD BE GREATLY APPRECIATED. THANKS FOR YOUR CONSIDERATION OF THIS MATTER.

If there is any difficulty with this transmission, please call the number below.

RT. 2, BOX 2165 • WHEATLAND, MO 65779-9803

TEL/FAX (417) 282-6140

G/SA GUENTHER/SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

P.O. Box 807 • Crown Point. IN 46307 • TEL (219) 663-5394 • FAX (219) 662-7037

April 2, 2003

Mr. Ed Surla
Indiana Department of Environmental Management
IGCN 1001
100 North Senate
P.O. Box 6015
Indianapolis, IN 46206-6015

RE: Test Report Due Date Extension
Source Emissions Compliance Test
Steel Dynamics, Inc. - Columbia City, Indiana Facility
Electric Arc Furnace and Reheat Furnace
G/SA Project No. 03-T-201

Dear Mr. Surla:

Per my telephone conversation today with Mr. Steve Friend of your office and his instructions, Guenther/Shackelford Associates (G/SA) is hereby submitting this request on behave of Steel Dynamics, Inc. (SDI) for a 10-day extension to allow enough time to fully complete the report for the source emissions compliance testing performed at SDI's Columbia City, Indiana facility from Tuesday, February 18 through Thursday, February 20, 2003 on the Electric Arc Furnace (EAF) and the Reheat Furnace (RF).

The testing performed on the EAF's baghouse outlet (exhaust stack) included EPA Methods 1, 2, 3, 3A, 4, 5, 6C, 7E, 13B, 18, 29, 202 and 316. The testing conducted on the RF's exhaust stack was EPA Methods 7E and 10. As can be seen, this involved a substantial amount of analyses.

The completion of the report has been delayed primarily because of reanalysis of the fluoride samples, re-evaluation of lab notes and calculations of the mercury analyses, and the somewhat late arrival of the gaseous data, all of which started arriving the middle of last week through Tuesday of this week. The report is actually due in the Indiana Department of Environmental Management's (IDEM) office on April 6, 2003. Unfortunately, there is not enough time for the report to be completed, delivered and reviewed by SDI, and then forwarded to IDEM to be received on said date. However, the report can definitely be delivered to IDEM on or before April 16, 2003.

If you have any questions or require further information, please advise.

Sincerely,
Guenther/Shackelford Associates

Terry L. Shackelford
Partner-Senior Test Engineer

pc: Brad Brown, Environmental Engineer, SDI

EMISSIONS TEST PROTOCOL

GUENTHER/SHACKELFORD ASSOCIATES

P.O. BOX 807
CROWN POINT, IN 46307

FACSIMILE TRANSMISSION REPORT

OFFICE FAX NUMBER (219) 662-7037

DATE: February 4, **2003**

TO: Brad Brown

COMPANY: Steel Dynamics, Inc.

FAX NUMBER: **(260) 625-8950**

FROM: Fred H. Guenther

NUMBER OF PAGES FOLLOWING **6**

COMMENTS

Brad

Attached is a copy of the revised IDEM Emissions test protocol and RATA test protocol of the EAF and its CEMS. Please note that IDEM has made a significant modification to the test procedures to be employed during the test program. This will change our efforts and we will be forwarding revised documentation to you directly. Please feel free to contact me regarding any comments or questions that you may have on the attached.

Fred Guenther

If you have not received this clearly or number of pages do not coincide, please call us at **(219) 662-7037.**

3915 **W.** 106th Lane, Crown Point, Indiana **46307**
(219) 662-7037

GUENTHER/SHACKELFORD ASSOCIATES

P.O. BOX 807
CROWN POINT, IN 46307

FACSIMILE TRANSMISSION REPORT

OFFICE FAX NUMBER (219) 662-7037

DATE: February 4.2003

TO: Ed Surla

COMPANY: Indiana Department of Environmental Management

FAX NUMBER: (317) 233-6865

FROM: Fred H. Guenther

NUMBER OF PAGES FOLLOWING 5

COMMENTS

Ed

G/SA is herewith submitting three (3) revised Compliance Test Protocols for the emissions and RATA testing to be performed on the EAF and its CEMS located at Steel Dynamics. Inc. The testing has been rescheduled to be performed during the period February 18-20, 2003.

Please free to call us regarding any questions that you mav have on the attached information.

Fred Guenther

If you have not received this clearly or number of pages do not coincide, please call us at (219) 662-7037.

3915 W. 106th Lane, Crown Point, Indiana 46307
(219) 662-7037

GUENTHER / SHACKELFORD *ENVIRONMENTAL CONSULTANTS*
ASSOCIATES *& TESTWG CONTRACTORS*
P. O. Box 807 * Crown Point. Indiana 46307 * (219) 662-7037 / FAX (219) 662-7037

February 4,2003

Mr. Ed Surla
Compliance Data Section
Compliance Branch
Office of Air Management
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, IN 46206

RE: **TRANSMITTAL OF REVISED EMISSIONS AND RATA TEST PROTOCOL**
Steel Dynamics, Inc.
Columbia City, IN
CP 183-10097 / Plt. ID 183-00030

Dear Mr. Surla:

On behalf of Steel Dynamics, Inc., we are providing a revised Emissions and RATA Test Protocol for the emissions testing of the baghouse outlet and the Continuous Emissions Monitoring System on the Electric Arc Furnace (EAF) located in Columbia City, Indiana. These revised protocols are submitted in response to our discussions with Mr. Dave Cline on January 31,2003 and February 3,2003. The testing remains scheduled for the period February 18-21, 2003.

Please note the following regarding the RATA testing. The RATA testing is proposed to be performed on one capacity condition, i.e., maximum capacity since this emissions facility is not expected to be regularly operated under any kind of reduced capacity conditions.

Should you have any questions pertaining to the attached protocol, please feel free to contact me at (219) 663-5394.

Sincerely,
Guenther/Shackelford Associates

F H. Guenther
red H. Guenther

Attachments: Emission Test Protocol - Two Pages
RATA Notification Protocol One Page

cc: Mr. Brad Brown
Steel Dynamics, Inc.
2601 S. County Road 700 E
Columbia City, IN 46725

Compliance Test Protocol
Indiana Department of Environmental Management

Office of Air Management/Compliance Data Section
100 N Senate, POB 6015
Indianapolis, IN 46206-6015
Phone: 317/232-8338 Fax: 3171233-6865

Date Prepared: 1/16/03 **Proposed Test Date:** 02/18/03 - 02/21/03 **Plant Address:** 2601 S. County Road 700 E. **Plant Location:** Columbia City, IN 46725

1. Source Info ID. No.: 183-00030 Permit No.: CP183-10097

Company: Steel Dynamics, Inc.

Mail Address: 2601 S. County Rd. 700 E Mail City: Columbia City, IN 46725

Company Contact: Brad Brown Phone: (260) 625-8852

Check applicable program:

FESOP: _____ Title V: _____ SSOA: _____

Other: Construction Permit

AGENCY USE ONLY Date Received: _____

Inspector: _____ Reviewer: _____ Approval Date: _____

Other permit conditions: (use back if needed)

2. Tester Information

Name: Guenther/Shackelford Associates

Address: P.O. Box 807, Crown Point, IN 46308

Contact: Fred H. Guenther Phone: (219) 663-5394

5. a. Describe any deviations from standard test method. None

b. Describe method used to determine operating level. Furnace Charge

3. Process Information (List each piece of equipment to be tested on separate form.)

Unit to Test: Electric Arc Furnace

Max. Rated Capacity: 200 T/Hr. (2 Furnace Total)

Proposed Operating Speed: Maximum Capacity

Poll. Control Equipment: Baghouse (PM), DSE (CO) Low NOx Burner (NOx)

Process Description: The EAF is composed of one twin shell furnaces with a combined rated capacity of 400 tons per hour. The furnaces produce molten metal using scrap metal and an electric arc.

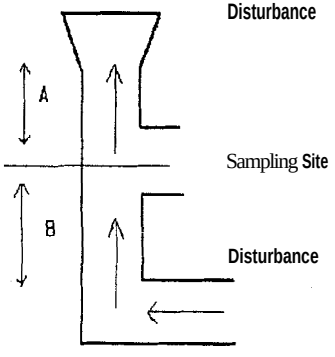
Fuel Type: NA

6. SAMPLE SITE LOCATION

Number of sample points for M5: 24

Diameter at sample site: 20 height: 135 Ft.

To Be Determined



Distance A _____

Distance B _____

Does Sample port location meet 40 CFR 60, Appx. A, Method 1, Sec. 1.2 requirements: Y x N ___ If no, explain.

Appx. Stack gas flow (ACFM):	850,000
Appx. Stack gas temp (deg. F):	200
Appx. Stack gas moisture (%):	~1%

4. Test Information: (Use back if needed)	No. Runs	Time/Run
Method 1-4:	3	4 Hr.
Method 29: Lead	3	4 Hr.
Method 29 :Hg	3	4 Hr.
Method 29 : Be	3	4 Hr
Method 13B: F	3	1 Hr
Other : M18 - HAP	3	1 Hr.

Reason for Test
Operating Permit: Yes No X
Construction Permit: Yes X No
State Agreed Order : Yes No X
Compliance w/326 IAC NSPS 40 CFR 60 Subpart —Ma —Other :
Title V: Yes No
Other (i.e. EPA, CD, State, 114): _____

326 IAC 3-2.1 requires this completed form to be submitted 35 days **prior** to proposed test date to above address. 326 IAC 2-1-7 **(a)(b)** requires any test **fee** to be submitted with the protocol. (FEE NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OR TESTING VE's ONLY.)

Compliance Test Protocol
Indiana Departmept of Environmental Management

Office of Air Management/Compliance Data Section
100 N Senate, POB 6015
Indianapolls, IN 46206-6015
Phone: 317/232-8338 Fax: 317/233-6865

Date Prepared: 1/16/03 **Proposed Test Date: 02/18/03 - 02/21/03** **Plant Address: 2601 S. County Road 700 E.** **Plant Location: Columbia City, IN 46725**

1. Source Info ID. No.: 183-00030 Permit No.: CP183-10097

Company: Steel Dynamics, Inc.

Mail Address: 2601 S. County Rd 700 E Mail City: Columbia City, IN 46725

Company Contact: Brad Brown Phone: (260) 625-8852

Check applicable program:

FESOP: _____ Title V: _____ SSOA: _____

Other: Construction Permit

AGENCY USE ONLY Date Received: _____

Inspector: _____ Reviewer: _____ Approval Date: _____

Other permit conditions: (use back if needed)

2. Tester Information

Name: Guenther/Shackelford Associates

Address. P.O. Box 807. Crown Point, IN 46308

Contact: Fred H. Guenther Phone: (219) 663-5394

5. a. Describe any deviations from standard test method. None

b. Describe method used to determine operating level. Furnace Charge

6. SAMPLE SITE LOCATION

Number of sample points for M5: 24

Diameter at sample site: 20 height: 135 Ft.

Does Sample port location meet 40 CFR 60, Appx 4 Method I, Sec. 1.2 requirements Y x N ___ If no, explain

Appx. Stack gas flow (ACFM);	850,000
Appx. Stack gas temp (deg. F):	200
Appx. Stack gas moisture (%):	~1%

3. Process Information (List each piece of equipment to be tested on separate form.)

Unit to Test: Electric Arc Furnace

Max. Rated Capacity: 200 T/Hr. (2 Furnace Total)

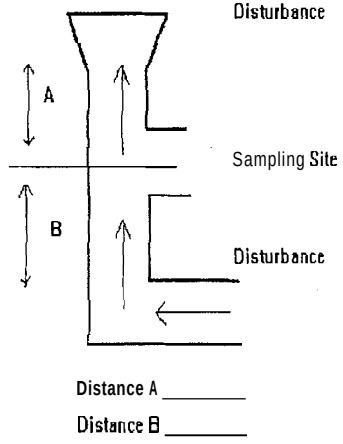
Proposed Operating Speed: Maximum Capacity

Poll. Control Equipment: Baghouse (PM), DSE (CO) Low NOx Burner (NOx)

Process Description: The EAF is composed of one twin shell furnaces with a .combined rated capacity of 400 tons per hour. The furnaces produce molten metal using scrap metal and an electric arc.

Fuel Type: N/A

To Be Determined



Distance A _____

Distance B _____

4. Test Information: (Use back if needed)	No. Runs	Time/Run
Method 1-4:	3	1 Hr.
Method 5 / 202	3	1 Hr.
Method 6 :	3	1 Hr.
Method 7 :	3	1 Hr
Method 10 :	3	1 Hr.
Other : M 25A	3	1 Hr.

Reason for Test

Operating Permit: Yes No X

Construction Permit: Yes X No

State Agreed Order : Yes No X

Compliance w/326 IAC NSPS 40 CFR 60 Subpart __AAa___Other .

Title V: Yes No

Other (i.e. EPA, CD, State, 114): _____

326 IAC 3-2.1 requires this completed form tn be submitted 35 days prior to proposed test date to above address. 326 IAC 2-1-7 (a)(b) requires any test fee to be submitted with the protocol. (FEE NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OW TESTING VE's ONLY.)

Relative Accuracy Test Audit Notification Protocol

Indiana Department of Environmental Management
Office of Air **Quality/Compliance** Data **Section**
100 N Senate, Post **Office** Box 6015
Indianapolis, IN 46206-6015
Phone: **317/232-8338** Fax: **317/233-6865**

Date Prepared: 02/04/03 Proposed Test Date: 2/18-20/03 Plant Address: 2601 S County Road 700 E **Plant Location:** Columbia City, IN

1. SOURCE INFO: **ID/Permit** No.: CP 183-10097-00030

Company: Steel Dynamics, Inc.
Mail Address: 2601 S. County Road 700 E.
City, State, Zip: Columbia City, IN 46725
Company Contact: Brad Brown Phone: (260) 625-8852

6. Check Applicable:
Annual RATA: ____ Part 75: ____
Semi-Annual: ____ Part 60: ____
Other:
Certification: Recertification:

AGENCY USE ONLY: Date Received:
Inspector: Approval Date:
Reviewer:
Comments:

2. Test Company Information:

Name: Guenther/Shackelford Associates
Address: P.O. Box 807
City, State, Zip: Crown Point, IN 46308
Contact: Fred Guenther Phone: (219) 663-5394

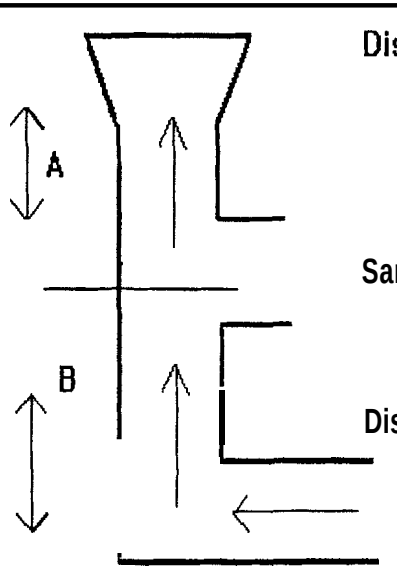
7 SAMPLE **SITE** LOCATION

3. PROCESS INFORMATION: (Submit a separate form for each unit to test)

Unit to Test: Twin Shell Electric Arc Furnace
Max. Rated Capacity: 200 T/Hr.
Proposed Operating Speed: Maximum Capacity
Describe method used to determine operating level:
Charge Rate

Pollution Control Equipment: Baghouse. DSE (CO), Low Nox Burner
Fuel Type: N.A.

4. **Load** Level	Test Method	**No. Runs**	Time
LOW	2		
	3		
___ MWG	4		
	Other ____		
MID	2		
	3		
	4		
	6		
___ MWG	7		
	Other ____		
HIGH	2	9-12	20
	3	9-12	20
	4	9-12	20
	6	9-12	20
___ MWG	7	412	20
	Other 10	9-12	20



5. Describe any deviations from standard test methods:
None

Does sample port location meet 40 CFR 60, Appx. A Method 1, Sec. 1.2 Requirements: Yes / No
If No, explain: Yes
Sample Point Dimensions are to be determined at this time.

Approximate Stack gas flow (ACFM):	850,000
Approximate Stack gas temp (deg. F):	170
Approximate Stack gas moisture (%):	3
Number of points for Method 2:	24
Number of points for Method 4:	24
Number of points for Method 6:	1
Number of points for Method 7:	1
Anticipated date of Flow RATAs:	2/18-20/03
(Anticipated date of Normal Load Gaseous RATA:	2/18-20/03

Please attach explanation if performing a **Single Load** RATA only.

326 IAC **3-6-2(a)** requires this completed form to **be submitted** 35 **days prior to the proposed test** date to the above address. 326 IAC 2-1.**1-7(6)(B)** requires any **applicable** test fee to be submitted with the protocol. (FEE NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OR VE TESTING ONLY.)

HP OfficeJet *G* Series G85
Personal Printer/Fax/Copier/Scanner

Fax-History Report for
Fred H. Guenther
(219) 662-7037
Feb 05 2003 8:51am

Last Fax

Date	Time	Type	Identification	Duration	Pages	Result
Feb 5	8:46am	Sent	12606258950	4:33	7	OK

Result:
OK - black and white fax
Okay color - color fax

HP OfficeJet G Series G85
Personal Printer/Fax/Copier/Scanner

Fax-History Report for
Fred **H.** Guenther
(219) 662-7037
Feb 05 2003 8:34am

Last Fax

Date	Time	Type	Identification	Duration	Pages	Result
Feb 5	8:31am	Sent	13172336865	3:31	6	OK

Result:
OK - black and white fax
Okay color - color fax

GUENTHER/SHACKELFORD ASSOCIATES

P.O. BOX 807
CROWN POINT, IN 46307

FACSIMILE TRANSMISSION REPORT

OFFICE FAX NUMBER (219) 662-7037

DATE: January 17.2003

TO: Brad Brown

COMPANY: Steel Dynamics, Inc.

FAX NUMBER: (260) 625-8950

FROM: Fred H. Guenther

NUMBER OF PAGES FOLLOWING 5

COMMENTS

Brad

Attached please find the emissions test protocol documents forwarded to IDEM regarding the emissions testing to be done on the EAF. Please note that the testing has been rescheduled for February 19-21, 2003. Please note that February 18. 2003 is a holiday. Therefore we will have to start on Tuesday. Also note that I don't have complete information regarding the Reheat Furnace so I guessed. Please feel free to contact me regarding any comments or questions regarding the attached information.

Fred Guenther

If you have not received this clearly or number of pages do not coincide, please call us at (219) 662-7037.

3915 W. 106th Lane, Crown Point, Indiana 46307
(219) 662-7037

GUENTHER/SHACKELFORD ASSOCIATES

P.O. BOX 807
CROWN POINT, IN 46307

FACSIMILE TRANSMISSION REPORT

OFFICE FAX NUMBER (219) 662-7037

DATE: January 17. 2003

TO: Ed Surla

COMPANY: Indiana Department of Environmental Management

FAX NUMBER: (317) 233-6865

FROM: Fred H. Guenther

NUMBER OF PAGES FOLLOWING 4

COMMENTS

Ed

G/SA is herewith submitting; revised Compliance Test Protocols for emissions testing to be performed on the EAF Process and Reheat Furnace located at Steel Dynamics, Inc in Columbia City, IN.. The testing has been tentatively rescheduled to be performed on February 18-21, 2003.

Please free to call us regarding any questions that you may have on the attached information.

Fred Guenther

If you have not received this clearly or number of pages do not coincide, please call us at (219) 662-7037.

3915 W. 106th Lane, Crown Point, Indiana 46307
(219) 662-7037

GUENTHER / SHACKELFORD ASSOCIATES ***ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS***
P. O. Box 807 • Crown Point. Indiana 46307 a (219) 662-7037 1 FAX (219) 662-7037

January 17,2003

Mr. Ed Surla
Compliance Data Section
Compliance Branch
Office of Air Management
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, IN 46206

RE: **TRANSMITTAL OF REVISED TEST PROTOCOL & PROPOSED TEST DATE**
Steel Dynamics, Inc.
Columbia City, IN
CP 183-10097 / Plt. ID 183-00030

Dear Mr. Surla:

On behalf of Steel Dynamics, Inc., we are providing a revised Compliance Test Protocol for the emissions testing of the Electric Arc Furnace (EAF) located in Columbia City, Indiana. The purpose of the revised protocol is to add metals and fluorides emissions testing and to add testing for the Reheat Furnace. As per my discussion with you on January 17, 2003, the testing has been rescheduled to be performed during the period February 19 to 21, 2003.

Should you have any questions pertaining to the attached protocol, please feel free to contact me at (219) 663-5394.

Sincerely,
Guenther/Shackelford Associates

Fred H. Guenther

Attachments: Emission Test Protocol - three pages

cc: Mr. Brad Brown
Steel Dynamics, Inc.
2601 South County Road 700 E
Columbia City, IN 46725

Compliance Test Protocol
Indiana Department of Environmental Management

Office of Air **Management/Compliance Data Section**
100 N Senate, POB 6015
Indianapolis, IN 46206-6015
Phone: 317/232-8338 Fax: 3171233-6865

Date Prepared: 1/16/03 **Proposed Test Date: 02/18/03 - 02/21/03** **Plant Address: 2601 S. County Road 700 E.** **Plant Location: Columbia City, IN 46725**

1. Source Info ID. No.: 183-00030 Permit No.: CP183-10097

Company: Steel Dynamics, Inc.

Mail Address: 2601 S. County Rd. 700 E Mail City: Columbia City, IN 46725

Company Contact: Brad Brown Phone: (260) 625-8852

Check applicable program:

FESOP: _____ Title V: _____ SSOA: _____

Other: **Construction** Permit

AGENCY USE ONLY Date Received: _____

Inspector: _____ Reviewer: _____ Approval Date: _____

Other permit conditions: (use back ifneeded)

2. Tester Information

Name: Guenther/Shackelford Associates

Address: P.O. Box 807, Crown Point, IN 46308

Contact: Fred H. Guenther Phone: (219) 663-5394

5. a. Describe any deviations from standard test method. None

b. Describe method used to determine operating level. Furnace Charge

3. Process Information (List each piece of equipment to be tested on separate form.)

Unit to Test: Electric Arc Furnace

Max. Rated Capacity: 200 T/Hr. (2 Furnace Total)

Proposed Operating Speed: Maximum Capacity

Poll. Control Equipment: Baghouse (PM), DSE (CO) Low NOx Burner (NOx)

Process Description: The EAF is composed of two twin shell furnaces with a .combined rated capacity of 400 tons per hour. The furnaces produce molten metal using scrap metal and an electric arc.

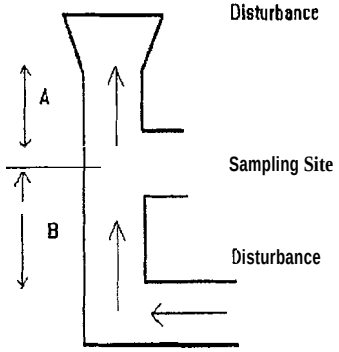
Fuel Type: N/A

6. **SAMPLE SITE LOCATION**

Number of sample points for M5: 24

Diameter at sample site: 20 height: 135 Ft.

To Be Determined



Distance A _____

Distance B _____

Does Sample port location meet 40 CFR 60, Appx. A, Method 1, S 1.2 requirements: Y _x_ N ___ If no, explain.

Appx. Stack gas flow (ACFM):	850,000
Appx. Stack gas temp (deg. F):	200
Appx. Stack gas moisture (%):	~1%

Reason for Test

Operating Permit: Yes (No)

Construction Permit: (Yes) No

State Agreed Order : Yes (No)

Compliance w/326 IAC NSPS 40 CFR 60 Subpart __AAa __ Othe

Title V: Yes No

Other (i.e. EPA, CD, State, 114): _____

4. **Test Information:** (Use back ifneeded)	No. Runs	Time/Run
Method 1-4:	3	4 Hr.
Method 5 / 202	3	4 Hr.
Method6 :	3	1 Hr.
Method 7 :	3	1 Hr
Method 10 :	3	1 Hr.
Other : M 25A	3	1 Hr.

326 **IAC 3-2.1 requires this completed form to be submitted 35 days prior to proposed test date to above address.** 326 **IAC 2-1 (a)@) requires any test fee to be submitted with the protocol.** (**NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OR TESTING VE's ONLY.)**

Compliance Test Protocol

Indiana Department of Environmental Management

Office of Air Management/Compliance Data **Section**
100 N Senate, **POB** 6015
Indianapolis, IN 46206-6015
Phone: **317/232-8338** Fax: 3171233-6865

Date Prepared: 1/16/03 **Proposed Test Date: 02/18/03 - 02/21/03** **Plant Address: 2601 S. County Road 700 E.** **Plant Location: Columbia City, IN 46725**

1. Source Info ID. No.: 183-00030 **Permit** NO.: CP183-10097

Company: Steel Dynamics, lnc.

Mail Address: 2601 S. County Rd. 700 E Mail City: Columbia City, IN 46725

Company Contact: Brad Brown Phone: (260) 625-8852

Check applicable program:

FESOP: _____ Title **V:** _____ SSOA: _____

Other: Construction Permit

AGENCY USE ONLY Date Received: _____

Inspector: _____ Reviewer: _____ Approval Date: _____

Other permit conditions: (use back if needed)

2. Tester Information

Name: Guenther/Shackelford Associates

Address: **P.O.** Box 807, Crown Point, IN 46308

Contact: Fred H. Guenther Phone: (219) 663-5394

5. a. Describe any deviations from standard test method. None

b. Describe method used to determine operating level. Furnace Charge

6. SAMPLE SITE LOCATION

Number of sample points for M5: 24

Diameter at sample site: 20 height: 135 Ft.

Does Sample port location meet 40 CFR 60, Appx. A, Method 1, S
1.2 requirements: Y_x__ N ___ If no, explain.

Appx. Stack gas flow (ACFM):	850,000
Appx. Stack gas temp (deg. F):	200
Appx. Stack gas moisture (%):	–f %

3. Process Information (List each piece of equipment to be tested on separate form.)

Unit to Test: Electric Arc Furnace

Max. Rated Capacity: 200 T/Hr. (2 Furnace Total)

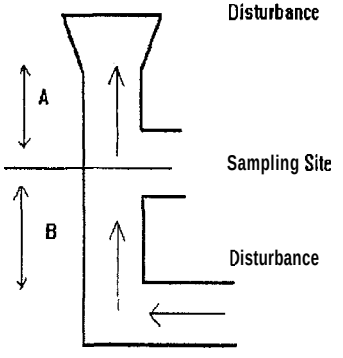
Roposed Operating Speed: Maximum Capacity

Poll. Control Equipment: Baghouse (PM), DSE (CO) Low NOx Burner (NOx)

Process Description: The EAF is composed of two twin shell furnaces with a combined rated capacity of 400 tons per hour The furnaces produce molten metal using scrap metal and an electric arc.

Fuel Type: N/A

To Be Determined



Distance A _____

Distance B _____

Reason for Test

Operating Permit: Yes (No)

Construction Permit: (Yes) No

State Agreed Order: Yes (No)

Compliance w/326 IAC NSPS 40 CFR 60 Subpart __AAa __Othe

Title V: Yes No

Other (i.e. EPA, CD, State, 114): _____

4. Test **Information:** (Use back if needed)	No. Runs	Time/Run
Method 1-4:	3	1 Hr.
Method 29: Lead	3	1 Hr.
Method29 :Hg	3	1 Hr.
Method29 : Be	3	1 Hr
Method 13B: F	3	1 Hr.
Other :		

326 IAC 3-2.1 requires this completed form to be submitted 35 days **prior** to proposed test date to above address. 326 IAC 2-1 (a)@) requires any test fee to be submitted with the **protocol.** (NOT APPLICABLE IF PROGRAM IS FESOP. TITLE V OR TESTING VE's ONLY.)

Compliance Test Protocol
Indiana Department of Environmental Management
Office of Air Management/Compliance Data Section
100 **N Senate, POB** 6015
Indianapolis, IN 46206-6015
Phone: 3171232-8338 **Fax:** 3171233-6865

Date Prepared: 1/16/03 **Proposed Test Date: 02/18/03 - 02/21/03** **Plant Address: 2601 S. County Road 700 E.** **Plant Location: Columbia City, IN 46725**

1. Source Info ID. No.: 183-00030 Permit No.: **CP183-10097**

Company: Steel Dynamics, Inc.

Mail Address: 2601 S. County Rd. 700 E Mail City: Columbia City, IN 46725

Company Contact: Brad Brown Phone: (260) 625-8852

Check applicable program:

FESOP: _____ Title V: _____ SSOA: _____

Other: **Construction** Permit

AGENCY USE ONLY Date Received: _____

Inspector: _____ Reviewer: _____ Approval Date: _____

Other permit conditions: (use back if needed)

2. Tester Information

Name: Guenther/Shackelford Associates

Address: P.O. Box 807, Crown Point, IN 46308

Contact: Fred H. Guenther Phone: (219) 663-5394

5. a. Describe any deviations from standard test method. None

b. Describe method used to determine operating level. Furnace Charge

6. SAMPLE SITE LOCATION

Number of sample points for M5: 24

Diameter at sample site: 8 Ft height: 128 Ft.

Does Sample port location meet 40 CFR 60, Appx. 4 Method 1, Sec. 1.2 requirements: Y x N ___ If no, explain.

Appx. Stack gas flow (ACFM):	200,000
Appx. Stack gas temp (deg. F):	300
Appx. Stack gas moisture (%):	<10%

3. Process Information (List each piece of equipment to be tested on separate form.)

Unit to Test: Reheat Furnace

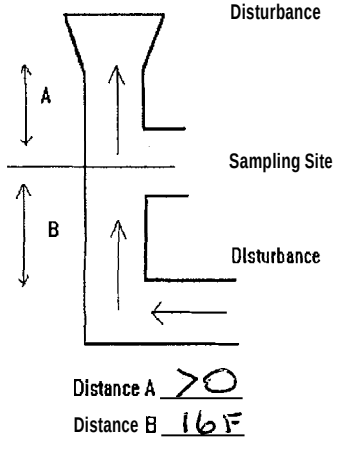
Max. Rated Capacity: 2065 MMBTU/Hr.

Proposed Operating Speed: Maximum Capacity

Poll. Control Equipment: Low Nox Burner

Process Description: Reheat Furnace

Fuel Type: N/A



4. Test Information: (Use back if needed)

	No. Runs	Time/Run
Method 1-4:	3	1 Hr.
Method 7E:	3	1 Hr.
Method 10	3	1 Hr.
Method :		
Method :		
Other :		

Reason for Test

Operating Permit: Yes (No)

Construction Permit: (Yes) No

State Agreed Order : Yes (No)

Compliance w/326 IAC NSPS 40 CFR 60 Subpart __AAa __Other

Title V: Yes No

Other (i.e. EPA, CD, State, 114): _____

326 **IAC** 3-2.1 **requires this completed form to be submitted** 31 **days prior to proposed test date to above address.** 326 **IAC** 2-1 **(a)@) requires any test fee to be submitted with the protocol.** **(FEE NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OR TESTING V ONLY.)**

HP OfficeJet G Series G85
Personal Printer/Fax/Copier/Scanner

Fax-History Report for
Fred H. Guenther
(219) 662-7037
Jan 17 2003 12:01pm

Last Fax

Date	Time	Type	Identification	Duration	Pages	Result
Jan 17	11:57am	Sent	12606258950	4:21	7	OK

Result:
OK - black and white fax
Okay color - color fax

HP OfficeJet G Series G85
Personal Printer/Fax/Copier/Scanner

Fax-History Report for
Fred H. Guenther
(219) 662-7037
Jan 17 2003 11:54am

Last Fax

Date	Time	Type	Identification	Duration	Pages	Result
Jan 17	11:51am	Sent	13172336865	3:17	6	OK

Result:
OK - black and white fax
Okay color - color fax

40.5

ACKNOWLEDGMENTS

I would like to thank Mr. Kevin Bort, Mr. William Bougher, Mr. Barry Smith and their associates for their cooperation, patience and input in the coordination of the testing program conducted at Steel Dynamics, Inc. Their knowledge and experience in process control and operation, and project development proved invaluable towards the completion of this project.

Fred H. Guenther
Project Manager

TABLE OF CONTENTS

ACKNOWLEDGMENTS ..... *i*

PREFACE ..... *iv*

1.0 INTRODUCTION 1

2.0 TEST RESULTS SUMMARY 5

3.0 FACILITY DESCRIPTION 7

4.0 TEST PROCEDURES 9

5.0 ANALYTICAL PROCEDURES 12

6.0 QUALITY ASSURANCE PROCEDURES 13

7.0 CONCLUSIONS 14

LIST OF TABLES

TABLE 1 - EPA METHOD 12 - LEAD EMISSIONS TEST RESULTS - ELECTRIC ARC FURNACE BAGHOUSE STACK 6

LIST OF FIGURES

FIGURE 1 - MELTSHOP - BAGHOUSE /STACK CONFIGURATION 8

FIGURE 2 - MELTSHOP - STACK SAMPLING LOCATION 8

APPENDICES

APPENDIX A - FIELD TEST DATA
APPENDIX B - PROCESS OPERATING DATA
APPENDIX C - LABORATORY ANALYSIS AND CEM ANALYTICAL DATA
APPENDIX D - REAGENT CERTIFICATION AND MATERIAL SAFETY DATA

APPENDICES (CONTINUED)

APPENDIX E - CALIBRATION DATA
APPENDIX F - SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS
APPENDIX G - CORRESPONDENCE

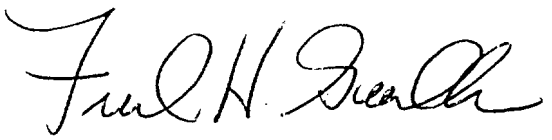
PREFACE

I, Fred H. Guenther do hereby certify that the source emissions testing conducted at Steel Dynamics, Inc. Structural and Rail Division near Columbia City, Indiana was performed in accordance with the procedures set forth by the United States Environmental Protection Agency, and that the data and results submitted within this report are an exact representation of the testing.



Fred H. Guenther
Test Supervisor

I, Fred Guenther, do hereby attest that all-work on this project was performed under my direct supervision, and that this report accurately and authentically presents the source emissions testing conducted at Steel Dynamics, Inc. Structural and Rail Division near Columbia City, Indiana.



Fred H. Guenther
Test Supervisor

SOURCE EMISSIONS COMPLIANCE TESTING
EPA Methods 1, 2, 3, 4 and 12
Performed on the
Electric Arc Furnace
Baghouse Outlet (Exhaust Stack)
at
Steel Dynamics, Inc.
Structural and Rail Division
Columbia City, Indiana

April 19-20,2005

Project No. 05-T-314

1.0 INTRODUCTION

This report presents the results of the source emissions compliance testing conducted by Guenther/Shackelford Associates (G/SA) for Steel Dynamics, Inc. (SDI), Structural and Rail Division near Columbia City, Indiana.

The primary purpose of this testing program was to obtain lead samples from the effluent gas stream of the baghouse serving the Electric Arc Furnace (EAF). The results of this sampling were used to determine if the emissions discharged into the atmosphere from the facility meet the Indiana Department of Environmental Management (IDEM) source emission limits.

G/SA's responsibility was to collect and analyze lead samples and perform data reduction for emission concentrations evaluation. SDI's responsibility was to maintain process operating parameters and to provide process operating data per compliance test

requirements.

The following report provides information pertaining to SDI's Structural and Rail Division's process operations, emissions testing and analytical results.

The emissions testing conducted on the Meltshop Baghouse Stack was performed on Tuesday, April 19, 2005, from 06:44 A.M. to 10:17 A.M. and on Wednesday, April 20, 2005, from 06:45 A.M. to 07:58 A.M. AS discussed below, SDI experienced a malfunction of the EAF from approximately 6:44 A.M. to 11:00 A.M. on April 19, 2005.

The following requirements were specific for the testing program:

1. Equipment calibrations performed and calibration data provided.
2. Three (3), one (1)-hour, minimum, lead emissions test runs at the outlet (exhaust stack) of the EAF Baghouse, which shall include an integral number of complete process heat cycles, pursuant to EPA, Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Subpart AAa, Section 60.275a and Indiana Department of Environmental Management (IDEM) Construction Permit #CP-183-12692-00030.
3. Process manufacturing capacities and control devices maintained at required operating conditions, and production rates recorded during the emissions testing periods.
4. All testing and analyses performed in accordance with current EPA test methodologies and analytical procedures for Lead emissions.

6. Lead emissions from the EAF Baghouse Stack shall not exceed an average emission rate of 0.114 pounds per hour (lb/hr), pursuant to IDEM Construction Permit #CP-183-12692-00030.

The emissions testing program was supervised in part by G/SA, whose headquarters is in Crown Point, Indiana. G/SA also performed stack gas flow rate, (CO_2) and oxygen (O_2) testing and moisture content determinations, the lead emissions testing on the EAF Baghouse Stack, overall emissions data review and prepared in part the final report. The lead analyses were subcontracted through G/SA's analytical broker, Sampling and Analytical Management, Inc. (SAMI) to DataChem, Inc. whose headquarters is in Cincinnati, Ohio. The final report preparation was also prepared by G/SA.

The emissions testing was performed in accordance with EPA Reference Methods 1, 2, 3, 4, and 12 (Lead), Title 40 Code of Federal Regulations, Part 60, Appendix A, "Test Methods".

The testing program was approved by and/or coordinated with the following personnel:

Kevin J. Bort, Engineering Manager, SDI

William Bougher, SDI

Barry Smith, SDI

The emissions testing was performed by the following personnel:

Fred Guenther, Test Supervisor, G/SA

Andrew Kendall, Test Technician, GISA

Kyle Clayton, Test Technician, G/SA

The emissions testing was observed by the following personnel:

Jarrod Fisher, Environmental Scientist, Air Compliance Section, IDEM

2.0 TEST RESULTS SUMMARY

The source emissions testing was performed utilizing EPA Methods 1, 2, 3, 4 and 12 at the Electric Arc Furnace Baghouse Stack sampling location. A summary of the test results is given below:

Lead Emissions Test Results	
Run No.	Emissions Results (Lbs/Hr)
1 (Malfunction)	0.353
2 (Malfunction)	0.232
3	0.079
Average	0.222
Emission Limit	0.114

A complete list of test parameters for each Method 12 (Lead) emissions test run performed at the stack sampling location can be found in Table 1.

Sample calculations and examples of the equations used to generate the test results can be found in Appendix F.

TABLES

A ..... ENVIRONMENTAL TESTING CONSULTANTS

P.O. Box 807, Crown Point, IN 46307 TEL (219) 663-5394 / FAX (219) 662-7037

TABLE 2

EPA METHOD 12

LEAD (PB) EMISSIONS TEST RESULTS

CLIENT: SDI-COLUMBIA CITY — PROJECT NO.: 05-T-314

SOURCE TESTED: ELECTRIC ARC FURNACE - BAGHOUSE OUTLET — DATA INPUT BY: FHG

INPUT DATA

Run Number	1	2	3
Date	19-Apr-05	19-Apr-05	20-Apr-05
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stacl
Test Time, Start-Stop (24 Hour)	0644-0806	0907-1017	0645-0758
Sampling Time (Minutes)	60	60	60
Average Process Weight Rate (TPH)	***157.0***	***164.0***	***159.0***
Stack Area (Ft^2)	312.20	312.20	312.20
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	1.005	1.005	1.005
Nozzle Area (Ft^2)	0.000309	0.000309	0.000309
Barometric Pressure (In. Hg)	29.06	29.06	28.94
Static Pressure (In. H20)	-0.27	-0.27	-0.25
Dry Gas Meter Sample Volume (DCF)	50.008	50.499	53.868
Average Dry Gas Meter Temperature (°F)	70.7	78.9	78.0
Average Orifice Meter Delta H (In. H20)	1.768	1.780	2.004
Volume Condensate Collected (Ml)	29.2	29.1	25.9
Average C02 Concentration (%)	0.0	0.0	0.0
Average 0 2 Concentration (%)	20.9	20.9	20.9
Average Square Root of Delta P (In. H2O½)	0.873	0.875	0.911
Average Stack Gas Temperature (°F)	170.7	184.2	155.E
Pb Mass Concentration **(Milligrams, mg)**	**0.160**	**0.093**	**0.038**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.04	29.04	28.92
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	48.794	48.524	51.661
Water Vapor Volume at Standard Conditions (SCF)	1.374	1.370	1.219
Moisture Fraction (Unitless)	0.027	0.027	0.023
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.84	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.54	28.54	28.59
Stack Gas Velocity (FPS)	54.7	55.4	56.5
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,024,324	1,037,749	1,058,124
Stack Gas Flow Rate at Standard Conditions (SCFM)	832,438	825,676	876,979
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	809,632	803,008	811,785
Isokinetic Sampling (%)	101.6	101.8	101.6
Pb Emissions Concentration (Gr/DSCF)	0.00005	0.00003	0.00001
Pb Emissions Concentration (Lb/DSCF)	7.23E-009	4.23E-009	1.62E-009
Pb Emissions Rate (Lb/Hr)	0.351	0.204	0.079

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**1,040,066**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**808,142**
Average Pb Emissions Concentration **(Gr/DSCF)**	**0.00003**
dverage Pb Emissions Concentration (LblDSCF)	**4.36E-009**
dverage Pb Emissions Rate **(Lb/Hr)**	**0.211**

Emission Limit: 0.114 Lbs/Hr

Signature of Reviewer: Fred H. Smith

3.0 FACILITY DESCRIPTION

Steel Dynamics, Inc. Structural and Rail Division facility manufactures steel products from scrap metal. The facility has a nominal capacity to produce 200 tons of steel per hour.

SDI Structural and Rail Division is located at 2610 County Road 700 East near Columbia City, Indiana which is in Whitley County.

The SDI Structural and Rail Division facility consists basically of one (1) single shell Electric Arc Furnace (EAF) incorporating a fabric filter baghouse with exhaust stack for particulate removal, one back-up single shell EAF, a ladle metallurgical station for refining, one (1) natural gas-fired reheat furnace (RF) with separate exhaust stack, continuous casting, hot roll milling and slag processing. The compliance emissions testing was performed on the EAF stack. See Figures 1 and 2.

During the emissions testing on April 19-20, 2005: the Electric Arc Furnace steel processing tap rates averaged 111.5 tons/hr (Run 1), 126.2 tons/hr (Run 2), and 111.9 tons/hr (Run 3). The 95% capacity criterion was not met during these test runs.

Process operating data recorded during the emissions testing can be found in Appendix B of this report.

FIGURES

FIGURES



Figure 1 - Electric Arc Furnace - Baghouse/Stack Configuration



Figure 2 - Electric Arc Furnace - Stack Sampling Location

4.0 TEST PROCEDURES

G/SA, and G/SA's affiliates and subcontractors use all current EPA accepted testing methodologies in their Air Quality Programs as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A. For this testing program, the following specific methodologies were utilized:

EPA Method 1 - Sample and Velocity Traverses for Stationary Sources

EPA Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 3 - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources

EPA Method 4 - Determination of Moisture Content From Stack Gases

EPA Method 12 - Determination of Inorganic Lead Emissions from Stationary Sources

EPA Methods 1, 2 and 12 were performed at the Electric Arc Furnace Baghouse Stack sampling location using one (1) Apex Instruments, Model 522, control unit and sampling train incorporating a 7', effective length, stainless-steel probe with a heated, borosilicate glass liner, stainless-steel nozzle and Type S, stainless-steel pitot tube, ¼" O.D., stainless-steel static pressure/gas sampling tube and Type K (Chromel/Alumel) thermocouples; an aluminum filter oven and borosilicate glass filter holders with Teflon filter supports with Viton-0-Rings, and 0.3 micron (99.9% retention), Whatman 8.5 cm, Type 934-AH, glass microfiber filters; foam insulated, aluminum impinger units with two (2) Greenburg-Smith

and two (2) modified Greenburg-Smith glass impinger bottles, and a stainless-steel umbilical adapter with Type K (Chromel/Alumel) gas exit thermocouple; and a 90' umbilical with various interconnecting fittings, plugs and connectors.

USEPA Method 3 was performed at the EAF sampling location during the Lead testing to determine exhaust gas concentrations of CO, and O_2 using a Bacharach, Duplex Fyrite Kit, Gas Analyzer to extract and measure integrated gas samples collected in Calibrated Instruments, Inc. 10 liter, pillow type, Tedlar bags at the outlet of the stainless-steel probe's gas sampling tube.

Calibration data, including an on-site dry gas meter calibration check, and pretest run and post-test run calibrations of the aforementioned instrumentation, and calibration span gas certifications can be found in Appendix E.

Cyclonic flow checks were omitted at the Electric Arc Furnace Baghouse Stack sampling location due to the acceptable stack and test port configurations based on Method 1 requirements, and relatively laminar flows noted during the preliminary traverse procedures conducted prior to the emissions testing a the sampling location.

No testing or sample recovery deviations or procedural errors occurred during the onsite sampling phase of the testing program.

Certifications and material safety data for the chemical reagents used in performing the lead

testing are included in Appendix D.

Significant process deviations or upsets did occur during 2 of the 3 emissions testing periods. A malfunction of the EAF occurred from approximately 6:44 A.M. to 11:00 A.M. on April 19,2005. A verbal and follow-up written report was provided to by SDI to IDEM's Richard Sekula. The malfunction appears to have been related to the melt shop computer interface and the associated delivery system that provides fluxes to the scrap mixes. In addition, a slide gate on the EAF malfunctioned.

The emissions test data collected during the field sampling can be found in Appendix A of this report. The particulate and gaseous emissions concentrations, rates and pertinent data are presented in the "Test Results Summary".

5.0 ANALYTICAL PROCEDURES

G/SA, and G/SA's affiliates and subcontractors utilize all current analytical procedures outlined in the following reference methods as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A:

EPA Method 1 - Sample and Velocity Traverses for Stationary Sources

EPA Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 3 - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources

EPA Method 4 - Determination of Moisture Content From Stack Gases

EPA Method 12 - Determination of Inorganic Lead Emissions from Stationary Sources

An AND, Model EK-1200A, Electronic Toploading Balance was used to weigh spent silica gel from the EPA Method 12 (Lead) testing to determine, in part, stack gas moisture content.

No analytical procedure errors occurred during the Lead analyses phase of the testing program.

All pertinent laboratory analysis data can be found in Appendix C of this report.

6.0 QUALITY ASSURANCE PROCEDURES

Each reference method presented in the U.S. Code of Federal Regulations details the instrument calibration requirements, sample recovery and analysis, data reduction and verification, types of equipment required and the appropriate sampling and analytical procedures to assure maximum performance and accuracy. G/SA, and G/SA's affiliates and subcontractors adhere to the guidelines for quality control set forth by the United States Environmental Protection Agency. These procedures are outlined in the following documents:

Code of Federal Regulations, Title 40, Part 51

Code of Federal Regulations, Title 40, Part 60

Quality Assurance Handbook, Volume 1, EPA 600/9-76-005

Quality Assurance Handbook, Volume 2, EPA 60014-77-027a

Quality Assurance Handbook, Volume 3, EPA 60014-77-027b

7.0 CONCLUSIONS

An emissions testing program was conducted on the outlet of the baghouse serving the Electric Arc Furnace at Steel Dynamics, Inc.'s plant in Columbia City, Indiana during the period April 19-20, 2005. The average Lead emission rate was 0.222 lb/hr during the compliance testing; the required EPA PB emission concentration limit of 0.114 lb/hr.

The usefulness and/or significance of the emissions values presented in this document as they relate to the compliance status of the Electric Arc Furnace's operation based on process operating conditions shall be determined by others. It should be noted that a malfunction occurred during two the three stack testing runs.

For additional information pertaining to the testing program see Appendix G at the end of this report.

APPENDICES

APPENDIX A

FIELD TEST DATA

USEPA METHOD 1

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 1 – SITE DETERMINATION FIELD DATA SHEET

Client: Steel Dynamics Inc. Project No.: 05-T-314
Source: EAF Date: 8/15-20/05

Flue Data:

Distance from far inside wall to outside of port: 246 in.
Port length: 6.0 in.
I.D. or depth of flue: 240 in.
Width of flue (rect.): N.A. in.
Area of flue: 314.159 sq. ft.
Equivalent dia., De = 2LW / (L+W)

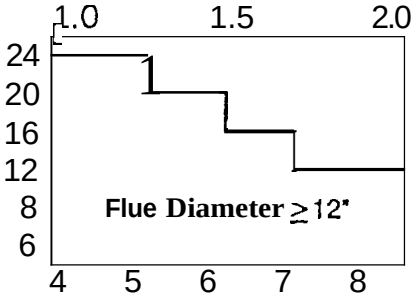
De = 240 in.

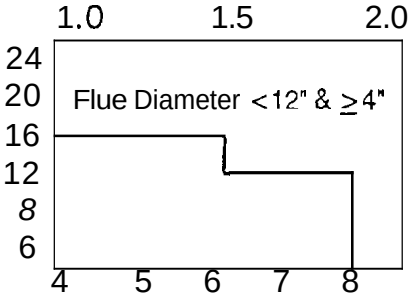
Distance from the nearest flow disturbance to the center line of the test ports:

Upstream (A)	Downstream (B)
120 in.	240 in.
Number of diameters	Number of diameters
0.5 unitless	2.0 unitless

Traverse Points Determination:

Diameters upstream from disturbance





Minimum number of traverse points

Diameters downstream from disturbance

Traverse Points Measurements:

Circular flue (Percentage of flue diameter) / Rectangular flue (Percentage of flue depth)

Point No.	2	4	6	8	10	12
1	14.6 / 25.0	6.7 / 12.5	4.4 / 8.3	3.2 / 6.3	2.6 / 5.0	2.1 / 4.2
2	85.4 / 75.0	25.0 / 37.5	14.6 / 25.0	10.5 / 18.8	8.2 / 15.0	6.7 / 12.5
3		75.0 / 62.5	29.6 / 41.7	19.4 / 31.3	14.6 / 25.0	11.8 / 20.8
4		93.3 / 87.5	70.4 / 58.3	32.3 / 43.8	22.6 / 35.0	17.7 / 29.2
5			85.4 / 75.0	67.7 / 56.3	34.2 / 45.0	25.0 / 37.5
6			95.6 / 91.7	80.6 / 68.8	65.8 / 55.0	35.6 / 45.8
7				89.5 / 81.3	77.4 / 65.0	64.4 / 54.2
8				96.8 / 93.8	85.4 / 75.0	75.0 / 62.5
9					91.8 / 85.0	82.3 / 70.8
10					97.4 / 95.0	88.2 / 79.2
11						93.3 / 87.5
12						97.9 / 95.8

Traverse Points Dimensions:

1	5.04 in.	7	in.
2	16.08 in.	8	in.
3	28.32 in.	9	in.
4	42.48 in.	10	in.
5	60.00 in.	11	in.
6	85.44 in.	12	in.

Sketch Of Flue

USEPA METHOD 3

S.A.T., *LLC* Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA Method 3 – Gas Analysis Field Data Sheet

Client: Steel Dynamics, Inc. | Project #: OST-314 | Fo = 20.9 − %O2 / %CO2

Process: EAF | Unit: EAF

Date: 4/19-20 10 | Fuel Type: N.A | Fo = 1.083 to 1.230 (for bitum. coal)

IGS Analyzer I.D. #: GSA 1 | Leak Check? N.C

Analyst: Fredh. Quentyn

Run Number	Location	Bag I.D. Number	Trial	Percent CO2	Percent CO2 + O2	Percent O2	Analytical Time
1	B.O.	IGS #1	1	0.0	20.9	20.9	10:40
			2	0.0	20.9	20.9	4/19/10
			3	0.0	20.9	20.9	
			Average	0.0		20.9	
2	B.O	IGS #2	1	0.0	20.9	20.9	10:50
			2	0.0	20.9	20.9	4/19/10
			3	0.0	20.9	20.9	
			Average	0.0		20.9	
3	B.O	IGS #3	1	0.0	20.9	20.9	9:15
			2	0.0	20.9	20.9	4/20/10
			3	0.0	20.9	20.9	
			Average	0.0		20.9	
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				
			1				
			2				
			3				
			Average				

COMMENTS:

USEPA METHOD 12

G/SA, LTD P.O. BOX 807. CROWN POINT. IN 46307 TEL/FAX (219 661-9900/661-9902

EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.	Project No.	G/SA 05-T-314
Plant	Columbia City, IN	Unit	EAF Baghouse Outlet — Stack Area (ft²) 312.20
Date	0411912005	Ambient Temperature (°F)	60
Operator	A. Kendall	Barometeric Pressure (inches Hg)	29.06
Probe Operator(~)	K. Clayton	Static Pressure (± inches H2O)	-0.27
Control Unit No.	609198 Nozzle Diameter (in.) 0.238	%CO2 / %02	0.0 / 20.9
Pitot Cp	0.84 Filter No. F-1 (Blank)	Condensate (milliliters)	10.1 Silica Gel (grams) 19.1
Meter Y	1.005 Front-half No. FH-1	Test Time (24 hour)	0644-0806
Run No.	1 Back-half No. BH-1	Sample Time (minutes)	60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. HZO)	Metered Gas Volume Vm (ft³) Initial Volume 898.6001	Dry Gas Meter Temperature Tm (°F)	Notes
A	1	165	0.920	2.070		66	
	2	147	0.840	1.950		66	Pretest Nozzle Cal:
	3	136	0.770	1.820		66	A = 0.237"
	4	148	0.950	2.200		66	B = 0.238"
	5	155	0.820	1.880		67	C = 0.238"
	6	157	0.600	1.380		68	Avg. = 0.238"
B	1	147	0.750	1.770		69	
	2	180	0.680	1.510		69	
	3	187	0.530	1.170		70	
	4	199	0.500	1.080		70	
	5	206	0.510	1.100		71	
	6	206	0.540	1.160		71	
C	1	194	0.650	1.430		71	
	2	205	1.100	2.380		72	
	3	171	0.930	2.120		72	
	4	170	0.700	1.900		73	
	5	171	0.950	2.180		73	
	6	174	0.720	1.640		73	
D	1	161	0.850	1.980		73	
	2	167	0.870	2.010		73	
	3	157	0.820	1.930		74	
	4	164	0.860	2.000		74	
	5	164	0.820	1.910	Final Volume	74	
	6	166	0.800	1.860	948.608	75	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		170.7	0.873	1.768	50.008	70.7	

G/SA, LTD P.O. BOX 807, CROWN POINT, IN 46307 TEL/FAX (219) 661-9900/661-9902

EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS, INC	Project No.	G/SA 05-T-314
Plant	Columbia City, IN	Unit	EAF Baghouse Outlet
Date	04/19/2005	Ambient Temperature (°F)	65
Operator	A Kendall	Barometeric Pressure (inches Hg)	29.06
Probe Operator(~)	K Clayton	Static Pressure (± inches H20)	-0.27
Control Unit No	609198	Nozzle Diameter (in)	0 238
Pitot Cp	0.84	Filter No	F-1 (Blank)
Meter Y	1 005	Front-half No	FH-1
Run No.	2	Back-half No	BH-1

Stack Area (ft²): 312.20
%CO2 / %O2: 0.0 / 20.9
Condensate (milliliters): 10.0
Silica Gel (grams): 19.1
Test Time (24 hour): 0907-1017
Sample Time (minutes): 60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H20)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³)	Dry Gas Meter Temperature Tm (°F)	Notes
					Initial Volume 948.870		
D	1	213	0.900	1.950		75	
	2	179	0.950	2.160		75	
	3	164	0.860	2.010		75	
	4	161	0.900	2.120		76	
	5	168	0.850	1.980		76	
	6	171	0.630	1.460		77	
C	1	162	0.720	1.700		77	
	2	174	1.050	2.440		78	
	3	165	0.990	2.330		78	
	4	169	0.710	1.660		78	
	5	170	0.850	1.990		79	
	6	189	0.700	1.590		79	
B	1	219	0.590	1.290		80	
	2	226	0.560	1.210		80	
	3	233	0.500	1.070		80	
	4	233	0.550	1.180		81	
	5	211	0.670	1.480		80	
	6	185	0.650	1.500		81	
A	1	153	0.810	1.970		81	
	2	169	0.800	1.890		81	
	3	171	0.820	1.930		81	
	4	172	0.750	1.770		81	
	5	179	0.890	2.080	Final Volume 999.369	82	
	~	185	0.840	1.950		82	
		Average 184.2	Avg. Sqrt. 0.875	Average 1.780	Volume Sampled 50.499	Average 78.9	

G/SA, *LTD* P.O. BOX 807, CROWN POINT, IN 46307 TEL/FAX (219) 661-9900/661-9902

EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS, INC.	Project No.	G/SA 05-T-314
Plant	Columbia City, IN	Unit	EAF Baghouse Outlet
Date	04/20/2005	Ambient Temperature (°F)	60
Operator	A. Kendall	Barometeric Pressure (inches Hg)	28.94
Probe Operator(s)	K. Clayton	Static Pressure (± inches H2O)	-0.27
Control Unit No.	609198	Nozzle Diameter (in.)	0.238
Pitot Cp	0.84	Filter No.	F-1 (Blank)
Meter Y	1.005	Front-half No.	FH-1
Run No.	3	Back-half No.	BH-1

Stack Area (ft²) 312.20

%CO2 / %02 0.0 / 20.9

Condensate (milliliters) 11.7 Silica Gel (grams) 14.2

Test Time (24 hour) 0645-0758

Sample Time (minutes) 60.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H2O)	Orifice Setting Delta H (in. H20)	Metered Gas Volume Vm (ft³) Initial Volume 0.200	Dry Gas Meter Temperature Tm (°F)	Notes
A	1	165	0 950	2 220		75	
	2	145	0.990	2.380		74	
	3	141	0.850	2.060		74	Post Test Nozzle Cal:
	4	141	0.740	1.800		75	A = 0.239"
	5	132	1.050	2.590		75	B = 0.237"
	6	129	0.820	2.040		75	C = 0.238"
B	1	138	0.860	2.100		75	Avg. = 0.238"
	2	145	0.810	1.960		75	
	3	149	0.710	1.710		76	
	4	154	0.890	2.130		76	
	5	156	0.670	1.600		77	
	6	159	0.700	1.670		77	
C	1	182	0.820	1.890		78	
	2	187	0.730	1.670		78	
	3	188	0.720	1.640		78	
	4	188	0.890	2.040		79	
	5	175	0.900	2.110		80	
	6	153	0.820	2.000		81	
D	1	142	0.870	2.160		81	
	2	153	0.860	2.110		82	
	3	153	0.850	2.080		82	
	4	156	0.920	2.250		83	
	5	154	0.950	2.330	Final Volume	83	
	6	156	0.640	1.560	54.068	83	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		155.9	**0.911**	**2.004**	**53.868**	**78.0**	

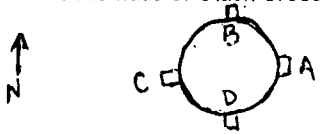
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EPA Method 12 (PM) Testing - Field Data Sheet

Run # 1 **Sampling Location** EAF Baghouse Outlet

Client SDI	Project # 05-T-314
Plant CCI	Unit EAF Baghouse Outlet
Date 4/19/05	Project Site Columbia City, IN
Meter Operator A. Kendall	
Probe Operator K. Clayton	

Schematic of Stack Cross Section



Ambient Temperature (°F) 60		Barometric Press. (in. Hg) B 29.06	
Assumed Moisture (%) (M) 2		Calculated Moisture (%)	
Nozzle # N-248		Probe Length (ft.) 8	
Nozzle Diameter (in.) (D) 0.248		Probe Liner Material glass	
Nozzle Material SS		Probe Heater Setting (°F) 255	
Probe # P-8		Oven Heater Setting (°F) 255	
Control Unit # 609145	Meter Y (C Factor) (A) 1.005	First traverse point all the way	In / Out
Filter Oven #	Meter Delta H@	Inside Dimension(s) (in.) Diameter 240 L / W /	Port Dimen. (in.) Dia. 4 L 6
Impinger Unit # GSA 1	Meter K / Orifice Factor (D) 2.474		Gas Flow Direction In / Out ✓
Pitot # P-8	Pitot Cp (C) 0.84		
Pitot Leak Check: Initial ok	Final		
DGM Leak Rate Before: 0.0	CFM @ 19 in. Hg	Filter Number(s)	F1
DGM Leak Rate After: 0.0	CFM @ 8 in. Hg	Front-half Number(s)	
Static Pressure (± in. H2O) (A) -0.27		Back-half Number(s)	
IGS Bag #		IGS Analyzer #	
%CO2		%O2	
Condensate (ml/g)		Silica Gel (g)	
Total Vlc (ml)		Total Acetone Wash (ml)	
Total 0.1 HNO3 Rinse (ml)			
Start Time (24 Hour) 6:44		Stop Time (24 Hour)	

Traverse Point Number	Stop-watch Time: Minutes / Sample Point 2.5	N Stack Gas Temp. Ts (°F)	P Velocity Head Delta Ps (in. H2O)	Q Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume: 898.600	D Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
A 1	2:30	165	0.92	2.07	900.913	66	253	257	49	2.7	
2	5	147	0.84	1.95	903.157	66	255	253	48	2.9	
3	7:30	136	0.77	1.82	905.276	66	254	255	48	2.9	
4	10	148	0.95	2.20	907.651	66	252	256	50	3.1	
5	12:30	155	0.82	1.88	909.754	67	250	258	52	3.1	
6	15	157	0.60	1.38	911.535	68	251	257	52	3.1	
B 1	17:30	142	0.75	1.77	913.817	69	252	259	53	3.1	
2	20	180	0.68	1.51	915.758	69	252	260	52	3.1	
3	22.30	187	0.53	1.17	917.531	70	250	258	53	3.1	
4	25	199	0.50	1.08	919.179	70	251	260	55	3.1	
5	27:30	206	0.51	1.10	920.815	71	252	262	54	3.1	
6	30	206	0.54	1.16	922.513	71	254	264	54	3.1	
C 1	32:30	194	0.65	1.43	924.435	71	250	263	54	3.1	
2	35:00	206	1.10	2.38	926.910	72	255	263	53	3.4	
3	37:30	171	0.93	2.12	928.917	72	255	262	55	3.4	
4	40	170	0.70	1.90	931.353	73	257	263	56	3.4	
5	42:30	171	0.95	2.18	933.700	73	258	261	57	3.4	
6	45	174	0.72	1.64	935.753	73	258	260	57	3.4	
D 1	47:30	161	0.85	1.98	937.891	73	255	263	54	3.4	
2	50	167	0.87	2.01	939.999	73	258	262	54	3.4	
3	52:30	157	0.82	1.93	942.451	74	262	265	55	3.4	
4	55	164	0.86	2.00	944.235	74	266	268	56	3.4	
5	57:30	164	0.82	1.91	946.431	74	250	253	57	3.4	
6	60	166	0.80	1.86	948.608	75	249	248	58	3.4	
Averages / Totals											

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EPA Method 12 (PM) Testing - Field Data Sheet

Run # 2 Sampling Location EAF Baghouse Outlet

Client SDI	Project # 05-T-34
Plant CC1	Unit EAF Baghouse Outlet
Date 4/19/05	Project Site Columbia City, IN
Meter Operator A. Kendall	
Probe Operator K. Clayton	

Schematic of Stack Cross Section

See Run 1

Ambient Temperature (°F) 65	Barometric Press. (in. Hg) 29.06
Assumed Moisture (%) 2	Calculated Moisture (%)

Nozzle # N-240	Probe Length (ft.) 8
Nozzle Diameter (in.) 0.238	Probe Liner Material Glass
Nozzle Material Stainless Steel	Probe Heater Setting (°F) 255
Probe # P-3	Oven Heater Setting (°F) 259

Control Unit # 60498	Meter Y (C Factor) 1.005	
Filter Oven # 1011	Meter Delta H@ 1.537	
Impinger Unit # GSA2	Meter K / Orifice Factor 2.474	
Pitot # P-8	Pitot Cp 0.84	
Pitot Leak Check: Initial ok	Final	
DGM Leak Rate Before: 0.0	CFM @ 15	in. Hg
DGM Leak Rate After: 0.0	CFM @ 12	in. Hg
Static Pressure (± in. H2O) -0.27		

First traverse point all the way In Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In ___
L ✓ W ✓	L 6	Out ✓
Filter Number(s)	Pb R2	
Front-half Number(s)		
Back-half Number(s)		

IGS Bag # 2	IGS Analyzer # GSA-1
%CO2 0.0	%O2 20.5
Condensate (ml/g) 10.2	Silica Gel (g) 15.1
Total Vlc (ml) 29.1	Total Acetone Wash (ml) ___
Total 0.1 HNO3 Rinse (ml)	
Start Time (24 Hour) 9:07	Stop Time (24 Hour) 10:17

Traverse Point Number	Stop-watch Time Minutes / Sample Point 60/24	Stack Gas Temp Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 948.870	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
D 1	2:30	213	0.90	1.95	951.113	75	258	260	60	5.9	
2	5:00	179	0.95	2.16	953.450	75	254	253	60	5.9	
3	7:30	164	0.86	2.01	955.715	75	260	255	61	5.9	
4	10:00	161	0.90	2.12	957.999	76	260	257	59	5.7	
5	12:30	168	0.85	1.98	960.257	76	258	258	59	5.9	
6	15:00	171	0.63	1.46	962.213	77	256	260	60	5.9	
C 1	17:30	162	0.72	1.70	964.358	77	255	262	58	5.7	
2	20:00	174	1.05	2.44	966.709	78	253	260	57	6.9	
3	22:30	165	0.99	2.33	969.205	78	250	255	60	6.9	
4	25:00	169	0.71	1.66	971.230	78	250	251	60	6.9	
5	27:30	170	0.85	1.99	973.451	79	252	254	60	6.9	
6	30:00	189	0.70	1.59	975.259	79	253	258	61	6.9	
B 1	32:30	219	0.59	1.29	977.233	80	257	255	62	6.9	
2	35:00	226	0.56	1.21	979.001	80	260	253	61	6.9	
3	37:30	233	0.50	1.07	980.652	80	260	258	62	6.9	
4	40:00	233	0.55	1.18	982.414	81	260	261	63	6.9	
5	42:30	241	0.67	1.48	984.339	80	260	254	63	6.9	
6	45:00	185	0.65	1.50	986.420	81	260	251	63	6.9	
A 1	47:30	153	0.81	1.97	988.510	81	250	253	62	6.9	
2	50:00	169	0.80	1.89	990.717	81	251	251	61	6.9	
3	52:30	171	0.82	1.93	992.875	81	250	253	63	6.9	
4	55:00	172	0.75	1.77	994.988	81	249	251	63	6.9	
5	57:30	179	0.89	2.08	997.100	82	248	250	64	6.9	
6	60:00	185	0.84	1.95	999.369	82	248	251	64	6.9	
Averages / Totals					44.50						

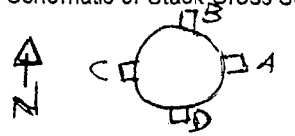
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EPA Method 12 (PM) Testing - Field Data Sheet

Run # 3 **Sampling Location** EAF Baghouse Outlet

Client SDI	Project # 05-T-314
Plant CCI	Unit EAF Baghouse Outlet
Date 4/20/05	Project Site Columbia City, IN
Meter Operator A. Kendall	
Probe Operator K. Clayton	

Schematic of Stack Cross Section



Ambient Temperature (°F) 60		Barometric Press. (in. Hg) 28.94	
Assumed Moisture (%) 2		Calculated Moisture (%)	
Nozzle # N-233		Probe Length (ft.) 8	
Nozzle Diameter (in.) 0.233		Probe Liner Material glass	
Nozzle Material SS		Probe Heater Setting (°F) 255	
Probe # P-8		Oven Heater Setting (°F) 255	
Control Unit # 609193	Meter Y (C Factor) 1.005		
Filter Oven # 1011	Meter Delta H@ 1.537		
Impinger Unit # GSA3	Meter K / Orifice Factor 2.474		
Pitot # P-8	Pitot Cp 0.84		
Pitot Leak Check: Initial OK	Final		
DGM Leak Rate Before: 0.0	CFM @ 15 in. Hg		
DGM Leak Rate After: 0.0	CFM @ 7 in. Hg		
Static Pressure (± in. H2O) -0.27			

First traverse point all the way In Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4	In
L / W /	L 6	Out ✓

Filter Number(s)	
Front-half Number(s)	
Back-half Number(s)	

IGS Bag # 6		IGS Analyzer # Gas Mi	
%CO2 0.0		%O2 20.9	
Condensate (ml/g) 11.7		Silica Gel (g) 14.2	
Total Vlc (ml) 25.9		Total Acetone Wash (ml) —	
Total 0.1 HNO3 Rinse (ml)			
Start Time (24 Hour) 6:45		Stop Time (24 Hour) 7:58	

Traverse Point Number	Stop Watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
	60/24				000.200						
A 1	2:30	165	0.95	2.22	002.598	75	250	261	56	5.0	
2	5:00	145	0.99	2.38	005.000	74	252	260	51	5.9	
3	7:30	141	0.85	2.06	007.251	74	252	257	56	5.0	
4	10:00	141	0.74	1.80	009.399	75	253	253	56	4.0	
5	12:30	132	1.05	2.59	011.953	75	252	250	58	6.1	
6	15:00	129	0.82	2.04	014.182	75	253	252	59	5.0	
B 1	17:30	136	0.86	2.10	016.459	75	254	254	60	5.0	
2	20:00	145	0.81	1.96	018.711	75	280	257	57	4.9	
3	22:30	149	0.71	1.71	020.690	76	259	263	55	4.1	
4	25:00	154	0.89	2.13	023.099	76	263	262	57	5.0	
5	27:30	156	0.67	1.60	025.089	77	263	261	57	4.0	
6	30:00	159	0.70	1.67	027.205	77	263	265	57	4.0	
C 1	32:30	162	0.82	1.89	029.380	78	251	252	58	4.8	
2	35	167	0.73	1.67	031.500	78	250	259	60	4.1	
3	37:30	166	0.77	1.64	033.53	78	250	258	57	4.1	
4	40	168	0.89	2.04	035.750	79	251	263	55	5.0	
5	42:30	175	0.90	2.11	038.007	80	249	260	55	5.1	
6	45	153	0.82	2.00	040.313	81	248	255	55	5.0	
D 1	47:30	142	0.87	2.16	042.629	81	250	252	59	4.9	
2	50	153	0.86	2.11	045.003	82	249	259	55	5.0	
3	52:30	153	0.85	2.08	047.305	82	256	260	57	5.0	
4	55	156	0.92	2.25	049.712	83	265	263	58	5.5	
5	57:30	154	0.95	2.33	052.059	83	260	258	58	5.0	
6	60	156	0.64	1.56	054.068	83	252	250	57	5.0	
Averages / Totals		155.88	0.83	2.00	53.87	78.00					

APPENDIX B

PROCESS OPERATING DATA

Subject: Structural - Pb stack test production
Date: Mon, 16 May 2005 16:35:42 -0500
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: Structural - Pb stack test production
Thread-Index: AcVaXzXbzE4PAXkORH+1mi9fYiyu3w==
From: <barry.smith@stld.com>
To: <gsa1@myvine.com>,
<guenther@mail.icongrp.com>
Cc: <bill.bougher@stld-cci.com>
X-Alligate-In: IGNORED - WhiteListed From: (barry.smith@stld.com)
X-Alligate-QueueFile: 038609241.dta
X-Alligate-EnvID: BE59AED6547E82D2.84FA96914CCE39AD@NOCMAILSVC108.ALLTHESITES.ORG
X-Alligate-EnvIP: 63.144.89.198
X-Alligate-RCPT: gsal @myvine.com
X-Alligate-MBX: gsal@myvine.com
X-Alligate-EnvFrom: barry.smith@stld.com
X-Alligate-CountryFrom: United States (US)

Fred,
Here are the production results represented in tonslhour production

	Tonslhr
Run #1	157
Run #2	164
Run# 3	159
Average	160

Barry

APPENDIX C

LABORATORY ANALYSIS DATA

LEAD ANALYSIS

TEST REPORT
Page 1 of 2
5/10/05

DATA CHEM LABORATORIES, INC.

Submitted To: Michelle LaLiberte
SAMI
7314 Egypt Rd.
Medina, **OH** 44256

Reference Data:	**Lead**
Client **Sample No.:**	SDI-R1 through Blank
P.O. No.:	05-T-314
Sample Location:	G/SA 05-T-314
sample Type:	Filter/Impinger
Method Reference:	Method 12
DCL Set ID **No.:**	*05-S-2267*
DCL Sample ID No.:	05-13386 **through** 05-13389
Sample Receipt Date:	4/22/2005
Preparation Date:	5/5-10/2005
Analysis Date:	5/10/2005

The **samples were prepared and analyzed in** accordance with **EPA method 12** using **a** Jarrell **Ash Trace** (ICP) **purged spectrometec. Sample condition** was **acceptable** upon receipt **except where** noted.

The results **are** provided in the **enclosed data table. Results** relate only **to** the **items** *tested* and are **not blank corrected unless indicated** *in* the data **table.**

This report shall **not** be reproduced except in full, **without** the written **approval of the laboratory.**

Chris Gibson
Analyst

Reviewer

CINCINNATI OFFICE
4388 WENOME-MILFORD ROAD
CINCINNATI, OHIO 45242-3708
513 733-5336, FAX 513 7355347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 200-8071, FAX 415 893-9469

TEST REPORT
Page 2 of 2
05-S-2267

Results
Lead

Client #	DCL #	Container Volume (mL)	µg/sample
SDI-R1	05-13386	350.	160.
SDI-R2	05-13387	405.	93.
SDI-R3	05-13388	350.	38.
Blank	05-13389	325.	ND
	Prep Blank		ND
% Recovery	LCS 1		134.
RPL			10.

ND - not detected at or above the reporting limit (RPL).
LCS - laboratory control sample.

Chris Gibson
Analyst

Reviewer

APPENDIX D

REAGENT CERTIFICATIONS AND MATERIAL SAFETY DATA

D.I. WATER

H_2O F.W.18.0

Specifications

Ultraviolet Absorbance of	
Largest Eluted peak (*)	0.001
Residue after Evaporation	1ppm

Certificate of Actual Lot Analysis Available Upon Request

LOT NO. 981909

Date Rec'd / / CAS 7732-18-5

This special product is packaged under conditions of extreme cleanliness. Because both chemical and bacteriological contamination can occur through normal handling and use, it is recommended that the user observe extreme care in all opening, transfer, and closing operations

* Determined using a Waters Associates Model ALC 204 LC; Model 440 UV-VIS detector at 254 nm, 0.02 aufs, 25 cm x 4.6 mm I.d. Zorbax ODS column; mobile phase, linear gradient from 100% water to 100% acetonitrile at a rate of 5% per minute; flow rate, 2.0 ml per minute.

FILTERED THROUGH A 0.1 MICRON FILTER

Fair Lawn, New Jersey 07410
Made in U.S.A. (201)796-7100

For laboratory and manufacturing use only, not for drug, food, or household use.

4 L

W5^{SK}-4

SaleCote®

FL-05-0588

DO NOT TRANSFER TO AN UNMARKED CONTAINER

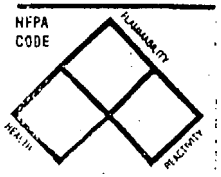
Water

HPLC GRADE

Fisher *ChemAlert®* Guide G

SAFETY CODE

NFPA CODE



NO NFPA LISTING

FisherChemicals Fisher Scientific G Storage Code Gray

H_2O F.W.18.0

Specifications

Ultraviolet Absorbance of	
Largest Eluted peak (*)	0.001
Residue after Evaporation	1ppm

Certificate of Actual Lot Analysis Available Upon Request

LOT NO. 994256

Date Rec'd / / CAS 7732-18-5

This special product is packaged under conditions of extreme cleanliness. Because both chemical and bacteriological contamination can occur through normal handling and use, it is recommended that the user observe extreme care in all opening, transfer, and closing operations

* Determined using a Waters Associates Model ALC 204 LC; Model 440 UV-VIS detector at 254 nm, 0.02 aufs, 25 cm x 4.6 mm I.d. Zorbax ODS column; mobile phase, linear gradient from 100% water to 100% acetonitrile at a rate of 5% per minute; flow rate, 2.0 ml per minute.

FILTERED THROUGH A 0.1 MICRON FILTER

Fair Lawn, New Jersey 07410
Made in U.S.A. (201)796-7100

For laboratory and manufacturing use only, not for drug, food, or household use.

4 L

W5^{SK}-4

SaleCote®

FL-05-0588

DO NOT TRANSFER TO AN UNMARKED CONTAINER

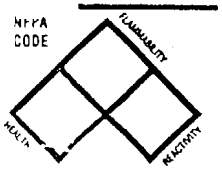
Water

HPLC GRADE

Fisher *ChemAlert®* Guide G

SAFETY CODE

NFPA CODE



NO NFPA LISTING

FisherChemicals Fisher Scientific G Storage Code Gray

NITRIC ACID

**** MATERIAL SAFETY DATA SHEET ****

Nitric Acid
16550

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Nitric Acid
Catalog Numbers:
S71972, S71972MF, S75623-2, S75623-3, S76523, A198C-212, A198C4X-212, A200-212, A200-500, A200-612GAL, A200C-212, A200C4X-212, A200C4X2001, A200C4X2122, A200C4X212L, A200J500, A200S-212, A200S-500, A200S4X-212, A200S4X212L, A200SI-212, A206C-212, A206C4X-212, A467-1, A467-2, A467-250, A467-500, A483-212, A509-212, A509-500, A509SK-212, S719721, S719721MF, S71972SC
Synonyms:
Azotic Acid; Engravers Nitrate; Hydrogen Nitrate.
Company Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7697-37-2	Nitric acid	69-71	231-714-2
7732-18-5	Water	29-31	231-791-2

Hazard Symbols: O C
Risk Phrases: 35 8

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear to yellow liquid.
Danger! Strong oxidizer. Contact with other material may cause a fire. Corrosive. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. Check internal container upon receipt. Bottles should be vented periodically to relieve pressure.
Target Organs: Eyes, skin, mucous membranes.

Potential Health Effects

Eye:
Causes severe eye burns. May cause irreversible eye injury. May cause chemical conjunctivitis and corneal damage.

Skin:
Causes skin burns. May cause deep, penetrating ulcers of the skin. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.

Ingestion:
May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May cause systemic effects.

Inhalation:
Effects may be delayed. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause acute pulmonary edema, asphyxia, chemical pneumonitis, and upper airway obstruction caused by edema.

Chronic:
Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion of teeth. Effects may be delayed.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).

Skin:
Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.

Ingestion:
Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts.

Extinguishing Media:
Substance is noncombustible; use agent most appropriate to extinguish surrounding fire. Contact professional fire-fighters immediately.

Autoignition Temperature: Not available.
Flash Point: Not available.
Explosion Limits, lower: Not available.
Explosion Limits, upper: Not available.
NFPA Rating: (estimated) Health: 4; Flammability: 0; Instability: 0; Specia

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Neutralize spill with sodium bicarbonate. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not get on skin or in eyes. Avoid ingestion and inhalation. Discard contaminated shoes.

Storage:
Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Bottles should be vented periodically in order to overcome pressure buildup.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Nitric acid	2 ppm; 4 ppm STEL	2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH	2 ppm TWA; 5 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs:
Nitric acid:
2 ppm TWA; 5 mg/m3 TWA
Water:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin:

Clothing: Wear appropriate gloves to prevent skin exposure.

Wear a chemical apron. Wear appropriate clothing to prevent skin exposure.

Respirators: Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

hysical State:	Liquid
olor:	clear to yellow
dor:	strong odor - acrid odor
H:	1.0
apor Pressure:	6.8 mm Hg
apor Density:	Not available.
vaporation Rate:	Not available.
iscosity:	Not available.
oiling Point:	186.8 deg F
reezing/Melting Point:	-43.6 deg F
ecomposition Temperature:	Not available.
olubility in water:	Soluble in water.
pecific Gravity/Density:	1.50
olecular Formula:	HNO3
olecular Weight:	63.0119

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable. Decomposes when in contact with air, light, or organic matter.
Conditions to Avoid:
High temperatures, incompatible materials, ignition sources, moisture, combustible materials, reducing agents.
Incompatibilities with Other Materials:
Reducing agents, combustible materials, strong bases, alcohols, aldehydes, cyanides, metals, Incompatible with many substances..
Hazardous Decomposition Products:
Nitrogen oxides.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7697-37-2: QU5775000 QU5900000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7697-37-2: Inhalation, rat: LC50 = 67 ppm(NO2)/4H.
CAS# 7732-18-5.
Carcinogenicity:
Nitric acid -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Water -
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No information found.
Teratogenicity:
No information found.
Reproductive Effects:
No information found.
Neurotoxicity:
No information found.
Mutagenicity:
No information found.
Other Studies:
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Other
For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT

Shipping Name: NITRIC ACID
Hazard Class: 8
UN Number: UN2031
Packing Group: II
Canadian TDG
Shipping Name: NITRIC ACID
Hazard Class: 8(9.2)
UN Number: UN2031

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 7697-37-2: 1000 lb TPQ; 1000 lb EPCRA RQ
SARA Codes
CAS # 7697-37-2: acute, chronic, flammable.
Section 313
This material contains Nitric acid (CAS# 7697-37-2, 69.71%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7697-37-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Nitric acid can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
Water is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: O C
Risk Phrases:
R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire.
Safety Phrases:
S23B Do not breathe fumes.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
WGK (Water Danger/Protection)
CAS# 7697-37-2: 1
CAS# 7732-18-5: No information available.
United Kingdom Occupational Exposure Limits
CAS# 7697-37-2: OES-United Kingdom, TWA 2 ppm TWA; 5.2 mg/m3 TWA
CAS# 7697-37-2: OES-United Kingdom, STEL 4 ppm STEL; 10 mg/m3 STEL
CAS# 7697-37-2: OES-United Kingdom, STEL 4 ppm STEL; 10 mg/m3 STEL

United Kingdom Maximum Exposure Limits

Canada
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.
This product has a WHMIS classification of C, D1A, E.
CAS# 7697-37-2 is listed on Canada's Ingredient Disclosure List.
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.
Exposure Limits
CAS# 7697-37-2: OEL-ARAB Republic of Egypt:TWA 2 ppm (5 mg/m3)
OEL-AUSTRALIA:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3)
OEL-BELGIUM:TWA 2 ppm (5.2 mg/m3);STEL 4 ppm (10 mg/m3)

OEL-CZECHOSLOVAKIA:TWA 2.5 mg/m3;STEL 5 mg/m3
OEL-DENMARK:TWA 2 ppm (5 mg/m3)
OEL-FINLAND:TWA 2 ppm (5 mg/m3);STEL 5 ppm (13 mg/m3);Skin
OEL-FRANCE:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3)
OEL-GERMANY:TWA 10 ppm (25 mg/m3)
OEL-HUNGARY:STEL 5 mg/m3
OEL-JAPAN:TWA 2 ppm (5.2 mg/m3)
OEL-THE PHILIPPINES:TWA 2 ppm (5 mg/m3)
OEL-POLAND:TWA 10 mg/m3
OEL-RUSSIA:TWA 2 ppm;STEL 2 mg/m3;Skin
OEL-SWEDEN:TWA 2 ppm (5 mg/m3);STEL 5 ppm (13 mg/m3)
OEL-SWITZERLAND:TWA 2 ppm (5 mg/m3);STEL 4 ppm (1 mg/m3)
OEL-THAILAND:TWA 2 ppm (5 mg/m3)
OEL-TURKEY:TWA 2 ppm (5 mg/m3)
OEL-UNITED KINGDOM:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3)
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/30/1998 Revision #9 Date: 12/06/2001

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if the company has been advised of the possibility of such damages.

APPENDIX E

CALIBRATION AND CERTIFICATION DATA

LEAD INSTRUMENTATION

Pretest Calibrations

APEX INSTRUMENTS METHOD 5 (M5CO-SET) ORIFICE SET CALIBRATION

Calibration Information	
Orifice Series	40-73
Serial Number	OM
Meter Gamma	0.99450

Calibration Conditions			
Date	Time	NOV. 24-03	2:24
Barometric Pressure		747.0	mm Hg
Theoretical Critical Vacuum[1]		352.8	mm Hg
Calibration Technician		LP	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K_1	0.386	K/mm Hg

[1]The Critical Orifice Coefficient, K', in English units, $(ft^3*R^{\circ})/(in.Hg*min)$.
[2]The Critical Orifice Coefficient, K', in Metric units, $(m^3*K^{\circ})/(mmHg*min)$.

			Calibration Data									Results		
					Reference Meter							Critical Orifice		
Run #	Orifice Number	Run Time Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Volume Total	Outlet Temp Initial	Outlet Temp Final	Amb Temp Initial	Amb Temp Final	Actual Vacuum	Coefficient Metric Units	Coefficient English Units	% Variation from Avg
		(Θ)	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	($t_{amb,i}$)	($t_{amb,f}$)		K'	K'	(<0.5%)
		min	mm H_2O	m^3	m^3	m^3	°C	°C	°C	°C	mm Hg	see above[1]	see above[2]	%
1	OM 40	10	8.80	330.8731	330.9610	0.0879	22	22	22	22	584	1.963E-04	0.2383	0.00
2	OM 40	10	8.80	330.8810	331.0488	0.0078	22	22	22	22	584	1.961E-04	0.2380	-0.11
3	OM 40	10	8.80	331.0488	331.1368	0.0880	22	22	22	22	3584	1.966E-04	0.2388	011
											Average	1.963E-04	0.2383	
1	OM 48	10	16.00	331.1388	331.2664	0.1298	22	22	22	22	533	2.898E-04	0.3487	-0.26
2	OM 48	10	16.00	331 2684	331.3965	0.1301	22	22	22	22	533	2.909E-04	0.3501	0.13
3	OM 48	10	16.00	331.3965	331.5268	0.1301	22	22	22	22	533	2.909E-04	0.3501	0.13
											Average	2.905E-04	0.3496	
1	OM 55	10	30.00	331.5268	331.6952	0.1686	22	22	22	22	495	3.775E-04	0.4543	-0.08
2	OM55	10	30.00	331.6952	331.8838	0.1686	22	22	22	22	495	3.775E-M	0.4543	-0.08
3	OM 55	10	30.00	331.8838	332.0328	0.1690	22	22	22	22	495	3.784E-04	0.4553	0.16
											Average	3.778E-04	0.4546	
1	OM 63	11	48.00	332.0328	332.2691	0.2363	22	22	22	22	445	4.817E-04	0.5797	-0.09
2	OM 63	10	46.00	332.2691	332.4842	0.2151	22	22	22	22	445	4.823E-04	0.5805	0.05
3	OM 63	11	48.00	332.4842	332.7208	0.2366	22	22	22	22	445	4.823E-04	0.5804	0.04
											Average	4.821E-04	0.5802	
1	OM 73	10	84.00	332.7208	333.0080	0.2872	22	22	22	22	381	6.464E-04	0.7779	-0.03
2	OM 73	10	84.00	333.0080	333.2958	0.2870	22	23	22	23	381	6.472E-04	0.7789	0.09
3	OM73	10	84.00	333.2858	333.5834	0.2876	23	23	23	23	381	6.462E-04	0.7777	-0.08
											Average	6.466E-04	0.7782	

I certify that the above Orifice Set was calibrated in accordance with USEPA Methods, CFR 40 Part 60, Appendix A. Method 5, Item 7.2.2

Signature L. PERKINS Date NOV. 24 2003

S.A.T., *LLC* Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	G/SA	Date Calibrated	02-04-05
Location	Crown Point, IN	Control Unit ID No.	609198
Project No.	Misc.	Critical Orifice ID No.	OM40
Technician	B. Peyton	Critical Orifice K' Factor	0.2363

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	947.182	949.184	951.185
Initial Reading	CF	945.700	947.700	949.700
Difference (Vm)	CF	1.482	1.484	1.485
Average Meter Temperature				
Initial	°F	64.0	65.0	66.0
Final	°F	65.0	66.0	67.0
Average (Tm)	°F	64.5	65.5	66.5
Run Time (Ø)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H2O	0.24	0.24	0.24
;;BarometricPressure (Pbar)	In. Hg	29.38	29.38	29.38
Ambient Temperature (Tamb)	°F	59.0	59.0	59.0
Pump Vacuum	In. Hg	14.7	14.7	14.7

CALCULATIONS

				1	2	3
Vm, std =	17.65 × Vm ×	$\frac{Pbar + (dH/13.6)}{(Tm + 460)}$	=	1.466	1.465	1.463
Vcr, std =	K' Factor ×	$\frac{Pb \times O}{(Tamb + 460)^{1/2}}$	=	1.524	1.524	1.524
Y =	Vcr, std / Vm, std	Where: 0.98Y < Y, avg < 1.02Y	=	1.039	1.040	1.041
			Trial 1 -	1.02	1.04	1.06
			Trial 2 -	1.02	1.04	1.06
			Trial 3 -	1.02	1.04	1.06
dH@ =	0.0319 × dH ×	$\frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$	=	1.445	1.442	1.439

RESULTS

;~AverageDGM Y Factor	Unitless	1.040
Average DGM dH@	In. H20	1.442
Average DGM K Factor	Unitless	2.080

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	G/SA	Date Calibrated	02-04-05
Location	Crown Point, IN	Control Unit ID No.	609198
Project No.	Misc.	Critical Orifice ID No.	OM48
Technician	B. Peyton	Critical Orifice K' Factor	0.3496

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	959.782	958.586	981.188
Initial Reading	CF	957.500	956.300	978.900
Difference (Vm)	CF	2.282	2.286	2.288
Average Meter Temperature				
Initial	°F	68.0	69.0	69.0
Final	°F	69.0	69.0	69.0
Average (Tm)	°F	68.5	69.0	69.0
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.57	0.57	0.57
Barometric Pressure (Pbar)	In. Hg	29.38	29.38	29.38
Ambient Temperature (Tamb)	°F	60.0	60.0	60.0
Pump Vacuum	In. Hg	14.7	14.7	14.7

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

	1	2	3
=	2.242	2.244	2.246

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

	1	2	3
=	2.252	2.252	2.252

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: 0.98Y < Y, avg < 1.02Y

	1	2	3
=	1.004	1.004	1.003
Trial 1 -	0.98	1.00	1.02
Trial 2 -	0.98	1.00	1.02
Trial 3 -	0.98	1.00	1.02

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

	1	2	3
=	1.548	1.546	1.546

RESULTS

Average DGM Y Factor	Unitless	1.004
Average DGM dH@	In. H20	1.547
Average DGM K Factor	Unitless	2.392

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PRETEST DRY GAS METER CALIBRATION

Client	G/SA	Date Calibrated	02-04-05
Location	Crown Point. IN	Control Unit ID No.	609198
Project No.	Misc.	Critical Orifice ID No.	OM55
Technician	B. Peyton	Critical Orifice K' Factor	0.4546

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	8.662	27.158	30.362
Initial Reading	CF	5.700	24.200	27.400
Difference (Vm)	CF	2.962	2.958	2.962
Average Meter Temperature				
Initial	°F	68.0	69.0	69.0
Final	°F	69.0	69.0	69.0
Average (Tm)	°F	68.5	69.0	69.0
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.95	0.95	0.95
Barometric Pressure (Pbar)	In. Hg	29.38	29.38	29.38
Ambient Temperature (Tamb)	°F	62.0	62.0	62.0
Pump Vacuum	In. Hg	14.7	14.7	14.7

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

	1	2	3
Vm, std =	2.913	2.907	2.910

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)1/2}$$

	1	2	3
Vcr, std =	2.923	2.923	2.923

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

	1	2	3
Y =	1.003	1.006	1.004
Trial 1 -	0.98	1.00	1.02
Trial 2 -	0.99	1.00	1.03
Trial 3 -	0.98	1.00	1.02

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

	1	2	3
dH@ =	1.548	1.546	1.546

RESULTS

Average DGM Y Factor	Unitless	1.004
Average DGM dH@	In. H20	1.547
Average DGM K Factor	Unitless	2.393

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PRETEST DRY GAS METER CALIBRATION

Client	G/SA	Date Calibrated	02-04-05
Location	Crown Point, IN	Control Unit ID No.	609198
Project No.	Misc.	Critical Orifice ID No.	OM63
Technician	B. Peyton	Critical Orifice K' Factor	0.5802

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	34.377	38.380	42.482
Initial Reading	CF	30.600	34.600	38.700
Difference (Vm)	CF	3.777	3.780	3.782
Average Meter Temperature				
Initial	°F	69.0	70.0	70.0
Final	°F	70.0	70.0	70.0
Average (Tm)	°F	69.5	70.0	70.0
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In H20	1.60	1.60	1.60
Barometric Pressure (Pbar)	In. Hg	29.38	29.38	29.38
Ambient Temperature (Tamb)	°F	61.0	61.0	61.0
Pump Vacuum	In. Hg	14.7	14.7	14.7

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)} =$$

3.714	3.713	3.715

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)^{1/2}} =$$

3.734	3.734	3.734

$Y =$ Vcr, std / Vm, std — Where: 0.98Y < Y, avg < 1.02Y

	1.005	1.006	1.005
Trial 1 -	0.99	1.01	1.03
Trial 2 -	0.99	1.01	1.03
Trial 3 -	0.98	1.01	1.03

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2} =$$

1.600	1.598	1.598

RESULTS

Average DGM Y Factor	Unitless	1.005
Average DGM dH@	In. H20	1.599
Average DGM K Factor	Unitless	2.555

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dyanamics, Inc.	Control Unit ID No.	609198
Location	Columbia City, IN	Umbilical ID No.	EU-9
Project No.	05-T-314	Sample Probe ID No.	P8-I
Date	11-26-04	Filter Oven ID No.	1011
Auditor	B. Peyton	Filter Holder OTS ID No	FH-1
Checked By	T. Shackelford	Impinger OTS ID No.	1-4

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
69	31	66	67	31	69	32

* Ice Bath

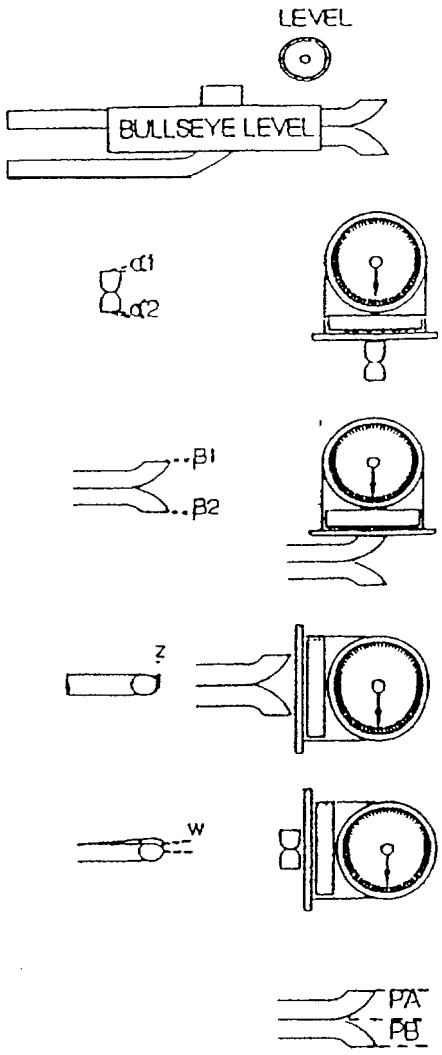
Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	-1	-1	-1	0	0
100 °F	100	96	96	97	97
200 °F	199	199	199	200	
300 °F	298	298	298	299	
400 °F	396	395	395	396	
500 °F					
600 °F	496				
700 °F	698				
800 °F	800				
900 °F	898				
1000 °F	999				
1100 °F	1099				
1200 °F	1197				
1300 °F	1298				
1400 °F	1395				
1500 °F	1498				
1600 °F	1599				
1700 °F	1698				
1800 °F	1798				
1900 °F	1900				
2000 °F	1999				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Pretest

tube Assembly Level?	
Posts Damaged?	
$-10° < \alpha 1 < +10°$	0°
$-10° < \alpha 2 < +10°$	0°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	0°
$\gamma =$	0°
$\theta =$	1°
A=	0.960 in.
$Z = A \sin \gamma \leq \frac{1}{8}$"	0"
$W = A \sin \theta \leq \frac{1}{32}$"	0.017"
PA=	0.848"
PB=	0.845"
Tube Dia. (D_T)=	0.374"
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number P81 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84. See 40 CFR 60, Vol. 42, No. 160, EPA Method 2

Signature: [signature]

Date: 11-26-04

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Remarks
From Nozzle Opening, >0.75"	(Yes) / No	
Gas Line & Stack T/C, >0.75"	(Yes) / No	
"Z" Clear, Side to T/C, 2.0"	(Yes) / No	
"W" Clear, Rear to T/C, 2.0"	(Yes) / No	
"Y" Clear to Union, 3.0	(Yes) / No	

ALTEK

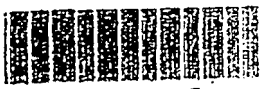
CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: Altek Industries Corp. Recommend Recalibration: Annually

Model Number K2100f Factory Calibration Date 9 May 00

Calibration Due _____ Calibration Technician _____



Serial N 10184805 In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The above signature for Altek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 U.S.A. Declares that the equipment specified complies with standards EN50081-1 and EN50082-1. The product complies with the essential requirements of the EMC Directive 89/336/EEC

Field Calibrations

S.A.T. , LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

METER ORIFICE CHECK, Yc

Client	SDI - CCI	Date	4/19/05
Project No.	05-T-314	Control Unit ID No.	609198
Facility	EAF Baghouse Outlet	Checked By	Andrew Kendall
Project Site	Columbia City, IN	Observed By	

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	898.413		
Initial Reading	CF	891.000		
Difference (Vm)	CF	7.413		
Average Meter Temperature				
Initial	°F	62		
Final	°F	64		
Average (Tm)	°F	63		
Run Time	Minutes	10	10	10
Barometric Pressure (Pbar)	In. Hg	29.06		
DGM Y Factor	Dimensionless	1.005		
DGM Delta H@	In. H20	1.937		

CALCULATIONS

Trial 1

Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 10 / 7.413 [0.0319 (63 +460) / 29.06]½

Yc = 1.026

Where: 0.97Y < Yc < 1.03Y = 0.975 < 1.026 < 1.035

Trial 2

Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 10 / _____ [0.0319 (_____ +460) / _____]½

Yc =

Where: 0.97Y < Yc < 1.03Y = _____ < _____ < _____

Trial 3

Yc = 10 / Vm [0.0319 (Tm + 460) / Pbar]½

Yc = 10 / _____ [0.0319 (_____ +460) / _____]½

Yc =

Where: 0.97Y < Yc < 1.03Y = _____ < _____ < _____

Comments: See Section 4.4.1, Method 5, Appendix A, 40 CFR 60

Post-Test Calibrations

Post-Test Dry Gas Meter Calibration

Client:	Steel Dynamics, Inc.	Operator:	A. Perdue	Calibrated By:	B. Peyton
Project #:	G/SA 05-T-314	DGM #:	609198	DGM C Factor, Y	1.005
Date(s) Used:	04119-20105	Date Calibrated:	02104105	DGM Delta H@:	1.573

Trial #1

Ø, Total (Minutes):	60.0	DGM Sample Volume, Total (Ft³):	50.008
DGM Temperature, Average (°F):	70.7	Pbar (" Hg)	29.06
Delta H, Average (" H2O):	1.768	SGMW, Dry (Lb/Lb-Mole):	28.84

DGM Yqa* = 0.971

Trial #2

Ø, Total (Minutes):	60.0	DGM Sample Volume, Total (Ft³):	44.499
DGM Temperature, Average (°F):	78.0	Pbar (" Hg):	29.06
Delta H, Average (" H2O):	1.780	SGMW, Dry (Lb/Lb-Mole):	28.84

DGM Yqa* = 1.104

Trial #3

Ø, Total (Minutes):	60.0	DGM Sample Volume, Total (Ft³):	53.868
DGM Temperature, Average (°F):	78.0	Pbar (" Hg):	28.94
Delta H, Average (" H2O):	2.004	SGMW, Dry (Lb/Lb-Mole):	28.84

DGM Yqa* = 0.968

DGM Yqa, Average* = 1.015

where:	**0.95Y**	**<**	**Yqa, Avg.**	**<**	**1.05Y**
therefore:	**0.955**	**<**	**1.015**	**<**	**1.055**

*See EMTIC GD-026, Alternative Method 5 Post-Test Calibration

ALTERNATIVE METHOD 5 POST-TEST CALIBRATION

INTRODUCTION AND BACKGROUND

EPA Method 5 requires the calibration of the metering system after each field use. Because the post-test calibration requires the use of a spirometer or wet test meter, the calibration is often conducted in the laboratory. However, a field calibration procedure is highly desirable for two reasons: (1) it eliminates questions about the possibility of the damage to the metering system occurring during transport and (2) it eliminates travel costs for a retest if the metering system fails the post-test calibration.

The alternative post-test calibration procedure described below is based on the principles of the optional pretest orifice meter coefficient check in Section 4.4.1 of Method 5. Since the orifice meter coefficient check will not detect leakages between the inlet of the metering system and the dry gas meter, the alternative procedure includes two additional steps: (1) a leak check from either the inlet of the sampling train or the inlet of the metering system and (2) a leak check of that portion of the sampling train from the pump to the orifice meter.

PROCEDURE

The alternative to the post-test calibration in Section 5.3.2 of Method 5 is as follows:

After each test run, do the following:

1. Ensure that the metering system has passed the post-test leak-check. If not, conduct a leak-check of the metering system from its inlet.

2. Conduct the leak-check of that portion of the train from the pump to the orifice meter as described in Section 5.6 of Method 5.

3. Calculate Y_{qa} for each test run using the following equation:

$$Y_{qa} = \frac{\theta}{V_m}\sqrt{\frac{0.0319 T_m}{\Delta H_@ (P_b + \Delta \frac{H_{avg}}{13.6})}\frac{29}{M_d}}\ (\sqrt{\Delta H})_{avg}$$

where:

Y_{qa} = dry gas meter calibration check value, dimensionless.
θ = total run time, min.
V_m = total sample volume ineasured by **dry** gas neter, dcf.
T_m = absolute average dry gas meter temp-, oR-
P_b = barometric pressure, in. Hg,
0.0319 = $(29.92/528)(0.75)^2$ (in. Hg/oR) cfm^2.
Δh_{avg} = average orifice meter differential, in. H_2O.
$\Delta H@$ = orifice meter calibration coefficient, in. H_2O.
M_d = dry molecular weight of stack gas, lb/lb-mole.
29 = dry molecular weight of air, lb/lb-mole.
13.6 = specific gravity of mercury-

After each test run series, do the following:

4. Average the three or more Y_{qa}'s obtained from ***the*** test ***run*** series and **compare** this average Y_{qa} with the **dry gas** meter calibration factor, Y. The average Y_{qa} must be **within** 5 percent of Y.

5. If the average Y_{qa} does not meet the ±5 percent criterion, recalibrate the meter over the full range of orifice settings, as detailed in Section 5.3.1 of Method 5. Then follow the procedure in Section 5.3.3 of **Method** 5.

REFERENCE

1. Roger T. Shigehara, P-G. Royals, **and** E.W. Steward, "Alternative Method 5 Post-Test Calibration", Entropy, Inc, contained in the EMTIC TSAR Library.

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

POST TEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dyanamics, Inc.	Control Unit ID No.	609198
Location	Columbia City, IN	Umbilical ID No.	EU-9
Project No.	05-T-314	Sample Probe ID No.	P8-1
Date	05-12-05	Filter Oven ID No.	1011
Auditor	B. Peyton	Filter Holder OTS ID No.	FH-1
Checked By	T. Shackelford	Impinger OTS ID No.	1-4

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings: Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
69	31	66	67	31	69	32

* Ice Bath

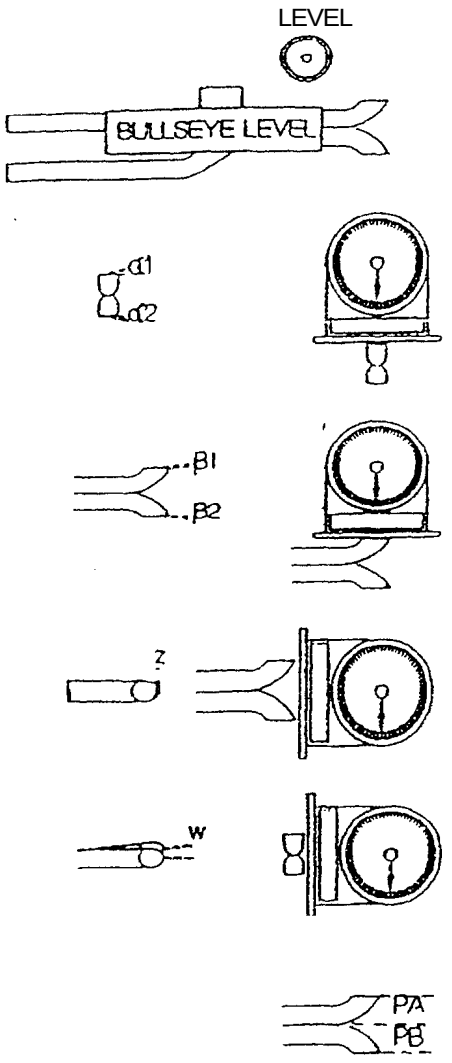
Thermocouple Simulator Settings	Control Unit Selector Switch Settings: Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	-1	-1	-1	0	0
100 °F	100	96	96	97	97
200 °F	199	199	199	200	
300 °F	298	298	298	299	
400 °F	396	395	395	396	
500 °F	496				
600 °F	598				
700 °F	698				
800 °F	800				
900 °F	898				
1000 °F	999				
1100 °F	1099				
1200 °F	1197				
1300 °F	1298				
1400 °F	1395				
1500 °F	1498				
1600 °F	1599				
1700 °F	1698				
1800 °F	1798				
1900 °F	1900				
2000 °F	1999				
2100 °F	N.A.				

Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Post Test

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0°
$-10° < \alpha 2 < +10°$	0°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	0°
$\gamma =$	0°
$\theta =$	0°
$A =$	0.900"
$Z = A \sin \gamma \leq \frac{1}{8}"$	0"
$W = A \sin \theta \leq \frac{1}{32}"$	0.017"
$PA =$	0.548"
$PB =$	0.545"
Tube Dia. $(D_T) =$	0.377"
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

I certify that pitot tube/probe number P81 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calbration factor *of* 0.84. See 40 CFR 60, Vol. 42, No. 160, EPA Method 2

Signature: [signature]

Date: 05-12-05

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Remarks
From Nozzle Opening, >0.75"	Yes / No	
Gas *Line* & Stack T/C, >0.75"	Yes / No	
"Z" Clear, Side *Ro* T/C, 2.0"	Yes / No	
"W" Clear, Rear to T/C, 2.0'	Yes / No	
"Y" Clear to Union, 3.0"	Yes / No	

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: Altek Industries Corp. Recommend Recalibration: Annually

Model Number 622005 Factory Calibration Date 9 May 00

Calibration Due _____ Calibration Technician _____

Serial N 10184806 In Service Date 5-10-00

CE DECLARATION OF CONFORMITY CE

The above signature for Altek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 U.S.A. Declares that the equipment specified complies with standards EN50081-1 and EN50082-1. The product complies with the essential requirements of the EMC Directive 89/336/EEC

S15000-005 REV.A

APPENDIX F

SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS

SAMPLE CALCULATIONS

USEPA Method 12

Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 51202 (PM/CPM).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round-off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: STEEL DYNAMICS, INC. Project #: G/SA 05-T-314
Location: Electric Arc Furnace - BO
Run #: 1

Total Sampling Time, min (O)	60.0
Average Process Rate, TPH (Rp)	N.A.
Stack Area, ft² (A)	314.2
Barometric Pressure, in. Hg (Pbar)	29.06
Static Pressure, in. H20 (Ps)	-0.27
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	1.005
Nozzle Area, ft² (An)	0.000309
Metered Gas Volume, ft³ (Vm)	50.008
Average Meter Temperature, °F (Tm)	70.7
Stack Gas Temperature, °F (Ts)	170.7
Meter Orifice Pressure, in. H20 (dH)	1.768
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.873
Volume of H20 Collected, ml (Vlc)	25.4
% Carbon Dioxide (%CO2)	0.0
% Oxygen (%O2)	20.9
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.1
Lead (Pb) Concentration, mg (Mn)	0.160
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA Method 12 (Pb) Sample Calculations

Location:	Electric Arc Furnace - BO	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 05-T-314

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 29.06 + (-0.27 ÷ 13.6)

Pa = 29.04

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 × Vlc

Vw, std = 0.04707 x 25.4

Vw, std = 1.196

Volume of Dry Metered Gas, Standard Conditions (DSCF):

Vm, std = (17.65 × Vm × Y × [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$Vm,\ std = \frac{(17.65 \times 50.01 \times 1.005 \times [\ 29.06 + (\ 1.768 \div 13.6\ )\ ]\}}{(\ 70.7 + 460\ )}$$

Vm, std = 48.790

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 1.196 ÷ (48.79 + 1.196)

Bws = 0.024

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 × %CO2 + 0.32 × %O2 + [0.28 × (%CO + %N2)]

Md = 0.44 × 0 + 0.32 × 20.9 + [0.28 × (0.0 + 79)]

Md = 28.84

EPA Method 12 (Pb) Sample Calculations

Location:	Electric Arc Furnace - BO	Client:	STEEL DYNAMICS. INC.
Run #:	1	Project #:	G/SA 05-T-314

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 × Bws + [Md × (1 - Bws)]

Ms = 18 × 0.02392 + [28.84 × (' - 0.024)]

Ms = 28.58

Velocity of Stack Gas (FPS):

Vs = 85.49 × Cp × sqrt dP × sqrt [(Ts + 460) ÷ (Ms × Pa)]

$$Vs = 85.49 \times 0.84 \times 0.873 \times \text{sqrt}\left[\left(\frac{170.7}{28.58} \times \frac{460}{29.04}\right)\right]$$

vs = 54.7

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A × Vs × 60

Qa = 314.16 × 54.7 × 60

Qa = 1,030,187

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 × Qa × Pa × (1 - Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 1030187 \times 29.04 \times (1 - 0.024)]}{(170.7 + 460)}$$

Qstd = 817,190

Isokinetic Sampling (%):

%I = [0.0945 × Vm, std × (Ts + 460)] ÷ [Ø × Vs × Pa × An × (1 - Bws)]

$$\%I = \frac{0.0945 \times 48.79 \times (170.7 + 460)]}{[60 \times 54.7 \times 29.0 \times 0.0003 \times (1 - 0.024)]}$$

%I = 101.2

S.A.T., *LLC* Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA Method 12 (Pb) Sample Calculations

Location:	Electric Arc Furnace - BO	Client:	STEEL DYNAMICS, INC.
Run #:	1	Project #:	G/SA 05-T-314

TPM Emissions Concentration (Gr/DSCF):

Gr/DSCF = 15.435 × Mn ÷ Vm, std

Gr/DSCF = 0.015435 × 0.1600 ÷ 48.79

Gr/DSCF = 0.00005

TPM Emissions Concentration (Lb/DSCF):

Lb/DSCF = Gr/DSCF ÷ 7000

Lb/DSCF = 0.000 ÷ 7000

Lb/DSCF = 7.23E-009

TPM Emissions Rate (Lb/Hr):

Lb/Hr = Lb/DSCF × Qstd × 60

Lb/Hr = 7.23E-009 × 817190 × 60

Lb/Hr = 0.355

TPM Emissions Concentration (lb/TPW):

Lb/TPH = Lb/Hr ÷ TPH

Lb/TPH = 7.23E-009 ÷ N.A.

Lb/TPH = ERR

NOMENCLATURE

NOMENCLATURE

acf	= actual cubic feet
acfm	= actual cubic feet per minute
A	= inside cross-sectional area of stack or duct (ft^2)
A_n	= inside cross-sectional area of sampling nozzle (ft^2)
%AM	= percent ash moisture content
Btu	= British thermal units
B_{ws}	= water vapor (moisture) in gas stream, proportion by volume
C	= mass conentration of effluent
C_a	= concentration of gaseous analyte (ppmv or %)
C_m	= average of initial and final bias check responses for upscale cal gases
C_{ma}	= actual concentration of upscale cal gases
C_o	= average of initial and final bias check responses for zero or low level cal gases
C_{oa}	= actual concentration of low level cal gases
C_p	= pitot tube coefficient (unitless)
C_s	= sample concentration
C_{s7}	= sample concentration corrected to 7% O,
C_{s12}	= sample concentration corrected to 12% CO_2
C_{s50}	= sample concentration corrected to 50% excess air
$C_{s50/rga}$	= sample concentration corrected to 50% excess air per raw gas analysis
CEM	= continuous emission monitor
$C_{(1+2)}$	= corrected TGNMO concentration for 1 trap and 2 tanks
%C	= percent carbon by weight, dry basis
%CO	= percent carbon monoxide by volume, dry basis
$\%CO_2$	= percent carbon dioxide by volume, dry basis
dcf	= dry cubic feet
dscf	= dry standard cubic feet
dscfin	= dry standard cubic feet per minute
dsm^3	= dry standard cubic meters
%EA	= percent excess air
F_d	= ratio factor of dry gas volume to heat value of combusted fuel (dscf/mmBtu)
fps	= feet per second
ft^2	= square feet
ft^3	= cubic feet
°F	= degrees Fahrenheit
G_{mfr}	= mass flow rate of stack gas (lb/hr)
gr	= grains
g	= grams
H_c	= heat of combustion, dry basis (Btu/lb)
hr	= hour
AH	= average orifice meter pressure differential (in. H_2O)
$\Delta H_@$	= orifice meter calibration factor (in. H_2O)

NOMENCLATURE, Continued

%H	= percent hydrogen by weight, dry basis
%I	= percent of isokinetic sampling
in. Hg	= inches of mercury
in. H_2O	= inches of water
lb	= pounds
lbllb-mole	= pound per pound-mole
m	= thousand
mm	= million
M_b	= mass concentration of media blank
M_c	= mass concentration of target analyte collected (mg, μg, ng or ppmC)
M_n	= mass concentration of PM collected (g)
Mg	= megagrams
Mg C	= megagram of charge
Mg P	= megagram of pour
μg	= micrograms
meq	= milliequivalents
mg	= milligrams
ml	= milliliters
MW	= molecular weight of analyte (lbllb-mole)
M_d	= molecular weight of stack gas, dry basis (lb/lb-mole)
M_s	= molecular weight of stack gas, wet basis (lb/lb-mole)
ng	= nanograms
N	= normality of barium perchlorate titrant (meq/ml)
%N	= percent nitrogen by weight, dry basis
$\%N_2$	= percent nitrogen by difference, dry basis
%O	= percent oxygen by weight, dry basis
$\%O_2$	= percent oxygen by volume, dry basis
pg	= picograms
PW	= process weight
ppmC	= parts per million concentration equivalent
ppmv	= parts per million by volume
P_l	= particulate loading per heat input in lb/mmBtu per F_d constant
$P_{l'}$	= particulate loading per heat input in lb/mmBtu per F_d calculated
P_a	= absolute stack gas pressure (in. Hg)
P_{bar}	= barometric pressure at sampling site (in. Hg)
P_s	= static stack gas pressure (in. H_2O)
AP	= stack gas velocity head (in. H_2O)
$\sqrt{\Delta P}$	= average square root of stack gas velocity head (in. H_2O)
Q_a	= volumetric stack gas flow rate at actual conditions (acfm)
Q_{std}	= volumetric stack gas flow rate corrected to dry standard conditions (dscfm)

R_{gu} = natural or propane gas usage rate (mscfh)

NOMENCLATURE, Continued

R_{ho} = stack gas density (lb/ft^3)
R_p = process rate (tph)
std = standard conditions at 29.92 in. Hg and 68°F
scf = standard cubic feet
scfh = standard cubic feet per hour
%S = percent sulfur by weight, dry basis
T_m = average dry gas meter temperature (°F)
T_s = average stack gas temperature (°F)
TC = ton of charge
TEQ = toxicity equivalent
TGNMO = total gaseous nonmethane organic
TP = ton of pour
TPH = tons per hour
TPW = ton of process weight
V_a = volume of sample aliquot titrated (ml)
V_{lc} = total volume of liquid condensed in impingers and collected in silica gel (ml)
V_m = total volume of dry metered gas (dcf)
$V_{m, std}$ = volume of dry metered gas corrected to standard conditions (scf)
V_s = stack gas velocity (fps)
V_{soln} = total volume of sample solution (ml)
V_t = average volume of titrant used for sample titration (ml)
V_{tb} = average volume of titrant used for blank titration (ml)
$V_{w, std}$ = volume of water vapor in sampled gas corrected to standard conditions (scf)
Y = dry gas meter calibration (correction) factor (unitless)
θ = total sampling time (minutes)

EQUATIONS

EQUATIONS

1) Absolute Stack Gas Pressure (in. Hg):

$$P_a = P_{bar} + (\pm P_s \div 13.6)$$

2) Volume of Water Vapor in Sampled Gas, Standard Conditions (scf):

$$V_{w,\,std} = 0.04707 \times V_{lc}$$

3) Volume of Dry Metered Gas, Standard Conditions (scf):

$$V_{m\,std} = \{17.65 \times V_m \times Y \times [P_{bar} + (\Delta H \div 13.6)]\} \div (T_m + 460)$$

4) Moisture Fraction (unitless):

$$B_{ws} = V_{w\,std} \div (V_{m,\,std} + V_{w\,std})$$

5) Molecular Weight of Stack Gas, Dry Basis (lb/lb-mole):

$$M_d = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + [0.28 \times (\%CO + \%N_2)]$$

6) Molecular Weight of Stack Gas, Wet Basis (lb/lb-mole):

$$M_s = 18 \times B_{ws} + [M_d \times (1 - B_{ws})]$$

7) Velocity of Stack Gas (fps):

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P} \times \sqrt{[(T_s + 460) \div (M_s \times P_a)]}$$

8) Volumetric Stack Gas Flow Rate, Actual Conditions (ach):

$$Q_a = A \times V_s \times 60$$

9) Volumetric Stack Gas Flow Rate, Dry Standard Conditions (dsch):

$$Q_{std} = [17.65 \times Q_a \times P_a \times (1 - B_{ws})] \div (T_s + 460)$$

10) Isokinetic Sampling (%):

$$\%I = [0.0945 \times V_{m,\,std} \times (T_s + 460)] \div [\theta \times V_s \times P_a \times A_n \times (1 - B_{ws})]$$

EQUATIONS, Continued

11) PM Concentrations:

$gr/dscf = 15.435 \times M_n \div V_{m,\,std}$

$lb/dscf = gr/dscf \div 7000$

$lb/hr = lb/dscf \times Q_{std} \times 60$

$lb/mmscf = lb/hr \div (R_{gu} \times 1E\text{-}03)$

$lb/tpw = lb/hr \div R_p$

$\mu g/Mg\ pw = lb/tpw \times 5.0E+08$

$lb/mmBtu = 20.9 \times lb/dscf \times F_d \div (20.9 - \%O_2)$

12) Flue Gas Density (lb/ft^3):

$R_{ho} = 0.0458 \times M_s \times P_a \div (T_s + 460)$

13) Gas Mass Flow Rate (lb/hr):

$G_{mfr} = R_{ho} \times acfm \times 60$

14) Excess Combustion Air Per Raw Gas Analysis (%):

$$\%EA = \frac{[\%O_2 - (0.5 \times \%CO)]}{\{0.264 \times \%N_2 - [\%O_2 - (0.5 \times \%CO)]\}} \times 100$$

15) Ash Moisture Content (%):

%AM = *(**net** loss after heating)* × 100 ÷ *(**net** loss **after drying**)*

16) Target Analyte Concentrations:

$lb/dscf = mg \times 2.205E\text{-}06 \div V_{m,\,std}$

$" = \mu g \times 2.205E\text{-}09 \div V_{m,\,std}$

$" = ng \times 2.205E\text{-}12 \div V_{m,\,std}$

$" = pg \times 2.205E\text{-}15 \div V_{m,\,std}$

EQUATIONS, Continued

" $= ppmC \times V_{soln} \times 2.205E\text{-}09 \div V_{m,\,std}$

$lb/hr = lb/dscf \times Q_{std} \times 60$

17) TGNMO Concentrations:

$lb/dscf = mg\ C/dsm^3 \times 6.243E\text{-}08$

$lb/hr = lb/dscf \times Q_{std} \times 60$

18) TGNMO Concentration Correction for 1 Trap and 2 Tanks:

$$C_{(1+2)} = \frac{[conc.\ (1) \times vol.\ sampled\ (1)] + [conc.\ (21 \times vol.\ sampled\ (2)]}{[vol.\ sampled\ (1) + vol.\ sampled\ (2)]}$$

19) Collection Vessel/CEM Gaseous Analyte Concentrations:

$$lb/dscf = ppmv \times \frac{Molecular\ Weight\ of\ Analyte,\ lb/lb\text{-}mole}{385.3\ dscf/lb\text{-}mole \times 10^6}$$

$lb/hr = lb/dscf \times Q_{std} \times 60$

20) Sample Concentration Corrections:

12% CO_2 (lb/ft^3) -

$C_{s12} = C_s \times 12 \div \%CO_2$

7% O_2 (lb/ft^3) -

$C_{s7} = C_s \times (20.9 - 7) \div (20.9 - \%O_2)$

50% excess air (lb/ft^3) -

$C_{s50} = C_s \times (100 + \%EA) \div 150$

50% excess air per raw gas analysis (lb/ft^3) -

$C_{s50/rga} = C_s \div \{1 - [(1.5 \times \%CO_2) - (0.13 \times \%N_2) - (0.75 \times \%CO)] \div 20.9)$

EQUATIONS, Continued

21) Weighted Analyte Concentrations Per Two Ducts:

$lb/dscf_{avg}$ = *(lb/dscf, duct 1 + lb/dscf, duct 2) ÷ 2*

lb/hr_{total} = *lb/hr, duct 1 + lb/hr, duct 2*

$lb/mmbtu_{avg}$ = *(lb/mmbtu, duct 1 + lb/mmbtu, duct 2) ÷ 2*

APPENDIX G

CORRESPONDENCE

TRANSMITTAL OF PROCESS INFORMATION

Subject: Structural - Pb stack test production
Date: Mon, 16 May 2005 16:35:42 -0500
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: Structural - Pb stack test production
Thread-Index: AcVaXzXbzE4PAXkORH+1mi9fYiyu3w==
From: <barry.smith@stld.com>
To: <gsa1@myvine.com>,
<guenther@mail.icongrp.com>
Cc: <bill.bougher@stld-cci.com>
X-Alligate-In: IGNORED - WhiteListed From: (barry.smith@stld.com)
X-Alligate-QueueFile: 038609241.dta
X-Alligate-EnvID: BE59AED6547E82D2.84FA96914CCE39AD@NOCMAILSVC108.ALLTHESITES.ORG
X-Alligate-EnvIP: 63.144.89.198
X-Alligate-RCPT: gsal@myvine.com
X-Alligate-MBX: gsal@myvine.com
X-Alligate-EnvFrom: barry.smith@stld.com
X-Alligate-CountryFrom: United States (US)

Fred,
Here are the production results represented in tons/hour production.

	Tons/hr
Run #1	157
Run #2	164
Run# 3	159
Average	160

Barry

TRANSMITTAL OF LABORATORY ANALYSIS DATA

TEST REPORT
Page 1 of 2
5/10/05

DATA CHEM LABORATORIES, INC.

Submitted To: **Michelle** LaLiberte
SAMI
7314 Egypt Rd.
Medina, **OH** 44256

Reference Data:	**Lead**
Client Sample No.:	SDI-R1 **through** Blank
P.O. No.:	**05-T-314**
Sample Location:	G/SA 05-T-314
Sample Type:	Filter/Impinger
Method Reference:	Method **12**
DCL *Set* **ID No.:**	**05-S-2267**
DCL Sample ID No.:	05-13386 **through** 05-13389
Sample **Receipt Date:**	4/22/2005
Preparation Date:	5/5-10/2005
Analysis Date:	5/10/2005

The samples were prepared and analyzed in accordance **with** EPA **method** *22* using a Jarrell **Ash** Trace (ICP) purged spectrometer. **Sample condition** was **acceptable** upon receipt *except* **where** noted.

The results **are** provided **in** the **enclosed** data **table. Results relate** only **to** the items **tested** and **are** not **blank corrected** unless **indicated in** the data **tabie.**

This **report** shall not **be reproduced except** in **full,** without ***the*** written **approval *of*** the **laboratory.**

Chris Gibson
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-8071, FAX 415 893-9469

TEST REPORT
Page 2 **of** 2
05-S-2267

Results
Lead

Client #	DCL #	Container Volume (mL)	µg/sample
SDI-R1	05-13386	350.	**160.**
SDI-R2	05-13387	405.	93.
SDI-R3	05-13386	350.	38.
Blank	05-13389	**315.**	ND
	Prep Blank		ND
% **Recovefy**	LCS **1**		**134,**
RPL			**10.**

ND - not detected at or **above** the **reporting limit** (RPL).
LCS - **laboratory** control **sample.**

Chris Gibson
Analyst

Reviewer

EMISSIONS TEST PROTOCOL

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	Barry Smith, William Bougher
organization:	Steel Dynamics, Inc.
fax/phone:	(260) 868-8953 / (260) 868-8185 / (260) 625-8950
from:	Fred Guenther
date/time:	Tuesday, March 8, 2005
subject:	Emissions Test Protocol - Steel Dynamics, Inc.
pages:	6 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTLAL ☐ PLEASE REPLY ASAP
comments:	Attached is the protocol documentation sent to IDEM today As noted in the attachments, we have requested test dates of April 19-20, 2005. Please feel free to contact us regarding any questions that you may have on this submission.

If there is any difficulty with this transmission, please call the number below

P.O. Box 807 • Crown Point, IN 46308-0807

TEL: (219) 661-9900

FAX: (219) 661-9902

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	David Cline
organization:	Indiana Department of Environmental Management
fax/phone:	(317) 233-5967 / (317) 232-8443
from:	Fred Guenther
date/time:	Tuesday, March 8, 2005
subject:	Emissions Test Protocol - Steel Dynamics, Inc.
pages:	5 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTWL ☐ PLEASE REPLY ASAP
comments:	Attached please find one (1) Emissions Test Protocol and one (1) RATA test protocol for the testing of the Electric Arc Furnace at Steel Dynamics, Inc.'s plant located in Columbia City, Indiana. As noted in this transmission, we are requesting a test date of April 19-20, 2005. Should you have any comments or questions, please feel free to contact us.

If there is any difficulty with this transmission, please call the number below.

P.O. Box **807** • Crown Point, IN **46308-0807**

TEL: (219) 661-9908

FAX: (219) 661-9902

GUENTHER / SHACKELFORD ASSOCIATES *ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS*
P. O. Box 807 * Crown Point, Indiana 46307 * (219) 662-7037 / FAX (219) 662-7037

March 8, 2005

Mr. David Cline
Compliance Data Section
Compliance Branch
Office of Air Management
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, IN 46206

RE: **TRANSMITTAL OF EMISSIONS TEST PROTOCOL**
Steel Dynamics, Inc.
Columbia City, IN
CP 183-10097 / Plt. ID 183-00030

Dear Mr. Cline:

On behalf of Steel Dynamics, Inc., we are providing one(1) emissions testing protocol and one (1) RATA test protocol for the emissions testing of the baghouse outlet on the Electric Arc Furnace (EAF) located in Columbia City, Indiana. The purpose of this testing is to comply with annual testing requirements. We are requesting that the testing be scheduled for the period April 19-20, 2005.

Please note the following regarding the RATA testing. The RATA testing is proposed to be performed on one capacity condition, i.e., maximum capacity since this emissions facility is not expected to be regularly operated under any kind of reduced capacity conditions.

Should you have any questions pertaining to the attached protocol, please feel free to contact me at (219) 663-5394.

Sincerely,
Guenther/Shackelford Associates

Fred H. Guenther

Attachments: Emission Test Protocol (1), RATA Test Protocol (1)

cc: Mr. William Bougher
Steel Dynamics, Inc.
2601 S. County Road 700 E
Columbia City, IN 46725

Mr. Barry Smith
Steel Dynamics, Inc.
4500 County Road 59
Butler, IN 46721

Compliance Test Protocol

Indiana Department of Environmental Management
Office of Air Quality/Compliance Data Section
100 North Senate Avenue, Post Office Box 6015
Indianapolis, IN 46206-6015
Phone: 317/232-8338 Fax: 3171233-6865

Date Prepared: 03/08/05 Proposed Test Date: 04/19-20/200[illegible] Plant Address: 2601 S. County Road 700E Plant Location: Columbia City, IN

1. SOURCE INFO: **ID/Permit** No.: **F089-16214-000107**

Company: Steel Dynamics, Inc.
Mail Address: 2601 S. County Road 700E
City, State, Zip: Columbia City, IN 46712
Company Contact: William Bougher Phone: 260-625-8852

2. TEST COMPANY INFORMATION

Name: Guenther/Shackelford Associates
Address: P.O. Box 807
City, State, Zip: Crown Point, IN 46307
Contact: Fred H. Guenther Phone: 219-661-9900

3. PROCESS INFORMATION (Submit a separate form for each unit to test)

Unit to Test: Electric Arc Furnace
Max. Rated Capacity: 200 Tons Coal Slag/Hr
Proposed Operating Speed: Maximum Capacity
Describe method used to determine operating level:
Charge Weight

Pollution Control Equipment: Baghouse (PM), DSE (CO), Low Nox Burn
Process Description:
Electric Arc Furnace

Type: N.A.

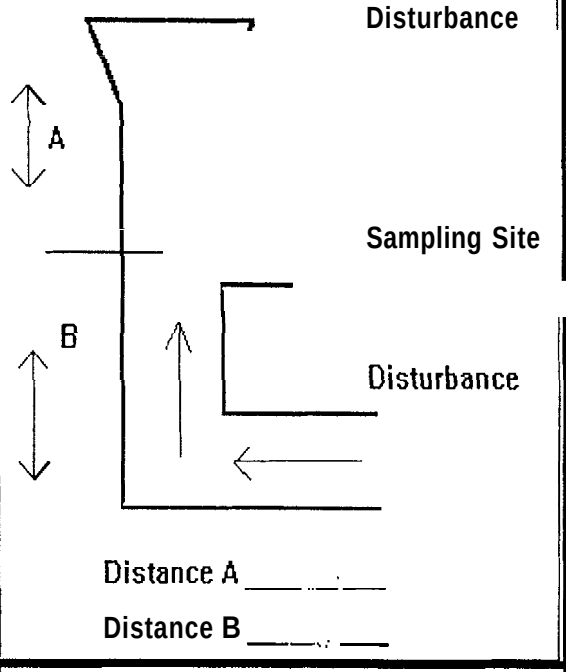
TEST INFORMATION	No. Runs	Time
Method 1-4	3	1 Hr.
Method 5		
Method 6C	3	1 Hr.
Method 7E	3	1 Hr.
Method 9		
Method 12	3	1 Hr.
Method 202		
Other: M23		

Describe any deviations from standard test method:
None

5. Check Applicable Program:
Title V: ____ FESOP: ____
SSOA: ____ MSOP:
Other: Construction Permit

AGENCY USE ONLY:
Date Received:
Inspector: Approval Date:
Reviewer: Comments:

6. SAMPLE **SITE** LOCATION



No. of sample points for Method 5:	24
Diameter at sample site:	20 Ft
Stack Height:	135
Approximate Stack gas flow (ACFM):	850,000
Approximate Stack gas temp (deg. F):	200
Approximate Stack gas moisture (%)	<3%
Does sample port location meet 40 CFR 60, Appx. A. Method 1, Sec. 1.2 Requirements:	Yes

If No, explain:

326 IAC **3-6-2(a)** requires this completed form to be submitted 35 days prior to the proposed test date to the above address. 326 IAC **2-1.1-7(6)(B)** requires any applicable test fee to be submitted with the protocol. (FEE NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OR VE TESTING ONLY.)

7. **REASON FOR TEST**

Operating Permit:	No
Construction Permit:	Yes
If yes, Unit Start Up Date:	
State Agreed Order: **Please include No.**	
Title V:	No
Compliance with 326 IAC NSPS 40 CFR 63 ~~Subpart~~ RRR:	No
Other (EPA, CD, State, 114):	

Relative Accuracy Test Audit Notification Protocol

Indiana Department of Environmental Management
Office of Air **Quality/Compliance** Data Section
100 N Senate, Post **Office** Box 6015
Indianapolis, IN **46206-6015**
Phone: **317/232-8338** Fax: **317/233-6865**

Date Prepared: 03/08/05 Proposed Test Date: 04/19-20/200 Plant Address: 2601 S. County Road 700 E Plant Location: Columbia City, IN

1. SOURCE INFO: **ID/Permit** No.: CP 183-10097-00030

Company: Steel Dynamics, Inc.
Mail Address: 2601 S. County Road 700 E.
City, State, Zip: Columbia City, IN
Company Contact: Mr. William Bougher Phone: (260) 625-8852

2 Test Company Information:

Name: Guenther/Shackelford Associates
Address: P.O. Box 807
City, State, Zip: Crown Point. IN 46308
Contact: Fred Guenther Phone: 1219) 663-5394

3. PROCESS INFORMATION: (Submit a separate form for each unit to test)

Unit to Test: Electric Arc Furnac
Max. Rated Capacity: 200 T/Hr.
Proposed Operating Speed: Maximum Capacity
Describe method used to determine operating level: Charge

Pollution Control Equipment: Baghouse (PM), DSE (CO), Low Nox Burn
Fuel Type: NIA

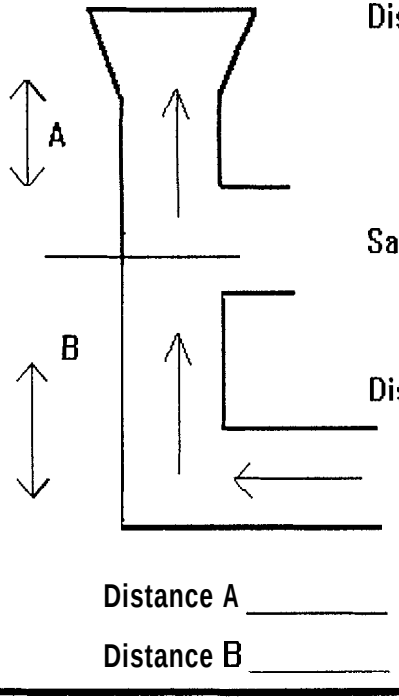
4. Load Level	Test Method	No. Runs	Time
LOW	2		
	3		
____ MWG	4		
	Other ____		
MID	2		
	3		
	4		
	6		
____ MWG	7		
	Other ____		
HIGH	2	9 to 12	21 min.
	3	9 to 12	21 min.
	4	9 to 12	21 min
	6		
____ MWG	7		
	Other _10, 25A____	9 to 12	21 min.

6. Check Applicable:

Annual RATA: ____ Part 75: ____
Semi-Annual: ____ Part 60: ____
Other:
Certification: Recertification:

AGENCY USE ONLY: **Date Received:** ____
Inspector: Approval Date:
Reviewer:
Comments:

7 SAMPLE **SITE** LOCATION



Does sample port location meet 40 CFR 60, Appx. A, Method 1, Sec. 1.2 Requirements: Yes / No
If No, explain:

Approximate Stack gas flow (ACFM):	850,000
Approximate Stack gas temp (deg F)	200
Approximate Stack gas moisture (%)	<2
Number of points for Method 2:	16
Number of points for Method 4:	16
Number of points for Method 6:	
Number of points for Method 7:	
Anticipated date of Flow RATAs:	08/01/03
Anticipated date of Normal Load Gaseous RATA:	08/01/03

Please attach explanation if performing a Single Load RATA **only.**

5. Describe any deviations from standard test methods:

326 IAC **3-6-2(a)** requires this completed **form to be submitted** 35 **days prior to the proposed test** date to the above address. 326 IAC **2-1.1-7(6)(B)** requires any applicable test fee to be **submitted** with the protocol. (FEE NOT APPLICABLE **IF** PROGRAM IS FESOP, TITLE V OR VE **TESTING** ONLY.)

HP Officejet 6100 Series 6150
Personal Printer/Fax/Copier/Scanner

Log for
Fred H. Guenther
219-662-7037
Mar *09 2005* 8:00am

Last Transaction

Date	Time	Type	Identification	Duration	Pages	Result
Mar *9*	7:56am	Fax Sent	12608688953	2:18	*6*	OK

HP Officejet 6100 Series 6150
Personal Printer/Fax/Copier/Scanner

Log for
Fred H. Guenther
219-662-7037
Mar 09 2005 8:03am

Last Transaction

Date	Time	Type	Identification	Duration	Pages	Result
Mar 9	8:01am	**Fax Sent**	**12606258950**	1:29	**6**	**OK**

ACKNOWLEDGMENTS

I would like to thank Mr. Kevin Bort, Mr. Barry Smith and their associates for their cooperation, patience and input in the coordination of the testing program conducted at Steel Dynamics, Inc. Their knowledge and experience in process control and operation, and project development proved invaluable towards the completion of this project.

Fred H. Guenther
Project Manager

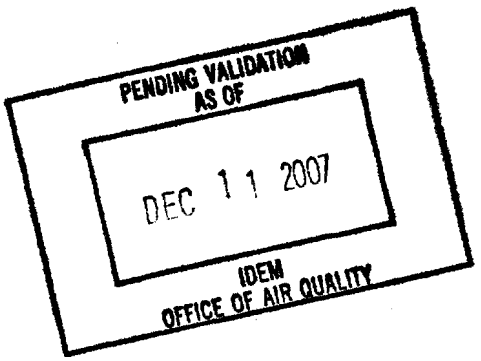


TABLE OF CONTENTS

ACKNOWLEDGMENTS . . . . . *i*

PREFACE . . . . . **iv**

1.0 INTRODUCTION. **1**

2.0 TEST RESULTS **SUMMARY** **5**

3.0 FACILITY DESCRIPTION 7

4.0 TEST PROCEDURES 9

5.0 ANALYTICAL PROCEDURES **12**

6.0 QUALITY ASSURANCE PROCEDURES **13**

7.0 CONCLUSIONS **14**

LIST OF TABLES

TABLE **1** - EPA METHOD 12 - **LEAD EMISSIONS TEST RESULTS** - ELECTRIC ARC **FURNACE BAGHOUSE** STACK **6**

LIST OF FIGURES

FIGURE 1 - MELTSHOP - BAGHOUSE /STACK CONFIGURATION **8**

FIGURE 2 - MELTSHOP - STACK SAMPLING LOCATION **8**

APPENDICES

APPENDIX A - FIELD TEST DATA
APPENDIX B - PROCESS OPERATING DATA
APPENDIX C - LABORATORY ANALYSIS AND CEM ANALYTICAL DATA
APPENDIX D - REAGENT CERTIFICATION AND **MATERIAL** SAFETY **DATA**

PENDING VALIDATION
AS OF
DEC 2007
IDEM
OFFICE OF AIR QUALITY

APPENDICES (CONTINUED)

APPENDIX E - CALIBRATION DATA
APPENDIX F - SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS
APPENDIX G - CORRESPONDENCE

PENDING VALIDATION
AS OF
DEC 1 1 2007
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PREFACE

I, Fred Guenther, do hereby certify that the source emissions testing conducted at Steel Dynamics, Inc. Structural and Rail Division near Columbia City, Indiana was performed in accordance with the procedures set forth by the United States Environmental Protection Agency, and that the data and results submitted within this report are an exact representation of the testing.

Fred H. Guenther
Project Manager

I, Fred Guenther, do hereby attest that all work on this project was performed under my direct supervision, and that this report accurately and authentically presents the source emissions testing conducted at Steel Dynamics, Inc. Structural and Rail Division near Columbia City, Indiana.

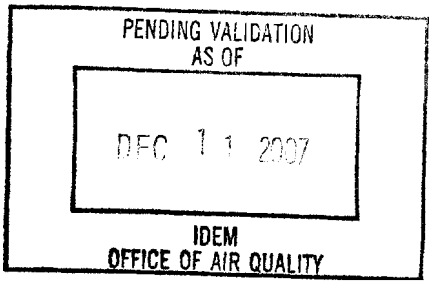
Fred H. Guenther
Project Manager

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AS OF
DEC 11 2007
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SOURCE EMISSIONS COMPLIANCE TESTING
EPA Methods 1, 2, 3, 4 and 12
Performed on the
Electric Arc Furnace
Baghouse Outlet (Exhaust Stack)
at
Steel Dynamics, Inc.
Structural and Rail Division
Columbia City, Indiana

August 6 ,2004

Project No. 04-T-275



1.0 INTRODUCTION

This report presents the results of the source emissions compliance testing conducted by Guenther/Shackelford Associates (G/SA) for Steel Dynamics, Inc. (SDI), Structural and Rail Division near Columbia City, Indiana.

The primary purpose of this testing program was to obtain lead (Pb) samples from the effluent gas stream of the baghouse serving the Electric Arc Furnace (EAF). The results of this sampling was used to determine if the emissions discharged into the atmosphere from the facility meet the Indiana Department of Environmental Management (IDEM) source emission limits and the U.S. Environmental Protection Agency (EPA) standards of performance for steel plants utilizing an electric arc furnace (EAF).

G/SA's responsibility was to collect and analyze Pb samples and perform data reduction for emission concentrations evaluation. SDI's responsibility was to maintain process

operating parameters and to provide process operating data per compliance test requirements.

The following report provides information pertaining to SDI's Structural and Rail Division's process operations, emissions testing and analytical results.

The emissions testing conducted on the Meltshop Baghouse Stack was performed on Tuesday, August 6, 2004, from 06:45 A.M. to 06:28 P.M.

The following requirements were specific for the testing program:

1. Equipment calibrations performed and calibration data provided.
2. Three (3), one and one half (1 1/2)-hour, minimum, Pb emissions test runs at the outlet (exhaust stack) of the EAF Baghouse, which shall include an integral number of complete process heat cycles, pursuant to EPA, Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Subpart AAa, Section 60.275a and Indiana Department of Environmental Management (IDEM) Construction Permit #CP-183-10097-00030.
3. Process manufacturing capacities and control devices maintained at required operating conditions, and production rates recorded during the emissions testing periods.
4. All testing and analyses performed in accordance with current EPA test methodologies and analytical procedures for Pb emissions.

PENDING VALIDATION
AS OF
DEC 1 1 2007
IDEM
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5. Lead emissions from the EAF Baghouse shall not exceed an average concentration of 0.114 lb/hr pursuant to IDEM Construction Permit #CP-183-10097-00030.

The emissions testing program was supervised in part by G/SA, whose headquarters is in Crown Point, Indiana. G/SA also performed stack gas flow rate and moisture content determinations, carbon dioxide (CO_2), oxygen (O_2), the lead emissions testing on the EAF Baghouse Stack, overall emissions data review and prepared the final report. The lead analyses were subcontracted to G/SA's analytical broker, Sampling and Analytical Management, Inc. (SAMI) to Data Chem in Cincinnati, Ohio.

The emissions testing was performed in accordance with EPA Reference Methods 1, 2, 3, 4, 12 (Lead), Title 40 Code of Federal Regulations, Part 60, Appendix A, "Test Methods".

The testing program was approved by and/or coordinated with the following personnel:

Kevin J. Bort, Engineering Manager, SDI

Barry Smith, SDI

The emissions testing was performed by the following personnel:

Fred Guenther, Test Supervisor, G/SA

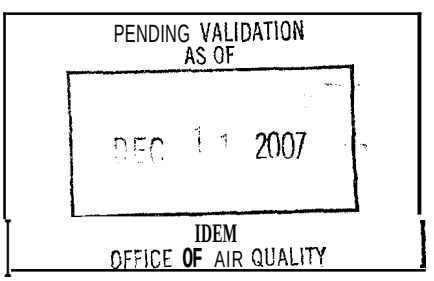
Brandon Peyton, Senior Test Technician, G/SA

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DEC 1 1 2007 3
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Andrew Kendall, Test Technician, G/SA

The emissions testing was observed by the following personnel:

Doug Vandermark, Environmental Scientist, Air Compliance Section, IDEM



2.0 TEST RESULTS SUMMARY

The source emissions testing was performed utilizing EPA Methods 1, 2, 3, 4 and 12 at the Electric Arc Furnace Baghouse Stack sampling location. A summary of the test results is given below:

ELECTRIC ARE FURNACE LEAD EMISSIONS		
Run No.	**Lead Emissions (Lb/Hr)**	**Lead Emissions (Lb/Ton)**
1	**0.029**	**0.00026**
2	**0.026**	**0.00017**
3	**0.039**	**0.00026**
Average	**0.031**	**0.00023**
Emission Limit	**0.114**	**N.A.**

A complete list of test parameters for each Method 12 (Lead) emissions test run performed at the stack sampling location can be found in Tables 1.

Sample calculations and examples of the equations used to generate the test results can be found in Appendix F.

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AS OF
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TABLES

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G/SA ..... ENVIRONMENTAL TESTING **CONSULTANTS**

P.O. Box 807, Crown Point, IN 46307 TEL (219) 663-5394 / FAX (219) 662-7052

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DEC 11 2007

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TABLE **1**

EPA METHOD **12**

LEAD (Pb) EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS JOB NO.: 04-275

SOURCE TESTED: **EAF - BAGHOUSE** OUTLET DATA INPUT BY: MMK

INPUT DATA

Run Number	1	2	3
Date	06-Aug-04	06-Aug-04	06-Aug-04
Sampling Location	Exhaust Stack	Exhaust Stack	Exhaust Stack
Test Time, Start-Stop (24 Hour)	0645-0855	1020-1326	1415-1828
Sampling Time (Minutes)	108	116	120
Average Process Weight Rate (TPH)	***111.0***	***156.0***	***146.0***
Stack Area (Ft^2)	314.2	314.2	314.2
Pitot Tube Coefficient (Unitless)	0.84	0.84	0.84
Dry Gas Meter Correction Factor (Unitless)	0.992	0.992	0.992
Nozzle Area (Ft^2)	0.000207	0.000207	0.000207
Barometric Pressure (In. Hg)	29.23	29.23	29.23
Static Pressure (In. H2O)	-0.3	-0.3	-0.3
Dry Gas Meter Sample Volume (DCF)	54.886	57.700	62.569
Average Dry Gas Meter Temperature (°F)	78.4	89.9	88.2
Average Orifice Meter Delta H (In. H2O)	0.760	0.784	0.867
Volume Condensate Collected (Ml)	33.2	41.7	38.6
Average CO2 Concentration (%)	0.6	0.6	0.6
Average 0 2 Concentration (%)	20.4	20.4	20.4
Average Square Root of Delta P (In. H2O½)	0.752	0.768	0.808
Average Stack Gas Temperature (°F)	158.9	193.1	193.0
Actual Pb Mass **Concentration** (mg)	***0.0160***	***0.0150***	***0.0230***

CALCULATED DATA

Absolute Pressure (In. Hg)	29.21	29.21	29.21
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	52.269	53.803	58.536
Water Vapor Volume at Standard Conditions (SCF)	1.563	1.960	1.815
Moisture Fraction (Unitless)	0.029	0.035	0.030
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.91	28.91	28.91
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.60	28.53	28.58
Stack Gas Velocity (FPS)	46.5	48.8	51.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	876,204	920,324	967,160
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	708,760	700,924	740,637
Isokinetic Sampling (%)	103.5	100.3	99.8
Pb Emission Concentration (Gr/DSCF)	4.72E-006	4.30E-006	6.06E-006
Pb Emission Concentration (Lb/DSCF)	6.75E-010	6.15E-010	8.66E-010
Pb Emission Rate (Lb/Hr)	0.029	0.026	0.039
Pb Emission Concentration *(Lb/TPW)*	*0.00026*	*0.00017*	*0.00026*

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	[redacted]230
Average Stack Gas Flow Rate at **Dry** Standard Conditions (DSCFM)	[redacted]
Average TPM Emission Concentration **(Gr/DSCF)**	[redacted]
Average TPM Emission Concentration **(Lb/DSCF)**	[redacted]
Average TPM Emission Rate **(Lb/Hr)**	[redacted]
Average TPMEmission Concentration ***(Lb/Ton*** Process Weight)	[redacted]23

Signature of Reviewer: Paul H Smith

3.0 FACILITY DESCRIPTION

Steel Dynamics, Inc. Structural and Rail Division facility manufactures steel products from scrap metal. The facility has a capacity to produce over 200 tons of steel per hour.

SDI Structural and Rail Division is located at 2610 County Road 700 East near Columbia City, Indiana which is in Whitley County.

The SDI Structural and Rail Division facility consists basically of one (1) single shell Electric Arc Furnace (EAF) incorporating a jet-pulse, fabric filter baghouse with eshaust stack for particulate removal, one back-up single shell EAF, a ladle metallurgical station for refining, one (1) natural gas-fired reheat furnace (RF) with separate exhaust stack, continuous casting, hot roll milling and slag processing. The compliance emissions testing was performed on the EAF stack. See Figures 1 and 2.

During the emissions testing on August 06, 2004, the Electric Arc Furnace steel processing tap rates averaged 111.5 tons/hr (Run 1), 156.2 tons/hr (Run 2), and 146.5 tons/hr (Run 3).

Process operating data recorded during the emissions testing can be found in Appendix B of this report.

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FIGURES

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FIGURES

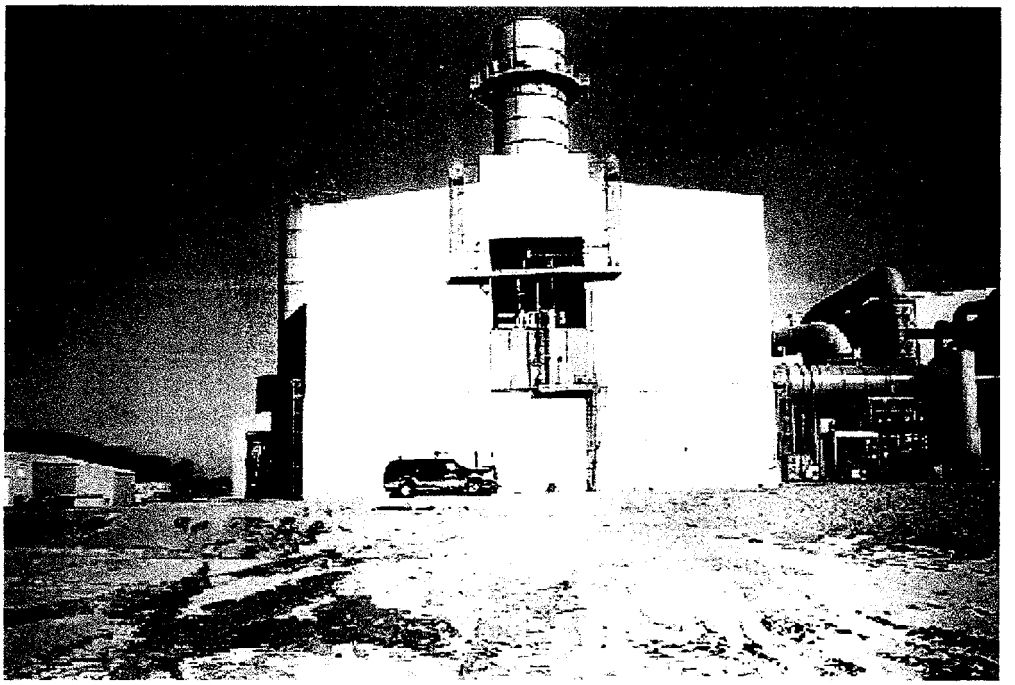


Figure 1 - Electric Arc Furnace - Baghouse/Stack Configuration



Figure 2 - Electric Arc Furnace - Stack Sampling Location

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4.0 TEST PROCEDURES

G/SA, and G/SA's affiliates and subcontractors use all current EPA accepted testing methodologies in their Air Quality Programs as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A. For this testing program, the following specific methodologies were utilized:

EPA Method 1 - Sample and Velocity Traverses for Stationary Sources

EPA Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 3 - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources

EPA Method 4 - Determination of Moisture Content From Stack Gases

EPA Method 12 - Determination of Inorganic Lead Emissions from Stationary Sources

EPA Methods 1, 2 and 12 were performed at the Electric Arc Furnace Baghouse Stack sampling location using one (1) Apex Instruments, Model 522, control unit and sampling train incorporating a 7′, effective length, stainless-steel probe with a heated, borosilicate glass liner, stainless-steel nozzle and Type S, stainless-steel pitot tube, ¼" O.D., stainless-steel static pressure/gas sampling tube and Type K (Chromel/Alumel) thermocouples; an aluminum filter oven and borosilicate glass filter holders with Teflon filter supports with Viton-0-Rings, and 0.3 micron (99.9% retention), Whatman 8.5 cm, Type 934-AH, glass

PENDING VALIDATION
AS OF
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microfiber filters; foam insulated, aluminum irnpinger units with two (2) Greenburg-Smith and two (2) modified Greenburg-Smith glass impinger bottles, and a stainless-steel umbilical adapter with Type K (Chromel/Alumel) gas exit thermocouple; and a 90' umbilical with various interconnecting fittings, plugs and connectors.

Sample pH levels were determined with EM colorpHast pH Strips with a 0 to 6 pH range. Impinger contents were purged with ambient air utilizing a Gast ¼ h.p. vacuum pump incorporating a Dwyer, Model RMA-23-SSV, Rate-Master Flowmeter (5-50 lpm range), and ¼" O.D. rubber tubing, regulators, interconnecting fittings and valves.

USEPA Method 3 was performed at the sampling location on August 12, 2003, only, during runs 1 - 3 of the Method 12 testing to determine exhaust gas concentrations of carbon dioxide (CO_2) and oxygen (O_2) using a Bacharach, Duplex Fyrite Kit, Gas Analyzer (Orsat) to extract and measure integrated gas samples collected in Calibrated Instruments, Inc. 10 liter, pillow type, Tedlar bags at the outlet of the stainless-steel probe's gas sampling tube

Calibration data, including an on-site dry gas meter calibration check, and pretest run and post-test run calibrations of the aforementioned instrumentation, and calibration span gas certifications can be found in Appendix E.

Cyclonic flow checks were omitted at the Electric Arc Furnace Baghouse Stack sampling

PENDING VALIDATION
AS OF
DEC 11 2007
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location due to the acceptable stack and test port configurations based on Method 1 requirements, and relatively laminar flows noted during the preliminary traverse procedures conducted prior to the emissions testing a the sampling location.

No testing or sample recovery deviations or procedural errors occurred during the onsite sampling phase of the testing program.

Certifications and material safety data for the chemical reagents used in performing the lead testing are included in Appendix D

No significant process deviations or upsets occurred during the emissions testing periods.

The emissions test data collected during the field sampling can be found in Appendix A of this report. The particulate and gaseous emissions concentrations, rates and pertinent data are presented in the "Test Results Summary".

PENDING VALIDATION
AS OF
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5.0 ANALYTICAL PROCEDURES

G/SA, and G/SA's affiliates and subcontractors utilize all current analytical procedures outlined in the following reference methods as listed in the U.S. Code of Federal Regulations, Title 40, Part 51, Appendix M and Part 60, Appendix A:

EPA Method 1 - Sample and Velocity Traverses for Stationary Sources

EPA Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)

EPA Method 3 - Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources

EPA Method 4 - Determination of Moisture Content From Stack Gases

EPA Method 12 - Determination of Inorganic Lead Emissions from Stationary Sources

An AND, Model EK-1200A, Electronic Toploading Balance was used to weigh spent silica gel from the EPA Method 12 (Lead) testing to determine, in part, stack gas moisture content.

No analytical procedure errors occurred during the Lead analyses phase of the testing program.

All pertinent laboratory analysis data can be found in Appendix C of this report.

PENDING VALIDATION
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6.0 QUALITY ASSURANCE PROCEDURES

Each reference method presented in the U.S. Code of Federal Regulations details the instrument calibration requirements, sample recovery and analysis, data reduction and verification, types of equipment required and the appropriate sampling and analytical procedures to assure maximum performance and accuracy. G/SA, and G/SA's affiliates and subcontractors adhere to the guidelines for quality control set forth by the United States Environmental Protection Agency. These procedures are outlined in the following documents:

Code of Federal Regulations, Title 40, Part 51

Code of Federal Regulations, Title 40, Part 60

Quality Assurance Handbook, Volume 1, EPA 600/9-76-005

Quality Assurance Handbook, Volume 2, EPA 600/4-77-027a

Quality Assurance Handbook, Volume 3, EPA 600/4-77-027b

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7.0 CONCLUSIONS

An emission testing program was conducted on the outlet of the baghouse serving the Electric Arc Furnace to determine lead emissions rates. The testing program was conducted on August 6, 2004. The results of the testing program are summarized in the following table.

ELECTRIC ARE FURNACE LEAD EMISSIONS		
Run No.	Lead Emissions (Lb/Hr)	Lead Emissions (Lb/Ton)
1	0.029	0.00026
2	0.026	0.00017
3	0.039	0.00026
Average	0.031	0.00023
Emission Limit	0.114	N.A.

The usefulness and/or significance of the emissions values presented in this document as they relate to the compliance status of the Electric Arc Furnace's operation based on process operating conditions shall be determined by others.

For additional information pertaining to the testing program see Appendix G at the end of this report.

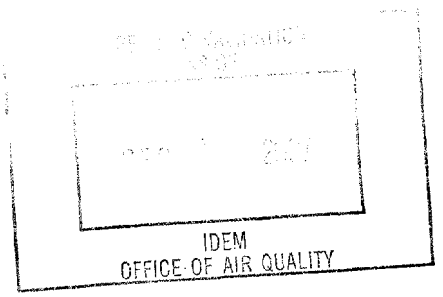
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APPENDICES

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APPENDIX A

FIELD TEST DATA



EPA METHOD 1

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S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 TEL/FAX (417) 282-6140

EPA METHOD 1 – SITE DETERMINATION FIELD DATA SHEET

Client: Steel Dynamics - CCI Project No.: 03-T-[illegible]

Source: EAF Date: 1/15/03

Flue Data:

Distance from far inside wall to outside of port: 246.2 in.
Port length: 60 in.
I.D. or depth of flue: 240 in.
Width of flue (rect.): N.A. in.
Area of flue: 314.159 sq. ft.
Equivalent dia., De = 2LW / (L+W)

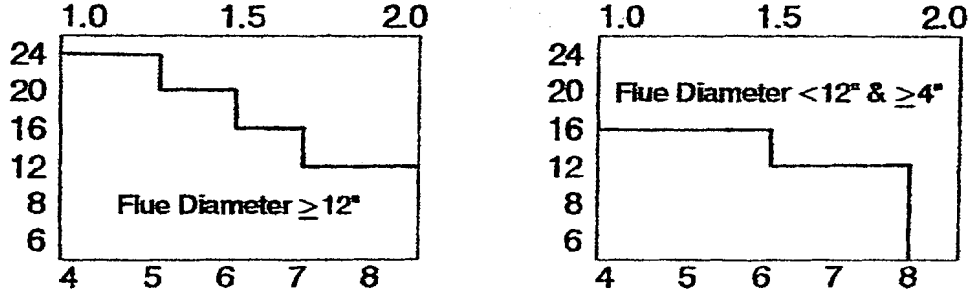
De = 240 in.

Distance from the nearest flow disturbance to the center line of the test ports:

Upstream (A)	Downstream (B)
120 in.	240 in.
Number of diameters 0.5 unitless	Number of diameters 2.0 unitless

Traverse Points Determination:

Diameters upstream *from* disturbance



Minimum number of traverse points

Diameters downstream from disturbance

Traverse Points Measurements:

Circular flue (Percentage of flue diameter) / Rectangular flue (Percentage *of* flue depth)

Point No.	2	4	6	8	10	(12)
1	14.6 / 25.0	6.7 / 125	4.4 / 8.3	8 2 / 6.3	2.6 / 5.0	21 / 4.2
2	85.4 / 75.0	25.0 / 37.5	14.6 / 25.0	10.5 / 18.8	8.2 / 15.0	6.7 / 12.5
3		75.0 / 62.5	29.6 / 41.7	19.4 / 31.3	14.6 / 25.0	11.8 / 20.8
4		93.3 / 87.5	70.4 / 58.3	323 / 43.8	22.6 / 35.0	17.7 / 29.2
5			85.4 / 75.0	67.7 / 56.3	34.2 / 45.0	25.0 / 37.5
(6)			95.6 / 91.7	80.6 / 68.8	65.8 / 55.0	35.6 / 45.8
7				89.5 / 81.3	77.4 / 65.0	64.4 / 54.2
8				96.8 / 93.8	85.4 / 75.0	75.0 / 62.5
9					91.8 / 85.0	82.3 / 70.8
10					97.4 / 95.0	88.2 / 79.2
11						93.3 / 87.5
12						97.9 / 95.8

Traverse Points Dimensions:

1	5.04 in.	7	in.
2	16.08 in.	8	in.
3	28.32 in.	9	in.
4	42.48 in.	10	in.
5	60.00 in.	11	in.
6	95.44 in.	12	in.

Sketch *Of* Flue

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EPA METHOD 3

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EPA METHOD 12

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EPA METHOD 12 FIELD TEST DATA

Client STEEL DYNAMICS
Plant Columbia City, IN
Date 08/06/2004
Operator A. Kendall
Probe Operator(~) B. Peyton
Control Unit No. 507123 Nozzle Diameter (in.) 0.195
Pitot Cp 0.84 Filter No. Blank #1
Meter Y 0.992 Front-half No. FH-1A
Run No. 1 Back-half No. BH-1W, BH-1M

Project No. G/SA 04-T-275
Unit EAF - Baghouse Outlet Stack Area (ft²) 314.2
Ambient Temperature (°F) 69
Barometeric Pressure (inches Hg) 29.23
Static Pressure (± inches H20) -0.3
%CO2 / %02 0.6 / 20.4
Condensate (milliliters) 23 Silica Gel (grams) 10.4
Test Time (24 hour) 0645-0855
Sample Time (minutes) 108.0

Traverse Point Number	Stack Temperature Ts (°F)	Velocity Head Delta P (in. HZO)	Orifice Setting Delta H (in. H2O)	Metered Gas Volume Vm (ft³) Initial Volume 836.600	Dry Gas Meter Temperature Tm (°F)	Notes
A- 1	148	0.610	0.810		71	
2	158	0.570	0.740		72	Pretest Nozzle Cal:
3	155	0.500	0.660		72	A = 0.242"
4	160	0.470	0.610		72	B = 0.243"
5	181	0.500	0.630		73	C = 0.243
6	178	0.410	0.520		73	Avg. = 0.243
B- 1	167	0.480	0.620		74	
2	213	0.410	0.500		74	
3	221	0.540	0.650		75	
4	203	0.640	0.800		75	
5	161	0.720	0.950		76	
6	154	0.730	0.980		77	
C- 1	141	0.620	0.850		78	
2	135	0.660	0.920		79	
3	131	0.600	0.840		80	
4	141	0.550	0.760		80	
5	139	0.580	0.810		80	
6	137	0.540	0.760		81	
D- 1	149	0.600	0.820		81	
2	158	0.490	0.660		82	
3	155	0.530	0.720		82	
4	160	0.570	0.770		83	
5	161	0.620	0.840		83	
6	96	0.500	0.670		84	
	Average	Avg. Sqrt.	Average	Volume Sampled	Average	

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EPA METHOD 12 FIELD TEST DATA

Client STEEL DYNAMICS—
Plant Columbia City, IN
Date 08/06/2004
Operator A. Kendall
Probe Operator(~) B. Peyton
Control Unit No. 507123 Nozzle Diameter (in.) 0.195
Pitot Cp 0.84 Filter No. Blank #1
Mdeter Y 0.992 Front-half No. FH-1A
Run No. 1 continued Back-half No. BH-1W, BH-1M

Project No. G/SA 04-T-275
Unit EAF - Baghouse Outlet Stack Area (ft²) 314.2
Ambient Temperature (OF) 69
Barometeric Pressure (inches Hg) 29.23
Static Pressure (± inches H20) -0.3
%CO2 / %O2 0.6 1 20.4
Condensate (milliliters) 23 Silica Gel (grams) 10.4
Test Time (24 hour) 0645-0855
Sample Time (minutes) 108.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H20)	Orifice Setting Delta H (in. H20)	Metered Gas Volume Vm (ft³) Initial Volume	Dry Gas Meter Temperature Tm (°F)	Notes
N-	1	151	0.710	0.980		84	
	2	158	0.650	0.890		85	0 2 Purge:
	3	166	0.590	0.800	Final Volume	85	Start - 1607 Hours
E-	4	171	0.530	0.710	891.486	85	Stop - 1707 Hours
	Average	158.9	Avg. Sqrt 0.752	Average 0.760	Volume Sampled 54.886	Average 78.4	

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EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS	Project No.	G/SA 04-T-275
Plant	Columbia City, IN	Unit	EAF - Baghouse Outlet
Date	08/06/2004	Stack Area (ft²)	314.2
Operator	A. Kendall	Ambient Temperature (°F)	72
Probe Operator(s)	B. Peyton	Barometeric Pressure (inches Hg)	29.23
Control Unit No.	507123	Nozzle Diameter (in.)	0.195
		Static Pressure (± inches H20)	-0.3
		%CO2 1%O2	0.6 1 20.4
Pitot Cp	0.84	Filter No.	Blank #2
		Condensate (milliliters)	29 Silica Gel (grams) 12.4
Meter Y	0.992	Front-half No.	FH-2A
		Test Time (24 hour)	1020-1326
Run No.	**2**	Back-half No.	BH-2W, BH-2M
		Sample Time (minutes)	116.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H20)	Orifice Setting Delta H (in. H20)	Metered Gas Volume Vm (ft³) Initial Volume 893.100	Dry Gas Meter Temperature Tm (°F)	Notes
A-	1	185	0.750	0.866		85	
	2	172	0.620	0.830		86	
	3	129	0.540	0.780		87	
	4	135	0.450	0.640		86	
	5	154	0.430	0.600		86	
	6	172	0.490	0.660		87	
B-	1	190	0.540	0.710		87	
	2	215	0.490	0.620		87	
	3	224	0.450	0.560		88	
	4	219	0.510	0.640		88	
	5	205	0.560	0.720		88	
	6	193	0.790	1.040		88	
C-	1	186	0.890	1.180		89	
	2	175	0.800	1.080		89	
	3	193	0.550	0.730		90	
	4	224	0.610	0.770		90	
	5	230	0.570	0.720		91	
	6	236	0.510	0.630		91	
D-	1	194	0.670	0.890		91	
	2	186	0.470	0.630		92	
	3	176	0.590	0.810		92	
	4	178	0.750	1.030		93	
	5	185	0.670	0.910		93	
	6	190	0.730	0.980		93	
		Average	Avg. Sqrt	Average	Volume Sampled	Average	

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EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS	Project No.	G/SA 04-T-275
Plant	Columbia City. IN	Unit	EAF - Baghouse Outlet — Stack Area (ft²) 314.2
Date	08/06/2004	Ambient Temperature (°F)	72
Operator	A. Kendall	Barometeric Pressure (inches Hg)	29.23
Probe Operator(s)	B. Peyton	Static Pressure (± inches H20)	-0.3
Control Unit No.	507123 Nozzle Diameter (in.) 0.195	%CO2 / %02	0.6 / 20.4
Pitot Cp	0.84 Filter No. Blank #2	Condensate (milliliters)	29 Silica Gel (grams) 12.4
Meter Y	0.992 Front-half No. FH-2A	Test Time (24 hour)	1020-1326
Run No.	2 (Continued) Back-half No. BH-2W, BH-2M	Sample Time (minutes)	116.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity Head Delta P (in. H20)	Orifice Setting Delta H (in. H20)	Metered Gas Volume Vm (ft³) Initial Volume	Dry Gas Meter Temperature Tm (°F)	Notes
N-	1	193	0.580	0.780		94	
	2	215	0.630	0.820		94	0 2 Purge:
	3	219	0.540	0.700		94	Start - 2217 Hours
	4	221	0.480	0.620		95	Stop - 2317 Hours
	5	207	0.600	0.790	Final Volume 950.800	94	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	
		193.1	0.768	0.784	57.700	89.9	

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EPA METHOD 12 **FIELD** TEST DATA

Client: STEEL DYNAMICS
Plant: Columbia City, IN
Date: 08/06/2004
Operator: B. Peyton
Probe Operator(s): A. Kendall
Control Unit No.: 507123 Nozzle Diameter (in.): 0.195
Pitot Cp: 0.84 Filter No.: Blank #3
Meter Y: 0.992 Front-half No.: FH-3A
Run No.: 3 Back-half No.: BH-3W, BH-3M

Project No.: G/SA 04-T-275
Unit: EAF - Baghouse Outlet Stack Area (ft^2): 314.2
Ambient Temperature (OF): 75
Barometeric Pressure (inches Hg): 29.23
Static Pressure (± inches H20): -0.3
%CO2 / %O2: 0.6 1 20.4
Condensate (milliliters): 28 Silica Gel (grams): 11.1
Test Time (24 hour): 1415-1828
Sample Time (minutes): 120.0

Traverse Point Number		Stack Temperature Ts (°F)	Velocity **Head** Delta P (in. H20)	Orifice Setting Delta H (in. H20)	Metered Gas Volume **Vm (ft^3)** Initial Volume 951.000	Dry Gas Meter Temperature **Tm** (°F)	Notes
A-	1	186	0.780	1.050		91	
	2	172	0.650	0.900		93	
	3	151	0.730	1.040		93	
	4	163	0.650	0.910		93	
	5	180	0.630	0.860		93	
	6	192	0.650	0.870		93	
B-	1	141	0.790	1.120		86	
	2	160	0.610	0.840		86	
	3	191	0.650	0.850		86	
	4	174	0.710	0.950		86	
	5	182	0.730	0.970		86	
	6	170	0.700	0.950		87	
C-	1	157	0.780	1.080		87	
	2	180	0.670	0.890		87	
	3	192	0.640	0.840		87	
	4	197	0.550	0.710		87	
	5	202	0.680	0.880		87	
	6	212	0.650	0.830		87	
D-	1	233	0.490	0.600		87	
	2	227	0.480	0.600		87	
	3	180	0.550	0.730		87	
	4	195	0.790	1.030		87	
	5	198	0.780	1.020		88	
	6	189	0.850	1.120		88	
		Average	Avg. Sqrt.	Average	Volume Sampled	Average	

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EPA METHOD 12 FIELD TEST DATA

Client	STEEL DYNAMICS		Project No.	G/SA 04-T-275	
Plant	Columbia City, IN		Unit	EAF - Baghouse Outlet	Stack Area (ft²) 314.2
Date	08/06/2004		Ambient Temperature (°F)	75	
Operator	B. Peyton		Barometeric Pressure (inches Hg)	29.23	
Probe Operator(s)	A. Kendall		Static Pressure (± inches H20)	-0.3	
Control Unit No.	507123	Nozzle Diameter (in.) 0.195	%CO2 / %02	0.6 1 20.4	
Pitot Cp	0.84	Filter No. Blank #3	Condensate (milliliters)	28	Silica Gel (grams) 11.1
Meter Y	0.992	Front-half No. FH-3A	Test Time (24 hour)	1415-1828	
Run No. 3 (Continued)		Back-half No. BH-3W, BH-3M	Sample Time (minutes)	120.0	

Traverse Point Number	Stack Temperature Ts (°F)	Velocity Head Delta P (in. H20)	Orifice Setting Delta H (in. H20)	Metered Gas Volume Vm (ft³) Initial Volume	Dry Gas Meter Temperature Tm (°F)	Notes
N- 1	200	0.520	0.680		880	
2	215	0.640	0.810	Final Volume	88	Post-test Nozzle Cal:
3	224	0.680	0.850	1013.569	88	A = 0.243
4	244	0.520	0.630		88	B = 0.243"
5	249	0.450	0.550		88	C = 0.242"
6	234	0.700	0.850		88	Avg. = 0.243"
	Average	Avg. Sqrt.	Average	Volume Sampled	Average	
	193.0	**0.808**	**0.867**	**62.569**	**114.6**	

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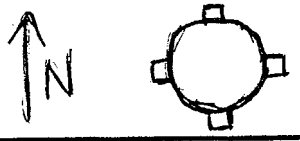
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EPA Method 12 (PM) Testing - Field Data Sheet

Run # 1 **Sampling Location** Electric Arc Furnace - Baghouse Outlet

Client SDI - CCI	Project # 04-T-275
Plant Columbia City	Unit EAF
Date 8/6/04	Project Site Columbia City, IN
Meter Operator Andy Kendall	
Probe Operator Brandon Peyton	

Schematic of Stack Cross Section



Ambient Temperature (°F) 69	Barometric Press. (in. Hg) 29.23
Assumed Moisture (%) 3	Calculated Moisture (%)

Nozzle # .195	Probe Length (ft.) 8
Nozzle Diameter (in.) .195	Probe Liner Material glass
Nozzle Material Stainless Steel	Probe Heater Setting (°F) 255
Probe # P-8	Oven Heater Setting (°F) 255

Control Unit # 507123	Meter Y (C Factor) .992
Filter Oven # 101	Meter Delta H@ 1.785
Impinger Unit # GSA 1	Meter K / Orifice Factor 3.185
Pitot # P-8	Pitot Cp .84
Pitot Leak Check: Initial ok	Final ok
DGM Leak Rate Before: 0.0	CFM @ 15 in. Hg
DGM Leak Rate After: 0.0	CFM @ 5 in. Hg
Static Pressure (± in. H2O) -0.27	

First traverse point all the way (In) Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter 240	Dia. 4.0	In
L / W /	L 6.0	Out ✓
Filter Number(s)	Blank #1	
Front-half Number(s)		
Back-half Number(s)		

IGS Bag #	IGS Analyzer #
%CO2	%O2
Condensate (ml/g) 22.85	Silica Gel (g) 10.35
Total Vlc (ml) 33.2	Total Acetone Wash (ml)
Total 0.1 HNO3 Rinse (ml)	
Start Time (24 Hour) 6:45	Stop Time (24 Hour) 855

Traverse Point Number	Stop-watch Time Minutes / Sample Point 96/24	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in H2O)	Orifice Meter Pressure Differential Delta H (in H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 836.600	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in Hg)	Notes
A 1	4	148	.61	.81	838.607	71	258	260	49	0.8	Were delayed @ 8:00 for approx. 10 min.
2	8	158	.57	.74	840.565	72	260	260	43	0.5	
3	12	155	.50	.66	842.270	72	261	259	44	0.5	
4	16	160	.47	.61	844.103	72	259	261	45	0.5	
5	20	181	.50	.63	845.890	73	258	261	46	0.3	
6	24	178	.41	.52	847.522	73	256	259	47	0.5	
B 1	28	167	.48	.62	849.300	74	258	258	47	0.5	
2	32	213	.44	.50	850.863	74	257	258	48	0.5	
3	36	221	.54	.65	852.711	75	256	261	48	0.5	
4	40	203	.64	.80	854.695	75	255	260	48	0.8	
5	44	161	.72	.95	856.871	76	255	257	49	1.0	
6	48	154	.73	.98	859.000	77	257	256	49	1.0	
C 1	52	141	.62	.85	861.151	78	258	255	51	1.0	
2	56	135	.66	.92	863.369	79	258	253	51	1.0	
3	60	131	.60	.84	865.737	80	260	253	52	1.0	
4	64	141	.55	.76	867.501	80	261	255	52	1.0	
5	68	139	.58	.81	869.496	80	259	257	53	1.0	
6	72	137	.54	.76	871.434	81	260	255	53	1.0	
D 1	76	149	.60	.82	873.501	81	262	258	54	1.0	
2	80	158	.49	.66	875.125	82	262	259	54	1.0	
3	84	155	.53	.72	877.039	82	263	262	54	1.0	
4	88	160	.57	.77	878.999	83	262	260	55	1.0	
5	92	161	.62	.84	880.057	83	264	259	55	1.0	
6	96	166	.50	.67	882.952	84	264	260	56	1.0	
Averages / Totals											

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EPA Method 12 (PM) Testing - Field Data Sheet

Run # **Sampling Location**

Client	Project #
Plant	Unit
Date	Project Site
Meter Operator	
Probe Operator	

See Page #1

Control Unit #	Meter Y (G Factor)
Filter Oven #	Meter Delta H@
Impinger Unit #	Meter K / Orifice Factor
Pitot #	Pitot Cp
Pitot Leak Check: Initial	Final
DGM Leak Rate Before:	CFM @ in. Hg
DGM Leak Rate After:	CFM @ in. Hg
Static Pressure (± in. H2O)	

Schematic of Stack Cross Section

First traverse point all the way In Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter	Dia.	In
L W	L	Out
Filter Number(s)		
Front-half Number(s)		
Back-half Number(s)		

Ambient Temperature (°F)	Barometric Press. (in. Hg)
Assumed Moisture (%)	Calculated Moisture (%)
Nozzle #	Probe Length (ft.)
Nozzle Diameter (in.)	Probe Liner Material
Nozzle Material	Probe Heater Setting (°F)
Probe #	Oven Heater Setting (°F)
IGS Bag #	IGS Analyzer #
%CO2	%O2
Condensate (ml/g)	Silica Gel (g)
Total Vlc (ml)	Total Acetone Wash (ml)
Total 0.1 HNO3 Rinse (ml)	
Start Time (24 Hour)	Stop Time (24 Hour)

Traverse Point Number	Stop-Watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in-H2O)	Orifice Meter Pressure Differential Delta H (in-H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume	Dry Gas Meter Temp Tm (°F)	Probe Liner Temp (°F)	Filter Oven Temp (°F)	Impinger Outlet Temp (°F)	Pump Vacuum (in-Hg)	Notes
					882.950						
	100	151	.71	.98	885.035	84	261	263	57	1.0	
	104	158	.65	.89	887.120	85	259	262	57	1.0	
	108	166	.59	.80	889.297	85	260	260	58	>1.0	
	112	171	.53	.71	891.486	85	260	257	58	>1.0	Test was stopped before this point started
	N6	164	.50	.68		85	259	255	59	>1.0	
Averages / Totals					54.866						

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EPA Method 12 (PM) Testing - Field Data Sheet

Run # 2 Sampling Location EAF Baghouse Outlet

Client SDI - CCI	Project # 04-T-275	Schematic of Stack Cross Section	Ambient Temperature (°F) 72 / Barometric Press. (In. Hg) 29.23
Plant Columbia City	Unit ~~CBI 2001~~ EAF	See R-1	Assumed Moisture (%) 3 / Calculated Moisture (%)
Date 8/6/2004	Project Site Columbia City, IN		
Meter Operator Andy Kendall			Nozzle # .195 / Probe Length (ft.) 8
Probe Operator Brandon Peyton			Nozzle Diameter (in.) .195 / Probe Liner Material Glass
			Nozzle Material Stainless Steel / Probe Heater Setting (°F) 255
Control Unit # 507123	Meter Y (C Factor) .992	First traverse point all the way (In) Out	Probe # P-5 / Oven Heater Setting (°F) 255
Filter Oven # 10.11	Meter Delta H@ 1.755	Inside Dimension(s) (in.) / Port Dimen. (in.) / Gas Flow Direction	
Impinger Unit # GSA	Meter K / Orifice Factor 3.185	Diameter 240 / Dia. 4 / In	IGS Bag # / IGS Analyzer #
Pitot # P-8	Pitot Cp .84	L — W — / L 6 / Out ✓	%CO2 / %O2
Pitot Leak Check: Initial ok Final ok			Condensate (ml/g) 29.3 / Silica Gel (g) 12.35
DGM Leak Rate Before: 0.0 CFM @ 15 in. Hg	Filter Number(s)	Blank-2	Total Vlc (ml) 41.65 / Total Acetone Wash (ml)
DGM Leak Rate After: 0.0 CFM @ 5 in. Hg	Front-half Number(s)		Total 0.1 HNO3 Rinse (ml)
Static Pressure (± in. H2O) -.27	Back-half Number(s)		Start Time (24 Hour) 10:20 / Stop Time (24 Hour) 1325

Traverse Point Number	Stop-watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in H2O)	Dry Gas Meter Sample Volume Vm (Ft³)	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (In. Hg)	Notes
	96/24				Initial Volume 893.100						
A 1	4	185	.75	.866	895.087	85	260	258	50	>1.0	Stopped @ 10:30
2	8	172	.62	.83	897.103	86	262	260	50	>1.0	Restarted @ 11:15
3	12	129	.54	.78	899.103	87	260	260	59	>1.0	
4	16	135	.45	.64	900.920	86	258	261	56	>1.0	
5	20	154	.43	.60	902.608	86	256	263	56	>1.0	
6	24	172	.49	.66	904.455	87	255	260	57	>1.0	
B 1	28	190	.54	.71	906.381	87	257	258	60	>1.0	
2	32	215	.49	.62	908.101	87	257	257	62	>1.0	
3	36	224	.45	.56	909.813	88	255	259	64	>1.0	
4	40	219	.51	.64	911.625	88	253	258	65	>1.0	added ice
5	44	205	.56	.72	913.989	88	252	259	63	>1.0	
6	48	193	.79	~~1.04~~ 1.04	915.803	88	253	260	60	>1.0	
C 1	52	186	.89	1.18	918.178	89	256	258	57	2.1	
2	56	~~175~~ 175	.80	1.08	920.541	89	257	259	52	1.9	
3	60	193	.55	.73	922.338	90	255	257	48	>1.0	
4	64	224	.61	.77	924.399	90	254	255	50	1.8	
5	68	230	.57	.72	926.324	91	256	257	50	1.0	
6	72	236	.51	.63	928.107	91	257	258	51	1.0	
D 1	76	~~1006~~ 194	.67	.84	930.211	91	257	259	53	1.8	
2	80	186	.47	.63	932.000	92	259	260	46	1.9	
3	84	176	.59	.81	933.897	92	260	261	46	1.7	
4	88	178	.75	1.03	936.351	93	258	263	47	2.2	
5	92	185	.67	.91	938.699	93	256	265	48	2.0	
6	96	190	.73	.98	941.101	93	254	264	49	2.0	
Averages / Totals											

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EPA Method 12 (PM) Testing - Field Data Sheet

Run # 2 Sampling Location

Client	Project #
Plant	Unit
Date	Project Site
Meter Operator	
Probe Operator	

Schematic of Stack Cross Section

See Page 1 →

Ambient Temperature (°F)	Barometric Press. (in. Hg)
Assumed Moisture (%)	Calculated Moisture (%)

Nozzle #	Probe Length (ft.)
Nozzle Diameter (in.)	Probe Liner Material
Nozzle Material	Probe Heater Setting (°F)
Probe #	Oven Heater Setting (°F)

Control Unit #	Meter Y (C Factor)	
Filter Oven #	Meter Delta H@	
Impinger Unit #	Meter K / Orifice Factor	
Pitot #	Pitot Cp	
Pitot Leak Check: Initial	Final	
DGM Leak Rate Before:	CFM @	in. Hg
DGM Leak Rate After:	CFM @	in. Hg
Static Pressure (± in. H2O)		

First traverse point all the way In Out

Inside Dimension(s) (in.)	Port Dimen. (in.)	Gas Flow Direction
Diameter	Dia.	In
L W	L	Out
Filter Number(s)		
Front-half Number(s)		
Back-half Number(s)		

IGS Bag #	IGS Analyzer #
%CO2	%O2
Condensate (ml/g)	Silica Gel (g)
Total Vlc (ml)	Total Acetone Wash (ml)
Total 0.1 HNO3 Rinse (ml)	
Start Time (24 Hour)	Stop Time (24 Hour) 13:26

Traverse Point Number	Stop-watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 949.101	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
1:40	100	193	.58	.78	943.091	94	256	262	49	1.8	
1:44	104	215	.63	.82	945.113	94	257	261	50	2.1	
1:48	108	219	.54	.70	946.991	94	259	259	50	1.5	
1:52	112	221	.48	.62	948.737	95	258	260	52	1.1	
1:56	116	207	.60	.79	950.800	94	258	261	51	1.8	
	120										
	124										
	128										
Averages / Totals		193.13	.56	.79	57.7	89.93					

DEC 11 2007
DEM OFFICE OF AIR QUALITY
PENDING VALIDATION AS OF

EPA Method 12 (PM) Testing - Field Data Sheet

Run # 3 **Sampling Location** Bag house Outlet Stack

Client	SDI - CIT	Project #	04-T-275
Plant	Steel Mill	Unit	EAF
Date	08-06-04	Project Site	Columbia City, IN
Meter Operator	B. Peyton		
Probe Operator	A. Kendall		

Schematic of Stack Cross Section: see R1

Ambient Temperature (°F)	75	Barometric Press. (in. Hg)	29.23
Assumed Moisture (%)	3	Calculated Moisture (%)	

Nozzle #	N - 195	Probe Length (ft.)	8
Nozzle Diameter (in.)	0.195	Probe Liner Material	Glass
Nozzle Material	Stainless	Probe Heater Setting (°F)	255
Probe #	P - 9	Oven Heater Setting (°F)	255

Control Unit #	507123	Meter Y (C Factor)	0.992
Filter Oven #	1011	Meter Delta H@	1.795
Impinger Unit #	CSA-5	Meter K / Orifice Factor	3.185
Pitot #	P-8	Pitot Cp	0.84
Pitot Leak Check: Initial	OK	Final	OK
DGM Leak Rate Before:	0.0	CFM @ 15	in. Hg
DGM Leak Rate After:	0.0	CFM @ 5	in. Hg
Static Pressure (± in. H2O)	-0.27		

First traverse point all the way (In) Out

Inside Dimension(s) (in.)		Port Dimen. (in.)		Gas Flow Direction
Diameter	240	Dia.	4	In
L	— W ~	L	6	Out ✓

Filter Number(s)	Blank 3		
Front-half Number(s)			
Back-half Number(s)			

IGS Bag #	R-3	IGS Analyzer #	
%CO2		%O2	
Condensate (ml/g)	27.5	Silica Gel (g)	11.05
Total Vlc (ml)	38.55	Total Acetone Wash (ml)	
Total 0.1 HNO3 Rinse (ml)			
Start Time (24 Hour)	14:15	Stop Time (24 Hour)	

Traverse Point Number	Stop-Watch Time: Minutes / Sample Point 96/24	Stack Gas Temp., Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 951.000	Dry Gas Meter Temp. Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (in. Hg)	Notes
D 1	4	166	0.76	1.05	953.300	91	254	256	54	2.6	
2	8	172	0.65	0.90	955.418	93	256	257	54	2.5	Stop 2:30 (Plant)
3	12	151	0.73	1.04	957.709	93	254	255	54	2.7	Start 2:42
4	16	163	0.65	0.91	959.840	93	256	254	54	2.5	
5	20	168	0.63	0.86	961.920	93	255	251	54	2.6	
6	24	192	0.65	0.87	964.020	93	256	257	54	2.5	Stop 14:58 (Plant)
C 1	28	141	0.79	1.13	966.403	86	255	256	56	2.5	Start 16:45
2	32	160	0.61	0.84	968.467	86	254	257	57	2.5	
3	36	191	0.65	0.95	970.541	86	256	256	58	2.5	
4	40	174	0.71	0.93	972.711	86	254	254	56	2.5	
5	44	182	0.73	0.97	974.911	86	254	256	57	2.5	
6	48	170	0.70	0.95	977.115	87	254	254	54	2.5	
B 1	52	157	0.78	1.06	979.445	87	256	253	54	2.5	
2	56	160	0.67	0.89	981.547	87	257	256	56	2.5	
3	60	192	0.64	0.84	983.538	87	254	251	54	2.5	
4	64	197	0.55	0.71	985.492	87	255	250	54	2.5	
5	68	202	0.66	0.86	987.417	87	256	254	57	2.5	
6	72	212	0.65	0.83	989.848	87	257	251	57	2.5	
A 1	76	233	0.49	0.66	991.582	87	256	256	52	2.5	
2	80	227	0.48	0.60	993.308	87	256	254	51	2.5	
3	84	180	0.55	0.73	995.210	87	255	256	52	2.5	
4	88	195	0.77	1.03	997.492	87	264	257	52	2.5	
5	92	198	0.74	1.02	999.761	88	251	261	54	2.5	
6	96	189	0.95	1.12	1002.115	88	255	256	54	2.5	
Averages / Totals											

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EPA Method 12 (PM) Testing - Field Data Sheet

Run # 3 **Sampling Location** Baghouse Outlet Stack

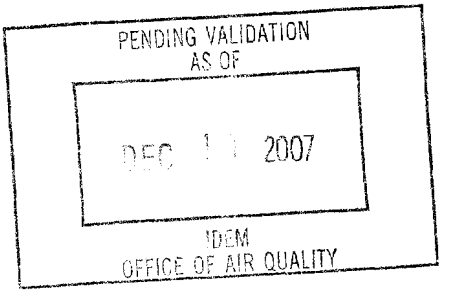
Client	Project # 04-T-279	Schematic of Stack Cross Section	Ambient Temperature (°F) / Barometric Press. (In. Hg)
Plant	Unit EAF		Assumed Moisture (%) / Calculated Moisture (%)
Date	Project Site		
Meter Operator			Nozzle # / Probe Length (ft.)
Probe Operator			Nozzle Diameter (in.) / Probe Liner Material
			Nozzle Material / Probe Heater Setting (°F)
Control Unit #	Meter Y (C Factor)	First traverse point all the way In Out	Probe # / Oven Heater Setting (°F)
Filter Oven #	Meter Delta H@	Inside Dimension(s) (in.) / Port Dimen. (in.) / Gas Flow Direction	
Impinger Unit #	Meter K / Orifice Factor	Diameter ____ / Dia. ____ / In ____	IGS Bag # / IGS Analyzer #
Pitot #	Pitot Cp	L W / L / Out	%CO2 / %O2
Pitot Leak Check: Initial	Final	Filter Number(s)	Condensate (ml/g) / Silica Gel (g)
DGM Leak Rate Before:	CFM @ In. Hg	Front-half Number(s)	Total Vlc (ml) / Total Acetone Wash (ml)
DGM Leak Rate After:	CFM @ in. Hg	Back-half Number(s)	Total 0.1 HNO3 Rinse (ml)
Static Pressure (± in. H2O)			Start Time (24 Hour) / Stop Time (24 Hour) 18:28

Traverse Point Number	Stop-watch Time Minutes / Sample Point	Stack Gas Temp. Ts (°F)	Velocity Head Delta Ps (in. H2O)	Orifice Meter Pressure Differential Delta H (in. H2O)	Dry Gas Meter Sample Volume Vm (Ft³) Initial Volume 1002.115	Dry Gas Meter Temp Tm (°F)	Probe Liner Temp. (°F)	Filter Oven Temp. (°F)	Impinger Outlet Temp. (°F)	Pump Vacuum (In Hg)	Notes
	100	200	0.52	0.68	3.961	88	256	257	48	3.0	
	104	215	0.64	0.81	6.000	88	254	256	49	3.0	
	108	224	0.66	0.85	8.057	88	257	257	50	3.0	
	112	244	0.52	0.63	9.852	88	256	258	50	3.0	
	116	244	0.45	0.55	11.502	88	258	256	50	3.0	
	120	234	0.70	0.85	13.569	88	258	257	50	3.0	
Averages / Totals											

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APPENDIX B

PROCESS OPERATING DATA

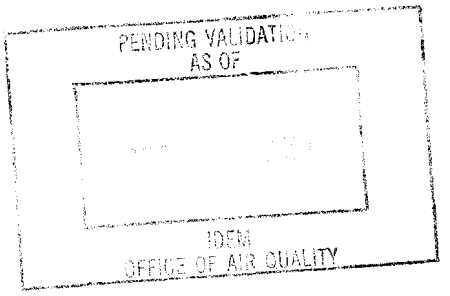


Subject: SDI - Structural Pb testing Production data
Date: Tue, 7 Sep 2004 14:21:02 -0500
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: SDI - Structural Pb testing Production data
Thread-Index: AcSVD9APQFabMR/uQbKb0ga+OYIOSg==
From: <barry.smith@stld.com>
To: <gsa1@myvine.com>,
<guenther@mail.icongrp.com>
Cc: <kevin.bort@stld-cci.com>
X-Alligate-In: Passed - Adult: 0 (Req: 18) Spam: 0 (Req: 18) Tot: 0 (Req: 22)
X-Alligate-QueueFile: 024551177.dta
X-Alligate-EnvID: AE9B03BAF14F6748.AF0462CF453BD2E1@NOCMAILSVC104.ALLTHESITES.ORG
X-Alligate-EnvIP: 63.144.89.198
X-Alligate-RCPT: guenther@mail.icongrp.com
X-Alligate-MBX: guenther@icongrp.com
X-Alligate-EnvFrom: bany.smith@stld.com
X-Alligate-CountryFrom: United States (US)
X-Alligate-SpamProb: 10%

Fred,
You were copied on the 8/13/04 email to Doug Van Demark regarding the production data for the Pb testing. I guess you didn't get it. Here it is again.

	Test Run Tons	Test Run Minutes	HOURS	Tons/hr	Comment
Run #1	243	131	2.2	111	5 minutes hold on heat during test
Run #2	366	141	2.4	156	18 minutes hold on heat during test
Run# 3	322	132	2.2	146	5 minutes hold on heat during test
		Average		138	

Barry



APPENDIX C

LABORATORY ANALYSIS DATA

PENDING VALIDATION
AS OF
2007
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LEAD ANALYSIS

PENDING VALIDATION
AS OF
2007
OFFICE OF AIR QUALITY

TEST REPORT
Page 1 of;2
8/18/04

DATA CHEM LABORATORIES, INC.

Submitted To: Michelle LaLiberty
SAMI
7314 Egypt Rd.
Medina, OH 44256

Reference Data:	Lead
Client Sample No.:	SDI M12 R1 through SDI Blank
P.O. NO.:	04-T-275
Sample Location:	G/SA 04-T-275
Sample Type:	Liquid/Filter
Method Reference:	EPA Method 12/6010B
DCL Set ID No.:	04-S-3924
DCL Sample ID No.:	04-21024 through 21027
Sample Receipt Date:	8/10/2004
Preparation Date:	08/14/04
Analysis Date;	08/16/04

The samples were prepared in accordance with EPA method 12. Sample condition was acceptable upon receipt except where noted. The samples were ,then analyzed in accordance with EPA ..method 6010B using a Thermo Perkin Elmer 3000XL (ICP) purged spectrometer.

The results are provided in the enclosed data table. Results relate only *to* the items tested and are not blank corrected.

This report shall not *be* reproduced except in full, without the written approval of the laboratory.

for
Chris Baugues
Analyst

Reviewer

CINCINNATI OFFICE
4388 GLENDALE-MILFORD ROAD
CINCINNATI, OHIO 45242-3706
513 733-5336, FAX 513 733-5347

PENDING VALIDATION
AS OF
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IDEM
OFFICE OF AIR QUALITY

WEST COAST OFFICE
11 SANTA YORMA COURT
NOVATO, CALIFORNIA 94945
800 280-6071, FAX 415 883-9469

Container Volumes

Client #	DCL #	Liters
SDI M12 R1	04-21024	0.435
SDI M12 R2	04-21025	0.420
SDX M12 R3	04-21026	0.410
SDI Blank	04-21027	0.400

Results
Lead

Client #	DCL #	µg/sample
SDI M12 R1	04-21024	16.
SDI M12 R2	04-21025	15.
SDI M12 R3	04-21026	23.
SDI Blank	04-21027	ND
	Prep Blank	ND
% Recovery	LCS 1	105.
% Recovery	LCS 2	102.
RPL		10.

ND = not detected at or above the reporting limit (RPL).
LCS = laboratory control sample.
NOTE: results are not calculated for dry gas volume.

Chris Baugues
Analyst

Reviewer

PENDING VALIDATION
AS OF
2004
IDEM
OFFICE OF AIR QUALITY

04-J-3404

sami

SAMPLING & ANALYTICAL MANAGEMENT, INC.

318 North Harmony St.
Medina, Ohio 44256
(330) 723-0552
FAX (330) 723-0645

Analysis Request / Environmental Services Chain of Custody

Please Print. Instructions on reverse side correspond with circled numbers

Page ___ of ___

(1) Company Name: SAMI
Report Address:
Billing Address:
City: State: Zip:
Phone: Fax:
Report Attention: MICHELLE
Project Name: G/SA 04-T-27
P.O. #: 04-T-27
Indicate state where samples were collected:
Compliance ☑ Non-Compliance ☐

(2)	Matrix	Time	(3) # of Containers	Preservative	Analysis Requested (4)	(5)	(6)
SOE MIL R1	S/C	0930	1		04 U.S. EPA Method 13	21084A	0.1 N HNO3 FILTER > R1
SOE MIL R1		0930	1			21084B	
SOE MIL R2		1300	1			21085A	0.1 N HNO3 FILTER > R2
SOE MIL R2		1300	1			21085B	
SOE MIL R3		1700	1			21086A	0.1 N HNO3 FILTER > R3
SOE MIL R3		1700	1			21086B	
SOE BLANK		1600	1			21087A	0.1 N HNO3 FILTER > BLANK
SOE BLANK		1600	1			21087B	
							Filter = A
							HNO3 = B

(7) **Turnaround Time Requested** (TAT) (please circle): Normal
Rush (Rush TAT is subject to SAMI approval and surcharge.)
Date results are needed: 8/25/04
Rush results requested by (please circle): Fax Mail
Fax #:

(8) **Notes:** PLEASE RETURN COPIES TO
G/SA
1237 ARROWHEAD CT.
SUITE 2
CROWN POINT, IN 46307

(9) Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	8/24/04	10:01

(10) Custody Seals

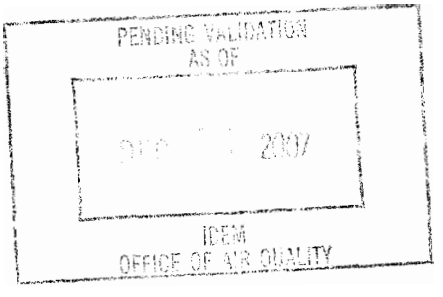
Initial	Final	Receipt

WHITE - FILE • YELLOW - CLIENT • PINK - LAB

PENDING VALIDATION AS OF
SEP 11 2007
OFFICE OF AIR QUALITY
Aug 26 04 Jon & Michelle Laliberte 330-723-0645 p.3

APPENDIX D

REAGENT CERTIFICATIONS AND MATERIAL SAFETY DATA



D.I. WATER

PENDING VALIDATION
AS OF
DEC 17 2007
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OFFICE OF AIR QUALITY

H_2O F.W. 18.0

Specifications

Ultraviolet Absorbance of

Largest Eluted peak (*)	0.001
Residue after Evaporation	1ppm

Certificate of Actual Lot Analysis Available Upon Request

LOT NO. 981909

Date Rec'd / / CAS 7732-18-5

This special product is packaged under conditions of extreme cleanliness. Because both chemical and bacteriological contamination can occur through normal handling and use, it is recommended that the user observe extreme care in all opening, transfer, and closing operations

* Determined using a Waters Associates Model ALC 204 LC; Model 440 UV-VIS detector at 254 nm, 0.02 aufs, 25 cm x 4.6 mm i.d. Zorbax ODS Column: mobile phase, linear gradient from 100% water to 100% acetonitrile at a rate of 5% per minute; flow rate, 2.0 ml per minute.

FILTERED THROUOH A 0.1 MICRON FILTER

Fair Lawn, New Jersey 07410
Made in U.S.A. (201)796-7100

For laboratory and manufacturing use only, not for drug, food, or household use.

4 L

W5SK-4

SaleCote®

FL-05-0588

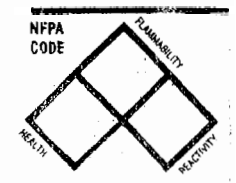
DO NOT TRANSFER TO AN UNMARKED CONTAINER

Water

HPLC GRADE

Fisher *ChemAlert®* Guide G

SAFETY CODE



NO NFPA LISTING

Fisher Chemicals — Fisher Scientific — G

H_2O F.W. 18.0

Specifications

Ultraviolet Absorbance of

largest Eluted peak (*)	0.001
Residue after Evaporation	1ppm

Certificate of Actual Lot Analysis Available Upon Request

LOT NO. 994256

Date Rec'd / / CAS 7732-18-5

This special product is packaged under conditions of extreme cleanliness. Because both chemical and bacteriological contamination can occur through normal handling and use. It is recommended that the user observe extreme care in all opening, transfer, and closing operations

Determined using a Waters Associates Model ALC 204 LC: Model 440 UV-VIS detector at 254 nm, 0.02 aufs 25 cm x 4.8 mm i.d. Zorbax ODS column; mobile phase, linear gradient from 100% water to 100% acetonitrile at a rate of 5% per minute: flow rate, 2.0 ml per minute.

FILTERED THROUGH A 0.1 MICRON FILTER

Fair Lawn, New Jersey 07410
Made in U S A 12011796-7100

For laboratory and manufacturing use only, not for drug, food, or household use.

4 L

W5SK-4

SaleCote®

FL-05-0588

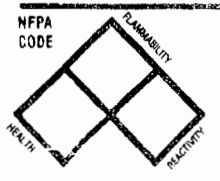
DO NOT TRANSFER TO AN UNMARKED CONTAINER

Water

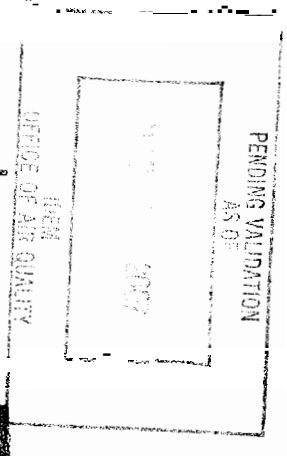
HPLC GRADE

Fisher *ChemAlert®* Guide G

SAFETY CODE



NO NFPA LISTING



NITRIC ACID

PENDING VALIDATION
AS OF
2007
IDEM
OFFICE OF AIR QUALITY

RECEIVED
JUN 2007
OFFICE OF AIR QUALITY
IDEM

DATE: 06/16/03 ACCT: 489428002
INDEX: A31646682 CAT NO: A200212 PO NBR: 03-10326

**** MATERIAL SAFETY DATA SHEET ****

ric Acid

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

Name: Nitric Actd
og Numbers:
571972. S71972MF, S75623-2, S75623-3, S76523, A198C-212, A198C4X-212,
A200-212, A200-500, A200-512GAL, A200C-213, A200C4X-212, A200C4X200H,
A200C4X2122. A200C4X212L, A200J500, A200S-212, A200S-500, A200S4X-212,
A200S4X212L, A200SI-212, A206C-212, A206C4X-212, A467-1, A467-2, A467-250,
A467-500, A483-212, A509-212, A509-500, A509SK-212, S719721, S71972MF,
S71973SC
yms:
Azotic Acid; Engravers Nitrate: Hydrogen Nitrate.
ny Identification: Fisher Scientific
1 Reagent Lane
Fairlawn, NJ 07410
nforrnation, call: 201-796-7100
ency Number: 201-796-7100
HEMTREC assistance, call: 800-424-9300
nternational CHEMTREC assistance. call: 703-527-3887

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
7697-37-2	Nitric acid	63-71	231-714-2
7732-18-5	Water	29-31	231-791-2

Hazard Symbols: O C
Risk Phrases: 35 fl

**** SECTION 3 - HAZARDS IDEMTIFICRTION ****

EMERGENCY OVERVIEW

arance: clear to yellow liquid.
er! Strong oxidizer. Contact with other material may cause a
. Corrosive. Causes eye and skin burns. May cause severe
iratory tract irritation with possible burns. May cause severe
stive tract irritation with possible burns. Check internal
ainer upon receipt. Bottles should be vented periodically to
eve pressure.
et. Organs: Eyes, skin, mucous membranes.

ntial Health Effects
eye:
Causes severe eye burns. May cauae irreversible eye injury. May cause chemicai conjunctivitis and corneal damage.
Skin:
Causes skin burns. May cause deep. penetrating ulcers of the skin. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion:
May cauae severe and permanent damage to the dignative tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. May cause systemic effects.
Inhalation:
Effects may be delayed. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Aspiration may lead to pulmonary edema. May Cause systemic effects. May cause acute pulmonary edema, asphyxia. chemical pneumonitis, and upper airway obstruction caused by edema.
Chronic:
Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion ot teeth. Effects may be delayed.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin:
Get medical aid immediately. Immediately flush akin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion:
Do NOT induce vomiting. If victim in conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately
Inhalation:

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DATE: 06/16/03 ACCT 489628002
INDEX A31646682 CAT NO: A200712 PO NBR: 03-10326

Get medical aid immediately. Remove from exposure to fresh air Immediately. IE not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device ouch as a hag and n mask
Notes to Physician
Treat symptomatically and supportively

**** SECTION 5 - FIRE FIGHTTNG MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure,a MSHA/NIOSH (approved or equivalent), and full protective year. Strong oxidizer. Contact with combustible materials may cause a tire. During a fire, irritating and. highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep Eire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts.
Extinguishing Media:
Substance is noncombustible; use aqent most appropriate to extinguish surrounding fire. Contact professional fire-fighters immediately.
Autoignition Temperature:Not available.
Flash Point: Not available.
Explosion Limits, lower:Not available.
Explosion Limits, upper:Not available.
NFPA Racing: (estimated) Health: 4; Flammability: 0; Instability 0; Specia

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Informatinn: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb Spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which Lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section Neutralize spill with sodium bicarbonate. Provide ventilation. A vapor suppressing foam may be used to reduce vapors

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Do not breathe dust, vapor, mist, or gas. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not get on skin Or in eyes. Avoid ingestion and inhalation. Discard contaminated shoes.
Storage:
Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use Store in a cool, dry, well-ventilated area away from incompatible substances. Bottles should be vented periodically in order to overcome pressure buildup.

**** SECTION 8 - EXPOSURE CONTROLS, PEPSONAL PROTECTION ****

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Nitric acid	2 ppm; 4 ppm STEL	2 ppm TWA; 5 mg/m3 TWA 25 ppm IDLH	2 ppm TWA, 5 mg/m3 TWA
water	none listed	none listed	none listed

OSHA Vacated PELs:
Nitric acid:
2 ppm TWA: 5 mg/m3 TWA
Water:
No OSHA Vacated PELs are Listed for this chemical

Personal Protective Equipment

Eyes.
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin:

Clothing: Wear appropriate gloves to prevent skin exposure
Wear a chemical apron. Wear appropriate clothing to prevent skin exposure

Respirators: Wear a NIOSH/MSHA or European Standard EN 149 approved full-facepiece airline respirator in the positive pressure mode with emergency escape provisions

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

ysical State:	Liquid
lor:	clear to yellow
or:	strong odor - acrid odor
	1.0
por Pressure:	6.8 mm Hg
por Density:	Not available.
aporation Rate:	Not available.
scosity:	Not available.
iling Point:	186.8 deg F
eezing/Melting Point:	-43.6 deg F
composition Temperature:	Not available.
lubility in water:	soluble in water.
ecific Gravity/Density:	1.50
lecular Formula:	HNO3
lecular Weight:	63.0119

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable. Decomposes when in contact with air, light, or organic matter.
Conditions to Avoid:
High temperatures, incompatible materials, ignition sources. moisture, combustible materials, reducing agents.
Incompatibilities with Other Materials:
Reducing agents, combustible materials, strong bases, alcohols. aldehydes, cyanides, metals, Incompatible with many substances..
Hazardous Decomposition Products:
Nitrogen oxides.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7697-37-2: QU5775000 QU5900000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CASU 7697-37-2: Inhalation. cat: LC50 = 67 ppm(NO2)/4H.
CAS# 7732-18-5.
Carcinogenicity:
Nitric acid -
Not listed by ACGIH. IARC, NIOSH, NTP, or OSHA.
Water -
Not listed by ACGIH, IARC. NIOSH, NTP, or OSHA.
Epidemiology:
No information found.
Teratogenicity:
No information found.
Reproductive Effects:
No information found.
Neurotoxicity:
No information found.
Mutagenicity:
No information found.
Other Studies:
See actual entry in RTECS for complete information.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Other
For more information, see "HANDBOOK OF ENVIRONMENTAL FATE AND EXPOSURE DATA."

*** *SECTION 13 - DISPOSAL CONSIDERATIONS ***

hemical waste generators must determine whether a discarded chemical s classified as a hazardous waste.
S EPA guidelines for the classification determination are listed in 0 CFR Parts 261.3. Additionally, waste generators must conoult state nd local hazardous waste regulations to ensure complete and accurate lassification.
CRA P-Series: Nsne listed.
CRA u-Series: None listed.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT

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Shipping Name: NITRIC ACID
Hazard Class: 8
UN Number: UN2031
Packing Group: II
Canadian TDG
Shipping Name: NITRIC ACID
Hazard Class: 8(9.2)
UN Number: UN2031

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL
TSCA
CAS# 7697-37-2 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA Inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List
Chemical Test Rules
NOne of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Uee Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
CERCLA Hazardous Substances and corresponding RQs
CAS# 7697-37-2: 1000 lb final RQ; 454 kg final RQ
SARA section 302 Extremely Hazardous Substances
CASY 7697-37-2: 1000 lb TPQ; 1000 lb EPCRA RO
SARA Codes
CAS # 7697-37-2: acute. chronic, flammable.
Section 313
This material contains Nitric acid (CAS# 7697-37-2, 69 719.1,which is subject to the reporting requirements of section 313 of SARA Title III and 40 CFR Part 372.
Clean Air Act:
This material does not contain any hazardous air pollutants
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CASR 7697-37-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
NOne of the chemicals in chis product are listed as Toxic Pollutants under the CWA.
OSHA.
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
Nitric acid can be found on the following state right to know lists: California. New Jersey, Florida, Pennsylvania, Minnesota. Massachusetts.
Water is not present on state lists from CA, PA. MN. MA, FL, or NJ.
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: O C
Risk Phrases:
R 35 Causes severe burns.
R 8 Contact with combustible material may cause fire
Safety Phrases:
S23B Do not breathe fumes.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36 Wear suitable protective clothing.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
WGK (Water Danger/Protection)
CASU 7697-37-2: 1
CAS# 7732-18-5: No information available
United Kingdom Occupational Exposure Limits
CAS# 7697-37-2: OES-United Kingdom. TWA 2 ppm TWA; 5.2 mg/m3 TWA
CASU 7697-37-2: OES-United Kingdom. STEL 4 ppm STEL; 10 mg/m3 STEL
CAS# 7697-37-2: OES-United Kingdom, STEL 4 ppm STEL; 10 mg/m3 STEL

united Kingdom Maximum Exposure Limits

Canada
CAS# 7697-37-2 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.
This product has a WHMIS classification of C. D1A. E.
CAS# 7697-37-2 is listed on Canada's Ingredient Disclosure List.
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure Lioc.
Exposure Limits
CASU 7697-37-2: OEL-ARAB Republic of Egypt:TWA 2 ppm (5 mg/m3)
OEL-AUSTRALIA:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3)
OEL-BELGIUM:TWA 2 ppm (5.2 mg/m3):STEL 4 ppm (10 mg/m3)

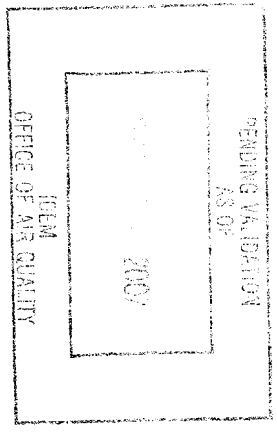
ATE: 06/15/03 ACCT: 489428002
NDEX: A31646682 CAT NO: A200212 PO NBR: 03-10326

OEL-CZECHOSLOVAKIA:TWA 2.5 mg/m3;STEL 5 mg/m3
OEL-DENMARK:TWA 2 ppm (5 mg/m3)
OEL-FINLAND:TWA 2 ppm (5 mg/m3);STEL 5 ppm (13 mg/m3);Skin
OEL-FRANCE:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3)
OEL-GERMANY:TWA 10 ppm (25 mg/m3)
OEL-HUNGARY:STEL 5 mg/m3
OEL-JAPAN:TWA 2 ppm (5.2 mg/m3)
OEL-THE PHILIPPINES:TWA 2 ppm (5 mg/m3)
OEL-POLAND:TWA 10 mg/m3
OEL-RUSSIA:TWA 2 ppm;STEL 2 mg/m3;Skin
OEL-SWEDEN:TWA 2 ppm (5 mg/m3);STEL 5 ppm (13 mg/m3)
OEL-SWITZERLAND:TWA 2 ppm (5 mg/m3);STEL 4 ppm (1 mg/m3)
OEL-THAILAND:TWA 2 ppm (5 mg/m3)
OEL-TURKEY:TWA 2 ppm (5 mg/m3)
OEL-UNITED KINGDOM:TWA 2 ppm (5 mg/m3);STEL 4 ppm (10 mg/m3)
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 9/30/1998 Revision #9 Date: 12/06/2001

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exempla damages, howsoever arising, even if the company has been advised of the possibility of such damages.



Pretest Calibrations

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APEX INSTRUMENTS METHOD 5 POST-TEST CONSOLE CALIBRATION

USING CALIBRATED CRITICAL ORIFICES

3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	507123
Console Serial Number	507123
DGM Model Number	
DGM Serial Number	

Calibration Conditions			
Date	Time		
Barometric Pressure		29.1	in Hg
Theoretical Critical vacuum[1]		13.7	in Hg
Calibration Technician		b. peyton	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	oR/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 In. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 \cdot {}^\circ R^{1/2})/(in.Hg \cdot min)$.

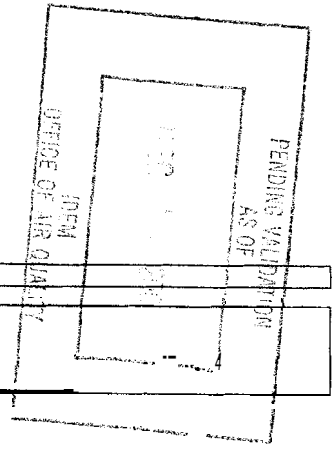
Calibration Data										
Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})		K'	(t_{amb})	(t_{amb})	
min	in H_2O	cubic feet	cubic feet	°F	°F		see above2	°F	°F	in Hg
5.0	0.3	705.500	707.070	80	80	om40	0.2363	70	71	16
5.0	0.3	707.070	708.638	80	80	om40	0.2363	71	71	16
5.0	0.3	708.638	710.208	80	80	om40	0.2363	71	71	16

Results								
Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Corr	0.75 SCFM	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vcr_{(std)}$)	($Q_{cr(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
1.494	0.299	1.492	0.298	0.999	0.000	0.298	1.685	-0.001
1.492	0.298	1.492	0.298	1.000	0.001	0.298	1.686	0.001
1.494	0.299	1.492	0.298	0.999	-0.001	0.298	1.686	0.001
Pretest Gamma		% Deviation	Enter Data	0.999	Y Average		1.686	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature _____ Date _____



S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	G/SA	Date Calibrated	07-30-04
Location	Crown Point, IN	Control Unit ID No.	507123
Project No.	Various	Critical Orifice ID No.	OM40
Technician	B. Peyton	Critical Orifice K' Factor	0.2363

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	707.070	708.638	710.208
Initial Reading	CF	705.500	707.070	708.635
Difference (Vm)	CF	1.570	1.568	1.573
Average Meter Temperature				
Initial	°F	80.0	80.0	80.0
Final	°F	80.0	80.0	80.0
Average (Tm)	°F	69.5	80.0	80.0
Run Time (0)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.28	0.28	0.28
Barometric Pressure (Pbar)	In. Hg	29.09	29.09	29.09
Ambient Temperature (Tamb)	°F	70.0	71.0	71.0
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	1.523	1.492	1.497

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	1.493	1.492	1.492

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y,\ avg < 1.02Y$

=	0.9801	1.000	0.997
Trial 1 -	0.96	0.99	1.00
Trial 2 -	0.98	0.99	1.02
Trial 3 -	0.98	0.99	1.02

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.722	1.692	1.692

RESULTS

Average DGM Y Factor	Unitless	0.992
Average DGM dH@	In. H20	1.702
Average DGM K Factor	Unitless	2.898

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S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST DRY GAS METER CALIBRATION

Client	GISA	Date Calibrated	07-30-04
Location	Crown Point, IN	Control Unit ID No.	507123
Project No.	Various	Critical Orifice ID No.	OM48
Technician	B. Peyton	Critical Orifice K' Factor	0.3496

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	684.330	686.681	688.998
Initial Reading	CF	682.000	684.330	686.681
Difference (Vm)	CF	2.330	2.351	2.317
Average Meter Temperature				
Initial	°F	80.0	80.0	80.0
Final	°F	80.0	80.0	80.0
Average (Tm)	°F	80.0	80.0	80.0
Run Time (Ø)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H20	0.64	0.64	0.64
Barometric Pressure (Pbar)	In. Hg	29.09	29.09	29.09
Ambient Temperature (Tamb)	°F	72.0	72.0	72.0
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	2.219	2.239	2.207

$$Vcr,std = K' Factor \times \frac{Pb \times Ø}{(Tamb + 460)^{1/2}}$$

=	2.205	2.205	2.205

$$Y = \frac{Vcr,std}{Vm,std}$$

Where: 0.98Y < Y, avg < 1.02Y

=	0.994	0.985	0.999
Trial 1 -	0.97	0.99	1.01
Trial 2 -	0.96	0.99	1.00
Trial 3 -	0.98	0.99	1.02

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1.774	1.774	1.774

S.A.T., LLC **Rt. 2, Box 2165, Wheatland, MO 65779** **Tel/Fax (417) 282-6140**

Average DGM Y Factor	Unitless	0.992
Average DGM dH@	In. H20	1.774
Average DGM K Factor	Unitless	3.146

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PRETEST DRY GAS METER CALIBRATION

Client	G/SA	Date Calibrated	07-30-04
Location	Crown Point, IN	Control Unit ID No.	507123
Project No.	Various	Critical Orifice ID No.	OM55
Technician	B. Peyton	Critical Orifice K' Factor	0.4546

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	717.339	720.377	723.409
Initial Reading	CF	714.300	717.339	720.377
Difference (Vm)	CF	3.039	3.038	3.032
Average Meter Temperature				
Initial	°F	80.0	80.0	80.0
Final	°F	80.0	81.0	80.0
Average (Tm)	°F	80.0	80.5	80.0
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H2O	1.10	1.10	1.10
Barometric Pressure (Pbar)	In. Hg	29.09	29.09	29.09
Ambient Temperature (Tamb)	°F	73.0	74.0	74.0
Pump Vacuum	In. Hg	16.0	16.0	16.0

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	1	2	3
	2.898	2.894	2.891

$$Vcr,\ std = K'\ Factor \times \frac{Pb \times O}{(Tamb + 460)1/2}$$

=	1	2	3
	2.864	2.861	2.861

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y, avg < 1.02Y$

=	1	2	3
	0.988	0.989	0.990
Trial 1 -	0.97	0.99	1.01
Trial 2 -	0.97	0.99	1.01
Trial 3 -	0.97	0.99	1.01

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	1	2	3
	1.810	1.812	1.814

RESULTS

Average DGM Y Factor	Unitless	0.989
Average DGM dH@	In. H2O	1.812
Average DGM K Factor	Unitless	3.284

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PRETEST DRY GAS METER CALIBRATION

Client	G/SA	Date Calibrated	07-30-04
Location	Crown Point, IN	Control Unit ID No.	507123
Project No.	Various	Critical Orifice ID No.	OM63
Technician	B. Peyton	Critical Orifice K' Factor	0.5802

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	693.846	697.792	701.744
Initial Reading	CF	690.000	693.946	697.892
Difference (Vm)	CF	3.846	3.846	3.852
Average Meter Temperature				
Initial	°F	80.0	80.0	81.0
Final	°F	80.0	81.0	81.0
Average (Tm)	°F	80.0	80.5	81.0
Run Time (O)	Minutes	5.0	5.0	5.0
DGM Orifice Delta H (dH)	In. H2O	1.80	1.80	1.80
Barometric Pressure (Pbar)	In. Hg	29.09	29.09	29.09
Ambient Temperature (Tamb)	°F	74.0	75.0	75.0
Pump Vacuum	In. Hg	15.8	15.8	15.8

CALCULATIONS

$$Vm,\ std = 17.65 \times Vm \times \frac{Pbar + (dH/13.6)}{(Tm + 460)}$$

=	3.673	3.670	3.672

$$Vcr,\ std = K' \text{ Factor} \times \frac{Pb \times O}{(Tamb + 460)^{1/2}}$$

=	5.706	5.700	5.700

$$Y = \frac{Vcr,\ std}{Vm,\ std}$$

Where: $0.98Y < Y, avg < 1.02Y$

=	1.553	1.553	1.552
Trial 1 -	1.52	1.55	1.58
Trial 2 -	1.52	1.55	1.58
Trial 3 -	1.52	1.55	1.58

$$dH@ = 0.0319 \times dH \times \frac{(Tm + 460) \times Ø^2}{Pbar \times (Y \times Vm)^2}$$

=	0.749	0.750	0.749

RESULTS

Average DGM Y Factor	Unitless	1.553
Average DGM dH@	In. H2O	0.749
Average DGM K Factor	Unitless	0.561

PENDING VALIDATION AS OF

IDEM OFFICE OF AIR QUALITY

S.A.T., LLC Rt. 2, Box 2165, Wheatland, MO 65779 Tel/Fax (417) 282-6140

PRETEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dynamics, Inc.	Control Unit ID No.	507123
Location	EAF	Umbilical ID No.	EU-9
Project No.	04-T-275	Sample Probe ID No.	P9-1
Date	06-20-04	Filter Oven ID No.	1011
Auditor	B. Peyton	Filter Holder OTS ID No	FH-1
Checked By	T. Shackelford	Impinger OTS ID No.	1-4

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 °F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
69	30	69	69	29	67	31

* Ice Bath

Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	0	0	0	-4	0
100 °F	97	96	97	95	97
200 °F	200	199	200	195	
300 °F	298	298	298	296	
400 °F	396	395	395	396	
500 °F	495				
600 °F	598				
700 °F	698				
800 °F	799				
900 °F	897				
1000 °F	998				
1100 °F	1097				
1200 °F	1195				
1300 °F	1296				
1400 °F	1393				
1500 °F	1495				
1600 °F	1597				
1700 °F	1695				
1800 °F	1794				
1900 °F	1895				
2000 °F	1997				
2100 °F	N.A.				

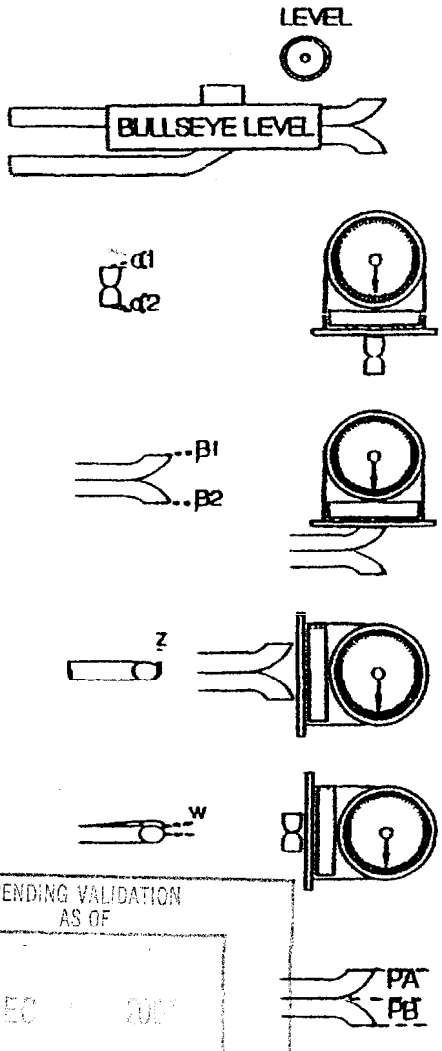
Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	±5.4 °F
Meter	±5.4 °F
Exit	±2.0 °F

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INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Pretest

Tube Assembly Level?	Yes
Ports Damaged?	No
$-10° < \alpha 1 < +10°$	0.5°
$-10° < \alpha 2 < +10°$	1°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	1°
$\gamma =$	0.5
$\theta =$	0.5
$A =$	1.030
$Z = A \sin \gamma \leq \frac{1}{8}''$	0.009
$W = A \sin \theta \leq \frac{1}{a2}''$	0.009
$PA =$	0.51
$PB =$	0.52
Tube Dia. (D_T) =	0.375
$P_A = P_B +/- (.063)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

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I certify that pitot tube/probe number P-9-1 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calibration factor of 0.84. See 40 CFR 60, Vol. 42, No. 160, EPA Method 2

Signature: [signature]

Date: 4-27-04

Pitot Tube Distance to Other Sensors (Circle Yes or No)

		Notes
From Nozzle Opening, >0.75"	(Yes) / No	
Gas Line & Stack T/C, >0.75"	(Yes) / No	
"Z" Clear, Side to T/C, 2.V	(Yes) / No	
"W" Clear, Rear to T/C, 2.0"	(Yes) / No	

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: **Altek Industries Corp.** Recommend Recalibration: **Annually**

Model Number K2100F Factory Calibration Date 9 May 00

Calibration Due _____ Calibration Technician _____

Serial N 10184806 In Service Date 5-16-00

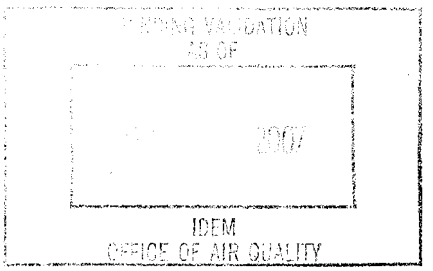
CE DECLARATION OF CONFORMITY CE

The above signature for Altek Industries Corp., 35 Vantage Point Drive, Rochester NY 14624 U.S.A.
Declares that the equipment specified complies with standards EN50081-1 and EN50082-1.
The product complies with the essential requirements of the EMC Directive 89/336/EEC

916000-005 REV-A

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Field Calibrations



CDL of) 04

G/SA , LTD. P.O. Box 807, Crown Point, IN 46308 Tel/Fax (219) 662-7037

METER ORIFICE CHECK, Yc

Client	Steel Dynamics - CCI	Date	08/06/04
Project No.	04-T-275	Control Unit ID No.	507123
Facility	Eletric Arc Furnace	Checked By	Andrew Kendall
Project Site	Columbia City Indiana	Observed By	

INPUT DATA

Dry Gas Meter Parameters	Units	Trials 1	2	3
Total Metered Gas Volume				
Final Reading	CF	838.400		
Initial Reading	CF	830.800		
Difference (Vm)	CF	7.600		
Average Meter Temperature				
Initial	°F	71		
Final	°F	70		
Average (Tm)	°F	70.5		
Run Time	Minutes	10	10	10
Barometric Pressure (Pbar)	In. Hg	29.23		
DGM Y Factor	Dimensionless	0.992		
DGM Delta H@	In. H2O	1.785		

CALCULATIONS

Trial 1 $Yc = 10 / Vm\,[0.0319\,(Tm + 460) / Pbar]^{1/2}$

$Yc = 10 /$ 7.6 $[0.0319\,($ 70.5 $+460) /$ 29.23 $]^{1/2}$

$Yc =$ 1.015

Where: $0.97Y < Yc < 1.03Y$ = 0.962 < 1.015 < 1.022

Trial 2 $Yc = 10 / Vm\,[0.0319\,(Tm + 460) / Pbar]^{1/2}$

$Yc = 10 /$ _____ $[0.0319\,($ _____ $+460) /$ _____ $]^{1/2}$

$Yc =$

Where: $0.97Y < Yc < 1.03Y$ = _____ < _____ < _____

Trial 3 $Yc = 10 / Vm\,[0.0319\,(Tm + 460) / Pbar]^{1/2}$

$Yc = 10 /$ _____ $[0.0319\,($ _____ $+460) /$ _____ $]^{1/2}$

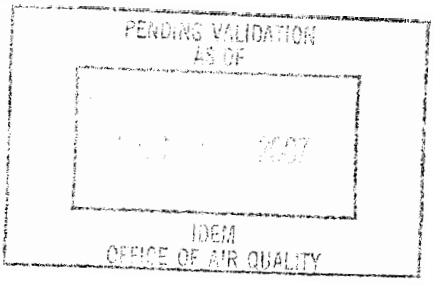
$Yc =$

Where: $0.97Y < Yc < 1.03Y$ = _____ < _____ < _____

Comments: See Section 4.4.1, Method 5, Appendix A, 40 CFR 60

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Post-Test Calibrations



Post-Test Dry Gas Meter Calibration

Client:	Steel Dynamics. Inc.	Operator:	B. Peyton	Calibrated By:	T. Shackelford
Project #:	G/SA 04-T-275	DGM #:	507123	DGM C Factor, Y	0.992
Date(s) Used:	08/06/2004	Date Calibrated:	07130104	DGM Delta H@:	1.785

Trial #1

O, Total (Minutes):	108.0	DGM Sample Volume, Total (Ft³):	54.886
DGM Temperature, Average (°F):	78.4	Pbar (" Hg):	29.23
Delta H, Average (" H2O):	0.760	SGMW, Dry (Lb/Lb-Mole):	28.91

DGM Yqa* = 0.985

Trial #2

O, Total (Minutes):	116.0	DGM Sample Volume, Total (Ft³):	57.7001
DGM Temperature, Average (°F):	89.9	Pbar (" Hg):	29.23
Delta H, Average (" H2O):	0.784	SGMW, Dry (Lb/Lb-Mole):	28.91

DGM Yqa* = 1.033

Trial #3

O, Total (Minutes):	120.0	DGM Sample Volume, Total (Ft³):	62.569
DGM Temperature, Average (°F):	88.2	Pbar (" Hg):	29.23
Delta H, Average (" H2O):	0.867	SGMW, Dry (Lb/Lb-Mole):	28.91

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DGM Yqa* = 1.034

DGM Yqa, Average* = 1.017

where:	0.95Y	<	Yqa, Avg.	<	1.05Y
therefore:	0.942	<	1.017	<	1.042

*See EMTIC GD-026, Alternative Method 5 Post-Test Calibration

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ALTERNATIVE METHOD 5 POST-TEST CALIBRATION

INTRODUCTION AND BACKGROUND

EPA Method 5 requires the calibration of the metering system after each field use, Because the post-test calibration requires the use of a spirometer or wet test meter, the calibration is often conducted in the laboratory. However, a field calibration procedure is highly desirable for two reasons: (1) it eliminates questions about the possibility of the damage to the metering system occurring during transport and (2) it eliminates travel costs for a retest if the metering system fails the post-test calibration.

The alternative post-test calibration procedure described below is based on the principles of the optional pretest orifice meter coefficient check in section 4.4.1 of Method 5- Since the orifice meter coefficient check will not detect leakages between the inlet of the metering system and the dry gas meter, the alternative procedure includes two additional steps: (1) a leak check from either the inlet of the sampling train or the inlet of the metering system and (2) a leak check of that portion of the sampling train from the pump to the orifice meter,

PROCEDURE

The alternative to the post-test calibration in Section 5.3.2 of Method 5 is as follows:

After each test run, do the following:

1. Ensure that the metering system has passed the post-test leak-check. If not, conduct a leak-check of the metering system from its inlet.

2. Conduct the leak-check of that portion of the train from the pump to the orifice meter as described in Section 5.6 of Method 5.

3. calculate Y_{qa} for each test run using the following equation:

$$Y_{qa} = \frac{\theta}{V_m}\sqrt{\frac{0.0319 T_m}{\Delta H_@ \left(P_b + \Delta \frac{H_{avg}}{13.6}\right)}\frac{29}{M_d}}\ (\sqrt{\Delta H})_{avg}$$

where:

Y_{qa} = dry gas meter calibration check value, dimensionless.
θ = total run time, min.
V_m = total sample volume measured by dry gas meter, dcf.
T_m = absolute average dry gas meter temp., °R.
P_b = barometric pressure, in- Hg.
0.0319 = (29.92/528)(0.75)^2 (in. Hg/°/R) cfm^2.
Δh_{avg} = average orifice meter differential, in. H_2O.
$\Delta H@$ = orifice meter calibration coefficient, in. H_2O.
M_d = dry molecular weight of stack gas, lb/lb-mole.
29 = dry molecular weight of air, lb/lb-mole.
13.6 = specific gravity of mercury.

After each test run series, do the following:

4. Average the three or more Y_{qa}'s obtained from the test run series and compare this average Y_{qa} with the dry gas meter calibration factor, Y. The average Y_{qa} must be within 5 percent of Y.

5. If the average Y_{qa} does not meet the ±5 percent criterion, recalibrate the meter over the full range of orifice settings, as detailed in Section 5.3.1 of Method 5. Then follow the procedure in Section 5.3.3 of Method 5.

REFERENCE

1. Roger T. Shigehara, P.G. Royals, and E.W. Steward, "Alternative Method 5 post-Test Calibration", Entropy, Inc, contained in the EMTIC TSAR Library.

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POST-TEST THERMOCOUPLE SYSTEM CALIBRATION AUDIT

Client	Steel Dynamics, Inc.	Control Unit ID No.	507123
/Location	EAF	Umbilical ID No.	U90-1
Project No.	04-T-275	Sample Probe ID No.	P9-1
Date	08-31-04	Filter Oven ID No.	1011
Auditor	B. Peyton	Filter Holder OTS ID No	FH-1
Checked By	T. Shackelford	Impinger OTS ID No.	1-4

AUDIT DEVICES

Reference Thermometer: Type Mercury Range 0 - 180 F

Thermocouple Simulator: Series Altek 22 Model K2100F Type K
Range 0 - 2100 °F Serial No. 10184805

INPUT DATA

Reference Thermometer (Ambient °F)	Control Unit Selector Switch Settings					
	Stack* (°F)	Probe (°F)	Filter (°F)	Auxiliary* (°F)	Meter (°F)	Exit* (°F)
69	30	69	69	29	67	31

* Ice Bath

Thermocouple Simulator Settings	Control Unit Selector Switch Settings				
	Stack (°F)	Probe (°F)	Filter (°F)	Auxiliary (°F)	Exit (°F)
0 °F	0	0	0	-4	0
100 °F	97	96	97	95	97
200 °F	200	199	200	195	
300 °F	298	298	298	296	
400 °F	396	395	395	396	
500 °F	495				
600 °F	598				
700 °F	698				
800 °F	799				
900 °F	897				
1000 °F	998				
1100 °F	1097				
1200 °F	1195				
1300 °F	1296				
1400 °F	1393				
1500 °F	1495				
1600 °F	1597				
1700 °F	1695				
1800 °F	1794				
1900 °F	1895				
2000 °F	1997				
2100 °F	N.A.				

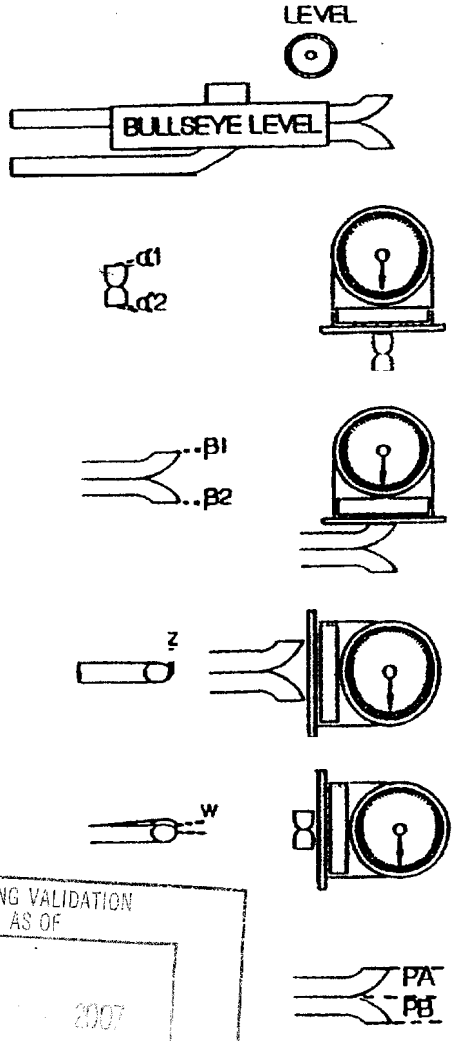
Tolerance Range

Stack	±1.5 % Absolute
Probe	±5.4 °F
Filter	±5.4 °F
Auxiliary	k5.4 °F
Meter	k5.4 °F
Exit	±2.0 °F

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APEX INSTRUMENTS
SOURCE TESTING EQUIPMENT

Pitot Inspection Form



Post-test

Tube Assembly Level?	Yes
Ports Damaged?	NO
$-10° < \alpha 1 < +10°$	0.5°
$-10° < \alpha 2 < +10°$	1°
$-5° < \beta 1 < +5°$	0°
$-5° < \beta 2 < +5°$	0.5°
$\gamma =$	0°
$\theta =$	0.5°
$A =$	1.030
$Z = A \sin \gamma \leq \frac{1}{8}''$	0
$W = A \sin \theta \leq \frac{1}{32}''$	0.009
$PA =$	0.51
$PB =$	0.52
Tube Dia. (D_T) =	0.374
$P_A = P_B +/- (.083)$	Yes
$1.05 \times D_T \leq P \leq 1.50 \times D_T$	Yes

Note: $P = \frac{(P_A + P_B)}{2}$

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I certify that **pitot tube/probe number** P-9-1 **meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube calbration factor** of 0.84. See 40 **CFR** *60*, **Vol. 42**, No. 160, **EPA Method** 2

Signature: [signature]

Date: 8-30-04

Pitot Tube Distance to Other Sensors	(Circle Yes or No)	Notes
From Nozzle Opening, >0.75"	(Yes) / No	
Gas Line & Stack T/C, >0.75"	(Yes) / No	
"Z" Clear, Side to T/C, 2.0"	(Yes) / No	
"W" Clear, Rear to TIC, 2.0"	(Yes) / No	
"Y" Clear to Union. 3.0"	(Yes) / No	

ALTEK

CERTIFICATE OF CALIBRATION

This is to certify that your Altek Unit has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology within the limits of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.

Certified by: Altek Industries Corp. Recommend Recalibration: Annually

Model Number K2100F Factory Calibration Date 9 May 00

Calibration Due _____ Calibration Technician _____

Serial N 10184806 In Service Date 5-16-00

CE DECLARATION OF CONFORMITY CE

The above signature for Altek Industries Corp., 25 Vantage Point Drive, Rochester NY 14624 U.S.A. Declares that the equipment specified complies with standards EN50081-1 and EN50082-1. The product complies with the essential requirements of the EMC Directive 89/336/EEC

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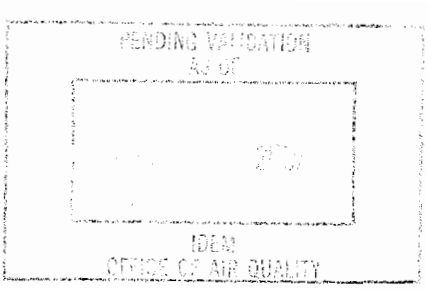
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APPENDIX F

SAMPLE CALCULATIONS, NOMENCLATURE AND EQUATIONS

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SAMPLE CALCULATIONS



EPA METHOD 12

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Sample Calculations Worksheet

Entry of a specific test run, source description and testing parameters will yield a package of sample calculations suitable for reference in any report. However, knowledge of this worksheet is necessary if you want to modify the worksheet to accommodate equations other than those already incorporated at this time. Currently, this worksheet is formatted for EPA Method 51202 (PM/CPM).

To continue, PAGE DOWN for data entry. Input data will automatically be entered into equations in the cells to the right of this screen (TAB RIGHT). To continue viewing equations from the first page, use PAGE DOWN after TAB RIGHT.

It should be noted that minor round-off differences may be noticed as you compare results from this spreadsheet with results derived from other spreadsheets. However, final result variance is usually insignificant.

Sample Calculations Data Entry Section

Client: STEEL DYNAMICS, INC. Project #: GISA 04-T-275
Location: ELECTRIC ARC FURNACE BAGHOUSE OUTLET
Run #: 1

Total Sampling Time, min (Ø)	108.0
Average Process Rate, TPH (Rp	111.0
Stack Area, ft² (A)	314.2
Barometric Pressure, in. Hg (Pbar)	29.23
Static Pressure, in. H20 (Ps)	-0.30
Pitot Tube Coefficient, dimensionless (Cp)	0.84
Dry Gas Meter Corr. Factor, dimensionless (Y)	0.992
Nozzle Area, ft² (An)	0.000207
Metered Gas Volume, ft³ (Vm)	54.886
Average Meter Temperature, °F (Tm)	78.4
Stack Gas Temperature, °F (Ts)	158.9
Meter Orifice Pressure, in. H20 (dH)	0.760
Average Sqrt. of Velocity Head, in. H20 (dP½)	0.752
Volume of H2O Collected, ml (Vlc)	33.2
% Carbon Dioxide (%CO2)	0.6
% Oxygen (%O2)	20.4
% Carbon Monoxide (%CO)	0.0
% Nitrogen, Calculated (%N2)	79.0
Lead (Pb) Concentration, mg (Mn)	0.016
Fuel Burned, lb/hr (from process data)	NA
Btu/lb of Fuel Burned (Hc from fuel analysis)	NA
Fd Factor (dscf/mmBtu)	NA

To add more parameters, PAGE DOWN

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EPA Method 12 (Pb) Sample Calculations

Location: ELECTRIC ARC FURNACE BAGHOUSE OUTLET Client: STEEL DYNAMICS, INC.
Run #: 1 Project #: G/SA 04-T-275

Absolute Stack Gas Pressure (In. Hg):

Pa = Pbar + (±Ps ÷ 13.6)

Pa = 29.23 + (-0.3 ÷ 13.6)

Pa = 29.21

Volume of Water Vapor in Sampled Gas, Standard Conditions (SCF):

Vw, std = 0.04707 × Vlc

Vw, std = 0.04707 x 33.2

Vw, std = 1.563

Volume of Dry Metered Gas, Standard Conditions (DSCF):

Vm, std = (17.65 × Vm × Y × [Pbar + (dH ÷ 13.6)]} ÷ (Tm + 460)

$$Vm,\ std = \frac{\{17.65 \times 54.89 \times 0.992 \times [\ 29.23 + (\ 0.760 \div 13.6)\ ]\}}{(\ 78.4 + 460\ )}$$

Vm, std = 52.272

Moisture Fraction (Dimensionless):

Bws = Vw, std ÷ (Vm, std + Vw, std)

Bws = 1.563 ÷ (52.27 + 1.563)

Bws = 0.029

Molecular Weight of Stack Gas, Dry Basis (Lb/Lb-Mole):

Md = 0.44 × %CO2 + 0.32 × %O2 + [0.28 × (%CO + %N2)]

Md = 0.44 × 0.6 + 0.32 × 20.4 + [0.28 × (0.0 + 79)]

Md = 28.91

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EPA Method 12 (Pb) Sample Calculations

Location: ELECTRIC ARC FURNACE BAGHOUSE OUTLET Client: STEEL DYNAMICS, INC.
Run #: 1 Project #: G/SA 04-T-275

Molecular Weight of Stack Gas, Wet Basis (Lb/Lb-Mole):

Ms = 18 × Bws + [Md × (1 - Bws)]

Ms = 18 × 0.02903 + [28.91 × (- 0.029)]

Ms = 28.60

Velocity of Stack Gas (FPS):

Vs = 85.49 × Cp × sqrt dP × sqrt [(Ts + 460) ÷ (Ms × Pa)]

$$Vs = 85.49 \times 0.84 \times 0.752 \times \sqrt{\left[\left(\frac{158.9 + 460}{28.60 \times 29.21}\right)\right]}$$

Vs = 46.5

Volumetric Flow Rate of Stack Gas, Actual Conditions (ACFM):

Qa = A x Vs × 60

Qa = 314.2 × 46.5 × 60

Qa = 876,360

Volumetric Flow Rate of Stack Gas, Dry Standard Conditions (DSCFM):

Qstd = [17.65 × Qa × Pa × (1 - Bws)] ÷ (Ts + 460)

$$Qstd = \frac{[17.65 \times 876360 \times 29.21 \times (1 - 0.029)]}{(158.9 + 460)}$$

Qstd = 708,785

Isokinetic Sampling (%):

%I = [0.0945 × Vm, std × (Ts + 460)] ÷ [Ø × Vs × Pa × An × (1 - Bws)]

$$\%I = \frac{0.0945 \times 52.27 \times (158.9 + 460)]}{[108 \times 46.5 \times 29.2 \times 0.0002 \times (1 - 0.029)]}$$

%I = 103.7

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EPA Method 12 (Pb) Sample Calculations

Location: ELECTRIC ARC FURNACE BAGHOUSE OUTLET Client: STEEL DYNAMICS, INC.
Run #: 1 Project #: G/SA 04-T-275

TPM Emissions Concentration (Gr/DSCF):

GrIDSCF = 15.435 × Mn ÷ Vm, std

Gr/DSCF = 0.015435 × 0.0160 ÷ 52.27

GrIDSCF = 4.72E-006

TPM Emissions Concentration (Lb/DSCF):

LbIDSCF = GrIDSCF ÷ 7000

Lb/DSCF = 0.000 ÷ 7000

LbIDSCF = 6.75E-010

TPM Emissions Rate (Lb/Hr):

Lb/Hr = LbIDSCF × Qstd × 60

Lb/Hr = 6.75E-010 × 708785 × 60

Lb/Hr = 0.029

TPM Emissions Concentration (lb/TPW):

Lb/TPH = Lb/Hr ÷ TPH

Lb/TPH = 0.029 ÷ 111.0

Lb/TPH = 0.00026

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NOMENCLATURE

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NOMENCLATURE

acf	= actual cubic feet
acfm	= actual cubic feet per minute
A	= inside cross-sectional area of stack or duct (ft^2)
A_n	= inside cross-sectional area of sampling nozzle (ft^2)
%AM	= percent ash moisture content
Btu	= British thermal units
B_{ws}	= water vapor (moisture) in gas stream, proportion by volume
C	= mass conentration of effluent
C_a	= concentration of gaseous analyte (ppmv or %)
C_m	= average of initial and final bias check responses for upscale cal gases
C_{ma}	= actual concentration of upscale cal gases
C_o	= average of initial and final bias check responses for zero or low level cal gases
C_{oa}	= actual concentration of low level cal gases
C_p	= pitot tube coefficient (unitless)
C_s	= sample concentration
C_{s7}	= sample concentration corrected to 7% O_2
C_{s12}	= sample concentration corrected to 12% CO_2
C_{s50}	= sample concentration corrected to 50% excess air
$C_{s50/rga}$	= sample concentration corrected to 50% excess air per raw gas analysis
CEM	= continuous emission monitor
$C_{(1+2)}$	= corrected TGNMO concentration for 1 trap and 2 tanks
%C	= percent carbon by weight, dry basis
%CO	= percent carbon monoxide by volume, dry basis
$\%CO_2$	= percent carbon dioxide by volume, dry basis
dcf	= dry cubic feet
dscf	= dry standard cubic feet
dscfm	= dry standard cubic feet per minute
dsm^3	= dry standard cubic meters
%EA	= percent excess air
F_d	= ratio factor of dry gas volume to heat value of combusted fuel (dscf/mmBtu)
fps	= feet per second
ft^2	= square feet
ft^3	= cubic feet
°F	= degrees Fahrenheit
G_{mfr}	= mass flow rate of stack gas (lb/hr)
gr	= grains
g	= grams
H_c	= heat of combustion, dry basis (Btu/lb)
hr	= hour
ΔH	= average orifice meter pressure differential (in, H_2O)
$\Delta H_@$	= orifice meter calibration factor (in. H_2O)

PENDING VALIDATION
AS OF
2007
IDEM
OFFICE OF AIR QUALITY

NOMENCLATURE, Continued

%H = percent hydrogen by weight, dry basis
%I = percent of isokinetic sampling
in. Hg = inches of mercury
in. H_2O = inches of water
lb = pounds
lb/lb-mole = pound per pound-mole
m = thousand
mm = million
M_b = mass concentration of media blank
M_c = mass concentration of target analyte collected (mg, pg, ng or ppmC)
M_n = mass concentration of PM collected (g)
Mg = megagrams
Mg C = megagram of charge
Mg P = megagrarn of pour
μg = micrograms
meq = milliequivalents
mg = milligrams
ml = milliliters
MW = molecular weight of analyte (lb/lb-mole)
M_d = molecular weight of stack gas, dry basis (lb/lb-mole)
M_s = molecular weight of stack gas, wet basis (lb/lb-mole)
ng = nanograms
N = normality of barium perchlorate titrant (meqiml)
%N = percent nitrogen by weight, dry basis
$\%N_2$ = percent nitrogen by difference, dry basis
%O = percent oxygen by weight, dry basis
$\%O_2$ = percent oxygen by volume, dry basis
pg = picograms
PW = process weight
ppmC = parts per million concentration equivalent
ppmv = parts per million by volume
P_l = particulate loading per heat input in lb/mmBtu per F_d constant
$P_{l'}$ = particulate loading per heat input in lb/mmBtu per F_d calculated
P_a = absolute stack gas pressure (in. Hg)
P_{bar} = barometric pressure at sampling site (in. Hg)
P_s = static stack gas pressure (in. H_2O)
ΔP = stack gas velocity head (in. H_2O)
$\sqrt{\Delta P}$ = average square root of stack gas velocity head (in. H_2O)
Q_a = volumetric stack gas flow rate at actual conditions (acfm)
Q_{std} = volumetric stack gas flow rate corrected to dry standard conditions (dscfm)

PENDING VALIDATION
AS OF
2007
IDEM
OFFICE OF AIR QUALITY

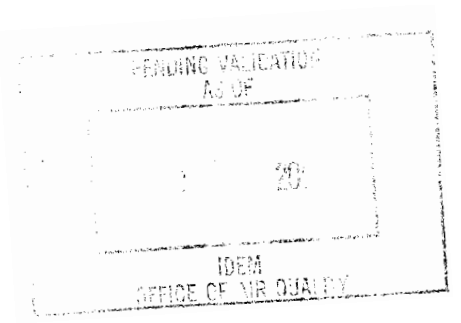
R_{gu} = natural or propane gas usage rate (mscfh)

NOMENCLATURE, Continued

R_{ho} = stack gas density (lb/ft^3)
R_p = process rate (tph)
std = standard conditions at 29.92 in. Hg and 68°F
scf = standard cubic feet
scfh = standard cubic feet per hour
%S = percent sulfur by weight, dry basis
T_m = average dry gas meter temperature (°F)
T_s = average stack gas temperature (°F)
TC = ton of charge
TEQ = toxicity equivalent
TGNMO = total gaseous nonmethane organic
TP = ton of pour
TPH = tons per hour
TPW = ton of process weight
V_a = volume of sample aliquot titrated (ml)
V_{lc} = total volume of liquid condensed in impingers and collected in silica gel (ml)
V_m = total volume of dry metered gas (dcf)
$V_{m, std}$ = volume of dry metered gas corrected to standard conditions (scf)
V_s = stack gas velocity (fps)
V_{soln} = total volume of sample solution (ml)
V_t = average volume of titrant used for sample titration (ml)
V_{tb} = average volume of titrant used for blank titration (ml)
$V_{w. std}$ = volume of water vapor in sampled gas corrected to standard conditions (scf)
Y = dry gas meter calibration (correction) factor (unitless)
θ = total sampling time (minutes)

PENDING VALIDATION
AS OF
2007
IDEM
OFFICE OF AIR QUALITY

EQUATIONS



EQUATIONS

1) Absolute Stack Gas Pressure (in. Hg):

$$P_a = P_{bar} + (\pm P_s \div 13.6)$$

2) Volume of Water Vapor in Sampled Gas, Standard Conditions (scf):

$$V_{w,\,std} = 0.04707 \times V_{lc}$$

3) Volume of Dry Metered Gas, Standard Conditions (scf):

$$V_{m,\,std} = \{17.65 \times V_m \times Y \times [P_{bar} + (\Delta H \div 13.6)]\} \div (T_m + 460)$$

4) Moisture Fraction (unitless):

$$B_{ws} = V_{w,\,std} \div (V_{m,\,std} + V_{w,\,std})$$

5) Molecular Weight of Stack Gas, Dry Basis (lb/lb-mole):

$$M_d = 0.44 \times \%CO_2 + 0.32 \times \%O_2 + [0.28 \times (\%CO + \%N_2)]$$

6) Molecular Weight of Stack Gas, Wet Basis (lb/lb-mole):

$$M_s = 18 \times B_{ws} + [M_d \times (1 - B_{ws})]$$

7) Velocity of Stack Gas (fps):

$$V_s = 85.49 \times C_p \times \sqrt{\Delta P} \times \sqrt{[(T_s + 460) \div (M_s \times P_a)]}$$

8) Volumetric Stack Gas Flow Rate, Actual Conditions (acfm):

$$Q_a = A \times V_s \times 60$$

9) Volumetric Stack Gas Flow Rate, Dry Standard Conditions (dscfm):

$$Q_{std} = [17.65 \times Q_a \times P_a \times (1 - B_{ws})] \div (T_s + 460)$$

10) Isokinetic Sampling (%):

$$\%I = [0.0945 \times V_{m,\,std} \times (T_s + 460)] \div [\theta \times V_s \times P_a \times A_n \times (1 - B_{ws})]$$

PENDING VALIDATION
AS OF
2007
IDEM
OFFICE OF AIR QUALITY

EQUATIONS, Continued

11) PM Concentrations:

$gr/dscf = 15.435 \times M_n \div V_{m,\,std}$

$lb/dscf = gr/dscf \div 7000$

$lb/hr = lb/dscf \times Q_{std} \times 60$

$lb/mmscf = lb/hr \div (R_{,,} \times 1E\text{-}03)$

$lb/tpw = lb/hr \div R_p$

$\mu g/Mg\ pl\text{-}v = lb/tpw \times 5.0E+08$

$lb/mmBtu = 20.9 \times lb/dscf \times F_d \div (20.9 - \%O_2)$

12) Flue Gas Density (lb/ft^3):

$R_{ho} = 0.0458 \times M_s \times P_a \div (T_s + 460)$

13) Gas Mass Flow Rate (lb/hr):

$G_{mfr} = R_{ho} \times acfm \times 60$

14) Excess Combustion Air Per Raw Gas Analysis (%):

$$\%EA = \frac{[\%O_2 - (0.5 \times \%CO)]}{\{0.264 \times \%N_2 - [\%O_2 - (0.5 \times \%CO)]\}} \times 100$$

15) Ash Moisture Content (%):

$\%AM = (net\ loss\ after\ heating) \times 100 \div (net\ loss\ after\ drying)$

16) Target Analyte Concentrations:

$lb/dscf = mg \times 2.205E\text{-}06 \div V_{m,\,std}$

$" = \mu g \times 2.205E\text{-}09 \div V_{m,\,std}$

$" = ng \times 2.205E\text{-}12 \div V_{m,\,std}$

$" = pg \times 2.205E\text{-}15 \div V_{m,\,std}$

PENDING VALIDATION AS OF
DEC 11 2007
IDEM
OFFICE OF AIR QUALITY

EQUATIONS, Continued

" $= ppmC \times V_{soln} \times 2.205E\text{-}09 \div V_{m,\,std}$

lb/hr $= lb/dscf \times Q_{std} \times 60$

17) TGNMO Concentrations:

lb/dscf $= mg\ C/dsm^3 \times 6.243E\text{-}08$

lb/hr $= lb/dscf \times Q_{std} \times 60$

18) TGNMO Concentration Correction for 1 Trap and 2 Tanks:

$$C_{(1+2)} = \frac{[conc.\ (1) \times vol.\ sampled\ (1)] + [conc.\ (2) \times vol.\ sampled\ (2)]}{[vol.\ sampled\ (1) + vol.\ sampled\ (2)]}$$

19) Collection Vessel/CEM Gaseous Analyte Concentrations:

$$lb/dscf = ppmv \times \frac{Molecular\ Weight\ of\ Analyte,\ lb/lb\text{-}mole}{385.3\ dscf/lb\text{-}mole \times 10^6}$$

lb/hr $= lb/dscf \times Q_{std} \times 60$

20) Sample Concentration Corrections:

12% CO_2 (lb/ft³) -

$C_{s12} = C_s \times 12 \div \%CO_2$

7% O_2 (lb/ft³) -

$C_{s7} = C_s \times (20.9 - 7) \div (20.9 - \%O_2)$

50% excess air (lb/ft³) -

$C_{s50} = C_s \times (100 + \%EA) \div 150$

PENDING VALIDATION
AS OF
2007
IDEM
OFFICE OF AIR QUALITY

50% *excess air per raw gas analysis (lb/ft³)* -

$C_{s50/rga} = C_s \div \{1 - [(1.5 \times \%CO_2) - (0.13 \times \%N_2) - (0.75 \times \%CO)] \div 20.9)$

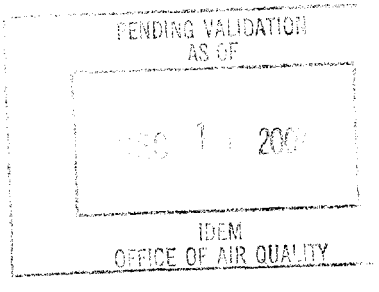
EQUATIONS, Continued

21) Weighted Analyte Concentrations Per Two Ducts:

$lb/dscf_{avg}$ = *(lb/dscf, duct 1 + lb/dscf, duct 2) ÷ 2*

lb/hr_{total} = *lb/hr, duct 1* + *lb/hr, duct 2*

$lb/mmbtu_{avg}$ = *(lb/mmbtu, duct I + lb/mmbtu, duct 2) ÷ 2*

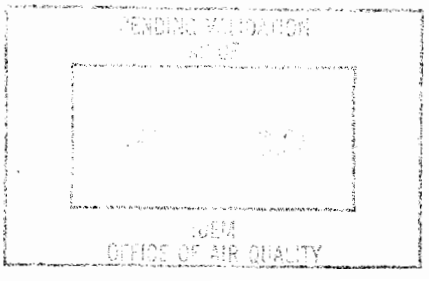


APPENDIX G

CORRESPONDENCE

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AS OF
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TRANSMITTAL OF PROCESS DATA

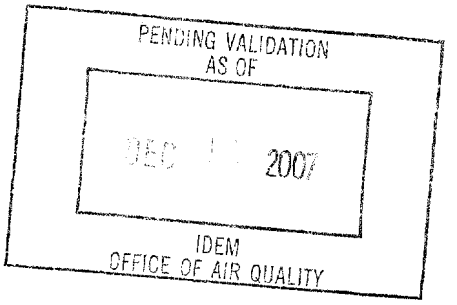


Subject: SDI - Structural Pb testing Production data
Date: Tue, 7 Sep 2004 14:21:02 -0500
X-MS-Has-Attach:
X-MS-TNEF-Correlator:
Thread-Topic: SDI - Structural Pb testing Production data
Thread-Index: AcSVD9APQFabMR/uQbKb0ga+OYIOSg==
From: <barry.smith@stld.com>
To: <gsa1@myvine.com>,
<guenther@mail.icongrp.com>
Cc: <kevin.bort@stld-cci.com>
X-Alligate-In: Passed - Adult: 0 (Req: 18) Spam: 0 (Req: 18) Tot: 0 (Req: 22)
X-Alligate-QueueFile: 024551177.dta
X-Alligate-EnvID: AE9B03BAF14F6748.AF0462CF453BD2E1@NOCMAILSVC104.ALLTHESITES.ORG
X-Alligate-EnvIP: 63.144.89.198
X-Alligate-RCPT: guenther@mail.icongrp.com
X-Alligate-MBX: guenther@icongrp.com
X-Alligate-EnvFrom: barry.smith@stld.com
X-Alligate-CountryFrom: United States (US)
X-Alligate-SpamProb: 10%

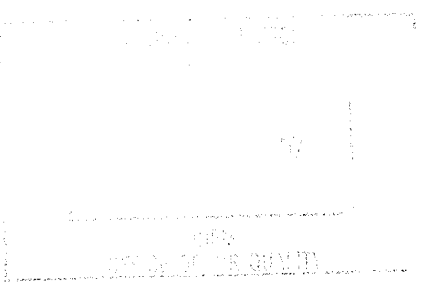
Fred,
You were copied on the 8/13/04 email to Doug Van Demark regarding the production data for the Pb testing. I guess you didn't get it. Here it is again.

	Test Run Tons	Test Run Minutes	HOURS	Tons/hr	Comment
Run #1	243	131	2.2	111	5 minutes hold on heat during test
Run #2	366	141	2.4	156	18 minutes hold on heat during test
Run# 3	322	132	2.2	146	5 minutes hold on heat during test
		Average		138	

Barry



EMISSIONS TEST PROTOCOL



G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	Mr. Barry Smith /Kevin Bort
organization:	Steel Dynamics, Inc.
fax/fax:	(260) 868-8058 / (260) 625-8950
from:	Fred Guenther
date/time:	Wednesday, July 1,2004
subject:	Transmittal of Emissions Test Protocol - SDI CCI, LVD
pages:	7 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTIAL ☐ PLEASE REPLY ASAP
comments:	Attached please find the emissions test protocol submitted to IDEM today. The protocol concerns the testing of the Ladle Vacuum Degasser. We have requested a test date of Friday, August 6,2004. Please note that there are a number of field listed as "To Be Determined." As this information becomes available, we may need to update this protocol. Please feel free to call me with any questions or comments that you may have regarding this fax or its attachments.

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AS OF
2007
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If there is any difficulty with this transmission, please call the number below.

P.O. Box 807 • Crown Point, IN 46308-0807

TEL: (219) 661-9900

FAX: (219) 661-9902

EMAIL: gsa1@myvine.com

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	David Cline
organization:	Indiana Department of Environmental Management
fax/phone:	(317) 233-5967 / (317) 232-8443
from:	Fred Guenther
dateltime:	Wednesday. July 1,2004
subject:	Emissions Test Protocol - Steel Dynamics, Inc. Columbia City, Indiana
pages:	6 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTIAL ☐ PLEASE REPLY ASAP
comments:	Attached please find one (1) Emissions Test Protocol for the testing of the Ladle Vacuum Degasser and associated boiler at Steel Dynamics, Inc.'s plant in Columbia City, Indiana. As noted therein, we are requesting a test date of August 6,2004. Should you have any comments or questions, please feel free to contact us.

If there is any difficulty with this transmission, please call the number below.

P.O. Box 807 ▪ Crown Point, IN 46308-0807

TEL: (219) 661-9900

FAX: (219) 661-9902

GUENTHER / SHACKELFORD ASSOCIATES *ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS*
P. O. Box 807 * Crown Point. Indiana 46307 * (219) 661-9900 / PAX (219) 661-9902

July 1,2004

Mr. David Cline
Compliance Data Section
Compliance Branch
Office of Air Management
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, IN 46206

RE: **TRANSMITTAL - TEST PROTOCOL & PROPOSED TEST DATES**
Steel Dynamics, Inc.
Warsaw, IN
Source Modification No. 183-15170-00030

Dear Mr. Cline:

On behalf of our client, Steel Dynamics, Inc.(SDI), we are providing one (1) Compliance Test Protocol for the testing of the outlet of the Ladle Vacuum Degasser and associated boiler at SDI's plant in Columbia City, Indiana. For your information, I have attached two pages from the permit for this facility to assist in evaluating this protocol. As noted during my telephone conversation with Steve Friend of your staff on June 25,2004, the testing has been scheduled to be performed on August 6, 2004.

Should you have any questions pertaining to the attached protocols or require further information, please feel free to contact me at (219) 661-9900.

Sincerely,
Guenther/Shackelford Associates

Fred H. Guenther
Principal

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AS OF
2007
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Attachments: Emission Test Protocol - Ladle Vacuum Degasser and Boiler (One Page)
Source Modification Permit 183-15170-00030 Pages 13 and 14 of 17 (Two Pages)

cc: Mr. Kevin Bort
Steel Dynamics, Inc.
2601 County Road 700 East
Columbia City, IN 46725

Mr. Barry Smith
Steel Dynamics, Inc.
4500 County Road 59
Butler, IN 46721

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Compliance Test Protocol

Indiana Department of Environmental Management
Office of Air Management/Compliance Data Section
100 N Senate, POB 6015
Indianapolis, IN 46206-6015
Phone: 317/232-8338 Fax: 31712334865

Date Prepared: 7/01/04 **Proposed Test Date: 08/06/04** **Plant Address: 2601 S. County Road 700 E.** **Plant Location: Columbia City, IN 46725**

1. Source Info ID. No.: 183-00030 Permit No.: CP183-15170

Company: Steel Dynamics, Inc.

Mail Address: 2601 S. County Rd. 700 E Mail City: Columbia City, IN 46725

Company Contact: Kevin Bort Phone: (260) 625-8100

Check applicable program:

FESOP: _____ Title V: _____ SSOA: _____

Other: Construction Permit

AGENCY USE ONLY Date Received: _____

Inspector: _____ Reviewer: _____ Approval Date: _____

Other permit conditions: (use back if neededj

2. Tester Information

Name: Guenther/Shackelford Associates

Address: P.O. Box 807, Crown Point, IN 46308

Contact: Fred H. Guenther Phone: (219) 661-9900

5. a. Describe any deviations from standard test method. None

b. Describe method used to determine operating level, Furnace Charge

6. **SAMPLE SITE LOCATION**

Number of sample points for M5: 24

Diameter at sample site: To Be Deter. (TBD) height: TBD

Does Sample port location meet 40 CFR 60, Appx. A, Method 1, Sec. 1.2 requirements: Y_x__ N ___ If no, explain.

Appx. Stack gas flow (ACFM):	TBD
Appx. Stack gas temp (deg. Fj:	TBD
Appx. Stack gas moisture (%):	TBD

3. Process Information (List each piece of equipment to be tested on separate form.)

Unit to Test: Ladle Vacuum Degasser + Boiler

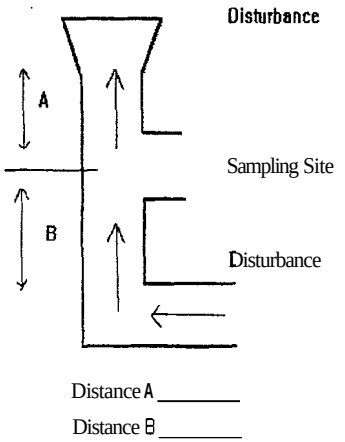
Max. Rated Capacity: 200 T/Hr. + 41.8 MMBtu

Proposed Operating Speed: Maximum Capacity

Process Description: Ladle Vacuum Degasser with associated new boiler

Fuel Type: N/A

To Be Determined



Distance A _____

Distance B _____

Reason for Test
Operating Permit: Yes No X
Construction Permit: Yes X No
State Agreed Order : Yes No X
Compliance _____ Subpart ___ Other : 326 IAC 2-2-3
Title V: Yes No
Other (i.e. EPA, CD, State, 114): _____

4. Test Information: (Use back if needed)	No. Runs	Time/Run
Method 1-4:	3	1 Hr.
Method 5:		
Method 6C :	3	2 Hr.
Method 7E :		
Method 10: F	3	1 Hr.
other : 25A		

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326 **IAC** 3-2.1 **requires this completed form to be submitted** 35 **days prior to proposed test date to above address.** 326 **IAC** 2-1-7 **(a)(b) requires any test fee to be submitted with the protocol.** (FEE NOT APPLICABLE IF PROGRAM IS FESOP, TITLE V OR TESTING VE's ONLY.)

SECTION D.1 **FACILITY OPERATION CONDITIONS**

Facility Description [326 IAC 2-7-5(15)]

one (1) new ladle vacuum degasser (LVD) with a nominal maximum capacity of 200 tons per hour of steel and one (1) new boiler to power the LVD. Gases from the LVD will be directed to the new boiler for combustion in the boiler. The boiler has a nominal maximum heat input capacity of 41.8 MMBtu per hour, and will use natural gas as the primary fuel, with propane used as an emergency back up fuel. Emissions from the boiler will exhaust through stack 40.

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards **[326 IAC 2-7-5(1)]**

D.1.1 PM/PM10 Limitations (PM) [326 IAC 2-2-3] [326 IAC 6-2-4]

(a) Pursuant to 326 IAC 2-2-3 (PSD), the total PM/PM10 (including both filterable and condensible) emissions from the LVD boiler shall not exceed 0.0076 pound per million Btu of heat input and 0.318 pound per hour.

(b) Pursuant to 326 IAC 6-2-4 (Particulate emission limitations for sources of indirect heating: emission limitations for facilities specified in 326 IAC 6-2-1(d)), particulate emissions from the boiler shall not exceed 0.1 pound per million Btu of heat input.

D.1.2 NOx Limitations (PM) [326 IAC 7-7-3]

Pursuant to 326 IAC 2-2-3 (PSD), the NOx emissions from the **LVD** boiler shall not exceed 0.04 pound per million Btu of heat input and 1.67 pounds per hour, unless these limits are adjusted as follows. If the stack test required under Condition D.1.8 shows that these NOx limits are not achievable in practice for the vacuum degasser boiler, the Department may revise the permit to adjust these NOx limitations. If the stack test required under Condition D.1.8 shows that more stringent NOx limits are achievable, the Department may, at its discretion, use the authority under IC 13-15-7-2 to re-open and revise the limit to more closely reflect the actual stack test results. The Department will provide an opportunity for public notice and comment prior to finalizing any permit revision. IC 13-15-7-3 (Revocation or Modification of a Permit: Appeal to Board) shall apply to this permit condition. Any relaxation of the emission limit will require an air quality analysis that ensures protection of the NAAQS and compliance with the PSD increment.

D.1.3 CO Limitations (PM) [326 IAC 7-7-3]

Pursuant to 326 IAC 2-2-3 (PSD), the CO emissions from the **LVD** boiler shall not exceed 0.084 pound per million Btu of heat input and 3.51 pounds per hour, unless these limits are adjusted as follows. If the stack test required under Condition D.1.8 shows that these CO limits are not achievable in practice for the vacuum degasser boiler, the Department may revise the permit to adjust these CO limitations. If the stack test required under Condition D.1.8 shows that more stringent CO limits are achievable, the Department may, at its discretion, use the authority under IC 13-15-7-2 to re-open and revise the limit to more closely reflect the actual stack test results. The Department will provide an opportunity for public notice and comment prior to finalizing any permit revision. IC 13-15-7-3 (Revocation or Modification of a Permit: Appeal to Board) shall apply to this permit condition. Any relaxation of the emission limit will require an air quality analysis that ensures protection of the NAAQS and compliance with the PSD increment.

PENDING VALIDATION
AS OF
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D.1.4 VOC Limitations (PM) [326 IAC 7-7-3]

Pursuant to 326 IAC 2-2-3 (PSD), the VOC emissions from the LVD boiler shall not exceed 0.0026 pound per million Btu of heat input and 0.11 pound per hour.

D.1.5 SO, Limitations (PM) [326 IAC 7-2-3]

Pursuant to 326 IAC 2-2-3 (PSD), the SO, emissions from the LVD boiler shall not exceed 0.0006 pound per million Btu of heat input and 0.025 pound per hour.

D.1.6 Operating Parameters [326 IAC 2-2-3]

Pursuant to 326 IAC 2-2-3 (PSD), the following conditions shall apply:

(a) Only natural gas or propane fuels shall be used in the LVD boiler

(b) The amount of natural gas used in the LVD boiler shall not exceed 209 million cubic feet per 12 consecutive month period.

(c) The amount of propane used in the LVD boiler shall not exceed 222 kilogallons per 12 consecutive month period.

(d) Combustion emissions shall be reduced through the use of good combustion practices.

D.1.7 Preventive Maintenance Plan [326 IAC 2-7-5(13)]

A Preventive Maintenance Plan, in accordance with Section C - Preventive Maintenance Plan, of this permit, is required for the LVD boiler.

Compliance Determination Requirements

D.1.8 Testing Requirements [326 IAC 2-7-6(1),(6)] [326 IAC 2-1.1-11]

Not later than 60 days after achieving maximum capacity, and not later than 180 days after startup, the Permittee shall perform NOx and CO testing on the LVD boiler using methods as approved by the Commissioner. Testing shall be performed in compliance with Section C - Performance Testing.

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.1.9 Record Keeping Requirements [40 CFR 60, Subpart Dc]

(a) Pursuant to 40 CFR 60, Subpart Dc, the Permittee shall maintain records of the amount of each type of fuel combusted in the LVD boiler each day.

(b) In order to demonstrate compliance with Condition D.1.6 (b) and (c), the Permittee shall maintain records of the natural gas and propane usages in the LVD boiler each month.

(c) All records shall be maintained in accordance with Section C - General Record Keeping Requirements, of this permit.

D.1.10 Reporting Requirements

A quarterly summary of the information to document compliance with Condition D.1.6 (b) and (c) shall be submitted to the address listed in Section C - General Reporting Requirements, of this permit, using the reporting form located at the end of this permit, or its equivalent, not later than thirty (30) days after the end of the quarter being reported. The report submitted by the Permittee does require the certification by the "responsible official" as defined by 326 IAC 2-7-1(34).

TRANSMISSION VERIFICATION REPORT

TIME : 07/01/2004 18:04
NAME : G/SA
FAX : 2196619902
TEL : 2196619900
SER.# : 000G3J146776

DATE, TIME	07/01 18:02
FAX NO./NAME	12608688950
DURATION	00:02:03
PAGE(S)	07
RESULT	OK
MODE	STANDARD ECM

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

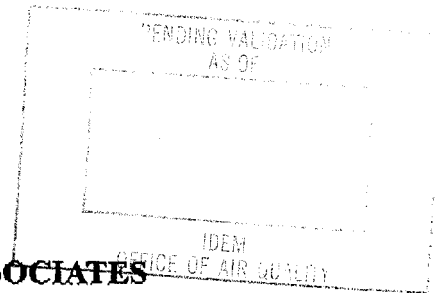
fax transmittal

to:	Mr. Barry Smith /Kevin Bort
organization:	Steel Dynamics, Inc.
fax/fax:	(260) 868-8058 / (260) 625-8950
from:	Fred Guenther
date/time:	Wednesday, July 1,2004
subject;	Transmittal of Emissions Test Protocol - SDI CCI, LVD
pages:	7 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTIAL ☐ PLEASE REPLY *ASAP*

TRANSMISSION VERIFICATION REPORT

TIME : 07/01/2004 17:53
NAME : G/SA
FAX : 2196619902
TEL : 2196619900
SER.# : 000635146776

DATE,TIME	07/01 17:50
FAX NO./NAME	12608688058
DURATION	00:03:15
PAGE(S)	07
RESULT	OK
MODE	STANDARD ECM



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to:	Mr. Barry Smith /Kevin Bort
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fax/fax:	(260) 868-8058 / (260) 625-8950
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TRANSMISSION VERIFICATION REPORT

TIME : 07/01/2004 16:55
NAME : G/SA
FAX : 2196619902
TEL : 2196619900
SER. # : 000635146776

DATE, TIME	07/01 16:53
FAX NO. /NAME	13172335967
DURATION	00:01:47
PAGE(S)	06
RESULT	OK
MODE	STANDARD ECM

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ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

fax transmittal

to:	David Cline
organization:	Indiana Department of Environmental Management
fax/phone:	(317) 233-5967 / (317) 232-8443
from:	Fred Guenther
date/time:	Wednesday, July 1,2004
subject:	Emissions Test Protocol - Steel Dynamics, Inc. Columbian City, Indiana
pages:	5 PAGES INCLUDING THIS PAGE
status:	☒ URGENT ☒ CONFIDENTIAL ☐ PLEASE REPLY ASAP