(21.1)

OFFICE OF AIR MANAGEMENT

OFFICE MEMORANDUM

To: Phil Perry

Date: April 30, 1999

From: Jarrod C. Fisher JCF

Thru: Ed Surla

Subj: Steel Dynamics Inc., Butler, IN
Source ID No. 033-00043
Permit Nos. 033-8091 and 033-9187

The subject company has submitted a report concerning the stack emissions testing at the subject source. The test was conducted by Guenther/Shakelford Associates. The purpose of the testing was to determine the compliance status of the Electric Arc Furnace and the Ladle Metallurgical Station with regards to the emission limitation stated below. The protocol was approved by Scott Stacy and Jarrod Fisher and the field tests were observed by Jarrod Fisher. I have reviewed this report and found the sampling procedures used and results to be acceptable to this Office. A copy of the test report is filed in the Compliance Data Section. The following is a summary of the test results:

Ladle Metallurgical Station
Date of test: February 2, 1999
Identification and Unit No. of Facility Tested: One Ladle Metallurgical Station (LMS)
Pollution Control Equipment: Baghouse
Operating Parameters: The average pressure drop across the baghouse was 6.85 inches of water. The range of pressure drops was 5.6-7.9 inches of water.

Pollutants: PM/PM-10
Test Methods: 1,2,3A,4,5,9,202
Permit No. 033-9187 Operation Condition No. 15 limit (326 IAC 2-2-3): 0.0032 gr/dscf and an average rate of 5.49 lb/hr
Allowable Opacity: 3%

Maximum Permitted Operating Rate: 400 TPH (2 Furnaces Total)
Average Operating Rate During Test: 329 TPH
Average Measured Emissions: PM (Method 5): 0.00034 gr/dscf and 0.47 lb/hr
PM/PM-10 (Method 5+202): 0.00186 gr/dscf and 2.53 lb/hr
Average Opacity: 0%
Highest 6-minute Opacity: 0%

Electric Arc Furnaces and Ladle Metallurgical Station
Dates of test: February 2-3, 1999
Identification and Unit No. of Facility Tested: Two (2) twin shell electric arc furnaces (EAF). One Ladle Metallurgical Station (LMS).
Pollution Control Equipment: Baghouses

Pollutants: SO2, NOX, and CO
Test Methods: 1,2,3A,4,6C,7E,10
Permit No. 033-9187 Operation Condition No. 17 SO2 limit (326 IAC 2-2-3): Combined average of 80.0 lb/hr and combined average concentration of 0.20 lb/ton of steel
Permit No. 033-8091 Operation Condition No. 14 (EAF) and Permit No. 033-9187 Operation Condition No. 18 (LMS) NOX limits (326 IAC 2-2-3): Individual average of 204.0 lb/hr and 0.51 lb/ton of steel for the EAFs. Individual average of 10.0 lb/hr and 0.025 lb/ton of steel for the LMS.
Permit No. 033-8091 Operation Condition No. 15 (EAF) and Permit No. 033-9187 Operation Condition No. 19 (LMS) CO limits (326 IAC 2-2-3): Individual average of 800.0 lb/hr and 2.0 lb/ton of steel for the EAFs. Individual average of 40.0 lb/hr and 0.10 lb/ton of steel for the LMS.

Maximum Permitted Operating Rate : 400 TPH (2 Furnaces Total)
Average Operating Rate During Test (SO2 and NOX tests): 329 TPH
Average Operating Rate During Test (CO test): 273 TPH

Average Measured SO2 Emissions:	EAF:	26.8 lb/hr	0.0815 lb/ton steel
	LMS:	14.2 lb/hr	0.0432 lb/ton steel
	Total:	**41.0 lb/hr**	**0.1247 lb/ton steel**
Average Measured NOX Emissions:	**EAF:**	**186.5 lb/hr**	**0.5669 lb/ton steel**
	LMS:	**5.3 lb/hr**	**0.0161 lb/ton steel**
Average Measured CO Emissions:	**EAF:**	**159.5 lb/hr**	**0.5842 lb/ton steel**
	LMS:	**7.6 lb/hr**	**0.0278 lb/ton steel**

STATUS: In Compliance for LMS sampling of PM/PM-10, SO2, NOX, and CO. In Compliance for EAF sampling of SO2 and CO. **Out of Compliance** for EAF sampling of NOX.

cc: WPS
JCF
Gen. File -- DeKalb Co.
Terry Coleman - Northern R.O.

Steel Dynamics, Inc.
EAF and LMS Stack Test
Steel Production During Emissions Testing
February 2-3, 1999

1 Tap/Furnace per Test Run

RUN NO.	Run Time (hours)	Furn 1, (tons)	Furn 2, (tons)	Furn 3, (tons)	Furn 4, (tons)	TOTAL, (tons)	AVERAGE (tons/hr)
1 (Feb 2)	2:00	166	154	160	163	643	322
2 (Feb 2)	2:00	168	169	161	165	663	332
3 (Feb 2)	2:00	183	166	155	159	663	332
4 (Feb 2)	2:00	165	167	161	155	648	324
5 (Feb 3)	1:00	164	152	160	-	476	476*
6 (Feb 3)	1:00	167	161	158	-	486	486*

PM-10 testing was conducted during Runs 1-3; SO2 and NOX testing was conducted during Runs 2-4; and CO testing was conducted during Runs 4-6.

*Note: On February 3rd 1999, SDI operated 3 of the 4 furnaces during the CO sampling. When calculating the average production during the compliance testing, CDS used the maximum production capacity of the previous day (329 TPH) and multiplied that by 75%. The resulting production capacity (247 TPH) takes into account the absence of 1 furnace during testing.

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

SOURCE EMISSIONS TEST REPORT

PERFORMED FOR
STEEL DYNAMICS, INC.
BUTLER, INDIANA

TWIN SHELL ELECTRIC ARC FURNACE LADLE METALLURGICAL STATION

EPA METHODS 1, 2, 3, 5, 6C, 7E, 9, 10 AND 202

FEBRUARY 2-3, 1999
G/SA PROJECT NO. 99-T-069

Prepared for:

Mr. Barry Smith
Environmental Engineer
Steel Dynamics, Inc.
4500 County Road 59
Butler, IN 46271

SDI™

COMPLIANCE TEST REPORT

STEEL PROCESSING MILL
EAF/LMS
BAGHOUSE OUTLETS
TEST DATA AND RESULTS

SOURCE EMISSIONS COMPLIANCE TESTING
EPA Methods 5, 6C, 7E, 9, 10 and 202
Performed on the
Ladle Metallurgical Station System
Baghouse Outlet
and
EPA Methods 6C, 7E and 10
Performed on the
Twin Shell Electric Arc Furnaces
Baghouse Outlet
at
Steel Dynamics, Inc.
Steel Processing Mill
Butler, Indiana

February 2 & 3, 1999

Project No. 99-T-069

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), near Butler, 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) , and to determine sulfur dioxide (SO_2), nitrogen oxides (NO_X) and carbon monoxide (CO) concentrations from the effluent gas stream of the baghouse serving the Ladle Metallurgical Station (LMS) System, and to determine SO_2, NO_X and CO concentrations from the effluent gas stream of the baghouse serving the Twin Shell Electric Arc Furnaces

(EAF) and associated equipment at SDI's Steel Processing Mill operations to establish outlet emission rates. Also, to conduct visible emissions (VE) observations to determine plume opacities of the flue gas vented from the LMS Baghouse through its exhaust stack to atmosphere.

G/SA's responsibility was to collect and analyze PM/CPM samples, conduct VE observations and instrument monitoring for SO_2, NO_X, and CO, 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 the SDI Steel Processing Mill's operations, emissions testing and analytical results.

The emissions testing conducted on the LMS and EAF Baghouse Outlets was performed on Tuesday, February 2 and Wednesday, February 3, 1999.

The following requirements were specific for the testing program:

1. Equipment calibrations performed and calibration data provided.
2. Three (3), consecutive two (2) hour, minimum, PM/CPM emissions test runs performed at the outlet (exhaust stack) of the LMS Baghouse per IDEM Rule 326 IAC 3-2.1 and NSPS 40 CFR 60.
3. Three (3), consecutive one (1) hour, minimum, SO_2, NO_X, and CO emissions

test runs performed, simultaneously, at the outlets (exhaust stacks) of the LMS and EAF Baghouses.

4. Three (3), consecutive one (1) hour, minimum, VE observations performed on the outlet exhaust of the LMS Baghouse.

5. Process manufacturing capacities and control devices maintained at required operating conditions, and production rates recorded during the emissions testing periods.

6. All testing, observations, monitoring and analyses performed in accordance with current U.S. Environmental Protection Agency (EPA) test methodologies and analytical procedures for PM, SO_2, NO_X, VE, CO and CPM emissions determinations.

7. PM/CPM emissions from the LMS Baghouse shall not exceed an average concentration of 0.0032 gr/dscf and an average rate of 28.8 lb/hr, and a 3% average VE opacity pursuant to IDEM Rule 326 IAC 12-1-1.

8. SO_2 emissions from the LMS and EAF shall not exceed a combined average rate of 80.0 lb/hr and a combined average concentration of 0.20 lb/ton of steel pursuant to IDEM Rule 326 IAC 12-1-1.

9. NO_X emissions from the LMS and EAF shall not exceed individual average rates of 10.0 lb/hr and 204.0 lb/hr, respectively, and individual average concentrations of 0.025 lb/ton of steel and 0.51 lb/ton of steel, respectively, pursuant to IDEM Rule 326 IAC 12-1-1.

10. CO emissions from the LMS and EAF shall not exceed individual average

rates of 40.0 lb/hr and 800.0 lb/hr, respectively, and individual average concentrations of 0.10 lb/ton of steel and 2.0 lb/ton of steel, respectively, pursuant to IDEM Rule 326 IAC 12-1-1.

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 LMS Baghouse are assumed to be ≤10 microns in particle size. Therefore, only EPA Method 5/202 (PM/CPM) sampling was conducted per IDEM's approval.

The emissions testing program was supervised by G/SA, whose headquarters is in Crown Point, Indiana. G/SA also performed VE observations on the LMS Baghouse Outlet, data reduction and prepared in part the final report. The PM/CPM emissions testing, and the stack gas flow rates, carbon dioxide (CO_2), oxygen (O_2) and moisture content determinations conducted at the LMS Baghouse Outlet sampling location 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 PM/CPM analyses and the PM/CPM, SO_2, NO_X and CO data reduction, and in part the final report preparation. The CEM emissions testing for SO_2, NO_X and CO, and carbon dioxide (CO_2) and oxygen (O_2) content, and stack gas flow rates and moisture content determinations conducted at the LMS Baghouse Outlet sampling location were performed by G/SA's subcontractor, Total Source Analysis, Inc. (TSA), whose headquarters is in Wellington, Ohio.

The emissions testing was performed in accordance with EPA Reference Methods 1, 2, 3, 3A, 4, 5 (PM), 6C (SO_2), 7E (NO_X), 9 (VE) and 10 (CO), Title 40, Part 60, Appendix A, and Method 202 (CPM), Title 40, Part 51, Appendix M of the U.S. Code of Federal Regulations and IDEM Rule 326 IAC 3-2.1.

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

Barry Smith, Environmental Engineer, SDI

The emissions testing was performed by the following personnel:

Fred Guenther, Test Supervisor, G/SA

Terry Shackelford, Senior Test Engineer, G/SA (S.A.T.)

Jim McCulloch, Test Engineer, S.A.T.

Ron Segert, Test Technician, G/SA

Rick Howes, Test Engineer, TSA

Gus Dria, Test Engineer, TSA

John Kehl, Test Technician, TSA

Russ Arnt, Test Technician, TSA

The emissions testing was observed by the following personnel:

Jerod Fisher, Environmental Scientist, Air Compliance Section, IDEM

2.0 TEST RESULTS SUMMARY

The source emissions testing was performed utilizing EPA Methods 1, 2, 3, 3A, 4, 5, 6C, 7E, 9, 10 and 202 at the LMS Baghouse Outlet sampling location, and EPA Methods 1, 2, 3A, 4, 6C, 7E and 10 at the EAF Baghouse Outlet sampling location. A summary of the test results is given below:

SAMPLING LOCATION	RUN NO.		PM/CPM *(Gr/DSCF)*	PM/CPM *Lb/Hr*	OPACITY (%)
LMS	1		0.00209 ✓	2.72	0
Baghouse	2		0.00238 ✓	3.37	0
Outlet	3		0.00112 ✓	1.50	0
		Avg.	0.00186 OK	2.53	0

SAMPLING LOCATION	RUN NO.		SO_2 *Lb/Hr*	SO_2 *Lb/Ton Process Weight*
LMS	1		10.8 ✓	0.0218
Baghouse	2		13.2 ✓	0.0318
Outlet	3		18.7 ✓	0.0381
		Avg.	14.2 OK	0.0306

SAMPLING LOCATION	RUN NO.		NO_x *Lb/Hr*	NO_x *Lb/Ton Process Weight*
LMS	1		5.16 ✓	0.0104
Baghouse	2		5.11 ✓	0.0123
Outlet	3		5.69 ✓	0.0116
		Avg.	5.32 OK	0.0114

SAMPLING LOCATION	RUN NO.		CO *Lb/Hr*	CO *Lb/Ton Process Weight*
LMS	1		5.66 ✓	0.0115
Baghouse	2		9.40 ✓	0.0197
Outlet	3		7.65 ✓	0.0157
		Avg.	7.57 OK	0.0157

SAMPLING LOCATION	RUN NO.		SO_2 Lb/Hr	SO_2 Lb/Ton Process Weight
EAF	1		26.0 ✓	0.0526
Baghouse	2		21.0 ✓	0.0504
Outlet	3		33.9 ✓	0.0691
		Avg.	27.0 OK	0.0574

SAMPLING LOCATION	RUN NO.		NO_x Lb/Hr	NO_x Lb/Ton Process Weight
EAF	1		194.7 ✓	0.394
Baghouse	2		183.5 ✓	0.441
Outlet	3		182.4 ✓	0.372
		Avg.	186.9 OK	0.402

SAMPLING LOCATION	RUN NO.		CO Lb/Hr	CO Lb/Ton Process Weight
EAF	1		198.3 ✓	0.404
Baghouse	2		142.6 ✓	0.300
Outlet	3		137.6 ✓	0.283
		Avg.	159.5 OK	0.329

A complete list of test parameters for each Method 5/202, 6C, 7E and 10 emissions test run performed at the LMS sampling location, and each Method 6C, 7E and 10 emissions test run performed at the EAF sampling location can be found in Tables 1 through 4 and Tables 5 through 7, respectively.

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

TABLES

LMS 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 EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	02-Feb-99	02-Feb-99	02-Feb-99
Date	**Stack**	**Stack**	**Stack**
Sampling Location	0940-1149	1400-1609	1705-1913
Test Time, Start-Stop (24 Hour)	120	120	120
Sampling Time (Minutes)	***482***	***494***	***416***
Average Process Tap Rate (TPH)	56.745	56.745	56.745
Stack Area (Ft^2)	0.840	0.840	0.84
Pitot Tube Coefficient (Dimensionless)	0.9860	0.9860	0.9860
Dry Gas Meter Correction Factor (Dimensionless)	0.000322	0.000322	0.000322
Nozzle Area (Ft^2)	28.81	28.81	28.81
Barometric Pressure (In. Hg)	-0.310	-0.310	-0.310
Static Pressure (In. H2O)	103.762	113.489	107.355
Dry Gas Meter Sample Volume (DCF)	50.9	57.3	59.6
Average Dry Gas Meter Temperature (°F)	3.093	3.750	3.369
Average Orifice Meter Delta H (In. H2O)	22.2	22.7	22.1
Volume Condensate Collected (Ml)	0.0	0.1	0.1
Average CO2 Concentration (%)	21.0	21.1	21
Average O2 Concentration (%)	0.855	0.922	0.866
Average Square Root of Delta P (In. H2O½)	118.2	105.7	103.1
Average Stack Gas Temperature (°F)	**0.0139**	**0.0171**	**0.0076**
Total Particulate Matter (Grams, G)			

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.79	28.79
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	102.629	111.059	104.484
Water Vapor Volume at Standard Conditions (SCF)	1.045	1.068	1.040
Moisture Fraction (Dimensionless)	0.010	0.010	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.73	28.76	28.75
Stack Gas Velocity (FPS)	51.3	54.7	51.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	174,661	186,237	174,661
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	151,964	165,616	156,039
Isokinetic Sampling (%)	99.2	98.5	98.3
TPM Emission Concentration (Gr/DSCF)	0.00209	0.00238	0.00112
TPM Emission Concentration (Lb/DSCF)	2.99E-07	3.40E-07	1.60E-07
TPM Emission Rate (Lb/Hr)	2.72	3.37	1.50

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**178,520**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**157,873**
Average TPM Emission Concentration (Gr/DSCF)	**0.00186**
Average TPM Emission Concentration (Lb/DSCF)	**2.66E-07**
Average TPM Emission Rate (Lb/Hr)	**2.53**

Signature of Reviewer: Fred H. Quentter,

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

TABLE 1A
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (FRONT-HALF)

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	02-Feb-99	02-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	0940-1149	1400-1609	1705-1913
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	***482***	***494***	***416***
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.84
Dry Gas Meter Correction Factor (Dimensionless)	0.9860	0.9860	0.9860
Nozzle Area (Ft^2)	0.000322	0.000322	0.000322
Barometric Pressure (In. Hg)	28.81	28.81	28.81
Static Pressure (In. H2O)	-0.310	-0.310	-0.310
Dry Gas Meter Sample Volume (DCF)	103.762	113.489	107.355
Average Dry Gas Meter Temperature (°F)	0.0	0.0	0.0
Average Orifice Meter Delta H (In. H2O)	3.093	3.750	3.369
Volume Condensate Collected (Ml)	22.2	22.7	22.1
Average CO2 Concentration (%)	0.0	0.1	0.1
Average O2 Concentration (%)	21.0	21.1	21
Average Square Root of Delta P (In. $H2O^{1/2}$)	0.855	0.922	0.866
Average Stack Gas Temperature (°F)	118.2	105.7	103.1
Filtered Particulate Matter (Grams, G)	**0.0018**	**0.0031**	**0.0022**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.79	28.79
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	113.988	124.881	118.018
Water Vapor Volume at Standard Conditions (SCF)	1.045	1.068	1.040
Moisture Fraction (Dimensionless)	0.009	0.008	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.77	28.76
Stack Gas Velocity (FPS)	51.3	54.7	51.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	174,661	186,237	174,661
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	151,964	165,616	156,039
Isokinetic Sampling (%)	110.1	110.6	111.0
FPM Emission Concentration (Gr/DSCF)	0.000244	0.000383	0.000288
FPM Emission Concentration (Lb/DSCF)	3.48E-08	5.47E-08	4.11E-08
FPM Emission Rate (Lb/Hr)	0.317	0.544	0.385

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**178,520**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**157,873**
Average FPM Emission Concentration (Gr/DSCF)	**0.000305**
Average FPM Emission Concentration (Lb/DSCF)	**4.36E-08**
Average FPM Emission Rate (Lb/Hr)	**0.415**

Signature of Reviewer: Fred H. Quantius

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

TABLE 1B
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (BACK-HALF)

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	02-Feb-99	02-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	0940-1149	1400-1609	1705-1913
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	***482***	***494***	***416***
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.84
Dry Gas Meter Correction Factor (Dimensionless)	0.9860	0.9860	0.9860
Nozzle Area (Ft^2)	0.000322	0.000322	0.000322
Barometric Pressure (In. Hg)	28.81	28.81	28.81
Static Pressure (In. H2O)	-0.310	-0.310	-0.310
Dry Gas Meter Sample Volume (DCF)	103.762	113.489	107.355
Average Dry Gas Meter Temperature (°F)	0.0	0.0	0.0
Average Orifice Meter Delta H (In. H2O)	3.093	3.750	3.369
Volume Condensate Collected (Ml)	22.2	22.7	22.1
Average CO2 Concentration (%)	0.0	0.1	0.1
Average O2 Concentration (%)	21.0	21.1	21
Average Square Root of Delta P (In. H2O½)	0.855	0.922	0.866
Average Stack Gas Temperature (°F)	118.2	105.7	103.1
Condensed Particulate Matter (Grams, G)	**0.0121**	**0.0140**	**0.0054**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.79	28.79
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	113.988	124.881	118.018
Water Vapor Volume at Standard Conditions (SCF)	1.045	1.068	1.040
Moisture Fraction (Dimensionless)	0.009	0.008	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.77	28.76
Stack Gas Velocity (FPS)	51.3	54.7	51.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	174,661	186,237	174,661
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	151,964	165,616	156,039
Isokinetic Sampling (%)	110.1	110.6	111.0
CPM Emission Concentration (Gr/DSCF)	0.00164	0.00173	0.00071
CPM Emission Concentration (Lb/DSCF)	2.34E-07	2.47E-07	1.01E-07
CPM Emission Rate (Lb/Hr)	2.13	2.46	0.94

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**178,520**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**157,873**
Average CPM Emission Concentration (Gr/DSCF)	**0.00136**
Average CPM Emission Concentration (Lb/DSCF)	**1.94E-07**
Average CPM Emission Rate (Lb/Hr)	**1.85**

Signature of Reviewer: Fred H. Quentter

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

TABLE 1C
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (INORGANICS)

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	02-Feb-99	02-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	0940-1149	1400-1609	1705-1913
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	***482***	***494***	***416***
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.84
Dry Gas Meter Correction Factor (Dimensionless)	0.9860	0.9860	0.9860
Nozzle Area (Ft^2)	0.000322	0.000322	0.000322
Barometric Pressure (In. Hg)	28.81	28.81	28.81
Static Pressure (In. H2O)	-0.310	-0.310	-0.310
Dry Gas Meter Sample Volume (DCF)	103.762	113.489	107.355
Average Dry Gas Meter Temperature (°F)	0.0	0.0	0.0
Average Orifice Meter Delta H (In. H2O)	3.093	3.750	3.369
Volume Condensate Collected (Ml)	22.2	22.7	22.1
Average CO2 Concentration (%)	0.0	0.1	0.1
Average O2 Concentration (%)	21.0	21.1	21
Average Square Root of Delta P (In. H2O½)	0.855	0.922	0.866
Average Stack Gas Temperature (°F)	118.2	105.7	103.1
Inorganic Particulate Matter (Grams, G)	**0.0058**	**0.0068**	**0.0044**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.79	28.79
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	113.988	124.881	118.018
Water Vapor Volume at Standard Conditions (SCF)	1.045	1.068	1.040
Moisture Fraction (Dimensionless)	0.009	0.008	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.77	28.76
Stack Gas Velocity (FPS)	51.3	54.7	51.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	174,661	186,237	174,661
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	151,964	165,616	156,039
Isokinetic Sampling (%)	110.1	110.6	111.0
IPM Emission Concentration (Gr/DSCF)	0.000785	0.000840	0.000575
IPM Emission Concentration (Lb/DSCF)	1.12E-07	1.20E-07	8.22E-08
IPM Emission Rate (Lb/Hr)	1.02	1.19	0.77

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	178,520
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	157,873
Average IPM Emission Concentration (Gr/DSCF)	0.000734
Average IPM Emission Concentration (Lb/DSCF)	1.05E-07
Average IPM Emission Rate (Lb/Hr)	1.00

Signature of Reviewer: Fred H. Quentter

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TABLE 1D
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (ORGANICS)

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	02-Feb-99	02-Feb-99	02-Feb-99
Date	Stack	Stack	Stack
Sampling Location	0940-1149	1400-1609	1705-1913
Test Time, Start-Stop (24 Hour)	120	120	120
Sampling Time (Minutes)	***482***	***494***	***416***
Average Process Tap Rate (TPH)	56.745	56.745	56.745
Stack Area (Ft^2)	0.840	0.840	0.84
Pitot Tube Coefficient (Dimensionless)	0.9860	0.9860	0.9860
Dry Gas Meter Correction Factor (Dimensionless)	0.000322	0.000322	0.000322
Nozzle Area (Ft^2)	28.81	28.81	28.81
Barometric Pressure (In. Hg)	-0.310	-0.310	-0.310
Static Pressure (In. H2O)	103.762	113.489	107.355
Dry Gas Meter Sample Volume (DCF)	0.0	0.0	0.0
Average Dry Gas Meter Temperature (°F)	3.093	3.750	3.369
Average Orifice Meter Delta H (In. H2O)	22.2	22.7	22.1
Volume Condensate Collected (Ml)	0.0	0.1	0.1
Average CO2 Concentration (%)	21.0	21.1	21
Average O2 Concentration (%)	0.855	0.922	0.866
Average Square Root of Delta P (In. $H2O^{1/2}$)	118.2	105.7	103.1
Average Stack Gas Temperature (°F)	**0.0063**	**0.0072**	**0.0010**
Organic Particulate Matter (Grams, G)			

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.79	28.79
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	113.988	124.881	118.018
Water Vapor Volume at Standard Conditions (SCF)	1.045	1.068	1.040
Moisture Fraction (Dimensionless)	0.009	0.008	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.74	28.77	28.76
Stack Gas Velocity (FPS)	51.3	54.7	51.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	174,661	186,237	174,661
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	151,964	165,616	156,039
Isokinetic Sampling (%)	110.1	110.6	111.0
OPM Emission Concentration (Gr/DSCF)	0.00085	0.00089	0.00013
OPM Emission Concentration (Lb/DSCF)	1.22E-07	1.27E-07	1.87E-08
OPM Emission Rate (Lb/Hr)	1.11	1.26	0.17

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**178,520**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**157,873**
Average OPM Emission Concentration (Gr/DSCF)	**0.00062**
Average OPM Emission Concentration (Lb/DSCF)	**8.92E-08**
Average OPM Emission Rate (Lb/Hr)	**0.85**

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TABLE 2
EPA METHOD 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	1	2	3
Date	02-Feb-99	02-Feb-99	02-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1400-1600	1705-1905	2031-2231
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	***494***	***416***	***491***
Stack Area (Ft^2)	56.745✓	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840✓	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9860✓	0.9860	0.9860
Barometric Pressure (In. Hg)	28.81✓	28.81	28.81
Static Pressure (In. H2O)	-0.310✓	-0.310	-0.310
Dry Gas Meter Sample Volume (DCF)	113.489	107.355	89.899
Average Dry Gas Meter Temperature (°F)	57.3	59.6	55.3
Average Orifice Meter Delta H (In. H2O)	3.750	3.369	2.039
Volume Condensate Collected (Ml)	22.7	22.1	7.5
Average CO2 Concentration (%)	0.1	0.1	0.1
Average O2 Concentration (%)	21.1	21.0	21.0
Average Square Root of Delta P (In. H2O½)	0.922	0.866	0.905
Average Stack Gas Temperature (°F)	105.7	103.1	97.1
Average Corrected SO2 Concentration (PPMV)	**6.51**	**8.50**	**11.40**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.79	28.79
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	111.059	104.484	87.920
Water Vapor Volume at Standard Conditions (SCF)	1.068	1.040	0.353
Moisture Fraction (Dimensionless)	0.010	0.010	0.004
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.86	28.86	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.76	28.75	28.81
Stack Gas Velocity (FPS)	54.7	51.3	53.2
Stack Gas Flow Rate at Actual Conditions (ACFM)	186,237	174,661	181,130
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	165,616	156,039	164,552
SO2 Emission Concentration (Gr/DSCF)	0.0076	0.0099	0.0133
SO2 Emission Concentration (Lb/DSCF)	1.08E-06	1.41E-06	1.90E-06
SO2 Emission Rate (Lb/Hr)	10.8	13.2	18.7
SO2 Emission Concentration (Lb/Ton Process Weight)	*0.0218*	*0.0318*	*0.0381*

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**180,676**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**162,069**
Average SO2 Emission Concentration (Gr/DSCF)	**0.0103**
Average SO2 Emission Concentration (Lb/DSCF)	**1.46E-06**
Average SO2 Emission Rate (Lb/Hr)	**14.2**
Average SO2 Emission Concentration (Lb/Ton Process Weight)	***0.0306***

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TABLE 3
EPA METHOD 7E
NITROGEN OXIDES EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	02-Feb-99	02-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1400-1600	1705-1905	2031-2231
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	***494***	***416***	***491***
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9860	0.9860	0.9860
Barometric Pressure (In. Hg)	28.81	28.81	28.81
Static Pressure (In. H2O)	-0.310	-0.310	-0.310
Dry Gas Meter Sample Volume (DCF)	113.489	107.355	89.899
Average Dry Gas Meter Temperature (°F)	57.3	59.6	55.3
Average Orifice Meter Delta H (In. H2O)	3.750	3.369	2.039
Volume Condensate Collected (Ml)	22.7	22.1	7.5
Average CO2 Concentration (%)	0.1	0.1	0.1
Average O2 Concentration (%)	21.1	21.0	21.0
Average Square Root of Delta P (In. H2O½)	0.922	0.866	0.905
Average Stack Gas Temperature (°F)	105.7	103.1	97.1
Average Corrected NOx Concentration as NO2 (PPMV)	**4.35**	**4.57**	**4.83**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.79	28.79
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	111.059	104.484	87.920
Water Vapor Volume at Standard Conditions (SCF)	1.068	1.040	0.353
Moisture Fraction (Dimensionless)	0.010	0.010	0.004
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.86	28.86	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.76	28.75	28.81
Stack Gas Velocity (FPS)	54.7	51.3	53.2
Stack Gas Flow Rate at Actual Conditions (ACFM)	186,237	174,661	181,130
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	165,616	156,039	164,552
NOx Emission Concentration (Gr/DSCF)	0.00364	0.00382	0.00404
NOx Emission Concentration (Lb/DSCF)	5.19E-07	5.46E-07	5.77E-07
NOx Emission Rate (Lb/Hr)	5.16	5.11	5.69
NOx Emission Concentration (Lb/Ton Process Weight)	*0.0104*	*0.0123*	*0.0116*

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**180,676**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**162,069**
Average NOx Emission Concentration (Gr/DSCF)	**0.00383**
Average NOx Emission Concentration (Lb/DSCF)	**5.47E-07**
Average NOx Emission Rate (Lb/Hr)	**5.32**
Average NOx Emission Concentration (Lb/Ton Process Weight)	***0.0114***

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TABLE 4
EPA METHOD 10
CARBON MONOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	03-Feb-99	03-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	2031-2231	1045-1145	1320-1420
Sampling Time (Minutes)	120	60	60
Average Process Tap Rate (TPH)	***491***	***476***	***486***
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9860	0.9860	0.9860
Barometric Pressure (In. Hg)	28.81	28.99	28.99
Static Pressure (In. H2O)	-0.310	-0.330	-0.330
Dry Gas Meter Sample Volume (DCF)	89.899	45.030	45.041
Average Dry Gas Meter Temperature (°F)	55.3	46.6	49.5
Average Orifice Meter Delta H (In. H2O)	2.039	2.039	2.039
Volume Condensate Collected (Ml)	7.5	5.4	6.1
Average CO2 Concentration (%)	0.1	0.1	0.1
Average O2 Concentration (%)	21.0	20.9	21.0
Average Square Root of Delta P (In. H2O½)	0.905	0.863	0.879
Average Stack Gas Temperature (°F)	97.1	108.8	102.4
Average Corrected CO Concentration (PPMV)	**7.88**	**13.83**	**11.00**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.79	28.97	28.97
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	87.920	45.078	44.831
Water Vapor Volume at Standard Conditions (SCF)	0.353	0.254	0.287
Moisture Fraction (Dimensionless)	0.004	0.006	0.006
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.86	28.85	28.86
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.81	28.79	28.79
Stack Gas Velocity (FPS)	53.2	51.2	51.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	181,130	174,321	176,363
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	164,552	155,765	159,383
CO Emission Concentration (Gr/DSCF)	0.00401	0.00704	0.00560
CO Emission Concentration (Lb/DSCF)	5.73E-07	1.01E-06	8.00E-07
CO Emission Rate (Lb/Hr)	5.66	9.40	7.65
CO Emission Concentration (Lb/Ton Process Weight)	*0.0115*	*0.0197*	*0.0157*

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**177,271**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**159,900**
Average CO Emission Concentration (Gr/DSCF)	**0.00555**
Average CO Emission Concentration (Lb/DSCF)	**7.93E-07**
Average CO Emission Rate (Lb/Hr)	**7.57**
Average CO Emission Concentration (Lb/Ton Process Weight)	***0.0157***

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EAF BAGHOUSE OUTLET

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TABLE 5
EPA METHOD 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	02-Feb-99	02-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1400-1600	1705-1905	2030-2230
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	***494***	***416***	***491***
Stack Area (Ft^2)	314.159	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.0220	1.0220	1.0220
Barometric Pressure (In. Hg)	28.81	28.81	28.81
Static Pressure (In. H2O)	-1.150	-1.150	-1.150
Dry Gas Meter Sample Volume (DCF)	89.954	89.916	89.935
Average Dry Gas Meter Temperature (°F)	53.4	51.2	50.8
Average Orifice Meter Delta H (In. H2O)	1.819	1.819	1.819
Volume Condensate Collected (Ml)	28.7	27.9	27.2
Average CO2 Concentration (%)	1.2	1.2	1.3
Average O2 Concentration (%)	20.6	20.7	20.5
Average Square Root of Delta P (In. H2O½)	1.267	1.247	1.228
Average Stack Gas Temperature (°F)	155.0	150.1	167.3
Average Corrected SO2 Concentration (PPMV)	2.17	1.77	2.95

CALCULATED DATA

Absolute Pressure (In. Hg)	28.73	28.73	28.73
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	91.475	91.839	91.918
Water Vapor Volume at Standard Conditions (SCF)	1.351	1.313	1.280
Moisture Fraction (Dimensionless)	0.015	0.014	0.014
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	29.02	29.02	29.03
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.86	28.86	28.88
Stack Gas Velocity (FPS)	78.4	76.8	76.7
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,477,804	1,447,645	1,445,760
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,200,213	1,186,365	1,152,333
SO2 Emission Concentration (Gr/DSCF)	0.00253	0.00206	0.00343
SO2 Emission Concentration (Lb/DSCF)	3.61E-07	2.94E-07	4.91E-07
SO2 Emission Rate (Lb/Hr)	26.0	21.0	33.9
SO2 Emission Concentration (Lb/Ton Process Weight)	*0.0526*	*0.0504*	*0.0691*

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**1,457,070**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**1,179,637**
Average SO2 Emission Concentration (Gr/DSCF)	**0.00267**
Average SO2 Emission Concentration (Lb/DSCF)	**3.82E-07**
Average SO2 Emission Rate (Lb/Hr)	**27.0**
Average SO2 Emission Concentration (Lb/Ton Process Weight)	***0.0574***

Signature of Reviewer: Fred H. Quentin

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TABLE 6
EPA METHOD 7E
NITROGEN OXIDES EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	02-Feb-99	02-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1400-1600	1705-1905	2030-2230
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	***494***	***416***	***491***
Stack Area (Ft^2)	314.159	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.0220	1.0220	1.0220
Barometric Pressure (In. Hg)	28.81	28.81	28.81
Static Pressure (In. H_2O)	-1.150	-1.150	-1.150
Dry Gas Meter Sample Volume (DCF)	89.954	89.916	89.935
Average Dry Gas Meter Temperature (°F)	53.4	51.2	50.8
Average Orifice Meter Delta H (In. H_2O)	1.819	1.819	1.819
Volume Condensate Collected (Ml)	28.7	27.9	27.2
Average CO_2 Concentration (%)	1.2	1.2	1.3
Average O_2 Concentration (%)	20.6	20.7	20.5
Average Square Root of Delta P (In. $H_2O^{1/2}$)	1.267	1.247	1.228
Average Stack Gas Temperature (°F)	155.0	150.1	167.3
Average Corrected NOx Concentration as NO_2 (PPMV)	**22.64**	**21.59**	**22.10**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.73	28.73	28.73
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	91.475	91.839	91.918
Water Vapor Volume at Standard Conditions (SCF)	1.351	1.313	1.280
Moisture Fraction (Dimensionless)	0.015	0.014	0.014
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	29.02	29.02	29.03
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.86	28.86	28.88
Stack Gas Velocity (FPS)	78.4	76.8	76.7
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,477,804	1,447,645	1,445,760
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,200,213	1,186,365	1,152,333
NOx Emission Concentration (Gr/DSCF)	0.0189	0.0180	0.0185
NOx Emission Concentration (Lb/DSCF)	2.70E-06	2.58E-06	2.64E-06
NOx Emission Rate (Lb/Hr)	194.7	183.5	182.4
NOx Emission Concentration (Lb/Ton Process Weight)	*0.394*	*0.441*	*0.372*

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**1,457,070**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**1,179,637**
Average NOx Emission Concentration (Gr/DSCF)	**0.0185**
Average NOx Emission Concentration (Lb/DSCF)	**2.64E-06**
Average NOx Emission Rate (Lb/Hr)	**186.9**
Average NOx Emission Concentration (Lb/Ton Process Weight)	***0.402***

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TABLE 7
EPA METHOD 10
CARBON MONOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 99-T-069
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	02-Feb-99	03-Feb-99	03-Feb-99
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	2030-2230	1045-1145	1320-1420
Sampling Time (Minutes)	120	60	60
Average Process Tap Rate (TPH)	***491***	***476***	***486***
Stack Area (Ft^2)	314.159	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.0220	1.0220	1.0220
Barometric Pressure (In. Hg)	28.81	28.99	28.99
Static Pressure (In. H2O)	-1.150	-1.100	-1.100
Dry Gas Meter Sample Volume (DCF)	89.935	44.401	44.041
Average Dry Gas Meter Temperature (°F)	50.8	55.7	52.0
Average Orifice Meter Delta H (In. H2O)	1.819	1.819	1.819
Volume Condensate Collected (Ml)	27.2	7.4	7.7
Average CO2 Concentration (%)	1.3	1.0	1.1
Average O2 Concentration (%)	20.5	20.7	20.6
Average Square Root of Delta P (In. H2O½)	1.228	1.208	1.260
Average Stack Gas Temperature (°F)	167.3	154.8	156.1
Average Corrected CO Concentration (PPMV)	**39.45**	**28.32**	**26.22**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.73	28.91	28.91
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	91.918	45.231	45.189
Water Vapor Volume at Standard Conditions (SCF)	1.280	0.348	0.362
Moisture Fraction (Dimensionless)	0.014	0.008	0.008
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	29.03	28.99	29.00
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.90	28.91
Stack Gas Velocity (FPS)	76.7	74.4	77.7
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,445,760	1,402,406	1,464,609
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,152,333	1,154,634	1,203,303
CO Emission Concentration (Gr/DSCF)	0.0201	0.0144	0.0133
CO Emission Concentration (Lb/DSCF)	2.87E-06	2.06E-06	1.91E-06
CO Emission Rate (Lb/Hr)	198.3	142.6	137.6
CO Emission Concentration (Lb/Ton Process Weight)	*0.404*	*0.300*	*0.283*

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**1,437,592**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**1,170,090**
Average CO Emission Concentration (Gr/DSCF)	**0.0159**
Average CO Emission Concentration (Lb/DSCF)	**2.28E-06**
Average CO Emission Rate (Lb/Hr)	**159.5**
Average CO Emission Concentration (Lb/Ton Process Weight)	***0.329***

Signature of Reviewer: Fred H. Quentin

3.0 FACILITY DESCRIPTION

Steel Dynamics, Inc. owns and operates a steel processing mill which has the capacity to produce 400 tons of hot rolled coil steel per hour. Tons of iron, scrap steel and various metals are charged into electric arc furnaces (EAF) and transformed to molten steel which is then transferred to a ladle metallurgical station (LMS) for refining.

SDI is located at Dekalb County Roads 44 & 59 near Butler, Indiana.

The SDI steel processing mill consists basically of two (2) twin shell EAF and a LMS system, which were the sources tested for compliance purposes, two (2) water cooled molds, two (2) tunnel furnaces with natural gas-fired burners, four (4) tundish preheaters with natural gas-fired burners, two (2) tundish dryers with natural gas-fired burners, two (2) ladle dry-outs with natural gas-fired burners, six (6) ladle preheaters with natural gas-fired burners; slag processing operations incorporating grizzly/feeders, covered conveyors, material sizing screens and storage piles; carbon, lime and flux additive handling systems with pneumatic conveyors, storage bins and enclosed conveyors to the blending areas at the EAF; and one (1) baghouse dust silo, an emissions side draft evacuation collection system and collection canopies which exhaust to two (2) pulse jet, fabric filter baghouses with 99.85% particulate removal efficiencies and 125' high exhaust stacks. The particulate and gaseous emissions testing was performed on these stacks. See Figures 1 and 2.

The LMS system is composed of two (2) small capacity electric arc heating stations and a central argon stir station. The LMS is capable of handling up to 400 tons of molten steel received from the EAF. Alloys such as ferromanganese, ferrovanadium and ferromagnesium are used to refine the steel to the desired specifications. The steel from the EAF is transferred to the heating stations where alloys are added for melting as the temperature is maintained at approximately 3,000 °F. The ladle is then transferred to the argon stir station where the mixture is stirred magnetically and charged with an argon lance. Calcium-silicon wire is added at this stage to remove remaining impurities. If necessary, the process is repeated until the required specifications are achieved.

During the emissions testing on February 2 and 3, 1999, the process tap rates averaged 470.8 and 481.0 tons of steel per hour, respectively.

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

21.2

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF AIR QUALITY

OFFICE MEMORANDUM

To: Dave Lawrence
Date: 8/24/01
From: Dave Cline DC
Thru: Ed Surla
Subject: Steel Dynamics EAF/LMF SO2, NOx Testing
Source I.D. 033-00043
Permit No. 9187

The subject company has submitted a report concerning SO2 and NOx testing on the Electric Arc Furnace (EAF), and the Ladle Metallurgical Station (LMF) baghouse outlet stacks. The testing was conducted by Guenther/Shackelford and Associates (GSA) using EPA reference methods 1-4, 6c, and 7e. The test protocol was reviewed by Quentin Flory who also observed the testing program. I have reviewed this report and found the sampling procedures used and results obtained to be acceptable to this office. A copy of the test report is filed in the Compliance Data Section. The following is a summary of the test results.

Date of Test: July 26, 2001
Unit Tested: EAF and LMF
Type of Fuel: N/A
Pollution Control Equipment: None

Pollutant:	SO2/NOx
Test Method:	1-4, 6c, 7e
Permit Condition:	#7
Limits:	
SO2: (EAF/LMF combined limit)	80 Lbs/hr and .20 Lbs/Ton steel
NOx: (EAF Only)	204 Lbs/hr and .51 Lbs/Ton steel
Maximum Operating Rate:	400 Tons Per Hr
Average Rate During Test:	418 Tons Per Hr
Average Measured Emissions:	
SO2:	53.13 Lbs/hr (EAF/LMF combined)
	.127 Lbs/Ton steel
NOx:	159.31 Lbs/hr (EAF only)
	.38 Lbs/Ton steel

Status: IN COMPLIANCE (with permitted limits at 104% of maximum rated capacity).

cc: D. Cline
WPS/General File Dekalb County

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

SOURCE EMISSIONS TEST REPORT

PERFORMED FOR
STEEL DYNAMICS, INC.
BUTLER, INDIANA

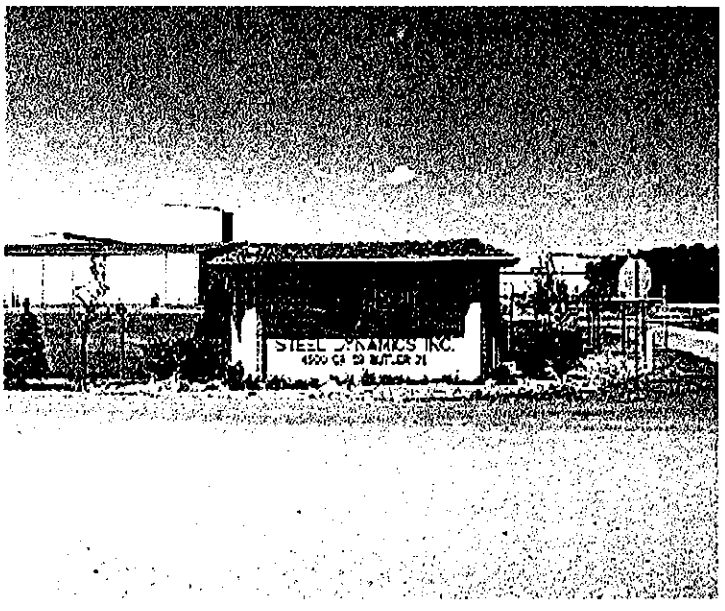
TWIN SHELL ELECTRIC ARC FURNACE
LADLE METALLURGICAL STATION
BAGHOUSE OUTLETS

EPA METHODS 1, 2, 3A, 4, 6C AND 7E

JULY 26, 2001
G/SA PROJECT NO. 01-T-136

Prepared for:

Mr. Barry Smith
Environmental Engineer
Steel Dynamics, Inc.
4500 County Road 59
Butler, IN 46271



SDI™

COMPLIANCE TEST REPORT

STEEL PROCESSING MILL
EAF/LMS
BAGHOUSE OUTLETS
TEST DATA AND RESULTS

SOURCE EMISSIONS COMPLIANCE TESTING
EPA Methods 1, 2, 3A, 4, 6C, and 7E
Performed on the
Twin Shell Electric Arc Furnaces
Baghouse Outlet
and
EPA Methods 1, 2, 3A, 4 and 6C
Performed on the
Ladle Metallurgical Station System
Baghouse Outlet
at
Steel Dynamics, Inc.
Steel Processing Mill
Butler, Indiana

July 26, 2001

Project No. 01-T-136

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), near Butler, Indiana.

The primary purpose of this testing program was to determine through continuous emissions monitoring (CEM) sulfur dioxide (SO_2) and nitrogen oxides (NO_X) concentrations from the effluent gas stream of the baghouse serving the Twin Shell Electric Arc Furnaces (EAF), and to determine SO_2 concentrations of the exhaust gas from the baghouse serving the Ladle Metallurgical Station (LMS) System, and associated equipment at SDI's Steel Processing Mill, to establish outlet emission rates, and to

determine if the emissions discharged into the atmosphere from the EAF and the LMS meet the Indiana Department of Environmental Management (IDEM) source emission limits.

G/SA's responsibility was to conduct instrument monitoring for SO_2 and NO_X ,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 the SDI Steel Processing Mill's operations, emissions testing and analytical results.

The emissions testing conducted on the EAF and LMS Baghouse Outlets was performed on Tuesday, July 26, 2001.

The following requirements were specific for the testing program:

1. Pertinent equipment calibrations performed and calibration data provided.
2. Three (3), consecutive two (2) hour, minimum, SO_2 and NO_X emissions test runs performed at the EAF Baghouse Outlet (exhaust stack), and, simultaneously, three (3), consecutive two (2) hour, minimum, SO_2 emissions test runs performed at the LMS Baghouse Outlet (exhaust stack) per IDEM Rule 326 IAC 3-2.1.

3. Process manufacturing capacities and control devices maintained at required operating conditions, and production rates recorded during the emissions testing periods.

4. All testing, monitoring and analyses performed in accordance with current United States Environmental Protection Agency (USEPA) test methodologies and analytical procedures for SO_2 and NO_X emissions determinations.

5. SO_2 emissions from the EAF and LMS shall not exceed a combined average rate of 80 pounds per hour (lb/hr), and a combined average concentration of 0.20 pounds per ton of steel process weight (lb/tpw) pursuant to IDEM Rule 326 IAC 12-1-1.

6. NO_X emissions from the EAF shall not exceed an average rate of 204 lb/hr and an average concentration of 0.51 lb/tpw pursuant to IDEM Rule 326 IAC 12-1-1.

The emissions testing program was supervised by G/SA, whose headquarters is in Crown Point, Indiana. G/SA also performed stack gas flow rates and moisture content determinations at the EAF Baghouse Outlet sampling location, and in part at the LMS Baghouse Outlet sampling location. G/SA performed the preliminary data reduction and prepared in part the final report. The stack gas flow rates and moisture content determinations at the LMS Baghouse Outlet sampling location were performed in part by G/SA's affiliate, Source Assessment Technologies, LLC (S.A.T.), whose headquarters

is in Wheatland, Missouri. S.A.T. also performed the final SO_2 and NO_x data reduction, and in part the final report preparation. The CEM emissions testing for SO_2 and NO_x concentrations, and carbon dioxide (CO_2) and oxygen (O_2) content conducted at the EAF and LMS Baghouse Outlet sampling locations were performed by G/SA's subcontractor, Grace Consulting, Inc. (GCI), whose headquarters is in Wellington, Ohio.

The emissions testing was performed in accordance with USEPA Reference Methods 1, 2, 3A, 4, 6C (SO_2) and 7E (NO_x), Title 40, Part 60, Appendix A of the U.S. Code of Federal Regulations and IDEM Rule 326 IAC 3-2.1.

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

Barry Smith, Environmental Engineer, SDI

The emissions testing was performed by the following personnel:

Fred Guenther, Test Supervisor, G/SA

Terry Shackelford, Senior Test Engineer, G/SA (S.A.T.)

Brandon Peyton, Test Engineer, G/SA

Gerry Gonzales, Test Technician, G/SA

Tim Hagg, Test Technician, G/SA

Tim Moody, Test Engineer, GCI

Kurt Kinter, Test Engineer, GCI

The emissions testing was observed by the following personnel:

Quintan Flory, Environmental Scientist, Air Compliance Section, IDEM

2.0 TEST RESULTS SUMMARY

The source emissions testing was performed utilizing USEPA Methods 1, 2, 3A, 4, 6C and 7E at the EAF Baghouse Outlet sampling location, and USEPA Methods 1, 2, 3A, 4 and 6C at the LMS Baghouse Outlet sampling location. A summary of the test results is given below:

SAMPLING LOCATION(S)	RUN NO.	COMBINED SO_2, *Lb/Hr*	COMBINED SO_2, *Lb/TPW*
EAF & LMS Baghouse Outlets	1	53.4	0.128
	2	42.9	0.101
	3	63.5	0.153
	Avg.	53.3	0.127
	(Combined Limit:	80 Lb/Hr)	(Combined Limit: 0.20 Lb/TPW)

SAMPLING LOCATION(S)	RUN NO.	NO_x, *Lb/Hr*	NO_x, *Lb/TPW*
EAF Baghouse Outlet	1	173.0	0.413
	2	155.7	0.367
	3	150.1	0.361
	Avg.	159.6	0.380
	(Limit:	204 Lb/Hr)	(Limit: 0.51 Lb/TPW)

A complete list of test parameters for each Method 6C and 7E emissions test run performed at the EAF sampling location, and each Method 6C emissions test run performed at the LMS sampling location can be found in Tables 1 and 2, and Table 3, respectively.

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

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 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 01-T-136
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	26-Jul-01	26-Jul-01	26-Jul-01
Sampling Location	**Exhaust Stack**	**Exhaust Stack**	**Exhaust Stack**
Test Time, Start-Stop (24 Hour)	0700-0914	1015-1220	1258-1510
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	**419.0**	**424.0**	**415.5**
Stack Area (Ft^2)	314.159	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.993	0.993	0.993
Barometric Pressure (In. Hg)	29.21	29.24	29.24
Static Pressure (In. H2O)	-1.00	-1.00	-1.00
Dry Gas Meter Sample Volume (DCF)	93.655	93.242	93.142
Average Dry Gas Meter Temperature (°F)	81.9	83.4	84.5
Average Orifice Meter Delta H (In. H2O)	1.728	1.728	1.728
Volume Condensate Collected (Ml)	44.3	48.1	46.7
Average CO2 Concentration (%)	1.3	1.3	1.2
Average O2 Concentration (%)	19.9	20.0	20.0
Average Square Root of Delta P (In. H2O½)	1.354	1.351	1.378
Average Stack Gas Temperature (°F)	187.7	188.5	192.0
Average Corrected SO2 Concentration (PPMV)	**3.31**	**1.93**	**3.45**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.17	29.17
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	88.867	88.321	88.038
Water Vapor Volume at Standard Conditions (SCF)	2.085	2.264	2.198
Moisture Fraction (Dimensionless)	0.023	0.025	0.024
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	29.00	29.01	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.75	28.73	28.72
Stack Gas Velocity (FPS)	85.5	85.3	87.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,611,636	1,607,866	1,645,565
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,250,322	1,244,588	1,268,231
SO2 Emission Concentration (Gr/DSCF)	0.0039	0.0022	0.0040
SO2 Emission Concentration (Lb/DSCF)	5.50E-07	3.21E-07	5.74E-07
SO2 Emission Rate (Lb/Hr)	41.3	24.0	43.7
SO2 Emission Concentration (Lb/TPW)	0.099	0.057	0.105

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**1,457,070**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**1,254,380**
Average SO2 Emission Concentration (Gr/DSCF)	**0.0034**
Average SO2 Emission Concentration (Lb/DSCF)	**4.82E-07**
Average SO2 Emission Rate (Lb/Hr)	**36.3**
Average SO2 Emission Concentration (Lb/TPW)	**0.087**

Signature of Reviewer: Fred H. Dalton

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 7E
NITROGEN OXIDES EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 01-T-136
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	26-Jul-01	26-Jul-01	26-Jul-01
Sampling Location	**Exhaust Stack**	**Exhaust Stack**	**Exhaust Stack**
Test Time, Start-Stop (24 Hour)	0700-0914	1015-1220	1258-1510
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	**419.0**	**424.0**	**415.5**
Stack Area (Ft^2)	314.159	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.993	0.993	0.993
Barometric Pressure (In. Hg)	29.21	29.24	29.24
Static Pressure (In. H2O)	-1.00	-1.00	-1.00
Dry Gas Meter Sample Volume (DCF)	93.655	93.242	93.142
Average Dry Gas Meter Temperature (°F)	81.9	83.4	84.5
Average Orifice Meter Delta H (In. H2O)	1.728	1.728	1.728
Volume Condensate Collected (Ml)	44.3	48.1	46.7
Average CO2 Concentration (%)	1.3	1.3	1.2
Average O2 Concentration (%)	19.9	20.0	20.0
Average Square Root of Delta P (In. H2O½)	1.354	1.351	1.378
Average Stack Gas Temperature (°F)	187.7	188.5	192.0
Average Corrected NOx Concentration as NO2 (PPMV)	**19.31**	**17.46**	**16.52**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.17	29.17
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	88.867	88.321	88.038
Water Vapor Volume at Standard Conditions (SCF)	2.085	2.264	2.198
Moisture Fraction (Dimensionless)	0.023	0.025	0.024
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	29.00	29.01	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.75	28.73	28.72
Stack Gas Velocity (FPS)	85.5	85.3	87.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,611,636	1,607,866	1,645,565
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,250,322	1,244,588	1,268,231
NOx Emission Concentration (Gr/DSCF)	0.0161	0.0146	0.0138
NOx Emission Concentration (Lb/DSCF)	2.31E-06	2.08E-06	1.97E-06
NOx Emission Rate (Lb/Hr)	173.0	155.7	150.1
NOx Emission Concentration (Lb/TPW)	0.413	0.367	0.361

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**1,457,070**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**1,254,380**
Average NOx Emission Concentration (Gr/DSCF)	**0.0148**
Average NOx Emission Concentration (Lb/DSCF)	**2.12E-06**
Average NOx Emission Rate (Lb/Hr)	**159.6**
Average NOx Emission Concentration (Lb/TPW)	**0.380**

Signature of Reviewer:

LMS BAGHOUSE OUTLET

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

TABLE 3
EPA METHOD 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. PROJECT NO.: 01-T-136
SOURCE TESTED: LMS SYSTEM – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	26-Jul-01	26-Jul-01	26-Jul-01
Sampling Location	**Exhaust Stack**	**Exhaust Stack**	**Exhaust Stack**
Test Time, Start-Stop (24 Hour)	0700-0912	1015-1218	1258-1502
Sampling Time (Minutes)	120	120	120
Average Process Tap Rate (TPH)	**419.0**	**424.0**	**415.5**
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.001	1.001	1.001
Barometric Pressure (In. Hg)	29.21	29.24	29.24
Static Pressure (In. H2O)	-0.51	-0.48	-0.49
Dry Gas Meter Sample Volume (DCF)	90.030	90.695	90.275
Average Dry Gas Meter Temperature (°F)	79.3	94.3	94.1
Average Orifice Meter Delta H (In. H2O)	1.960	1.960	1.960
Volume Condensate Collected (Ml)	33.3	33.0	34.1
Average CO2 Concentration (%)	0.0	0.1	0.1
Average O2 Concentration (%)	20.8	20.8	20.9
Average Square Root of Delta P (In. H2O½)	1.030	1.014	1.046
Average Stack Gas Temperature (°F)	159.8	164.5	158.3
Average Corrected SO2 Concentration (PPMV)	**6.83**	**10.89**	**11.04**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.17	29.20	29.20
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	86.572	84.938	84.583
Water Vapor Volume at Standard Conditions (SCF)	1.567	1.553	1.605
Moisture Fraction (Dimensionless)	0.018	0.018	0.019
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.83	28.85	28.85
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.64	28.65	28.65
Stack Gas Velocity (FPS)	63.7	62.9	64.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	216,879	214,156	219,944
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	176,913	173,555	179,849
SO2 Emission Concentration (Gr/DSCF)	0.0080	0.0127	0.0129
SO2 Emission Concentration (Lb/DSCF)	1.14E-06	1.81E-06	1.84E-06
SO2 Emission Rate (Lb/Hr)	12.1	18.9	19.8
SO2 Emission Concentration (Lb/TPW)	0.029	0.044	0.048

Average Stack Gas Flow Rate at Actual Conditions (ACFM)	**216,993**
Average Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	**176,772**
Average SO2 Emission Concentration (Gr/DSCF)	**0.0103**
Average SO2 Emission Concentration (Lb/DSCF)	**1.59E-06**
Average SO2 Emission Rate (Lb/Hr)	**16.9**
Average SO2 Emission Concentration (Lb/TPW)	**0.040**

Signature of Reviewer:

3.0 FACILITY DESCRIPTION

Steel Dynamics, Inc. owns and operates a steel processing mill which has the capacity to produce 400 tons of hot rolled coil steel per hour. Tons of iron, scrap steel and various metals are charged into electric arc furnaces (EAF) and transformed to molten steel which is then transferred to a ladle metallurgical station (LMS) for refining.

SDI is located at Dekalb County Roads 44 & 59 near Butler, Indiana.

The SDI steel processing mill consists basically of two (2) twin shell EAF and a LMS system, which were the sources tested for compliance purposes, two (2) water cooled molds, two (2) tunnel furnaces with natural gas-fired burners, four (4) tundish preheaters with natural gas-fired burners, two (2) tundish dryers with natural gas-fired burners, two (2) ladle dry-outs with natural gas-fired burners, six (6) ladle preheaters with natural gas-fired burners; slag processing operations incorporating grizzly/feeders, covered conveyors, material sizing screens and storage piles; carbon, lime and flux additive handling systems with pneumatic conveyors, storage bins and enclosed conveyors to the blending areas at the EAF; and one (1) baghouse dust silo, an emissions side draft evacuation collection system and collection canopies which exhaust to two (2) pulse jet, fabric filter baghouses with 99.85% particulate removal efficiencies and 125' high exhaust stacks. The gaseous emissions testing was performed on these stacks. See Figures 1 and 2.

The LMS system is composed of two (2) small capacity electric arc heating stations and a central argon stir station. The LMS is capable of handling up to 400 tons of molten steel received from the EAF. Alloys such as ferromanganese, ferrovanadium and ferromagnesium are used to refine the steel to the desired specifications. The steel from the EAF is transferred to the heating stations where alloys are added for melting as the temperature is maintained at approximately 3,000 °F. The ladle is then transferred to the argon stir station where the mixture is stirred magnetically and charged with an argon lance. Calcium-silicon wire is added at this stage to remove remaining impurities. If necessary, the process is repeated until the required specifications are achieved.

During the emissions testing on July 26, 2001, the process tap rates averaged 419.5 tons of steel per hour.

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

SIOS
213

Indiana Department of Environmental Management
Office of Air Management

Office Memorandum

To: Phil Perry

Date: May 3, 1999

From: Scott Stacy GWS

Thru: Ed S. Surla

Subj: Steel Dynamics, Inc.
Butler, Indiana
Source ID No. 033-00043
Permit No. CP033-9187-00043(LMF)
CP033-8091-00043(EAF)

The subject company has submitted a report concerning the stack emissions testing at the subject source. The test was conducted by G/SA. The purpose of the testing was to determine the compliance status of the facility with regard to the emission limitations stated below. The Protocol was approved by Scott Stacy, and the field test was observed by Scott Stacy. I have reviewed the report and found the sampling procedures used and results to be acceptable to this Office. A copy of the test report is filed in the Compliance Data Section. The following is a summary of the test results:

Date of Test:	November 17-20, 1998
Identification and Unit No. of Facility Tested:	EAF 1 and 2
APC Operating Parameters:	Baghouse
	Average Pressure Drop: 7.93"H2O
	Pressure Drop Range:7-9.2"H2O
Pollutant:	PM/PM10, CO, VOC, Opacity, SO2, NOX
Test Methods:	1-5, 9, 10, 202, 25A, 7E, 6C, 3A
NSPS Subpart AAA	0.0052 gr/dscf PM
	3% opacity
Permit 8091 Condition	
11	0.0032 gr/dscf PM/PM10, 35.7 lbs/hr PM/PM10, 1,300,000 dscfm
12	3% opacity
14	0.51 lbs NOX/ton steel produced, 204 lbs/hr NOX
15	2.0 lbs CO/ton steel produced, 800 lbs/hr CO
16	0.13 lbs VOC/ton of steel produced, 52.0 lbs/hr VOC
17	0.20 lbs SO2/ton of steel produced*, 80 lbs/hrSO2*
Permit 9187 Condition	
17	LMF and the EAF stack combined for
	0.20 lbs SO2/ton steel produced*, 80 lb/hr SO2*
Maximum Permitted Operating Rate:	400 tons/hr
Average Operating Rate During Test:	319 tons/hr (79.8%)
Average Measured Emissions:	0.00106 gr/dscf PM
	11.75 lbs/hr PM(filterable)(for informational purposes)
	21.39 lbs/hr PM10(condensible)(for informational purposes)
	33.15 lbs/hr PM/PM10(filterable PM+condensible PM)
	0.00299 gr/dscf PM/PM10
	174.47lbs/hr NOX 0.551 lbs NOX/ton steel produced
	21.49 lbs/hr VOC 0.0713 lbs VOC/ton steel produced

	123.44 lbs/hr SO2 EAF*	0.376 lbs SO2/ton steel produced EAF*
	159.69 lbs/hr SO2 Total*	0.486 lbs SO2/ton steel produced Total*

Highest 6 minute Opacity:	2.8%
Average Opacity:	1.12%

STATUS: IN COMPLIANCE (at 79.8% of Maximum Permitted Rate) VOC, PM/PM10
Out of Compliance(at 79.8% of Maximum Permitted Rate) NOX, SO2***

***Note: SO2 is listed under both permits. Permit 8091 is for the EAFs only. Permit 9187 is an overall SO2 limit for both the EAF and the LMF Baghouse stacks. The SO2 and NOX were retested on 2/2/99.**
Note: CO was tested but was thrown out on site from spiking out of range during the testing. This is being retested on 2/2/99.

Note: The PM/PM10 emission limit with the capacity operated at requires that SDI have production limit of 335 tph of steel. SDI will send in quarterly production data. Once this 335 tph production limit is reached, testing will be required until the 95% rule is met. A letter is being sent to SDI concerning this issue. SDI has a request for a permit amendment for changing the PM/PM10 emission limit to filterable PM10 or PM pending.

Date of Test:	November 17-20, 1998
Identification and Unit No. of Facility Tested:	LMF
APC Operating Parameters:	Baghouse
	Average Pressure Drop: 5.17"H2O
	Pressure Drop Range:2.6-7.1"H2O

Pollutant:	PM/PM10, CO, VOC, Opacity, SO2, NOX
Test Methods:	1-5, 9, 10, 202, 25A, 7E, 6C, 3A

Permit 9187 Condition	
15	0.0032 gr/dscf PM/PM10, 200,000 dscfm, 5.49 lbs/hr PM/PM10
16	3% opacity
17	LMF and the EAF stack combined for
	0.20 lbs SO2/ton steel produced*, 80 lb/hr SO2*
18	0.025 lbs NOX/ton steel produced, 10 lbs/hr NOX
19	0.1 lbs CO/ton of steel produced, 40 lbs/hr CO
20	0.013 lbs VOC/ton of steel produced, 5.21 lbs/hr VOC

Maximum Permitted Operating Rate:	400 tons/hr	
Average Operating Rate During Test:	319 tons/hr	
Average Measured Emissions:	1.88 lbs/hr PM(filterable)(for informational purposes)	
	91.19 lbs/hr PM10(condensible)(for informational purposes)	
	93.07 lbs/hr PM/PM10(filterable PM+condensible PM)	
	0.0794 gr/dscf PM/PM10	
	12.67lbs/hr NOX	0.039 lbs NOX/ton steel produced
	2.07 lbs/hr VOC	0.00672 lbs VOC/ton steel produced
	36.25 lbs/hr SO2 LMF*	0.1104 lbs SO2/ton steel produced LMF*
	159.69 lbs/hr SO2 Total*	0.486 lbs SO2/ton steel produced Total*

Highest 6 minute Opacity: 0%
Average Opacity: 0%

STATUS: IN COMPLIANCE (at 79.8% of Maximum Permitted Rate) VOC
Out of COMPLIANCE(at 79.8% of Maximum Permitted Rate) NOX, SO2*, PM/PM10*****

***Note: SO2 is listed under both permits. Permit 8091 is for the EAFs only. Permit 9187 is an overall SO2 limit for both the EAF and the LMF Baghouse stacks. The CO testing was thrown out due to not using the correct number of gases for Method 10! Retesting was performed on 2/2/99.**

*****The PM/PM10 problems were due to the LMF baghouse just starting operating. This baghouse had been running for 1 week before the test and was not in full operation during that week. The filter caking that occurs in all baghouse filter bags did not have time to get to a thickness that would give maximum performance. Retesting on the PM/PM10 occurred on 2/2/99. SDI has a request for a permit amendment for changing the PM/PM10 emission limit to filterable PM10 or PM pending.** The PM/PM10 test on 2/2/99 was in compliance.

****During the testing there were operational problems that caused the higher emissions. The longer processing time, slag layer problems, and higher than normal power usage caused the higher emissions. The slag layer was having problems forming so more carbon was injected. This carbon has a low level of Sulfur in it which causes the SO2 emission rates to increase for the EAF. The slag layer controls the amount of contact with the air and the metal. With the higher power usage for a long period of time, the EAF NOX was increased more than normal due to the heat of the metal combusting the air above the molten metal. This created a higher than normal NOX emissions. The Slag layer keeps the heat in the metal and also keeps the metal from contacting the outside air. The LMF is affected by what occurs at the EAF. The LMF removes the sulfur from the molten metal. This Sulfur readily becomes SO2. The higher Sulfur levels requires more stirring to reduce the level of Sulfur. The increased stirring required to remove this Sulfur causes the nitrogen in the molten metal to be released. This causes an increase of NOX emissions. The SO2 and NOX were retested on 2/2/99.**

cc: WPS/ General Files-Dekalb County
Terry Coleman-Northern Regional Office
Scott Stacy

G/SA

GUENTHER / SHACKELFORD ASSOCIATES

ENVIRONMENTAL CONSULTANTS & TESTING CONTRACTORS

SOURCE EMISSIONS TEST REPORT

PERFORMED FOR
STEEL DYNAMICS, INC.
BUTLER, INDIANA

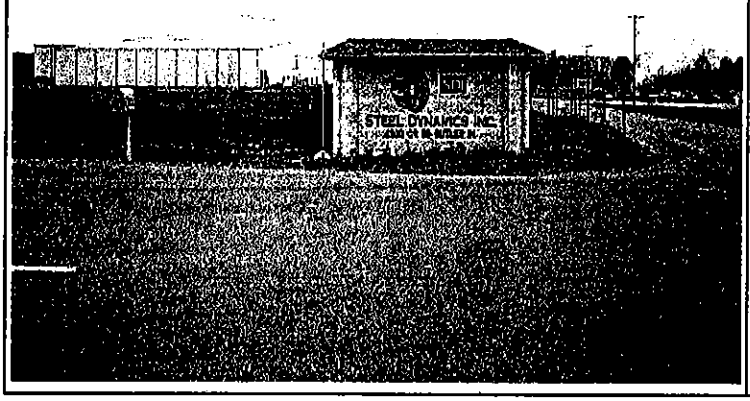
TWIN SHELL ELECTRIC ARC FURNACE LADLE METALLURGICAL STATION

EPA METHODS 1, 2, 3, 5, 6C, 7E, 9, 10, 25A AND 202

NOVEMBER 17-20, 1998
G/SA PROJECT NO. 98-T-065

Prepared for:

Mr. Barry Smith
Environmental Engineer
Steel Dynamics, Inc.
4500 County Road 59
Butler, IN 46271



SDI™

COMPLIANCE TEST REPORT

STEEL PROCESSING MILL
EAF/LMS
BAGHOUSE OUTLETS
TEST DATA AND RESULTS

SOURCE EMISSIONS COMPLIANCE TESTING
EPA Methods 5, 6C, 7E, 9, 10, 25A and 202
Performed on the
Twin Shell Electric Arc Furnace
Baghouse Outlet
and
Ladle Metallurgical Station
Baghouse Outlet
at
Steel Dynamics, Inc.
Steel Processing Mill
Butler, Indiana

November 17 - 20, 1998

Project No. 98-T-065

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), near Butler, 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) , and to determine sulfur dioxide (SO_2), nitrogen oxides (NO_X), carbon monoxide (CO), total gaseous organic (TGO) or volatile organic compounds (VOC) a.k.a. total hydrocarbons (THC) concentrations from the effluent gas streams of the baghouses serving the Twin Shell Electric Arc Furnace (EAF), Ladle Metallurgical Station (LMS) and associated equipment at SDI's Steel Processing Mill operations to

establish outlet emission rates. Also, to collect continuous emissions monitoring (CEM) data and to conduct visible emissions (VE) observations to determine plume opacities of the gases vented from the EAF and LMS Baghouses through their exhaust stacks to atmosphere, respectively.

G/SA's responsibility was to collect and analyze PM/CPM samples, conduct VE observations and instrument monitoring for SO_2, NO_X, CO and VOC, and perform data reduction for emission concentrations evaluation. SDI's responsibility was to provide CEM opacity data and process operating data per compliance test requirements.

The following report provides information pertaining to the Steel Processing Mill's operations, emissions testing and analytical results.

The emissions testing conducted on the EAF and LMS Baghouse Outlets was performed on Tuesday, November 17, Wednesday, November 18 and Friday, November 20, 1998.

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, PM/CPM emissions test runs performed, simultaneously, at the outlets (exhaust stacks) of the EAF and LMS Baghouses per IDEM Rule 326 IAC 3-2.1 and NSPS 40 CFR 60, Subpart AAa.

3. Three (3), consecutive ~~two (2)~~ Sour (1) hour, minimum, SO_2, NO_X, CO and VOC emissions test runs performed, simultaneously, at the outlets (exhaust stacks) of the EAF and LMS Baghouses.

4. Continuous six (6) minute, minimum, plume opacity averages recorded by the EAF's exhaust stack opacity monitor during the PM/CPM emissions testing.

5. Three (3), consecutive one (1) hour, minimum, VE observations performed on the outlet exhaust of the LMS Baghouse.

6. Process manufacturing capacities and control devices maintained at required operating conditions, and production rates recorded during the emissions testing periods.

7. All testing, observations, monitoring and analyses performed in accordance with current U.S. Environmental Protection Agency (EPA) test methodologies and analytical procedures for PM, SO_2, NO_X, VE, CO, VOC and CPM emissions determinations.

8. PM/CPM emissions from each of the EAF and LMS baghouses shall not exceed an average concentration of 0.0032 gr/dscf and a 3% average VE opacity pursuant to IDEM Rule ~~316 IAC 6-1-10.1, Subsection (c)~~ 326 IAC 12-1-1.

9. SO_2 emissions from the EAF and LMS shall not exceed a combined average concentration of 0.20 lb/ton of steel produced pursuant to IDEM Rule 326 IAC 2-1-1.

10. NO_X emissions from the EAF and LMS shall not exceed an individual

average concentration of 0.51 lb/ton and 0.025 lb/ton, respectively, of steel produced pursuant to IDEM Rule 326 IAC 2-1-1.

11. CO emissions from the EAF and LMS shall not exceed an individual average concentration of 2.0 lb/ton and 0.10 lb/ton, respectively, of steel produced pursuant to IDEM Rule 326 IAC 2-1-1.

12. VOC emissions from the EAF and LMS shall not exceed an individual average concentration of 0.13 lb/ton and 0.013 lb/ton, respectively, of steel produced pursuant to IDEM Rule 326 IAC 2-1-1.

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 and LMS Baghouses are assumed to be ≤ 10 microns in particle size. Therefore, only EPA Method 5/202 (PM/CPM) sampling was conducted per IDEM's approval.

The emissions testing program was supervised by G/SA, whose headquarters is in Crown Point, Indiana. G/SA also performed VE observations on the LMS Baghouse Outlet, data reduction and prepared in part the final report. The PM/CPM emissions testing conducted at the EAF Baghouse Outlet sampling location was performed by G/SA and G/SA's affiliate, Source Assessment Technologies, LLC (S.A.T.), whose headquarters is in Wheatland, Missouri. S.A.T. also performed the PM/CPM analyses and the PM/CPM, SO_2, NO_X, VE, CO and VOC data reduction, and in part the final report preparation. The PM/CPM emissions testing conducted at the LMS Baghouse Outlet

sampling location was performed by G/SA's subcontractor, Total Source Analysis, Inc. (TSA), whose headquarters is in Wellington, Ohio. TSA also performed the CEM testing for SO_2, NO_X, CO and VOC, and carbon dioxide (CO_2) and oxygen (O_2) content as well at both the EAF and LMS Baghouse Outlet sampling locations.

The emissions testing was performed in accordance with EPA Reference Methods 1, 2, 3A, 4, 5 (PM), 6C (SO_2), 7E (NO_X), 9 (VE), 10 (CO), and 25A (VOC), Title 40, Part 60, Appendix A, and Method 202 (CPM), Title 40, Part 51, Appendix M of the U.S. Code of Federal Regulations and IDEM Rule 326 IAC 3-2.1.

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

Barry Smith, Project Manager, SDI

The emissions testing was performed by the following personnel:

Fred Guenther, Test Supervisor, G/SA

Terry Shackelford, Test Engineer, G/SA (S.A.T.)

Ron Segert, Test Technician, G/SA

Hal Stiles, Test Engineer, TSA

Gus Dria, Test Engineer, TSA

John Sutton, Test Technician, TSA

Ken Eavenson, Test Technician, TSA

The emissions testing was observed by the following personnel:

Scott Stacy, Environmental Scientist, Air Compliance Section, IDEM

2.0 TEST RESULTS SUMMARY

The source emissions testing was performed utilizing EPA Methods 1, 2, 3A, 4, 5, 6C, 7E, 9, 10, 25A and 202 at the EAF and LMS Baghouse Outlet sampling locations. A summary of the test results is given below:

SAMPLING LOCATION	RUN NO.	PM/CPM *(Gr/DSCF)*	OPACITY (%)
EAF Baghouse Outlet	1	0.00485	1.0
	2	0.00209	1.0
	3	0.00204	1.0

SAMPLING LOCATION	RUN NO.	SO_2 *Lb/Ton Process Weight*	NO_x *Lb/Ton Process Weight*
EAF Baghouse Outlet	1	0.223	0.514
	2	0.371	0.697
	3	0.224	0.443
	4	0.413	0.587
	5	0.491	0.671

SAMPLING LOCATION	RUN NO.	CO *Lb/Ton Process Weight*	VOC *Lb/Ton Process Weight*
EAF	1	Invalid	0.0327
Baghouse	2	"	0.0865
Outlet	3	0.497	0.0507
	4	Invalid	N/A
	5	"	N/A

SAMPLING LOCATION	RUN NO.	PM/CPM *(Gr/DSCF)*	OPACITY (%)
LMS Baghouse Outlet	1	0.0690	0
	2	0.0781	0
	3	0.0902	0

SAMPLING LOCATION	RUN NO.	SO_2 *Lb/Ton Process Weight*	NO_X *Lb/Ton Process Weight*
LMS Baghouse Outlet	1	0.063	0.0122
	2	Invalid	Invalid
	3	"	"
	4	0.124	0.0594
	5	0.144	0.0455

SAMPLING LOCATION	RUN NO.	CO *Lb/Ton Process Weight*	VOC *Lb/Ton Process Weight*
LMS Baghouse Outlet	1	0.0078	0.00320
	2	0.0488	0.00347
	3	0.0513	0.00315

A complete list of test parameters for each Method 5/202, 6C, 7E, 10 and 25A emissions test run performed at the sampling locations can be found in Tables 1 through 10.

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

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 EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	18-Nov-98	18-Nov-98
Date	**Stack**	**Stack**	**Stack**
Sampling Location	1141-1625	0820-1247	1500-1931
Test Time, Start-Stop (24 Hour)	240	240	240
Sampling Time (Minutes)	***382.6***	***275.8***	***303.7*** 320.7
Average Process ~~Charge~~ Rate (TPH)	314.159	314.159	314.159
Stack Area (Ft^2) Ta P	0.840	0.840	0.840
Pitot Tube Coefficient (Dimensionless)	1.0290	1.0290	1.0290
Dry Gas Meter Correction Factor (Dimensionless)	0.000171	0.000171	0.000171
Nozzle Area (Ft^2)	29.21	29.35	29.35
Barometric Pressure (In. Hg)	-0.910	-0.890	-0.890
Static Pressure (In. H2O)	165.405	165.613	167.675
Dry Gas Meter Sample Volume (DCF)	62.2	61.5	62.6
Average Dry Gas Meter Temperature (°F)	1.628	1.652	1.712
Average Orifice Meter Delta H (In. H2O)	36.8	46.0	46.9
Volume Condensate Collected (Ml)	1.1	1.0	1.1
Average CO2 Concentration (%)	20.4	20.5	20.4
Average O2 Concentration (%)	1.330	1.354	1.372
Average Square Root of Delta P (In. H2O½)	153.8	148.3	148.0
Average Stack Gas Temperature (°F)	**0.0530**	**0.0230**	**0.0227**
Total Particulate Matter (Grams, G)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
Isokinetic Sampling (%)	101.5	99.8	99.6
TPM Emission Concentration (Gr/DSCF)	0.00485	0.00209	0.00204
TPM Emission Concentration (Lb/DSCF)	6.93E-07	2.98E-07	2.91E-07
TPM Emission Rate (Lb/Hr)	53.0	23.3	23.1

33.1

Signature of Reviewer: Fred H. Quentler

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

TABLE 1A
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (FRONT-HALF)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	18-Nov-98	18-Nov-98
Date	**Stack**	**Stack**	**Stack**
Sampling Location	1141-1625	0820-1247	1500-1931
Test Time, Start-Stop (24 Hour)	240	240	240
Sampling Time (Minutes)	***382.6***	***275.8***	***303.7***
Average Process ~~Charge~~ Rate (TPH)	314.159	314.159	314.159
Stack Area (Ft^2) Tap	0.840	0.840	0.840
Pitot Tube Coefficient (Dimensionless)	1.0290	1.0290	1.0290
Dry Gas Meter Correction Factor (Dimensionless)	0.000171	0.000171	0.000171
Nozzle Area (Ft^2)	29.21	29.35	29.35
Barometric Pressure (In. Hg)	-0.910	-0.890	-0.890
Static Pressure (In. H2O)	165.405	165.613	167.675
Dry Gas Meter Sample Volume (DCF)	62.2	61.5	62.6
Average Dry Gas Meter Temperature (°F)	1.628	1.652	1.712
Average Orifice Meter Delta H (In. H2O)	36.8	46.0	46.9
Volume Condensate Collected (Ml)	1.1	1.0	1.1
Average CO2 Concentration (%)	20.4	20.5	20.4
Average O2 Concentration (%)	1.330	1.354	1.372
Average Square Root of Delta P (In. H2O½)	153.8	148.3	148.0
Average Stack Gas Temperature (°F)	**0.0186**	**0.0086**	**0.0078**
Filtered Particulate Matter (Grams, G)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
Isokinetic Sampling (%)	101.5	99.8	99.6
FPM Emission Concentration (Gr/DSCF)	0.00170	0.00078	0.00070
FPM Emission Concentration (Lb/DSCF)	2.43E-07	1.12E-07	1.00E-07
FPM Emission Rate (Lb/Hr)	18.6	8.7	7.9

Signature of Reviewer: Fred H. Quentler

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

TABLE 1B
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (BACK-HALF)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	18-Nov-98	18-Nov-98
Date	**Stack**	**Stack**	**Stack**
Sampling Location	1141-1625	0820-1247	1500-1931
Test Time, Start-Stop (24 Hour)	240	240	240
Sampling Time (Minutes)	***382.6***	***275.8***	***303.7***
Average Process ~~Charge~~ Rate (TPH)	314.159	314.159	314.159
Stack Area (Ft^2) Ta P	0.840	0.840	0.840
Pitot Tube Coefficient (Dimensionless)	1.0290	1.0290	1.0290
Dry Gas Meter Correction Factor (Dimensionless)	0.000171	0.000171	0.000171
Nozzle Area (Ft^2)	29.21	29.35	29.35
Barometric Pressure (In. Hg)	-0.910	-0.890	-0.890
Static Pressure (In. H2O)	165.405	165.613	167.675
Dry Gas Meter Sample Volume (DCF)	62.2	61.5	62.6
Average Dry Gas Meter Temperature (°F)	1.628	1.652	1.712
Average Orifice Meter Delta H (In. H2O)	36.8	46.0	46.9
Volume Condensate Collected (Ml)	1.1	1.0	1.1
Average CO2 Concentration (%)	20.4	20.5	20.4
Average O2 Concentration (%)	1.330	1.354	1.372
Average Square Root of Delta P (In. H2O½)	153.8	148.3	148.0
Average Stack Gas Temperature (°F)	**0.0344**	**0.0144**	**0.0149**
Condensed Particulate Matter (Grams, G)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
Isokinetic Sampling (%)	101.5	99.8	99.6
CPM Emission Concentration (Gr/DSCF)	0.00315	0.00131	0.00134
CPM Emission Concentration (Lb/DSCF)	4.50E-07	1.87E-07	1.91E-07
CPM Emission Rate (Lb/Hr)	34.4	14.6	15.2

Signature of Reviewer: Fred H. Quentler

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

TABLE 1C
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (INORGANICS)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	18-Nov-98	18-Nov-98
Date	**Stack**	**Stack**	**Stack**
Sampling Location	1141-1625	0820-1247	1500-1931
Test Time, Start-Stop (24 Hour)	240	240	240
Sampling Time (Minutes)	***382.6***	***275.8***	***303.7***
Average Process ~~Charge~~ Rate (TPH)	314.159	314.159	314.159
Stack Area (Ft^2) Ta P	0.840	0.840	0.840
Pitot Tube Coefficient (Dimensionless)	1.0290	1.0290	1.0290
Dry Gas Meter Correction Factor (Dimensionless)	0.000171	0.000171	0.000171
Nozzle Area (Ft^2)	29.21	29.35	29.35
Barometric Pressure (In. Hg)	-0.910	-0.890	-0.890
Static Pressure (In. H2O)	165.405	165.613	167.675
Dry Gas Meter Sample Volume (DCF)	62.2	61.5	62.6
Average Dry Gas Meter Temperature (°F)	1.628	1.652	1.712
Average Orifice Meter Delta H (In. H2O)	36.8	46.0	46.9
Volume Condensate Collected (Ml)	1.1	1.0	1.1
Average CO2 Concentration (%)	20.4	20.5	20.4
Average O2 Concentration (%)	1.330	1.354	1.372
Average Square Root of Delta P (In. H2O½)	153.8	148.3	148.0
Average Stack Gas Temperature (°F)	**0.0089**	**0.0043**	**0.0049**
Inorganic Particulate Matter (Grams, G)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
Isokinetic Sampling (%)	101.5	99.8	99.6
IPM Emission Concentration (Gr/DSCF)	0.000814	0.000390	0.000440
IPM Emission Concentration (Lb/DSCF)	1.16E-07	5.58E-08	6.29E-08
IPM Emission Rate (Lb/Hr)	8.89	4.36	4.99

Signature of Reviewer: Fred H. Quentter

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TABLE 1D
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (ORGANICS)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1141-1625	0820-1247	1500-1931
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2) Ta P	314.159	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.0290	1.0290	1.0290
Nozzle Area (Ft^2)	0.000171	0.000171	0.000171
Barometric Pressure (In. Hg)	29.21	29.35	29.35
Static Pressure (In. H2O)	-0.910	-0.890	-0.890
Dry Gas Meter Sample Volume (DCF)	165.405	165.613	167.675
Average Dry Gas Meter Temperature (°F)	62.2	61.5	62.6
Average Orifice Meter Delta H (In. H2O)	1.628	1.652	1.712
Volume Condensate Collected (Ml)	36.8	46.0	46.9
Average CO2 Concentration (%)	1.1	1.0	1.1
Average O2 Concentration (%)	20.4	20.5	20.4
Average Square Root of Delta P (In. H2O½)	1.330	1.354	1.372
Average Stack Gas Temperature (°F)	153.8	148.3	148.0
Organic Particulate Matter (Grams, G)	**0.0255**	**0.0101**	**0.0100**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
Isokinetic Sampling (%)	101.5	99.8	99.6
OPM Emission Concentration (Gr/DSCF)	0.00233	0.00092	0.00090
OPM Emission Concentration (Lb/DSCF)	3.33E-07	1.31E-07	1.28E-07
OPM Emission Rate (Lb/Hr)	25.5	10.3	10.2

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TABLE 2
EPA METHOD 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	18-Nov-98	18-Nov-98
Date	Stack	Stack	Stack
Sampling Location	1141-1625	0820-1247	1500-1931
Test Time, Start-Stop (24 Hour)	240	240	240
Sampling Time (Minutes)	***382.6***	***275.8***	***303.7***
Average Process ~~Charge~~ Rate (TPH)	314.159	314.159	314.159
Stack Area (Ft^2) Tap	0.840	0.840	0.840
Pitot Tube Coefficient (Dimensionless)	1.0290	1.0290	1.0290
Dry Gas Meter Correction Factor (Dimensionless)	29.21	29.35	29.35
Barometric Pressure (In. Hg)	-0.910	-0.890	-0.890
Static Pressure (In. H2O)	165.405	165.613	167.675
Dry Gas Meter Sample Volume (DCF)	62.2	61.5	62.6
Average Dry Gas Meter Temperature (°F)	1.628	1.652	1.712
Average Orifice Meter Delta H (In. H2O)	36.8	46.0	46.9
Volume Condensate Collected (Ml)	1.1	1.0	1.1
Average CO2 Concentration (%)	20.4	20.5	20.4
Average O2 Concentration (%)	1.330	1.354	1.372
Average Square Root of Delta P (In. H2O½)	153.8	148.3	148.0
Average Stack Gas Temperature (°F)	**6.71**	**7.87**	**5.16**
Average Corrected SO2 Concentration (PPMV)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
SO2 Emission Concentration (Gr/DSCF)	0.00781	0.00916	0.00601
SO2 Emission Concentration (Lb/DSCF)	1.12E-06	1.31E-06	8.58E-07
SO2 Emission Rate (Lb/Hr)	85.3	102.4	68.1
SO2 Emission Concentration (Lb/Ton Process Weight)	*0.223*	*0.371*	*0.224*

Signature of Reviewer: Fred H. Quentin

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TABLE 2A
EPA METHOD 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	4	5
Date	20-Nov-98	20-Nov-98
Sampling Location	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	0917-1249	1410-1734
Sampling Time (Minutes)	180	180
Average Process ~~Charge~~ Rate (TPH)	***329.0***	***303.9***
Stack Area (Ft^2) Tap	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.0290	1.0290
Barometric Pressure (In. Hg)	29.06	29.06
Static Pressure (In. H2O)	-0.940	-0.980
Dry Gas Meter Sample Volume (DCF)	134.671	133.217
Average Dry Gas Meter Temperature (°F)	65.4	62.8
Average Orifice Meter Delta H (In. H2O)	1.850	1.850
Volume Condensate Collected (Ml)	31.5	24.8
Average CO2 Concentration (%)	1.1	1.1
Average O2 Concentration (%)	20.4	20.4
Average Square Root of Delta P (In. H2O½)	1.338	1.390
Average Stack Gas Temperature (°F)	128.6	128.2
Average Corrected SO2 Concentration (PPMV)	**10.43**	**11.00**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.99	28.99
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	135.905	135.108
Water Vapor Volume at Standard Conditions (SCF)	1.483	1.167
Moisture Fraction (Dimensionless)	0.011	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.87	28.90
Stack Gas Velocity (FPS)	80.6	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,519,273	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,306,185	1,358,465
SO2 Emission Concentration (Gr/DSCF)	0.0121	0.0128
SO2 Emission Concentration (Lb/DSCF)	1.73E-06	1.83E-06
SO2 Emission Rate (Lb/Hr)	135.9	149.1
SO2 Emission Concentration (Lb/Ton Process Weight)	*0.413*	*0.491*

Signature of Reviewer: Fred H. Quentler

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TABLE 3
EPA METHOD 7E
NITROGEN OXIDES EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	18-Nov-98	18-Nov-98
Date	Stack	Stack	Stack
Sampling Location	1141-1625	0820-1247	1500-1931
Test Time, Start-Stop (24 Hour)	240	240	240
Sampling Time (Minutes)	***382.6***	***275.8***	***303.7***
Average Process ~~Charge~~ Rate (TPH)	314.159	314.159	314.159
Stack Area (Ft^2)	0.840	0.840	0.840
Pitot Tube Coefficient (Dimensionless)	1.0290	1.0290	1.0290
Dry Gas Meter Correction Factor (Dimensionless)	29.21	29.35	29.35
Barometric Pressure (In. Hg)	-0.910	-0.890	-0.890
Static Pressure (In. H2O)	165.405	165.613	167.675
Dry Gas Meter Sample Volume (DCF)	62.2	61.5	62.6
Average Dry Gas Meter Temperature (°F)	1.628	1.652	1.712
Average Orifice Meter Delta H (In. H2O)	36.8	46.0	46.9
Volume Condensate Collected (Ml)	1.1	1.0	1.1
Average CO2 Concentration (%)	20.4	20.5	20.4
Average O2 Concentration (%)	1.330	1.354	1.372
Average Square Root of Delta P (In. H2O½)	153.8	148.3	148.0
Average Stack Gas Temperature (°F)	**21.54**	**20.59**	**14.21**
Average Corrected NOx Concentration as NO2 (PPMV)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
NOx Emission Concentration (Gr/DSCF)	0.0180	0.0172	0.0119
NOx Emission Concentration (Lb/DSCF)	2.57E-06	2.46E-06	1.70E-06
NOx Emission Rate (Lb/Hr)	196.7	192.3	134.6
NOx Emission Concentration (Lb/Ton Process Weight)	*0.514*	*0.697*	*0.443*

Signature of Reviewer: Fred H. Quentler

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TABLE 3A
EPA METHOD 7E
NITROGEN OXIDES EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	4	5
Date	20-Nov-98	20-Nov-98
Sampling Location	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	0917-1249	1410-1734
Sampling Time (Minutes)	180	180
Average Process ~~Charge~~ Rate (TPH)	***329.0***	***303.9***
Stack Area (Ft^2) Tap	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.0290	1.0290
Barometric Pressure (In. Hg)	29.06	29.06
Static Pressure (In. H2O)	-0.940	-0.980
Dry Gas Meter Sample Volume (DCF)	134.671	133.217
Average Dry Gas Meter Temperature (°F)	65.4	62.8
Average Orifice Meter Delta H (In. H2O)	1.850	1.850
Volume Condensate Collected (Ml)	31.5	24.8
Average CO2 Concentration (%)	1.1	1.1
Average O2 Concentration (%)	20.4	20.4
Average Square Root of Delta P (In. H2O½)	1.338	1.390
Average Stack Gas Temperature (°F)	128.6	128.2
Average Corrected NOx Concentration as NO2 (PPMV)	**20.65**	**20.96**

CALCULATED DATA

Absolute Pressure (In. Hg)	28.99	28.99
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	135.905	135.108
Water Vapor Volume at Standard Conditions (SCF)	1.483	1.167
Moisture Fraction (Dimensionless)	0.011	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.87	28.90
Stack Gas Velocity (FPS)	80.6	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,519,273	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,306,185	1,358,465
NOx Emission Concentration (Gr/DSCF)	0.0173	0.0175
NOx Emission Concentration (Lb/DSCF)	2.47E-06	2.50E-06
NOx Emission Rate (Lb/Hr)	193.2	204.0
NOx Emission Concentration (Lb/Ton Process Weight)	*0.587*	*0.671*

Signature of Reviewer: Fred H. Quentter

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TABLE 4
EPA METHOD 10
CARBON MONOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	"Invalid	"Invalid	18-Nov-98
Date	Test	Test	Stack
Sampling Location	Run"	Run"	1500-1931
Test Time, Start-Stop (24 Hour)			240
Sampling Time (Minutes)			***303.7***
Average Process ~~Charge~~ Rate (TPH)			314.159
Stack Area (Ft^2) πr^2			0.840
Pitot Tube Coefficient (Dimensionless)			1.0290
Dry Gas Meter Correction Factor (Dimensionless)			29.35
Barometric Pressure (In. Hg)			-0.890
Static Pressure (In. H2O)			167.675
Dry Gas Meter Sample Volume (DCF)			62.6
Average Dry Gas Meter Temperature (°F)			1.712
Average Orifice Meter Delta H (In. H2O)			46.9
Volume Condensate Collected (Ml)			1.1
Average CO2 Concentration (%)			20.4
Average O2 Concentration (%)			1.372
Average Square Root of Delta P (In. $H2O^{1/2}$)			148.0
Average Stack Gas Temperature (°F)			26.15
Average Corrected CO Concentration (PPMV)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	171.760
Water Vapor Volume at Standard Conditions (SCF)	2.208
Moisture Fraction (Dimensionless)	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.85
Stack Gas Velocity (FPS)	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,322,015
CO Emission Concentration (Gr/DSCF)	0.0133
CO Emission Concentration (Lb/DSCF)	1.90E-06
CO Emission Rate (Lb/Hr)	150.8
CO Emission Concentration (Lb/Ton Process Weight)	*0.497*

Signature of Reviewer: Fred H. Quantstar

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TABLE 5
EPA METHOD 25A
TOTAL GASEOUS ORGANIC EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: TWIN SHELL EAF – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1141-1625	0820-1247	1500-1931
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2)	314.159	314.159	314.159
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	1.0290	1.0290	1.0290
Barometric Pressure (In. Hg)	29.21	29.35	29.35
Static Pressure (In. H2O)	-0.910	-0.890	-0.890
Dry Gas Meter Sample Volume (DCF)	165.405	165.613	167.675
Average Dry Gas Meter Temperature (°F)	62.2	61.5	62.6
Average Orifice Meter Delta H (In. H2O)	1.628	1.652	1.712
Volume Condensate Collected (Ml)	36.8	46.0	46.9
Average CO2 Concentration (%)	1.1	1.0	1.1
Average O2 Concentration (%)	20.4	20.5	20.4
Average Square Root of Delta P (In. H2O½)	1.330	1.354	1.372
Average Stack Gas Temperature (°F)	153.8	148.3	148.0
Average TGO Concentration as Carbon (PPMV)	**5.25**	**9.78**	**6.23**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.28	29.28
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	168.736	169.982	171.760
Water Vapor Volume at Standard Conditions (SCF)	1.732	2.165	2.208
Moisture Fraction (Dimensionless)	0.010	0.013	0.013
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.99	28.98	28.99
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.88	28.84	28.85
Stack Gas Velocity (FPS)	81.5	82.5	83.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	1,536,238	1,555,087	1,575,822
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	1,274,386	1,303,977	1,322,015
TGO Emission Concentration (Gr/DSCF)	0.00115	0.00213	0.00136
TGO Emission Concentration (Lb/DSCF)	1.64E-07	3.05E-07	1.94E-07
TGO Emission Rate (Lb/Hr)	12.5	23.9	15.4
TGO Emission Concentration (Lb/Ton Process Weight)	*0.0327*	*0.0865*	*0.0507*

Signature of Reviewer: Fred H. Quentter

LMS BAGHOUSE OUTLET

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TABLE 6
EPA METHOD 5 / 202
TOTAL PARTICULATE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1225-1719	0830-1246	1500-1912
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940	0.9940
Nozzle Area (Ft^2)	0.000322	0.000322	0.000322
Barometric Pressure (In. Hg)	29.15	29.30	29.30
Static Pressure (In. H2O)	-0.150	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	192.344	179.438	187.041
Average Dry Gas Meter Temperature (°F)	68.7	64.9	67.5
Average Orifice Meter Delta H (In. H2O)	1.864	1.573	1.807
Volume Condensate Collected (Ml)	47.7	35.1	40.5
Average CO2 Concentration (%)	0.0	0.2	0.1
Average O2 Concentration (%)	20.9	20.7	20.7
Average Square Root of Delta P (In. H2O½)	0.786	0.753	0.770
Average Stack Gas Temperature (°F)	109.5	125.2	130.0
Total Particulate Matter (Grams, G)	**0.8357**	**0.8929**	**1.0699**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.29	29.29
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944	176.407	183.089
Water Vapor Volume at Standard Conditions (SCF)	2.245	1.652	1.906
Moisture Fraction (Dimensionless)	0.012	0.009	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.76	28.73
Stack Gas Velocity (FPS)	46.6	45.0	46.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659	153,212	157,638
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567	134,130	136,744
Isokinetic Sampling (%)	97.1	96.6	98.4
TPM Emission Concentration (Gr/DSCF)	0.0690	0.0781	0.0902
TPM Emission Concentration (Lb/DSCF)	9.86E-06	1.12E-05	1.29E-05
TPM Emission Rate (Lb/Hr)	83.7	89.8	105.7

Signature of Reviewer: Fred H. Quentler

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TABLE 6A
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (FRONT-HALF)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	18-Nov-98	18-Nov-98
Date	**Stack**	**Stack**	**Stack**
Sampling Location	1225-1719	0830-1246	1500-1912
Test Time, Start-Stop (24 Hour)	240	240	240
Sampling Time (Minutes)	***382.6***	***275.8***	***303.7***
Average Process ~~Charge~~ Rate (TPH)	56.745	56.745	56.745
Stack Area (Ft^2) Tap	0.840	0.840	0.840
Pitot Tube Coefficient (Dimensionless)	0.9940	0.9940	0.9940
Dry Gas Meter Correction Factor (Dimensionless)	0.000322	0.000322	0.000322
Nozzle Area (Ft^2)	29.15	29.30	29.30
Barometric Pressure (In. Hg)	-0.150	-0.150	-0.150
Static Pressure (In. H2O)	192.344	179.438	187.041
Dry Gas Meter Sample Volume (DCF)	68.7	64.9	67.5
Average Dry Gas Meter Temperature (°F)	1.864	1.573	1.803
Average Orifice Meter Delta H (In. H2O)	47.7	35.1	40.5
Volume Condensate Collected (Ml)	0.0	0.2	0.1
Average CO2 Concentration (%)	20.9	20.7	20.7
Average O2 Concentration (%)	0.786	0.753	0.770
Average Square Root of Delta P (In. H2O½)	109.5	125.2	130.0
Average Stack Gas Temperature (°F)	**0.0163**	**0.0161**	**0.0242**
Filtered Particulate Matter (Grams, G)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.29	29.29
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944	176.407	183.087
Water Vapor Volume at Standard Conditions (SCF)	2.245	1.652	1.906
Moisture Fraction (Dimensionless)	0.012	0.009	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.76	28.73
Stack Gas Velocity (FPS)	46.6	45.0	46.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659	153,212	157,638
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567	134,130	136,744
Isokinetic Sampling (%)	97.1	96.6	98.4
FPM Emission Concentration (Gr/DSCF)	0.00135	0.00141	0.00204
FPM Emission Concentration (Lb/DSCF)	1.92E-07	2.01E-07	2.91E-07
FPM Emission Rate (Lb/Hr)	1.63	1.62	2.39

Signature of Reviewer: Fred H. Quentler

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TABLE 6B
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (BACK-HALF)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1225-1719	0830-1246	1500-1912
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2) Tap	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940	0.9940
Nozzle Area (Ft^2)	0.000322	0.000322	0.000322
Barometric Pressure (In. Hg)	29.15	29.30	29.30
Static Pressure (In. H2O)	-0.150	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	192.344	179.438	187.041
Average Dry Gas Meter Temperature (°F)	68.7	64.9	67.5
Average Orifice Meter Delta H (In. H2O)	1.864	1.573	1.803
Volume Condensate Collected (Ml)	47.7	35.1	40.5
Average CO2 Concentration (%)	0.0	0.2	0.1
Average O2 Concentration (%)	20.9	20.7	20.7
Average Square Root of Delta P (In. H2O½)	0.786	0.753	0.770
Average Stack Gas Temperature (°F)	109.5	125.2	130.0
Condensed Particulate Matter (Grams, G)	**0.8194**	**0.8768**	**1.0457**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.29	29.29
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944	176.407	183.087
Water Vapor Volume at Standard Conditions (SCF)	2.245	1.652	1.906
Moisture Fraction (Dimensionless)	0.012	0.009	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.76	28.73
Stack Gas Velocity (FPS)	46.6	45.0	46.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659	153,212	157,638
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567	134,130	136,744
Isokinetic Sampling (%)	97.1	96.6	98.4
CPM Emission Concentration (Gr/DSCF)	0.0677	0.0767	0.0882
CPM Emission Concentration (Lb/DSCF)	9.66E-06	1.10E-05	1.26E-05
CPM Emission Rate (Lb/Hr)	82.1	88.2	103.3

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TABLE 6C
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (INORGANICS)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1225-1719	0830-1246	1500-1912
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2) Tap	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940	0.9940
Nozzle Area (Ft^2)	0.000322	0.000322	0.000322
Barometric Pressure (In. Hg)	29.15	29.30	29.30
Static Pressure (In. H2O)	-0.150	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	192.344	179.438	187.041
Average Dry Gas Meter Temperature (°F)	68.7	64.9	67.5
Average Orifice Meter Delta H (In. H2O)	1.864	1.573	1.803
Volume Condensate Collected (Ml)	47.7	35.1	40.5
Average CO2 Concentration (%)	0.0	0.2	0.1
Average O2 Concentration (%)	20.9	20.7	20.7
Average Square Root of Delta P (In. H2O½)	0.786	0.753	0.770
Average Stack Gas Temperature (°F)	109.5	125.2	130.0
Inorganic Particulate Matter (Grams, G)	**0.0225**	**0.0676**	**0.1074**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.29	29.29
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944	176.407	183.087
Water Vapor Volume at Standard Conditions (SCF)	2.245	1.652	1.906
Moisture Fraction (Dimensionless)	0.012	0.009	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.76	28.73
Stack Gas Velocity (FPS)	46.6	45.0	46.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659	153,212	157,638
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567	134,130	136,744
Isokinetic Sampling (%)	97.1	96.6	98.4
IPM Emission Concentration (Gr/DSCF)	0.00186	0.00591	0.00905
IPM Emission Concentration (Lb/DSCF)	2.65E-07	8.45E-07	1.29E-06
IPM Emission Rate (Lb/Hr)	2.3	6.8	10.6

Signature of Reviewer: Fred H. Quentler

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TABLE 6D
EPA METHOD 5 / 202
PARTICULATE EMISSIONS TEST RESULTS (ORGANICS)

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1225-1719	0830-1246	1500-1912
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2)	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940	0.9940
Nozzle Area (Ft^2)	0.000322	0.000322	0.000322
Barometric Pressure (In. Hg)	29.15	29.30	29.30
Static Pressure (In. H2O)	-0.150	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	192.344	179.438	187.041
Average Dry Gas Meter Temperature (°F)	68.7	64.9	67.5
Average Orifice Meter Delta H (In. H2O)	1.864	1.573	1.803
Volume Condensate Collected (Ml)	47.7	35.1	40.5
Average CO2 Concentration (%)	0.0	0.2	0.1
Average O2 Concentration (%)	20.9	20.7	20.7
Average Square Root of Delta P (In. H2O½)	0.786	0.753	0.770
Average Stack Gas Temperature (°F)	109.5	125.2	130.0
Organic Particulate Matter (Grams, G)	**0.7969**	**0.8092**	**0.9383**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.29	29.29
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944	176.407	183.087
Water Vapor Volume at Standard Conditions (SCF)	2.245	1.652	1.906
Moisture Fraction (Dimensionless)	0.012	0.009	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.76	28.73
Stack Gas Velocity (FPS)	46.6	45.0	46.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659	153,212	157,638
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567	134,130	136,744
Isokinetic Sampling (%)	97.1	96.6	98.4
OPM Emission Concentration (Gr/DSCF)	0.0658	0.0708	0.0791
OPM Emission Concentration (Lb/DSCF)	9.40E-06	1.01E-05	1.13E-05
OPM Emission Rate (Lb/Hr)	79.8	81.4	92.7

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TABLE 7
EPA METHOD 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	"Invalid	"Invalid
Sampling Location	**Stack**	Test	Test
Test Time, Start-Stop (24 Hour)	1225-1719	Run"	Run"
Sampling Time (Minutes)	240		
Average Process ~~Charge~~ Rate (TPH)	***382.6***		
Stack Area (Ft^2) Tap	56.745		
Pitot Tube Coefficient (Dimensionless)	0.840		
Dry Gas Meter Correction Factor (Dimensionless)	0.9940		
Barometric Pressure (In. Hg)	29.15		
Static Pressure (In. H2O)	-0.150		
Dry Gas Meter Sample Volume (DCF)	192.344		
Average Dry Gas Meter Temperature (°F)	68.7		
Average Orifice Meter Delta H (In. H2O)	1.864		
Volume Condensate Collected (Ml)	47.7		
Average CO2 Concentration (%)	0.0		
Average O2 Concentration (%)	20.9		
Average Square Root of Delta P (In. H2O½)	0.786		
Average Stack Gas Temperature (°F)	109.5		
Average Corrected SO2 Concentration (PPMV)	**17.14**		

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944
Water Vapor Volume at Standard Conditions (SCF)	2.245
Moisture Fraction (Dimensionless)	0.012
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71
Stack Gas Velocity (FPS)	46.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567
SO2 Emission Concentration (Gr/DSCF)	0.0200
SO2 Emission Concentration (Lb/DSCF)	2.85E-06
SO2 Emission Rate (Lb/Hr)	24.2
SO2 Emission Concentration (Lb/Ton Process Weight)	*0.063*

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TABLE 7A
EPA METHOD 6C
SULFUR DIOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	4	5
Date	20-Nov-98	20-Nov-98
Sampling Location	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	0910-1230	1425-1752
Sampling Time (Minutes)	180	180
Average Process ~~Charge~~ Rate (TPH)	***329.0***	***303.9***
Stack Area (Ft^2) Tab	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940
Barometric Pressure (In. Hg)	29.06	29.06
Static Pressure (In. H2O)	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	135.175	135.110
Average Dry Gas Meter Temperature (°F)	53.2	62.7
Average Orifice Meter Delta H (In. H2O)	1.661	1.661
Volume Condensate Collected (Ml)	21.3	24.7
Average CO2 Concentration (%)	0.1	0.1
Average O2 Concentration (%)	20.8	20.8
Average Square Root of Delta P (In. $H2O^{1/2}$)	0.745	0.767
Average Stack Gas Temperature (°F)	113.5	117.0
Average Corrected SO2 Concentration (PPMV)	**30.52**	**31.98**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.05	29.05
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	134.850	132.346
Water Vapor Volume at Standard Conditions (SCF)	1.003	1.163
Moisture Fraction (Dimensionless)	0.007	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.85	28.85
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.77	28.75
Stack Gas Velocity (FPS)	44.3	45.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	150,828	155,935
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	133,903	137,320
SO2 Emission Concentration (Gr/DSCF)	0.0355	0.0372
SO2 Emission Concentration (Lb/DSCF)	5.08E-06	5.32E-06
SO2 Emission Rate (Lb/Hr)	40.8	43.8
SO2 Emission Concentration (Lb/Ton Process Weight)	*0.124*	*0.144*

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TABLE 8
EPA METHOD 7E
NITROGEN OXIDES EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM - BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

	1	2	3
Run Number	17-Nov-98	"Invalid Test Run"	"Invalid Test Run"
Date	Stack		
Sampling Location	1225-1719		
Test Time, Start-Stop (24 Hour)	240		
Sampling Time (Minutes)	***382.6***		
Average Process ~~Charge~~ Rate (TPH)	56.745		
Stack Area (Ft^2) Tap	0.840		
Pitot Tube Coefficient (Dimensionless)	0.9940		
Dry Gas Meter Correction Factor (Dimensionless)	29.15		
Barometric Pressure (In. Hg)	-0.150		
Static Pressure (In. H2O)	192.344		
Dry Gas Meter Sample Volume (DCF)	68.7		
Average Dry Gas Meter Temperature (°F)	1.864		
Average Orifice Meter Delta H (In. H2O)	47.7		
Volume Condensate Collected (Ml)	0.0		
Average CO2 Concentration (%)	20.9		
Average O2 Concentration (%)	0.786		
Average Square Root of Delta P (In. H2O½)	109.5		
Average Stack Gas Temperature (°F)	**4.59**		
Average Corrected NOx Concentration as NO2 (PPMV)			

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944
Water Vapor Volume at Standard Conditions (SCF)	2.245
Moisture Fraction (Dimensionless)	0.012
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71
Stack Gas Velocity (FPS)	46.6
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567
NOx Emission Concentration (Gr/DSCF)	0.0038
NOx Emission Concentration (Lb/DSCF)	5.48E-07
NOx Emission Rate (Lb/Hr)	4.7
NOx Emission Concentration (Lb/Ton Process Weight)	*0.0122*

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TABLE 8A
EPA METHOD 7E
NITROGEN OXIDES EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	4	5
Date	20-Nov-98	20-Nov-98
Sampling Location	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	0910-1230	1425-1752
Sampling Time (Minutes)	180	180
Average Process ~~Charge~~ Rate (TPH)	***329.0***	***303.9***
Stack Area (Ft^2) Tap	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940
Barometric Pressure (In. Hg)	29.06	29.06
Static Pressure (In. H2O)	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	135.175	135.110
Average Dry Gas Meter Temperature (°F)	53.2	62.7
Average Orifice Meter Delta H (In. H2O)	1.661	1.661
Volume Condensate Collected (Ml)	21.3	24.7
Average CO2 Concentration (%)	0.1	0.1
Average O2 Concentration (%)	20.8	20.8
Average Square Root of Delta P (In. H2O½)	0.745	0.767
Average Stack Gas Temperature (°F)	113.5	117.0
Average Corrected NOx Concentration as NO2 (PPMV)	**20.36**	**14.05**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.05	29.05
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	134.850	132.346
Water Vapor Volume at Standard Conditions (SCF)	1.003	1.163
Moisture Fraction (Dimensionless)	0.007	0.009
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.85	28.85
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.77	28.75
Stack Gas Velocity (FPS)	44.3	45.8
Stack Gas Flow Rate at Actual Conditions (ACFM)	150,828	155,935
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	133,903	137,320
NOx Emission Concentration (Gr/DSCF)	0.0170	0.0117
NOx Emission Concentration (Lb/DSCF)	2.43E-06	1.68E-06
NOx Emission Rate (Lb/Hr)	19.5	13.8
NOx Emission Concentration (Lb/Ton Process Weight)	*0.0594*	*0.0455*

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TABLE 9
EPA METHOD 10
CARBON MONOXIDE EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1225-1719	0830-1246	1500-1912
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2) T&P	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940	0.9940
Barometric Pressure (In. Hg)	29.15	29.30	29.30
Static Pressure (In. H2O)	-0.150	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	192.344	179.438	187.041
Average Dry Gas Meter Temperature (°F)	68.7	64.9	67.5
Average Orifice Meter Delta H (In. H2O)	1.864	1.573	1.807
Volume Condensate Collected (Ml)	47.7	35.1	40.5
Average CO2 Concentration (%)	0.0	0.2	0.1
Average O2 Concentration (%)	20.9	20.7	20.7
Average Square Root of Delta P (In. H2O½)	0.786	0.753	0.770
Average Stack Gas Temperature (°F)	109.5	125.2	130.0
Average Corrected CO Concentration (PPMV)	**4.85**	**23.01**	**26.11**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.29	29.29
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944	176.407	183.089
Water Vapor Volume at Standard Conditions (SCF)	2.245	1.652	1.906
Moisture Fraction (Dimensionless)	0.012	0.009	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.76	28.73
Stack Gas Velocity (FPS)	46.6	45.0	46.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659	153,212	157,638
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567	134,130	136,744
CO Emission Concentration (Gr/DSCF)	0.0025	0.0117	0.0133
CO Emission Concentration (Lb/DSCF)	3.53E-07	1.67E-06	1.90E-06
CO Emission Rate (Lb/Hr)	3.0	13.5	15.6
CO Emission Concentration (Lb/Ton Process Weight)	*0.0078*	*0.0488*	*0.0513*

Signature of Reviewer: Fred H. Quentler

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TABLE 10
EPA METHOD 25A
TOTAL GASEOUS ORGANIC EMISSIONS TEST RESULTS

CLIENT: STEEL DYNAMICS, INC. JOB NO.: G/SA 98-T-065
SOURCE TESTED: LMS SYSTEM – BAGHOUSE OUTLET DATA INPUT BY: TLS

INPUT DATA

Run Number	1	2	3
Date	17-Nov-98	18-Nov-98	18-Nov-98
Sampling Location	**Stack**	**Stack**	**Stack**
Test Time, Start-Stop (24 Hour)	1225-1719	0830-1246	1500-1912
Sampling Time (Minutes)	240	240	240
Average Process ~~Charge~~ Rate (TPH)	***382.6***	***275.8***	***303.7***
Stack Area (Ft^2) Ta-P	56.745	56.745	56.745
Pitot Tube Coefficient (Dimensionless)	0.840	0.840	0.840
Dry Gas Meter Correction Factor (Dimensionless)	0.9940	0.9940	0.9940
Barometric Pressure (In. Hg)	29.15	29.30	29.30
Static Pressure (In. H2O)	-0.150	-0.150	-0.150
Dry Gas Meter Sample Volume (DCF)	192.344	179.438	187.041
Average Dry Gas Meter Temperature (°F)	68.7	64.9	67.5
Average Orifice Meter Delta H (In. H2O)	1.864	1.573	1.807
Volume Condensate Collected (Ml)	47.7	35.1	40.5
Average CO2 Concentration (%)	0.0	0.2	0.1
Average O2 Concentration (%)	20.9	20.7	20.7
Average Square Root of Delta P (In. H2O½)	0.786	0.753	0.770
Average Stack Gas Temperature (°F)	109.5	125.2	130.0
Average Corrected TGO Concentration as Carbon (PPMV)	**4.62**	**3.81**	**3.74**

CALCULATED DATA

Absolute Pressure (In. Hg)	29.14	29.29	29.29
Dry Gas Meter Sample Volume at Standard Conditions (DSCF)	186.944	176.407	183.089
Water Vapor Volume at Standard Conditions (SCF)	2.245	1.652	1.906
Moisture Fraction (Dimensionless)	0.012	0.009	0.010
Dry Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.84	28.86	28.84
Wet Molecular Weight of Stack Gas (Lb/Lb-Mole)	28.71	28.76	28.73
Stack Gas Velocity (FPS)	46.6	45.0	46.3
Stack Gas Flow Rate at Actual Conditions (ACFM)	158,659	153,212	157,638
Stack Gas Flow Rate at Dry Standard Conditions (DSCFM)	141,567	134,130	136,744
TGO Emission Concentration (Gr/DSCF)	0.00101	0.00083	0.00082
TGO Emission Concentration (Lb/DSCF)	1.44E-07	1.19E-07	1.17E-07
TGO Emission Rate (Lb/Hr)	1.22	0.96	0.96
TGO Emission Concentration (Lb/Ton Process Weight)	*0.00320*	*0.00347*	*0.00315*

Signature of Reviewer: Fred H. Quentler

3.0 FACILITY DESCRIPTION

Steel Dynamics, Inc. owns and operates a steel processing mill which has the capacity to produce ~~225~~ 400 tons of hot rolled coil steel per hour. Tons of iron, scrap steel and various metals are charged into an electric arc furnace (EAF) and transformed to molten steel which is then transferred to a ladle metallurgical station (LMS) for refining.

SDI is located at Dekalb County Roads 44 & 59 near Butler, Indiana.

The SDI steel processing mill consists basically of ~~a~~ two twin shell EAFs and a LMS system, which were the sources tested for compliance purposes, a water cooled mold, one (1) tunnel furnace with natural gas-fired burners, two (2) tundish preheaters with natural gas-fired burners, one (1) tundish dryer with a natural gas-fired burner, one (1) ladle dryout with a natural gas-fired burner, three (3) ladle preheaters with natural gas-fired burners, a slag processing operation consisting of a grizzly/feeder, covered conveyors, material sizing screens and storage piles, a carbon, lime and flux additive handling system with pneumatic conveyors, storage bins and enclosed conveyors to the blending area at the EAF, one (1) baghouse dust silo, an emissions side draft evacuation collection system and collection canopies which exhaust to two (2) pulse jet, fabric filter baghouses with 99.85% particulate removal efficiencies and 125' high exhaust stacks. The particulate and gaseous emissions testing was performed on these stacks. See Figures 1 and 2.

The LMS system is composed of two (2) small capacity electric arc heating stations and a central argon stir station. The LMS is capable of handling up to 400 tons of molten steel received from the EAF. Alloys such as ferromanganese, ferrovanadium and ferromagnesium are used to refine the steel to the desired specifications. The steel from the EAF is transferred to the heating stations where alloys are added for melting as the temperature is maintanined at approximately 3,000 °F. The ladle is then transferred to the argon stir station where the mixture is stirred magnetically and charged with an argon lance. Calcium-silicon wire is added at this stage to remove remaining impurities. If necessary, the process is repeated until the required specifications are achieved.

During the emissions testing on November 17, 18 and 20, 1998, the steel processing rates averaged 382.6 TPH, 289.8 TPH and 316.5 TPH, respectively.

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